

COSMOS

Consortium of Organizations for Strong-Motion Observation Systems

BOARD MEETING

16 March 2005

10:00 AM—3:10 PM

Pacific Earthquake Engineering Research Center

Room 19, Building 454

Richmond, California

The Agenda is given in Appendix A.

President Davis called the meeting to order at 10:05 AM.

The following were present, either in person or over the phone:

James F. Davis (President)

W. U. Savage (Vice President)

John Anderson (by phone) (Secretary)

Maurice S. Power (Treasurer)

Bruce A. Bolt

W. D. Iwan (by phone)

Norman Abrahamson

Farzad Naeim

Robert Bachman, Staff

Moh Hwang representing **Michael Reichle** and Anthony Shakal

Claire Johnson

Robert Nigbor – chair SAC

Melinda Squibb (by phone)

J. Carl Stepp, Staff, (by phone)

Bold indicates members of the Board of Directors

The following members of the Board of Directors were absent:

Don Yule

Jerry Wright

1. Review of Minutes

Director Bolt pointed out that there was discussion of an audit referred to in the minutes, and asked if this is on today's agenda. President Davis indicated that it will be discussed later. Bolt moved adoption. It was approved unanimously.

2. President's Report

President Davis reminded the directors that at the 12 November 2004 meeting, we had looked at goals and objectives of COSMOS and developed a list of actions. Goals included advocacy to promote collection and use of strong-motion data, forums on issues that are important for the

strong-motion community, and special services to the community. In November, 2003 in an effort to boost membership totals, the Board decided to include a Technical Session to follow the administration portion of the Annual Meeting. Norman Abrahamson organized this, it did take place, and it went very well.

Advocacy. President Davis has been in touch with several in contacts in the Washington D.C. area. The 26 December 2004 tsunami prompted augmentation for the USGS earthquake hazard program. There will be more funding for NEIC, allowing them to operate on a 24/7 basis, upgrade the Global Seismic Network, and put more emphasis on providing information to tsunami-prone areas, including more stations in the Caribbean region.

Last year, ANSS was in the end augmented by \$850,000 and that increase is in the baseline for the FY2006 budget proposal. Unfortunately, in the new budget, the USGS minerals program is cut by 50%, so a tug of war is possible to find funds from the hazards program to ameliorate minerals program cut. Jim will work with Bob Bachmann for the ongoing needed advocacy.

USGS has customer listening sessions, and COSMOS was invited last fall to participate in that. Jim Davis went at own expense to participate. The report was obtained electronically. Once Jim evaluates the report, he will determine if it is worthwhile to distribute it electronically, and possibly linking to it from our website.

President Davis asked for questions or comments.

Bruce Bolt noted that Cliff Astill had died. Carl Stepp remarked that Cliff was crucial for the formation of COSMOS and for support of several COSMOS activities. Bill Iwan added that Cliff was responsible for supporting the tsunami research community over the years, and that much of what we are learning in the aftermath of the Indonesia disaster is a credit to Cliff's foresight in keeping this community going.

Bruce Bolt suggested that COSMOS write a letter to NSF pointing out the importance of Cliff's role. Jim Davis agreed to prepare a draft letter on behalf of the board and circulate it for comments. Bill Iwan suggested that we have a brief commemoration of Cliff's contributions at the next meeting.

3. Treasurer's Report

The Treasurer Report consisted of a package with six parts. These are attached as Appendix B. They include 1) a short report; 2) a profit and loss statement; 3) notes on profit and loss; 4) a balance sheet; 5) a list of contracts; 6) a list of membership and membership dues; and 7) Report on Attendance at Annual Meetings.

Incomes from two sources: membership dues and contracts and grants. Treasurer Power's discussion followed the first two pages of Appendix B, so only the discussion is repeated here. The Board discussed the promise by FEMA to join; that has not been forthcoming. FEMA is now organized under Homeland Security, and in this new department emphasis on hazards is decreasing and responsibilities of the key people are shifting. President Davis will continue to make contacts.

COSMOS assets are around \$190,000. The Treasurer forecasts that the expenditures will exceed income in first half of 2005. The net effect in first half of 2005 is to reduce total assets by about \$30,000, so we are in good condition, but not quite as strong as it looks. In November 2004, the Board asked the treasurer to evaluate the need of a professional audit. As noted in Appendix B, Maury Power and Claire Johnson met with Dave Bott, a Principal at our accounting firm of Wilson, Markle, Stuckey, Hardesty, and Bott, on this issue. As reported in Appendix B, this was done. Maury Power moved that the Board approve an expenditure of \$2000 for a procedural audit. The motion was approved unanimously. Bob Bachman said he will work with Maury Power to review how the income and expenditures are binned into categories.

4. Review of status of COSMOS Workshops and Grants

Carl Stepp presented this discussion. He noted that some activities are funded by multiple projects.

a. NSF - Record Processing Workshop. This work was funded by NSF, supplemented by direct funding by Board, and funds from the USGS under a cooperative agreement. Status of completion: the workshop was held, and the proceedings are pending, some papers reviewed. Proceedings will be produced on CD-ROM, rather than paper. Guidelines for record processing have been completed, and are waiting for final approval by the working group. Stepp believes that there are no outstanding issues. They will publish the guideline for record processing in hard copy. Stepp has submitted a final report to NSF, which has accepted. He has submitted a final report to USGS, which has accepted it. The outstanding issue is to finish the proceedings. Then it will be fully closed.

b. NSF – Geotechnical Strong Motion Arrays. This was a combined award of about \$171,000 to support two workshops and develop a plan of action. Status – 1st workshop in October of last year, and Stepp is working on the proceedings. He is aiming to have those ready for mid April. At that time, he will submit the annual report to NSF, after which he expects release of funds for phase 2, and will proceed with the 2nd workshop. The total project will be finished early in 2006. Stepp thinks he can meet January 2006 due date.

c. USGS cooperative agreement. Starting May 2003, this is for \$30,000 over 3 years. It is to support the Virtual Data Center at a rate of \$10,000/year. Stepp asked Treasurer Power for help with details of the accounting. Deliverables include reports of meetings of the VDC Working Group, which have been delivered for the first year. Renewed funding for 2nd year is received but not yet passed through to UCSB. C. B. Crouse chairs the VDC Working Group. Others on the Working Group include Dave Boore, Vladimir Grazier, and Dan O’Connell. An additional three more meetings must be held over next year to meet the full agreement with USGS. The schedule for these meetings is underway. Stepp offered to continue to serve as recorder for the working group. He asked Board if they want him to continue to do that.

The USGS provided an additional \$30,000 under Amendment 1. Of that, \$5,000 was for the strong motion-processing guidelines. Fifteen thousand dollars was for a subcontract with Paolo Bazzurro for statistical insights into the biases that appear in computer models of nonlinear

structures that are introduced by strong-motions processing techniques. This is completed. They are considering publication options. Amendment 1 is closed with full reporting.

Woody Savage asked that COSMOS pay attention to when they ask for the money. He stated that COSMOS lost an opportunity at the end of the last fiscal year to easily put some more money into the contract. It is very important for agency related funding to stay in close contact with the project officer to be sure windows of opportunity are not lost. Now is a good time for COSMOS to pursue USGS for possible year-end funds for this fiscal year. Carl Stepp commented that it would be useful to set out a schedule for pursuing financial opportunities. Bob Bachmann indicated that he had the same thing in mind.

COSMOS provides direct funding for the Virtual Data Center at \$20,000 per year. Of this, \$15,000 goes directly to UC Santa Barbara. \$5,000 supports meetings of the working group. Those expenditures are on schedule. We recently received an invoice from UCSB that needs attention.

d). Pacific Earthquake Engineering Research (PEER) Center Lifelines program: to develop a system for archiving and dissemination of geotechnical data. This will also be a virtual data center. A pilot system has been completed, and a final report submitted to PEER. A workshop was held in June 2004; proceedings for workshop remain to be completed, perhaps as soon as June 2005. The Federal Highway Association also paid some costs, and Carl Stepp is reporting to them as well. On the basis of the workshop and recommendations, we have submitted a phase 3 proposal to PEER for the operation of a geotechnical data center. Stepp has heard that we will be funded, but there is not an official contract yet, so we are proceeding at our own (small) financial risk.

Bruce Bolt asked about if there are any future plans. Carl Stepp responded that the only present plan is continuation of the geotechnical strong-motion array project. He has been approached about the possibility of a workshop on strong-motion instrumentation development, but hasn't acted on it yet. Bruce Bolt asked if there may be an opportunity for a database for mareograms?

Stepp brought up one further item – we are far behind on processing the proceedings. It appears to be more than we can do with the time Claire has available. Jim Davis and Bob Bachmann agreed to work with Carl Stepp on the issue.

Carl Stepp noted that our colleagues in Mexico have a CD with strong-motion data that is not in the VDC. John Anderson agreed to contact them and see if we can get authority to post it on the VDC.

President Davis called for a break at 11:37.

5. Update on COSMOS Virtual Data Center

Please see Appendix C, which contains the report on the VDC presented by Melinda Squibb.

6. Review of ANSS Developments

Savage passed out a copy of his overview, including a progress report and funding. ANSS now has 500 stations, with a focus on high-activity areas. Guidelines for monitoring structures were distributed today. The Technical Integration Committee (TIC) is working on performance standards. With the recent NEHRP reauthorization, ANSS was reauthorized for 5 years. Future efforts will put increasing emphasis on monitoring structures, with the focus on measurements to gain predictive understanding of structural response. All the regional networks are now encouraged to submit pre-proposals for structures to be monitored. Discussion dealt with the need for availability of structural plans for the structural (which can be issues for confidentiality and terrorism).

Bill Iwan stated that it is critical that USGS make visible progress in instrumentation of structures. Without that, there is the risk of erosion of support. He stated that there is a perception that the program is not following through on structures. He's sure it's wrong, but that's a perception. ANSS needs notable results.

7. Plans for implementation of COSMOS Director of Management and Engineering Applications position

There was some discussion over whether there was any need for a change of bylaws to accommodate Bob Bachman's position.

Motion by Bruce Bolt: The position of "Director of Engineering Applications" will be established. The job description is as in the attachment. (Appendix D) This position will serve as Executive Director of COSMOS." Farzad Naeim seconded, and the directors unanimously approved the motion.

Bob Bachman discussed his ongoing professional activities. He is chair of the committee to develop the 2006 International Building Code. He is a task leader for ATC-58 on nonstructural components. He is working to implement PEER performance based engineering results. He remains highly involved in seismic code activities, although plans to transition out of these as others become leaders in the efforts. For COSMOS, he plans to begin working closely with Claire Johnson, Carl Stepp, and Maury Power on budgets. He sees his first action items to get proceedings done faster, to plan the next annual meeting and short courses, and to get a formal agreement into place with COSMOS. Bruce Bolt recommended that he get in touch with Doug Dreger, who is Claire's formal supervisor.

8. Discussion of Plans for the Design and Implementation of the COSMOS Introductory Short Course on the Use of Strong-Motion Time Histories in Structural Design

Appendix F shows the written proposal suggested by Bob Bachman.

In discussion, there was a rough consensus among board members and Bob Bachman that our target audience is the 5-10% of the engineering community that uses time histories. Our goal is to help them use time histories more effectively. For example, show situations where you apply

time history to solve a problem, and could not have done it any other way. Give the participants tools to work with. In general, Bob's suggestions were received well by the board. Bob Bachman, Eduardo Miranda, Farzad Naeim, and Norm Abrahamson agreed to continue to refine the ideas. Maury Power asked if the course is overlapping short courses offered by other engineering organizations, especially SEAOC. The board saw benefits to partnering and working with SEAOC. Board members were also concerned that the course operates at a profit.

Jim Davis moved that COSMOS form a Short-Course Development Committee, including Bob Bachman, Eduardo Miranda, Farzad Naeim, and other board members as they are interested, to further develop the target audience and contents of the short course, and report back to the board in May. Farzad Naeim seconded the motion. The motion was approved unanimously.

9. Review of 2004 Annual Meeting Technical Session and Planning for 2005 Technical Session

Appendix G presents the written proposal submitted by Bob Bachman.

Norman Abrahamson summarized the topic of the 2004 Annual Meeting Technical Session, which was how to select and scale accelerograms. The problem is the selection of recordings. There is no well-founded method by which to select recordings, and the problem is getting worse as the size of our data set increases. Without knowing intent, it is not possible to make a good selection. So the key conclusion is that in order to make a good selection, key parameters beyond the magnitude and distance are necessary to make a selection. It was a good, energetic meeting, and people are looking forward to coming back next year.

Bob Bachman is trying to pick up from where that last meeting stopped. He is considering a two-part meeting, with the first part laying out the code requirement. Farzad Naeim suggested following that with a panel of users like Norm to discuss how they really interpret this. For example, why is scaling by a factor of 5 not good? Bruce Bolt thinks the Annual Meeting should allow time for criticism and response to criticism, with perhaps a presentation of a case study followed by evaluation. Bob Bachman suggested that the panel could include someone knowing the intent of the code. Woody Savage asked if these case histories would be directly connected to the last meeting, or if this is a different focus. After much discussion President Davis asked that Norm Abrahamson and Bob Bachman work together to circulate refined plans for the next meeting to the Board in about May.

10. Plans for Senior Advisory Council (SAC) activities in 2005

Bob Nigbor, Chairman of the SAC, began his presentation wondering if there was a disconnect between the SAC and the Strong Motion Program Board. He suggested that the Bylaws be reviewed. Bob reviewed the membership and plans to contact each to see if they remain interested. He does not think SAC should focus on membership, but rather should focus on building an organization that people want to join. Opportunities he sees are relationships of the VDC and other data centers. He invited discussion from the Board of Directors.

Norm Abrahamson discussed implementing procedures for selecting accelerograms. Bob Bachman suggested that there is the potential to get a grant from FEMA to support a research

project on this topic. Several members of the board mused about making the selection process into a commercial product for COSMOS.

Woody Savage thought topic 2 was timely: Development and promotion of real-time data.

Maury Power thought topics 1 (ANSS structural implementation) & 3 (Involvement in ANSS product definition) are important.

Bob Nigbor would like to hold a SAC meeting in the summer.

Bob Bachman suggested that Nigbor's 1, 2, and 3 topics have the potential for workshop funding. He suggested that SAC consider three topics: 1) Relationship of VDC and other data centers, 2) Implementation of procedures or providing tools for selecting accelerograms, and 3) ANSS structural instrumentation.

Bob Bachman suggested a proposal to the USGS external program for Development and Promotion of Real-Time Data.

Woody Savage asked if the Strong Motion Program Board will be involved. Jim Davis said the program board did not meet last year, and that he needs to appoint a new chair.

11. New Business

Jim Davis wanted to talk about the fall meeting before we adjourn. He is concerned that an hour is a non-functional time for a Board of Directors meeting, as was used last year. He suggests having the Board meet first. Claire Johnson suggested a dinner meeting the night before the Technical Session. He will explore that possibility. He also thinks we should make the annual membership meeting last under an hour at the start of the Technical Meeting.

He asked that the Executive Committee think about financial charges for the next meeting.

12. Adjourn

**Appendix A
COSMOS**

Consortium of Organizations for Strong-Motion Observation Systems

BOARD MEETING

AGENDA

16 March 2005

10:00 AM—3:10 PM

Pacific Earthquake Engineering Research Center

Room 19, Building 454

Richmond, California

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|---|-------------------------|
| 1. Welcome to Board Members | 10:00 – 10:05 AM |
| 2. Review of Minutes | 10:05 – 10:10 AM |
| 3. President Report:
Jim Davis, President
Update and Outlook for 2005
Questions and Discussion | 10:10 – 10:30 AM |
| 4. Treasurer Report:
Maury Power, Treasurer and Financial Officer
Update on Financial Status
Questions and Discussion | 10:30 – 10:50 AM |
| 5. Review of status of COSMOS Workshops and Grants
Carl Stepp by phone
Questions and Discussion | 10:50 – 11:20 AM |
| 6. Break | 11:20 – 11:30 AM |
| 7. Update on COSMOS Virtual Data Center
Mindy Squibb, VDC Webmaster
Questions and discussion | 11:30 – 11:50 AM |
| 8. Review of ANSS Developments
Woody Savage, USGS
Questions and Discussion | 11:50 – 12:10 PM |

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|---|-------------------------|
| 9. Plans for implementation of COSMOS Director of Management and Engineering Applications position
Background: Jim Davis
Remarks: Bob Bachman
Questions and Discussion | 12:10 – 12:30 PM |
| 10. Lunch | 12:30 – 12:40 PM |
| 11. Discussion of Plans for the Design and Implementation of the COSMOS Introductory Short Course on the Use of Strong-Motion Time Histories in Structural Design
Bob Bachman
Questions and Discussion | 12:40 – 1:20 PM |
| 12. Review of 2004 Annual Meeting Technical Session and Planning for 2005 Technical Session
Overview: Norm Abrahamson
Questions and Discussion
2005 Target Audience and proposed emphasis:
Bob Bachman and Norm Abrahamson
Questions and Discussion | 1:20 – 2:20 PM |
| 13. Plans for Senior Advisory Council (SAC) activities in 2005
Bob Nigbor, Chair of SAC
Questions and Discussion | 2:20 – 2:50 PM |
| 14. New Business | 2:50 – 3:10 PM |
| 15. Adjourn | 3:10 PM |

APPENDIX B

Appendix C Update on the COSMOS VDC

**Melinda Squibb
University of California, Santa Barbara
March 2005**

The COSMOS VDC Working Group met in January 2004 and recommended a number of improvements to the website. As a result of those recommendations, the VDC has 1) added the capacity to display and configure Design Spectra overlays on response spectra plots; 2) added a search help page; 3) improved the search parameter input options; 4) included a log of files downloaded along with the zipped files; 5) increased the number of parameters displayed for search results; and 6) added notes about data availability where applicable. Recently a page showing an RSS feed of the USGS earthquakes > Mag5 for the previous 7 days was added to the web site. We plan to introduce an RSS feed for new event notifications for those users who would prefer that to email notices.

The VDC has added a considerable amount of data since the beginning of 2004: a 25% increase in earthquakes to 491; a 14% increase in stations to 2888; a 26% increase in accelerograms to 23,600. In addition to the data from the major data providers (USGS, CGS, K-Net and KikNet), a number of legacy records were incorporated from the NOAA/NGDC dataset. We expect to add the remainder of that dataset later this year.

The Cosmos VDC was migrated from a Windows/MSSQL/IIS system to a MacOSX/Postgres/Apache system this year, which has resulted in considerably less time spent on security problems.

In December, we submitted a proposal for an additional three years of support to NSF, to the Science and Engineering Informatics Program under the directorate of Computer and Information Science and Engineering. We also prepared a 2004 Fact Sheet for publicizing the VDC.

I'm currently working on revising the XML version of the Cosmos data format. The current version will be more compatible with ISO and OGC standards. XML is used as middleware in the process to convert data to the Cosmos text format, as well as being an end product for those who prefer XML formatted data. The goal is to convert all data to Cosmos format and to provide tools for generating legacy formats from the Cosmos format by September 2005.

Appendix D

POSITION: DIRECTOR OF MANAGEMENT AND ENGINEERING APPLICATIONS

Job Description: The person holding the COSMOS Director of Management and Engineering Applications position has the responsibility for managing the business activities of COSMOS in coordination with the COSMOS President, Treasurer & Financial Officer, Office Manager and Board of Directors. The incumbent also has a key responsibility in association with the other COSMOS officers to be a spokesperson and representative of COSMOS in order to facilitate advancement of COSMOS consensus policy matters. These include advancing the use of strong-motion data to enhance public safety in earthquakes.

Principal Duties:

- Manage the business activities of COSMOS in coordination with the COSMOS President, Treasurer & Financial Officer, Office Manager, and Board of Directors to further the achievement of COSMOS goals;
- Participate as one of the principal spokespersons for COSMOS, advocating national, state, and local programs and activities to promote earthquake safety; Lead, coordinate and advocate COSMOS efforts to enhance the understanding and use of strong-motion data in engineering applications;
- Participate in policy development discussions as an *ex-officio* member of the Board of Directors, the Senior Advisory Council and the Strong-Motion Programs Board at their regular meetings;
- Perform as a co-principal investigator of outside grants as needed; may serve as principal investigator of outside grants;
- Participate in periodic conference calls with officers and members of the organization as necessary to further the implementation of COSMOS projects and policies;
- Coordinate activities and serve as an *ex-officio* member of COSMOS working committees that are appointed from time-to-time by the Board or the Strong-Motion Programs Board to further COSMOS objectives;
- Coordinate with the COSMOS officers and others in implementation of COSMOS policies;
- Monitor the performance of COSMOS projects working with the responsible project managers; and
- Coordinate the preparations for two meetings of the Board of Directors annually and the annual meetings of the Senior Advisory Council, the Strong-Motion Program Board and the General Membership Meeting.

Appendix F

Suggested Short Course Plan of Action

R. Bachman

I have a had chance to review the revised plan for the short course, “Short Course on Selection and Use of Earthquake Records in Structural Engineering,” prepared by Eduardo Miranda last year. In recent discussions with Eduardo, the development of the short course has been on hold since the middle of last year because of his work schedule. However, he still is very interested in taking part in the project and would consider serving as the PI for the project is asked to do so. In reviewing the course, I would like to discuss some suggested revisions to the plan and target audience with the COSMOS Board of Directors at the March 16th meeting.

Discussion of Suggested Target Audience:

13. Who should be the target audience of the short course?

I suggest that the target audience should practicing Civil and Structural Engineers who will most benefit from utilizing response time history analyses in their engineering practice in their practice now or would contemplate doing so in the future. It is expected that most engineers on most projects will utilize equivalent static analysis or perhaps response spectra analysis on their projects rather than using time histories. It is estimated that of all engineered projects (both design and retrofit) perhaps only 15 % (this may be a very high estimate) would benefit from doing dynamic analyses using ground motion time histories. These are those who utilize seismic isolation or energy dissipation technologies and those who need to perform nonlinear dynamic analyses in their design. It is recommended that this short course target this audience.

14. How broad should the targeted audience be?

For example, should we target young engineers even though it is unlikely that they will be using time histories in their day-to-day work?

15. Is there value to targeting or addressing others with short courses?

For example, should Geotechnical professionals who supply time histories to engineers for use in dynamic time-history analyses be targeted as well?

Discussion of Suggested Program

I would suggest the program be organized as follows:

1. Overview of selection and scaling procedures for ground motion time histories required by codes and standards.
2. Selection of time-history records, including effective use of the COSMOSVDC and PEER database to obtain the ground motion records.
3. Step-by-step procedures for properly scaling the selected records, including an example.

4. Simplified nonlinear dynamic analysis for determining approximate estimated response of structures (perhaps we should contact Finley Charney as he has a program).
5. Detailed non-linear dynamic analysis (perhaps we should contact Graham Powell).
6. Resources, use and visualization of strong ground motion information from instrumented buildings (Farzad Naeim).

Discussion of Suggested Plan:

Get input and concurrence from COSMOS Board of Directors at March 16th meeting.

1. Discuss composition of a proposed Oversight Committee for the short course project.
2. Consider appointing an Oversight Committee at the March 16th meeting.
3. Develop a more detailed scope of course and review with Oversight Committee (Bachman and Miranda to put together suggested scope).
4. Prepare a proposal for joint funding by FEMA, USGS, CGS, and NSF. Discuss the funding of presenters to develop the course materials.

Discussion of Suggested Schedule:

- April 2005: Develop a more detailed proposal
- May 2005: Review with Oversight Committee
- June 2005: Revise Proposal Draft and Submit to FEMA, USGS, CGS and NSF
- August 2005: Negotiate Agreements and Obtain Funding
- Sept–Dec. 2005: Develop Short Course Materials
- Next Year: Advertise and Present Course

Discussion of Suggested Business Plan

The concept is to have the presenters be paid to develop the short course materials. Once the materials have been developed, the concept would be to work with practicing engineering organizations such as SEAOC and ASCE in determining the most effective ways to present the material. Suggestions include in having a seminar the day before their annual meeting or on a convenient Saturday. It is expected that there would a short course fee which would cover the cost of the meeting room, presenter expenses and honorariums, course materials, course advertising, etc. The location of the seminars would focus on locations where there is expected to be a reasonable size target audience (i.e., San Francisco, Los Angeles, Sacramento, San Diego, Seattle, Salt Lake City, St. Louis, Charleston, etc.).

Does this reasonable? Should we co-partner with others like SCEC ?

Appendix G

Suggested Program for Technical Portion of COSMOS Annual Meeting R. E. Bachman

Subject: Selection and Scaling of Ground Motion Time Histories to Comply with 1997 UBC, ASCE 7-05, and FEMA 356 required procedures for use in California, including suggestions for improving these procedures in future editions of these codes and standards.

Target Audience: Practicing Civil and Structural Engineers and Earthquake Ground Motion Specialists who need to use ground motion time histories in designing or retrofitting structures and those specialists who provide the time histories for the engineers to use. Typically, ground motion time histories are used in the design of new structures using seismic isolation, energy dissipation, or very significant structures where nonlinear time history analysis is performed. It is also used for the retrofit of building structures where nonlinear time-history analysis is performed. It is not intended for bridge engineers, those involved in power utilities, or those involved with performance-based earthquake engineering, where the subject codes and standards are not utilized.

Suggested Program:

1. Overview of selection and scaling procedures for ground motion time histories found in the 1997 UBC, ASCE 7-05, and FEMA 356 for seismic isolation, energy dissipation, and nonlinear dynamic analysis applications.
2. Suggested procedures for selecting ground motion time histories for satisfying the intent of the procedures. Where ground motion time histories can be obtained.
3. Step-by-step process for scaling the ground motions to satisfy the scaling procedures once the ground motions have been selected.
4. Comparison of code-required scaled ground motions with those scaled by other means (i.e., scaling to a specified spectral acceleration at a given period, etc.).
5. Recommendations for revising the code-specified scaling procedures.