Date:       June 19, 2014

To:         Paul Jenny
            Vice Provost for Planning and Budget

From:       Steven J. Charvat, Work Group Chair, UW Emergency Management
            Michael J. Carette, Work Group Co-Chair, Office of Planning and Budget

Subject:    Initial Findings of the UW Seismic Resilient Ad-Hoc Work Group

We are pleased to submit the initial findings and recommendations of the Seismic Resilient University of Washington Ad-Hoc Work Group’s year-long effort to prepare, respond and recover from a significant seismic event (earthquake) in the vicinity of the Seattle campus.

A Seismic Resilient University of Washington Work Group was appointed by the Provost’s Office in 2013 to gather knowledge through which UW leadership might frame future discussions and planning priorities and action plans not only to prevent loss of life and massive destruction from a seismic event, but also to quickly recover and continue the university’s core missions of education, research and public service.

Given the University’s immense academic, research and financial stake and size in the region, the Work Group took a holistic view at how to sustain the institution in the face of the threat posed seismic activity in the Cascadia and Puget Sound regions. Understanding the complex relationship between systems, the Work Group divided their investigations and findings into four interdependent critical functional areas: 1) Buildings and Structures, 2) Utilities and Critical Lifelines, 3) Non-Structural and Architectural Elements, and 4) Planning, Policies and Human Resources.

In order to fulfill this task, leadership from academic and non-academic university units were joined by outside experts from the City of Seattle, King County and the private sector to enhance the core UW Work Group. A series of four intense daylong conferences and workshops were held over the course of 12 months to focus our collective efforts (Attachments #2-5). Utilizing Lean-modelling tools, we identified the scope of the current seismic threat, the current state of readiness, envisioned a ‘future state’ of seismic resilience, and ultimately developed short-, mid-, and long-term recommendations on how bridge the many gaps. Throughout the process, Work Group members and staff explored ideas, debated concepts and developed concepts moving forward – all of which will enhance UW’s seismic resilience.
The Work Group concluded that ‘seismic resilience’ is a far larger, more complex and intricately intertwined issue with many other aspects of the institution that one set of 4 workshops could possibly address. Therefore, the Work Group recommendations (Attachment #6) are just the beginning of the work. The impact of creating resiliency at the UW is more than just strengthening its physical buildings, but should strive to protect instructional and research wealth, and the health and welfare of its students, faculty, staff and neighbors.

What follows is a summary of the discussions in each of the 4 major functional areas that will eventually bring UW closer to being ready for the “Big One”. We look forward to your review of these expert comments and your recommendations on the proposed next steps in this critical area.

Thank you.

Attachments:

1. Original Charge Letter Establishing the Ad-Hoc Seismic Work Group
2. June 4, 2013 Kickoff Meeting Summary Minutes
3. September 10, 2013 Workshop #1 Summary Notes
4. December 17, 2013 Workshop #2 Summary Notes
5. March 19, 2014 Workshop #3 Summary Notes
Attachment 1
Seismic Resilient University of Washington Ad Hoc Work Group

Kirk Pawlowski, Assistant Vice Provost, Office of Planning & Budgeting, Chair
Michael Carette, Office of Planning & Budgeting
Steven Charvat, Director, UW Emergency Management
Jeremy Eknoian, UW Real Estate Office
Ali Ferdos, Engineering Manager, UW Facilities Services
Rob Lubin, Associate Director, Facilities & Capital Planning, UW Housing & Food Services
Bob Ennes, Interim Director Finance & Administration, UW Health Sciences Administration
Dawn Lehman, Associate Dean for Infrastructure, UW College of Engineering
Chip Lydum, Associate Athletic Director, Facilities & Events, Intercollegiate Athletics
Steve Majeski, Associate Dean for Research Administration, UW College of Arts and Sciences
Mark Murray, Assistant Director Building & Fire Safety UW Environmental Health and Safety
Alan Nygaard, Director Business Services, UW Capital Projects Office
Tom Pittsford, Senior Facilities Engineer – Structural, UW Facilities Services
Helen Shawcroft, Senior Associate Administrator, UW Medical Center Administration
Pamela Stewart, Executive Director Planning & Facilities, UW Information Technology

Dear Colleagues:

To enhance the University of Washington’s success as a major research university and health sciences center, a major regional employment hub, and as a critical partner in building healthy communities in Seattle, Tacoma, and Bothell; and in concert with our ongoing emergency response planning, it is critical we prepare existing and new buildings and infrastructure to respond to and recover from expected seismic events. New steps can be taken to significantly improve the UW’s ability to absorb a major earthquake and quickly recover and sustain our mission.

The Seismic Resilient University of Washington Ad Hoc Work Group will frame the ongoing discussions and planning efforts that will embed our seismic resilience planning activities within the UW’s operating and capital budget planning process. I am writing to ask you to serve on the Work Group, and I have asked Kirk Pawlowski, Assistant Vice Provost Office of Planning & Budgeting, to serve as chair of this important effort.

There are nine specific areas which I believe need your focus over the next eight months as core components in developing resilient planning policy recommendations for UW Seattle which can, over time, potentially serve UW Bothell and UW Tacoma as well:

- Continue to evolve existing emergency response plans to fully implement and annually update University-wide business continuity planning with priority attention given to UW clinical operations.
- Define the “expected” and the “extreme” seismic events.
- Define the human capital requirements anticipated to support UW’s response and recovery.
• Rate the performance condition of current buildings and infrastructure lifelines (water, power, natural gas, sewer, thermal energy) including identification of critical vulnerabilities of infrastructure lifelines serving the campus from external serving utility providers.
• Review and confirm definition of program clusters for UW seismic resilient planning purposes including research laboratories, essential facilities (which include our hospital, public safety facilities, and physical plant), IT facilities and networks, instructional facilities, housing, and administrative offices.
• Assign expected performance criteria for UW buildings and infrastructure and develop improvement implementation plans based on key measures and targeted UW resilience outcomes.
• Identify the potential needs and plan for people from Seattle neighborhoods seeking assistance.
• Finalize prioritized programs to mitigate exceptional high-risk UW buildings, develop non-structural and structural retrofit programs for UW buildings, and establish an infrastructure lifelines improvement program and integrate all within UW's One Capital Plan.
• Collaborate with similar concurrent efforts by the City of Seattle.

The Office of Planning & Budgeting and our consultant team will host three quarterly meetings beginning in June. We will be working with you in the near future to finalize the meeting dates in June, September, and December 2013. The deliverable will include a final report and presentation with policy recommendations and an implementation work plan for 2014 on the nine key focus areas.

Given the critical importance of this effort, please assist us by coordinating your existing commitments that will allow you or your designated representative to participate in each of the working meetings.

I am also attaching a copy of our April 1, 2013 presentation to the Seattle City Council on this subject for your review and information. Thank you for agreeing to assist the University of Washington in this critical planning initiative.

Sincerely,

[Signature]

Paul Jenny, Vice Provost

Attachment

C:    Dave Anderson
      Rebecca Barnes
      Richard Chapman
      Charles Kennedy
      Pam Schreiber
      Kelli Trosvig
      Jude Van Buren
      V'ella Warren
Notes from the June 4 2013 Workshop 1
Under development by Michael, Chris and Steve
July 1 2013 Draft

Morning Session

Review April 1 2013 UW briefing to City

1. Organize around clusters
2. Response – safety
3. Recovery - getting the UW back into business. Tuition and grants are key to economic stability
4. 70% buildings in Seattle are under private ownership
5. Goal - reduce recovery time
6. Maintain grant funding and tuition
7. Business continuity and recovery
8. City of Seattle – neighborhood based capacity and good sustainability (capacity to endure)
   o City has pockets of preparedness
   o City can rally around this issue
   o Focus is on neighborhoods

Consider the Safety of Buildings

1. (Earthquake Readiness Advisory Committee) ERAC study 1991 pointed to the higher risk buildings.
   a. Tom still agrees with the process and the list.
   b. Prioritization based on following
      i. Soil type,
      ii. Quality of structural conditions/attachment,
      iii. How building is connected together
      iv. Age of Building
      v. Occupancy etc

2. EHR Buildings to be mitigated in Program 1
   a. Loadbearing unreinforced masonry wall buildings. City may require structural upgrades to these buildings. Ordinance under development that may require compliance within 7 years. Currently 4 buildings on campus:
      i. Lewis
      ii. Denny (reinforced from roof up)
      iii. Eagleson Hall
      iv. Observatory

   b. Next group of buildings with non-loadbearing unreinforced masonry and steel; or concrete frames include
      i. Anderson Hall
      ii. Art
      iii. Harris Hydraulics (old part)
      iv. Hutchinson
      v. Miller
      vi. Music
      vii. Pavilion Pool
      viii. Plant Ops
      ix. Raitt Hall
c. Non-ductile concrete buildings
   i. Gowan Hall
   ii. Chemistry Library
   iii. Med Ctr PAC Tower
   iv. Faculty Club
   v. Many of the Magnuson Health Science Buildings

Consider the Lifeline Systems

1. Water - 6 connections on campus, 2 loops on the north and south of main campus, 1 loop at health sciences. No domestic water in tunnels. Could use more interconnection. Hospital is at the low spot and may be subject to flooding.
2. Sewer - Large sewer line 132" necking down to 108" along Montlake. Overflows to lake. 14 lift stations, if there is a power failure a retaining tank will fill but also overflows in to Lake. Only 3 lift stations have emergency power.
3. Storm water - All storm water goes to Lake. Some storm water pipes are combined with sewer. UW is piecemeal separating storm and sewer lines.
4. Tunnel system - 6 to 80 feet deep, 7 miles long. Currently replacing steam expansion joints. Carries high pressure steam, compressed air (for HVAC building controls), chilled water, power and emergency power. All electrical connections have underwater couplings. There are also telecommunications cabling (fiber) in the tunnel.
5. Power - East and west receiving stations. Seattle city light provider. There is a potential power hook up to the north but not connected at the moment. Main city substation other side of University bridge. Had two power outages in 13 months (unusual occurrence). IT depends on power.
6. Power Plant - 1997 had structural upgrade has boilers chillers and small turbine to create own electrical power. Considered essential facility but equipment and piping was not braced. 3 emergency generators for hospital, 2 generators for rest of campus. Diesel Tanks back up plant.
7. Natural Gas - Main line runs east of Montlake. Power plant has interruptible gas supply, power plant can run for 15 days on oil stored in underground tank. Very little to no natural gas in tunnel except adjacent to surgery pavilion and Chemistry building. There is not a complete set of automatic gas shut off valves.
8. Communications - Main routers, need to provide emergency power. Current project Atmospheric Sciences/ATG and Kane Hall. Other routers in Chemistry, AA wing, G wing, H wing, and Gerberding. Data centers in 4545 15th Ave building 100% power backup, UW Tower Data center 1/3 backed up with emergency power. Remote storage facility at Liberty Lake, Spokane. Current IT machine spaces within buildings gets overheated due to energy given off by equipment that building ventilation and cooling systems cannot keep spaces cool. 24 hour restoration not practical or realistic.

Instruction (A&S).

1. Buildings
   a. Kane Hall (Large classrooms)
   b. Bagley Hall
   c. Denny Hall
   d. Communications Bldg
   e. Thompson Hall
   f. Music Bldg
   g. Art Bldg
   h. Condon Hall

2. Comments
a. Will have continued need for classrooms
b. Different mix of classroom sizes, including interaction space, small and flexible.
c. Courses on line
d. ‘Famous faculty teaching small classes’
e. MOOC ‘Massive Open Online Classes’ leading the revolution in learning
f. Where are the faculty going to do their podcasts? If students can’t be on campus they can be remotely taught. This is a science and engineering school.

**Research**

1. Buildings
   a. Bagley
   b. Chemistry
   c. Kinkaid
   d. Hitchcock
   e. Physics/Astronomy
   f. Guthrie (animals)
   g. MOLE (wet labs)
   h. Burke Museum
   i. Advanced Physics Lab

2. Comments
   a. The deans have a sense of which buildings are useful to their College and which need to be vacated.
   b. Need to protect data, animals and specimens.
   c. Need to discern experiment repeatability, days weeks months.
   d. May be willing to lose experiments that can be repeated in days-weeks
   e. Need to protect the research dollars also

**Asbestos**

1. Re-occupancy will be limited
2. Shaking displacement of asbestos fibers in many buildings
3. Schmitz has registrar and student services
4. T-wing instructional space for school of medicine
5. BB Towers have 9 floors of asbestos

**Chemical Spills**

1. Need to have the ability to enter the building after a chemical spill

**Student Housing**

1. 3,000 students in the North campus,
2. 6,000 students SW campus.
3. 19% campus student housed by UW. Average for peer institutions is 24%,
4. Serve 35,000 meals a day.
5. Food is available throughout the campus
7. 2 ½ days food supply on campus, response/responsibility after event 1st tier is students 2nd tier is emergency responders.
8. 15% of student housed have no where else to go (foreign students).

**Athletics**

1. Football is financial engine for athletics,
2. Some structures could be used a mass care shelters, refuge areas,
3. Stadium now has a full commissary that can serve 70,000.
4. Much of athletics' buildings built on fill (old city dump).
5. Using these facilities as a community shelter requires meeting multiple regulations.

**Essential Buildings**

2. Emergency operations center – 30 hrs generator capacity, concerned about adjacency to UW Tower
3. 2nd EOC in Poplar hall
4. Medical center would be a community resource. Some new facilities. Not clear if the medical center is in this program.
5. Hall Health student health support
6. Power Plant
7. No building/space identified for administration to meet after an emergency other than EOC
8. There are no fire stations on campus. Service provided by the City without promise of post-earthquake priority.

**Emergency Response and Recovery Planning Update**

1. UW response and recovery is 10 yrs old. Includes drills, raining, exercises, etc.
2. Administrative policies guide emergency management UW has FEMA approved mitigation plan
3. UW emergency calls for command and control which is different for shared governance model during normal times
4. Existing emergency plans are continuing to evolve. Only 20% participation on campus mostly by admin units. Less responsive units are academic and research units.
5. Difficult to get assessment teams together. Pre-entry teams needed to determine safety of buildings and if chemicals are present
6. List of priority buildings for inspecting include essential buildings, and those buildings that are core to the university ‘mission critical’
7. City of Seattle expects that the UW will take care of its own. UW has no understanding/agreement with Red Cross. We have to have a plan for neighbors coming onto campus. Collaboration with the City, use of UW employees as volunteers doctors –nurses etc.

**Mitigation Planning Programs**

1. UW buildings are being used not as they were intended. Research is a major contributor to UW finances. Big gap is information. Chairs of departments don’t know what research is going on in their own buildings. Develop programs that will cause resilience to happen.
2. Program 1 – EHR buildings
   a. Use ERAC report as a basis. Start with list of 15 Unreinforced masonry constructed buildings. Find buildings that will kill people, no need to rescreen buildings. Mitigation must include research surge space include tower as part of survey (due to adjacency to EOC).
   b. Chris and Tom to look through the Campus as a start
   c. Chris expect there to be only four URM bearing wall buildings and UW tower to deal with
3. Program 2 – Non-structural bracing
   a. Focus on experiments that take months or years.
   b. Categorize and prioritize mitigation activities.
   d. Be smart about being partners, Planning and Budgeting, the Departments and the Colleges.
   e. Hire consultant for deferred seismic bracing design guidelines. Provide guidelines and standards. Makes sense to have design guidelines based on publish guidelines that already exist. i.e. FEMA E-74. Need to specifically identify by clusters the extent of work required.
4. Program 3 – Structural Performance/Use assessment
a. Do not conduct survey and rate all buildings. Decision to reuse, repurpose, replace not dependent on current performance rating.
b. When a building is under consideration for retrofit or replacement, conduct detailed assessments and determine need for retrofit based on proposed use.
c. Perform incremental projects when possible.
d. Look for research and instruction within buildings.
e. Use group decision making, Rather that creating something prescriptive do a value engineering exercise. Review consequences of doing or not doing the upgrades
f. Establish new building design and existing building retrofit guidelines for use on all projects similar to those published by the Department of Veteran Affairs.

Lifeline Assessment
1. Create a lifelines council with external services providers (water, gas, electricity). Find out what to expect from them after a disaster.
Attachment 3
# UW Seismic Resiliency Workshop – Workshop #2

*State of the Campus*

*September 10, 2013*

*UW Tower, Emergency Operations Conference Center*

*Summary Notes & Attendees*

<table>
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<tr>
<th>Name</th>
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<tr>
<td>Rebecca Barnes</td>
<td>Office of Planning &amp; Budget</td>
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<td>Ali Ferdos</td>
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<td>Lifelines</td>
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<td>Pam Stewart</td>
<td>UW-IT</td>
<td>Lifelines</td>
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<td>Steve Charvat</td>
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<td>John Shaheen</td>
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<td>Dave Muto</td>
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<td>Linda Lockwood</td>
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<td>Ron Eng</td>
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<td>Name</td>
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<td>Randy West</td>
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<td>Josh Gana</td>
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<td>Laura Campbell</td>
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<td>Andy Ward</td>
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<td>Danica Little</td>
<td>UW Medical Center</td>
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<td>Aaron Hoard</td>
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<td>TJ McDonald</td>
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<td>Thomas Jenkins</td>
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<td>Scribe/Assistant</td>
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<td>Debra Hanna</td>
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<td>Katharine Flug</td>
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<td>Charles Kennedy</td>
<td>Facilities Services</td>
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<tr>
<td>Paul Jenny</td>
<td>Office of Planning and Budget</td>
<td>Scribe/Assistant</td>
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The workshop began with general introductions of all present parties and their departments/organizations, as well as an explanation for newcomers as to the purpose of this ambitions year-long project. Associate Vice President Charles Kennedy officially opened up the daylong workshop, welcoming those in attendance. On behalf of UW President Young and his senior Cabinet, Mr. Kennedy encouraged those in attendance to learn, share their thoughts and expertise and assist the core UW Work Group in meeting the project’s general mission which was established by the Provost’s office. Workgroup Chairman Steve Charvat, UWEM Director, explained how the UW Board of Regents initially brought up the topic of seismic resiliency recently and therefore assured that this project would receive attention and continued follow-up as the assorted subject-matter experts teamed up to produce a short-term, medium-term and long-term plans and strategies for the University of Washington Seattle campus. While this project focuses primarily on the core Seattle campus, the “lessons-learned” throughout this year long process could be applied to the Tacoma, Bothell, South Lake Union and other off-campus sites.

This second workshop (or 4 planned) was held to focus exclusively on existing programs (“The Current State”), services & activities that the UW Seattle and surrounding community/partners have in place and in effect to promote Seismic Resiliency and Safety. The stage was set by a teleconference call with Dr. Mary Comerio, from the UC-Berkeley School of Architecture, in which Dr. Comerio detailed the experience of planning and retro-fitting their campus after the Northridge Earthquake struck their region. She covered the entire process from the very technical products, such as specific engineering solutions for older buildings, to more abstract challenges that had to be addressed, such as notifying incoming students as to earthquake risk and how the entire campus had a change in attitude toward becoming a more resilient academic community. One particular item that elicited positive emotions
from the workgroup was that UC-Berkeley formed a Seismic Resiliency Committee that had oversight authority for all campus construction/renovation projects, and was granted the ability to halt work on specific projects if they questioned the rigor of seismic mitigation solutions. It was acknowledged by Dr. Comerio that this did indeed occur, and while it was at times the cause of passionate debate, the UC-Berkeley administration maintained support for the Seismic Resiliency Committee steering the campus toward a better-prepared future. A copy of the Dr. Comerio’s Powerpoint presentation was shared the next day with all participants via email and posted on the UW’s password-protected SharePint site dedicated to this project (https://sharepoint.washington.edu/opb/SCP/seismic/SitePages/Home.aspx).

At this point, the UW Seismic Resiliency Workgroup divided into 4 smaller groups of Subject-Matter Experts, each focused on a particular aspect of the existing strategy: Buildings & Structures, Non-Structural Elements/Safety, Lifelines & Utilities and Planning/Resources/Continuity. Each group had a facilitated discussion, guided by UWEM staff members, and pooled their existing resources in order to identify both strengths & weaknesses in the existing strategy. Below are the comments from each group, on the sub-topics they discussed:

Non-Structural Elements & Safety (Group #1)

1. Current Programs/Activities
   A. Physical Improvements – Compactor systems have been installed, UW Libraries has partial completion on the installation of quake-resistant shelves and many of their stacks have been braced. Science laboratories have partially secured cabinets to the walls in order to prevent spills. The Burke Museum has replaced all open shelving units with ones that have doors/coverings and secured their storage cabinets to the walls to prevent falling over.

   B. Monitoring/Prevention – Caution signs and emergency contact information has been posted at the entrances to all labs on campus. The EH&S Lab Chemical Inventory List is currently undergoing maintenance, and they have a Fire Safety Survey program that is currently active. A Fire Inspection was recently performed in the labs of Health Sciences Building, focusing on cylinders containing flammable gases. EH&S also has a Lab Safety Survey program that they administer, as well as inspecting Public Spaces and Instructional Areas (Classrooms).

   C. Emergency Preparedness – UW Libraries has a training program that is ongoing to provide awareness & familiarization to all of their employees about emergencies, including earthquakes. Health Sciences Building will be participating in the October “Great ShakeOut” drill, and has gotten buy-in from the deans of the schools in their building to use the internal P.A. system to announce Drop, Cover & Hold on 10/17. Health Sciences Administration has also secured funding for an additional PEAT to be formed for their building. A contract has been signed with NRC Environmental for HAZMAT/Asbestos spills to be contained and cleaned up. EH&S has a post-quake Building Re-Entry Assessment Guideline that is freely available to all UW departments.
2. Assessment of Progress
A. Building Components - Continue to assess the swap-out of old shelving with seismic-resistant shelves in UW Libraries. Verify the source of power for Emergency Exit lighting; is it connected to generator(s)? Assess the presence and risk of non-structural debris near Emergency Exits that may hinder an orderly evacuation of a building after a quake. Document the progress on making sure critical mechanical equipment is properly anchored to the walls, ceiling and floor as necessary. Finally, the stability of suspended lighting needs to be assessed and may require significant effort to mitigate existing risk.

3. Past Efforts & Completed Projects
A. Fire Safety – Fire Safety Systems continue to be improved & upgraded. Many Fire Sprinkler Systems across campus have been successfully retrofitted with newer technology; the remaining ones are currently scheduled for upgrade over the next year. Many lab shelves have had lips added to them to reduce the risk of chemical spills during a quake.
B. Education – Training has been provided for office & lab space mitigation of non-traditional hazards. A program for retrofitting shelves, filing cabinets and furniture with seismic restraints was completed. A webpage was designed with non-structural mitigation solutions, and is maintained by Facilities Maintenance & Construction (FMC). At the Department level though, education is not centralized and easy to find for employees.
C. Mitigation Projects – Several structural retrofitting projects and renovations have been planned already; they simply require funding. Floor tiles containing asbestos have been removed and all projects in areas containing asbestos must have an Asbestos Abatement plan prior to beginning work. Suspended ceilings and partial-height walls have all been removed from UW properties.

4. Building Codes and Legal Compliance
A. Fire & Building Codes – Seattle Fire Department performs routine fire inspections on all buildings. Current Fire Code requires lips on shelves in laboratories.
B. Regulated Building Materials – Asbestos, Lead and PCB’s are among some of the most common materials that are significantly regulated via EH&S & SFD. Some buildings on campus that experience damage cannot be re-entered due to concerns of asbestos or other HAZMAT release. Facilities Services and Capital Projects Office have some existing service contracts to help with Asbestos Abatement.

5. Best Practices
A. Utilities – Maintaining the condition of tunnels used to deliver utilities.
B. Labs & Chemical Storage – EH&S Lab Safety Manual outlines the safe storage of HAZMAT. Lab entrances also have the emergency information clearly posted and the accountability for the space identified.
C. Departmental Disaster Plans — UW Real Estate has developed a Building Disaster Preparedness Plan that complements the UW “All-Hazards” Emergency Management Plan.

6. “Parking Lot” Items — There is no campus-wide policy for prioritizing Non-Structural Improvement projects/programs. Freezers used by the Academic & Research communities are not all on emergency power circuits that have generators allocated ahead of time. Some research equipment is expensive and could easily be damaged in an earthquake. Real Estate office is concerned about having enough space for people who are forced to evacuate housing/office spaces. There is no policy about using unassigned space as temporary storage or work spaces. Utility lines within buildings do not have a program to become seismically-restrained like shelves & cabinets. It is difficult to get participation for earthquake drills in the same manner as fire drills. PEAT needs dedicated resources and to be included in damage recovery contracts. There is no database that geographically displays how many Research $S$’s concentrated within buildings/spaces. Mitigation solutions should be consolidated on the Emergency Management webpage. A design guide has not been created to outline the details of ongoing retrofitting activities campus-wide. There is also no master list/hazard map that displays which buildings contain asbestos and approximately how much of the building contains it.
Structural/Building Resiliency (Group #2)

1. Current Programs/Activities -- Preparations are underway to bring ShakeCast into the EOC workstation for Campus Engineering. There has been practice with using a Floating Slab over landfillied areas in eastern campus. There is a CFI Plan now (not sure what this is). New construction currently follows the building code for Life Safety design in regards to seismic resilience. The remaining buildings originally outlined in the ERAC 1-4 reports are currently identified for future retrofitting/renovation. The Pacific Northwest Seismic Network (PNSN) provides “ShakeMaps” based on observed data. ATC-20 education is well received by the Campus Engineering staff and there is a current process for a post-seismic event review. Seismic retrofitting continues to progress on a case-by-case basis. An application is on file to completely replace the footbridge over Montlake Blvd near the Hec Ed Pavilion. The HFS master plan includes all residence halls, as well as the garages and North Campus housing projects. The Triangle Garage is scheduled for a seismic upgrade as part of lowering NE Pacific Place near University Link Light Rail Station.

2. Assessment of Progress -- <10% of buildings on campus are currently considered “hazardous” in terms of seismic resiliency. The Research community continues to study local geo-hazards. Building Codes are continuously updated and require compliance inspections. Resiliency workshops like this promote cross-pollination of ideas and efforts, as well as establish a proactive culture towards earthquake hazard mitigation. Tom Pittsford has been tracking the progress on ERAC items for several years now.

3. Past Efforts -- In 1991, the ERAC study was completed to provide a plan of long-term renovation to campus. This resulted in several dangerous buildings being completely demolished. Transportation Services completed a PML study. The “Restore the Core” renovation campaign began, but has stalled lately due to lack of funding. Additionally, it did not include detailed studies of each project that was completed. DPD has a mandatory URM study. 34 buildings have received seismic resiliency upgrades since ERAC. All bridges on campus have had some form of seismic upgrade.

4. Laws & Codes -- There is only a requirement to build/renovate to the Life Safety Code Level. There is a possible URM mandatory upgrade coming in 2014.

5. Best Practices -- Safe Campus Notification Systems. Generator is properly sized to power refrigeration or food services in new Lander & Terry Halls. Retrofit of Assembly Building for recovery and utilities/generators in ICA spaces.

6. “The Good, the Bad & the Ugly” -- A. Good – Only 10% of buildings on campus identified as hazardous have not started their recommended upgrade(s). The ERAC has them prioritized from greatest need to least. >30 buildings have already begun to have seismic upgrades processed.
   B. Bad – UW lost funding to support “Restore the Core” in 2009, suspending that maintenance project.
   C. Ugly – >20 buildings still require an upgrade and have yet to start work. There is no strategy on how to restore funding for these projects, in order to complete the recommended seismic upgrades.
7. **Parking Lot** Issues  -- There is no instrument to give damage reports. "Code Blue" & Safe Campus. We need to upgrade Assembly Areas. Bridges on campus need more upgrades. The I-5 Bridge & University Bridge near campus requires upgrades. The condition of the Montlake Bridge is unknown. More assessment needs to be performed to determine the water level changes & seiche risk. Fire Sprinklers and utilities will need to be upgraded. We cannot afford to build structures to Level 1 Operational Code. There have been no structural upgrades in TI’s – it should be mandatory. The pools in the Dempsey Indoor Sports Center and IMA Building have not been seismically-upgraded. The cost for offices/departments to become self-sustaining after a major earthquake is unknown. IT infrastructure and medical equipment in UWMC needs to be made seismically-resilient too. The information regarding the seismic upgrade efforts needs to be centrally managed and available. When speaking of “Resiliency,” we should continue to bring up the idea that we need to build/re-build “Better Than Code” for Operational buildings (UWMC, Husky Stadium, etc.)
Lifelines/Utilities (Group #3)

1. Current Programs & Activities -- A. General – UW EOC is the City of Seattle’s back-up EOC. Regular EOC drills and exercises simulate utility outages. UW EOC does not have external utility providers working in the EOC, but does maintain 24/7 phone contact with them. UW EOC has activated for power outages in the past. Seattle City Light has an improvised Department Operations Center (DOC), staffed by employees who have been trained in NIMS, that is connected to the City of Seattle’s EOC. UW Facilities Services has its own Radio Communication System. Current seismic information is not considered generally available/accessible. Seattle City Light has a new online Outage Map to help customers identify where crews have already received calls for emergency service.

B. Power Plant – UW electrical grid is supplied by both the Power Plant and Seattle City Light. The campus tunnel system (7-8 miles) has steam/condensate, chilled water lines, electrical wiring, fiber-optic cable and compressed air distribution pipes. UW’s natural gas utility is provided by Puget Sound Energy for the Seattle campus only. The Power Plant’s normal fuel supply is natural gas that is provided by Puget Sound Energy. For emergencies, it can run off diesel oil that is stored in an underground tank.

C. UW-IT – Business Recovery/Disaster Recovery site is already designated and being expanded beyond Spokane for redundancy; this supports UW’s critical IT business applications. UW is part of a regional consortium working to build a fiber-optic loop around Lake Washington to be used for emergency preparedness communications. UW-IT has developed an internal emergency planning function and has established a physical URC. UW-IT’s URC has its plans and facility ready to respond & recover from a disaster.

D. Water – Seattle Public Utilities (SPU) has completed a Seismic Backbone Analysis for Water Distribution. Many reservoirs in northern Seattle have been upgraded, with ~20% less capacity due to some reservoirs being closed. The City of Seattle has a Debris Management Plan; UW has no Debris Management Plan. UW does have limited contracts for collection of solid waste on campus. There are multiple water lines that feed into UW Seattle. Campus properties west of 15th Avenue generally have water & sewage drawing off a main pipe underneath city streets.

E. Infrastructure – Verification of the existing storm drain/sanitary drain systems is in progress. Campus Engineering practices emergency preparedness via ATC-20 Teams. Campus Engineering performs Structural Audits regularly. Critical Systems are being identified and having plans created to support their recovery.

2. Assessment of Progress -- Use of a Balanced Score Card for utility service reliability, focusing on Steam, Electricity and HVAC. Having Emergency Management assist with a “Hot Wash” and After-Actions Review once each Response phase cycles forward to Recovery. Review the Building & Facilities Plan(s). Have Campus Engineering audit each building using the Balanced Score Card. Have UW-IT be evaluated on the amount of “down-time” for individual services. Have the Network Operation Center (NOC) monitor outages and restoration processes.
3. **Past Efforts** -- Have any discussions occurred in the past regarding the potential creation of a UW Fire Department? What is the current level of state funding for utility infrastructure? Seattle City Light had a feeder line from the 2nd substation into UW’s western receiving station. The natural gas utility system has been upgraded from cast iron to either Polyethylene (PE) or steel. The last Utility Master Plan was completed in 2006, and needs to be updated. The parking garage in Building 4545 has been sealed to prevent water from leaking into the Data Center from rain/snow. Capital funding for IT infrastructure is erratic, and often falls below identified needs.

4. **Laws, Codes, Regulations & Contracts** - The current processes to hire contractors are cumbersome. Post-disaster, regulations must still be followed; they do not account for how response & recovery operations may delay or hinder compliance. Natural gas systems must comply with CFR 192 and WAC 480. Emergency power must be available within 10 seconds of an electrical outage at the UWMC, per NFPA & JCAHCO regulations. CDLs are required to operate large passenger vehicles, which may reduce the eligible number of drivers in an emergency. Some regulations interfere with the ability to maintain operations. IT must maintain compliance with applicable electrical codes and BIESL design standards. Various types of buildings may have differing seismic codes. Water quality regulations may slow down provision of potable water. WA state Health Department codes impact the restoration of water, sewage and drainage utilities. Principal Investigators (PI’s) are under grant/contract requirements to safeguard their research investments, including support utilities.

5. **Best Practices** -- UW parking garages are inspected annually. They are also provided with back-up power for lighting and mechanical systems. The garages are also subject to a 5-year appraisal of their condition. Seattle City Light currently has an Outage Management System that is in the process of being connected to Smart-Meters. This is expected to be completed 2015-2018. Steel utility pipes for natural gas have a cathodic protection system in place. Surveys are also distributed by UW & PSE after each incident of a gas leak. There is research & development being initially started to provide an early-warning system for local earthquakes. It has no knowledge of other practices within the Higher Education community; they are not sure what other organizations are currently doing or in the process of implementing. The East Bay MUD (Municipal Utility District) in Oakland, CA just completed a Seismic Improvement Program that took 15 years and $200 million to finish! The Los Angeles Department of Water & Power is in the middle of a Seismic Pipeline Project. Other universities have a real-time utility outage display inside of their EOC.

6. **“Parking Lot” Issues** -- We have not identified vibration-sensitive buildings on campus. We did not discuss any external telecommunication capabilities, such as mobile telephones. There is no “1-Stop Shop” for general UW campus to see current outages. There is no current way to display current campus outages within the UW EOC. There is no Critical Systems Maintenance Group.
Planning/Resources/Continuity (Group #4)

1. Resources -- Resource availability between departments is inconsistent; many plans attempt to allocate resources in multiple places at once. We do not have a coordinated resource management plan or inventory. We have a robust first-response capability, but there are visible gaps that prevent sustained response into additional operational periods. Departments may have individual recovery plans, but there is no consistent standard to follow. We have some engagement with the university community regarding disaster education, but this remains an area that needs more work. Many planning efforts parallel each other, but “siloes” in management prevent ideas from being shared and collaborated upon each other. Some communications planning is done, but refined training & systems are needed to improve the quality and scope of this effort. Relationships among stakeholders will improve with additional clarity about roles and capabilities.

2. Standards & Evaluations -- Metrics and evaluation methods are not standardized across campus. The standard of reviewing major incidents is well-practiced and documented, but smaller scope incidents do not have a standardized “No Fault” evaluation process. Drills and exercises do not satisfactorily include faculty members or campus executives, nor do they follow an established standard of continuity. There is a lack of awareness between departments across campus about their interdependencies.

3. Past Efforts -- Past efforts to improve the seismic resiliency of the University of Washington – Seattle campus have been halted due to a lack of support and changing priorities.

4. Legal & Regulatory Compliance -- There is no coordinated oversight of legal, code and policy compliance. This leads to little or no enforcement and our liability is an unknown as a result.

5. Best Practices -- Having a uniform, standardized credentialing process is preferred. Setting benchmarks in line with professional accreditation standards is an industry best practice. Forming and maintaining partnerships is an ongoing process between peers & similar organizations. Being proactive with the use of student volunteers is a best practice for Higher Education specifically.

6. “Parking Lot” Issues -- Access to research and academic staff members and their resources within the EOC is still an unmet objective; no well-established lines of communication exist. Shelter and care resources will need additional attention in order to be properly distributed to high-priority recipients.
Attachment 4
Summary Notes & Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Assigned Break-Out Group</th>
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</thead>
<tbody>
<tr>
<td>Ali Ferdos</td>
<td>Facilities Services</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Pam Stewart</td>
<td>UW-IT</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Steve Charvat</td>
<td>Emergency Management</td>
<td>Lifelines</td>
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<tr>
<td>John Shaheen</td>
<td>Transportation Services</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Dave Muto</td>
<td>Seattle Public Utilities</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Jim Otte</td>
<td>Seattle Public Utilities</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Linda Lockwood</td>
<td>Seattle City Light (SCL)</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Jim Walker</td>
<td>Puget Sound Energy</td>
<td>Lifelines</td>
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<tr>
<td>Bob Ennes</td>
<td>Health Sciences</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Mark Murray</td>
<td>EH&amp;S</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Ron Eng</td>
<td>Burke Museum</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Siri McLean</td>
<td>Emergency Management</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Michael Carette</td>
<td>Planning and Budgeting</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Paula Walker</td>
<td>University Libraries</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Tom Pittsford</td>
<td>Facilities (Engineering)</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Chris Poland</td>
<td>DenKolb Associates (via phone)</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Renate Hartog</td>
<td>Pac NW Seismic Network</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Tom Rietkirk</td>
<td>School of Medicine</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Angel Ling</td>
<td>Pac NS Seismic Network</td>
<td>Physical Building/Structures</td>
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<tr>
<td>Alan Nygaard</td>
<td>Capital Projects Office</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>John Carroll</td>
<td>Facilities Services</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Steve Majeski</td>
<td>College of Arts &amp; Sciences</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Angel Ling</td>
<td>Pac NW Seismic Network</td>
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<tr>
<td>Randy West</td>
<td>UW Police</td>
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<tr>
<td>Josh Gana</td>
<td>Housing and Food Services</td>
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<tr>
<td>Scott Preston</td>
<td>Emergency Management</td>
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<tr>
<td>Name</td>
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<tr>
<td>Laura Campbell</td>
<td>Comparative Medicine</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Vince Stricherz</td>
<td>News &amp; Information</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Andy Ward</td>
<td>UW-IT</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Aaron Hoard</td>
<td>Office of Regional Relations</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>TJ McDonald</td>
<td>City of Seattle OEM</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Thomas Jenkins</td>
<td>UWEM</td>
<td>Scribe/Assistant</td>
</tr>
<tr>
<td>Debra Hanna</td>
<td>Facilities Services</td>
<td>Scribe/Assistant</td>
</tr>
<tr>
<td>Thomas Jenkins</td>
<td>UWEM</td>
<td>Scribe/Assistant/Project Asst.</td>
</tr>
<tr>
<td>Michael Lunceford</td>
<td>UWEM</td>
<td>Scribe/Assistant</td>
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</table>

The workshop began with general introductions of all present parties and their departments/organizations, a review of the outcome of the previous workshop meeting, and an explanation of the scope for this year-long project for newcomers. Workgroup Chairman Steve Charvat, and the UW Emergency Management (UWEM) Director, described how the idea of increasing UW’s resiliency to an earthquake emanated from a UW Board of Regents information request in late 2012. The intent is to conduct a series of Kaizen-like visioning events in which stakeholders from the university, the city of Seattle, utility providers, and other regional stakeholders and emergency service providers come together to define the problem, determine the current state, envision an ideal future, and then roadmap recommendations given priorities, time and resources.

This third of four workshops, held at the UW Emergency Operations Center (EOC) and Conference Center, sought to construct the template for a perfectly seismically resilient university. Participants were asked to bring ideas for activities, initiatives and policies that would, in a perfect world, allow UW to immediately resume normal operations in the wake of an earthquake. Charvat extolled the workshop members to think of big ideas and shoot for the moon. After, the chairman’s remarks, Thomas Brady, UWEM student project assistant, gave a presentation on the University of Canterbury (Christchurch, NZ) as a case study of a university’s experience. Brady’s presentation covered key decision points relevant to UW because of how recent the earthquakes were, its size and location within a large municipality and because of the geological similarities between New Zealand and Seattle. A copy of the Mr. Brady’s PowerPoint presentation was posted on the UW’s password-protected SharePoint site dedicated to this project [https://sharepoint.washington.edu/opb/SCP/seismic/SitePages/Home.aspx](https://sharepoint.washington.edu/opb/SCP/seismic/SitePages/Home.aspx).

Following the presentation, Mr. Charvat outlined how the workshop was to proceed and what the day’s final product should look like. After his final instructions, the UW Seismic Resiliency Workgroup divided into 4 smaller groups of Subject-Matter Experts, each focused on a particular aspect of the existing strategy: Non-Structural Elements/Safety, Buildings & Structures, Lifelines & Utilities and Planning/Resources/Continuity. Each group discussion was facilitated by UWEM staff members, and covered common issues facing their functional area. Below is a summary of ideas from each group, on the sub-topics they discussed:
Non-Structural Elements & Safety (Group #1)

The non-structural group focuses on safety elements in the interior of buildings and other structures that are not covered by the Structures group. Its focus is primarily on mitigation activities before a seismic event. The group consensus decided that for UW to be fully seismically resilient, each university department needed a mitigation and policy and budget for each and department. Specifically, the following needed funding and support:

1. **Code/policy for non-structural hazards**—UW adoption of code and policies that meets FEMA E-74 *Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide*.

2. **Bracing, anchoring and securing of machines, equipment and shelving**—throughout the university, free-standing equipment, machines, furniture, shelving and storage containers should be braced, anchored or secured in accordance to the FEMA E-74 guide, in particular in all public and non-public spaces, mechanical rooms, and the university's utility tunnels. The UW should institute an internal, annual competitive small-grant program that provides guidance and matching funds (75% UW/25% department) that provides an incentive for compliance with this recommendation.

3. **Asbestos abatement in all buildings**—a significant non-structural hazard, particularly in older un-renovated buildings, is asbestos fire-proofing in in tiling, pillars, flooring, ceiling and walls. The university should immediately begin planning and implementing abatement in all buildings that contain asbestos fire-proofing.

4. **Lifeline securing**—the university should secure lifeline infrastructure to ensure continuity of operations in the wake of an earthquake including electrical conduit, gas lines, communications cabling, air and ventilation ducting, in all structures including the utility tunnels.

5. **Securing non-structural architectural elements**—interior and exterior architectural elements such as veneer behind un-reinforced masonry, parapets, secured according to FEMA E-74.

6. **Identification, inventory and securing of hazardous material (HAZMAT)**—develop a mandatory, accountable inventory of HAZMAT quantities, point of contact, seismic resiliency status, use, and location in a central database. This could include chemicals or materials in laboratories, storage tanks, and other storage lockers throughout campus. In addition, an enforceable system of assurance should be implemented with a system that supports a policy mechanism for consequences.
Structural/Building Resiliency (Group #2)

The Structural group was tasked with seeking out ways to make all structures on the UW Seattle campus resilient to earthquakes. As reiterated in previous workshops, the goal would be to not only preserve life inside structures, but to allow for the resumption of business operations as quickly as possible. Given the size and complexity of main campus, the group established that the objective would be to resume business immediately following a most likely seismic event, and to be operational no more than two months after a mega-thrust earthquake. To achieve this, the group looked at existing structures, future design, building use and policies, and early warning systems.

1. **Existing structures**—realizing that of the existing structures requiring restoration (less than 10%), priority should be given to preservation of life. The group established that immediate attention should be paid the “Restore the Core” program to restore all buildings that do not meet current code. In addition, the school should upgrade all unreinforced masonry (URM) structures on campus as a new code requiring upgrade is imminent. In addition, UW should re-evaluate the pedestrian bridges to determine if they require upgrades to meet the “life safety” standard. As part of the consideration of the “Restore the Core”, the university should identify historic buildings that should be saved and determine which below standard buildings can be replaced. Because the UW Tower is a major hub of operations for the university, a study should be conducted to predict damage and impact to operations. Lastly, the university should require off-campus housing such as fraternity and sorority houses become upgraded to meet seismic code.

2. **Future design**—to take into account necessities for preparation, mitigation, response and recovery the structures group underscored that all new construction meet a standard higher than “life safety” in order to resume business after an earthquake. Consequently, on-campus student housing would need to meet this higher standard in order for students to shelter in place for the immediate response, and the long-term recovery. Secondly, the new structure to be utilized by the UW police department must be designed resilient enough for immediate reoccupation and use in order to perform its public safety function in response to an earthquake. Seismically support all existing M & E equipment

3. **Building use**—with an eye toward response and business continuity, the structures group would seek to cluster main hubs for lifelines, research and emergency services into the most seismically resilient buildings. In the long-term designing a seismically resilient research and hospital complex would help to facilitate rapid resumption of business operations. Anticipating the likelihood that the community in the University District would seek out UW for shelter and support, the university should designate buildings that would generally serve the purpose of preparing for this magnitude of disaster response.

4. **Earthquake early warning**—Earthquake early warning systems inside buildings could prevent second and third order effects from the immediate impact of an earthquake. Specifically,
retrofitting buildings and designing new building systems that provide auto-shut off features to disable lifelines that could create hazards as a result of earthquakes (i.e., gas lines). In addition these systems could include sensors able to measure the impact on a building’s structural integrity at key, predictable points, and inform occupants whether the building is immediately inhabitable after an earthquake. [Free field seismic stations to feed shake cast]
Lifelines/Utilities (Group #3)

1. Electric/Gas—
   a. Conduct a comprehensive study of current UW power Plant capabilities and Shortfalls
   b. Install large capacity on-site generators strategically at various campus buildings and locations to pick up critical loads.
   c. Establish redundancy in transmission-level feeds. Connect the existing system to multiple feeds (2 on West Campus, 1 on East campus) from different Seattle City Light substations.
   d. Evaluate solar energy and cogeneration alternatives to supplement prime power
   e. Install auto-shutoff valves for gas lines in every building on campus and for every main feeding a building.

2. Water—
   a. Develop an emergency water plan for UW.
   b. Build a potable water reservoir on campus, which may include more creative ideas such as swimming pools and retention ponds.
   c. Evaluate water transportation and distribution options.
   d. Replace water mains with seismically resistant water pipes.
   e. [Connect high pressure to ion pressure water system through PRV].
   f. Develop alternate sources for drinking water.

3. Sewer—
   a. Look at best practices for other universities
   b. Identify critical sewer systems on campus and define maintenance requirements to include skilled labor.
   c. Pre-stage sanitation supplies around campus for emergency situations
   d. Build and underground drainage system for the utility tunnels
   e. Build a detention system on campus to temporarily detain/divert raw sewerage overflows.

4. Communications/IT—
   a. Harden and reinforce data centers in the UW Tower and the 4545 Building as well as at campus router centers both physically and network-wise
   b. Make communication methods redundant by using overlapping voice communications methods and retaining copper landlines as a redundant backup.
   c. All Unit Response Centers (URCs) have baseline capabilities and can be up-and-running within 2 hours of an earthquake. All URCs are regularly tested for computer, phone and radio connectivity to the EOC.
   d. Place the Pacific Northwest Seismic Network’s servers in the university’s main data center.
   e. Create a one-stop site for parent/student/spouse communication in the event of a disaster.
5. Transportation—
   a. Have small non-motorized and motorized vehicles to transport people and cargo around campus after a disaster.
   b. Procures at least one fuel delivery truck on campus to deliver fuel to smaller emergency generators. The UW used to have one years ago, but it was sent to surplus.
   c. Develop a system to activate volunteers to use personal vehicles to transport personnel.
   d. Make all bridges and overpasses in and around campus seismically resilient.

6. Miscellaneous—
   a. Review and rate the UW tunnel system and its component parts for a seismic resilience rating and then prioritize and implement upgrades.
   b. Provide 3-day emergency survival kits for all UW critical employees and have additional storehouses of emergency supplies for other emergency responders.
   c. Develop and test drones for aerial campus assessments.
   d. Investigate and evaluate the establishment of a campus fire station and/or fire fighting and emergency medical service capabilities.
   e. Identify all critical systems on campus.
Planning/Resources/Continuity (Group #4)

The policy and planning group determined to make UW seismically resilient requires adequate funding and top-down support in order to implement the following ideas. There should be adequate equipment, to include communications, food/water and life-stability resources on campus at all times, and a sustainable means to store these resources. The group suggested that the UW have the capability to support 10% of the campus’ daily weekday population – for a sustained period of 3 days (minimum)[]. Communication and information management in emergencies is vital to an effective response and recovery. This should be accomplished through centralized planning. Emergency management, EMS, fire, and police services need to be independently operable and staffed appropriately; The University should develop and properly fund Community Emergency Response Teams (CERT) to augment the professional emergency services. Centralized planning is needed to prioritize business, academic and research continuity (BARC) in the context of shared spaces after a disaster. Specialized campus resources and populations will receive the priority for response/recovery efforts regardless of geographic proximity to main campus. A culture of accountability to address the mental and emotional health of UW-affiliated persons should be developed and encouraged. Most significantly, a cabinet-level executive position is recommended to consolidate decision-making, accountability, and reduce the time needed for routine operations. The university should better align with local and regional jurisdictions, to enhance planning, logistical and operational capabilities in keeping with its role as a state agency. In addition, the group recommends the following:

1. Plans, Training and Resources—
   a. Expansion of UW Outdoor Alert to all emergency phones.
   b. Fund UWPD for search and rescue equipment and training.
   c. Increase coordination and training for UWMC in emergency response.
   d. Quarterly building evacuation drills supported by training for building coordinators.
   e. Executive support and participation in emergency training and exercises.
   f. Conduct an all-campus emergency evacuation drill, similar to the one done by Stanford University in 2011
   g. Emergency power for all UW outdoor Alert towers.
   h. Disaster preparedness and safety as a requirement for graduating UW students.
   i. Resource annual training with SPD/SFD and Seattle EM.
   j. Develop a human waste plan for campus.
   k. An emergency kit in every workspace throughout campus.
   l. Plan and resources to support large-scale shelter on campus.
   m. Develop and test a medical Alternate Care Facility (ACF) in coordination with Seattle/King County Public Health

2. Human Resources—
   a. Establish an on-campus fire department and Emergency Medical Service (EMS) capability.
b. 24/7 on-call teams from HFS, EH&S and other relevant departments.

c. Standard tools/standards for Unit Response Center (URC) operations.

d. Establish a student emergency response volunteer group to mobilize after an earthquake [CERT].

e. Double the size of the UWPD force and increase security.

f. Dedicate an emergency/continuity manager in each major department at UW.

g. Develop a URC Community of Practice at UW.

3. Information Management—

   a. Establish seamless, interoperable and scalable communications capabilities to cover any event on campus.

   b. Integrate IT systems for better management and to minimize exposure.

   c. Establish information management system to track critical infrastructure/facilities data including stakeholders, occupants, HAZMAT, etc.

   d. Geo-located tracking of resources.

   e. A universally accessible tool to maintain accountability of the UW community in a disaster (online check-in system): People-Locator type project

   f. An integrated radio network and associated equipment and training available to all departments.

   g. Install a HAM/amateur radio base station in the EOC to ensure critical emergency communications when all other traditional systems have failed or are overloaded.

4. Prepare, Respond Recover—

   a. During the first class of every quarter, 10 minutes should be dedicated to an earthquake drill or emergency orientation.

   b. Conduct a monthly campus-wide earthquake drill.

   c. Mandatory informational session for new students and faculty on disaster preparedness.

   d. Train volunteers to assist during an emergency.

   e. Annual campus-wide UW Indoor Alert test.

   f. Train every UW staff member on their role during an emergency

   g. Establish a consistently funded and implemented budget for emergency preparedness.

   h. Essential Staff (particularly, URC and EOC) required to take ICS training.

   i. Fund and hire an outreach coordinator to assist departments and units in creating disaster plans and emergency communications.

   j. Require UW Financial Management staff (working in coordination with UW and regional stakeholders) to develop a Disaster Recovery Plan for the University.

   k. Essential staff funding for shelter, transportation and supplies during an emergency.

   l. Re-establish the CERT program.

   m. Develop a centrally organized, trained and credentialed cadre of volunteers.

   n. Develop a distance learning tool kit for disaster response training.
o. Mandated Business and Academic Research Continuity (BARC) plans that have an enforcement capability.

p. A plan and accompanying agreements for surge space for essential functions, animals on campus and research space.

q. Coordinated crisis communication teams for all 3 campuses.

r. GR/ITDR for VEOC.

s. Real time, extensible geospatial imagery of campus.

t. Increase the number of video cameras around campus.

u. Establish an automated early warning system on campus tied into regional earthquake monitoring systems.

v. Develop additional ATC-20 (post-earthquake building assessment) off-campus response teams and capabilities.

w. Develop an additional off-campus Pre-entry Assessment Team (PEAT) or similar capabilities for chemical assessment.

x. Develop and implement a standardized Chain of Command, Delegation of Authority and line of succession plan for university key leaders and executives to ensure continuity of campus governance.

y. Designated evacuation shelter locations with food and water stored on campus.

z. Casualty management plan.

aa. Develop an enhanced post-event plan for psychological support and care.

5. Policy and Budgets

   a. Establish a policy that dictates the university should be resilient enough to be able to resume campus core/primary mission operations within 24-48 hours of a Seattle fault earthquake.

   b. Establish a policy that dictates the university should be resilient enough to be able to resume operations within one academic quarter for a deep, mega-thrust earthquake.

   c. Establish university policies to establish chain of responsibility in departments and academic units.

   d. Have redundant academic, research and administrative data.

   e. Have university policies in place creating schedules for share use of space after a disaster.

   f. Develop university-wide policies for resumption of classes following an event.

   g. University leadership must emphasize resilience in annual operational budget.

   h. Establish a VP for Public Safety to cover Police, Fire, EMS, Risk Management, Safe Campus, EH&S and Emergency Management Functions.

   i. Develop university policy to require faculty and staff to complete emergency planning and education.

   j. Mandate that all critical organizations and departments have functioning Unit Response Centers (URCs) and related response plans.

   k. Spending and gifting flexibility in the State constitution.
l. Mandate that across the university that the Business, Academic and Research Continuity (BARC) program has full participation.
m. All enterprise critical business processes have GR apps and systems
n. In a university-wide policy statement delineate department and unit roles and responsibilities in EOC/Disaster operations.
o. UW is self-sufficient to the degree that after a major earthquake, the city can draw on UW resources to support community response and recovery in the University District.
p. University leadership should include emergency preparedness and campus safety as part of the top strategic goals every year.
### Summary Notes & Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Assigned Break-Out Group</th>
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</thead>
<tbody>
<tr>
<td>Ali Ferdos</td>
<td>Facilities Services</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Steve Charvat</td>
<td>Emergency Management</td>
<td>Lifelines</td>
</tr>
<tr>
<td>John Shaheen</td>
<td>Transportation Services</td>
<td>Lifelines</td>
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<tr>
<td>Dave Muto</td>
<td>Seattle Public Utilities</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Joles Tahara</td>
<td>Transportation Services</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Linda Lockwood</td>
<td>Seattle City Light (SCL)</td>
<td>Lifelines</td>
</tr>
<tr>
<td>Bob Ennes</td>
<td>Health Sciences</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Vince Collins</td>
<td>EH&amp;S</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Siri McLean</td>
<td>Emergency Management</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Paula Walker</td>
<td>University Libraries</td>
<td>Non-Structural</td>
</tr>
<tr>
<td>Tom Pittsfoid</td>
<td>Facilities (Engineering)</td>
<td>Physical Building/Structures</td>
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<tr>
<td>Bill Steele</td>
<td>Pac NW Seismic Network</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Thomas Brady</td>
<td>Emergency Management</td>
<td>Physical Building/Structures</td>
</tr>
<tr>
<td>Steve Majeski</td>
<td>College of Arts &amp; Sciences</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Josh Gana</td>
<td>Housing and Food Services</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Scott Preston</td>
<td>Emergency Management</td>
<td>Planning/Response/Continuity</td>
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<tr>
<td>Laura Campbell</td>
<td>Comparative Medicine</td>
<td>Planning/Response/Continuity</td>
</tr>
<tr>
<td>Andy Ward</td>
<td>UW-IT</td>
<td>Planning/Response/Continuity</td>
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<tr>
<td>TJ McDonald</td>
<td>City of Seattle OEM</td>
<td>Planning/Response/Continuity</td>
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</table>

The University of Washington Emergency Management (UWEM) hosted a final workshop for the Seismic Resilient University Project at the Emergency Operations Center (EOC) in the UW Tower on March 19, 2014. The workshop incorporated the work of three previous meetings of the workgroup in identifying how to “bridge the gap” between UW’s current state (Workshop 2) and the future vision (Workshop 3). The results from this workshop, as well as the previous workshops, will be included in a final report which will be submitted to the UW leadership in June 2014.
The workshop was brought to order by UWEM Director and Workgroup Chairman Steve Charvat. The start of the meeting introduced participants and reviewed administrative procedures for the conduct of the meeting. Mr. Charvat reviewed the history of efforts by UW to prepare for a possible earthquake. In addition, Mr. Charvat described the methodology and procedure for executing the workshop.

In between workshops, UWEM staff created worksheets for each individual proposal from the previous workshop. The worksheets identified four groups of categories in which workgroup members would label proposals. The categories were modeled after other reports from the emergency management field. The taxonomy set aside four main groups: function, criticality, ease of implementation and cost. The functional category is divided according to the structure of the SRU workgroup between structural, policy and planning, non-structural and lifelines. Participants would identify the functional categories under which the proposal would apply. In this group of categories, multiple functional areas might be considered and overlap depending on the proposal.

The criticality group associates each proposal with a value for prioritization: retroactive, new requirement, remove barriers, recommendation and further action. The retroactive category identifies proposals that may require actions to undo previous policies or activities that were in place by the university. The “new requirement” category establishes that upon the release of the report or a date set forth by the workgroup, the UW Board of Regents or President that moving forward the policy or activity should apply. The remove barriers category is for activities that may require a policy or regulatory change to be considered that would enhance seismic resilience activities. The recommendation category identifies activities that are of lower priority, but given time, funding and ease of implementation, the workgroup would recommend for a more seismically resilient university. Further action categorizes proposals that the workgroup considered, but decided that the workgroup, the Board of Regents or the President’s office ought to give further consideration prior to implementing. The last two groups of categories cover ease of implementation and cost, covering the time frame and dollar amount thresholds, respectively.

After receiving these instructions, the facilitators and participants divided into their assigned break-out groups and began reviewing the worksheets.

A brief summary of their recommendations divided amongst the break-out groups was developed and included in the final report that will be sent to Vice Provost Paul Jenny in the final report.
Attachment 6
Seismic Resilient University of Washington
Executive Summary

Introduction

To cover the areas specified in its charge letter, the Seismic Resilient University of Washington Work Group drew upon the expertise of specialists to develop relevant solutions for seismic resilience. As a result the broader work group divided its work into four functional areas: planning, policy and human resources; buildings and structures, critical lifelines/utilities and non-structural elements. The following is an executive summary of their work.

Planning, Policies and Human Resources

- Develop a program to sustain emergency responders and students who would remain on campus after a disaster for 72 hours, including shelter, water, food, sanitation and basic needs.

- Mandate annual campus-wide annual participation in the “Drop-Cover-Hold” Drill (currently voluntary and sporadic involvement of buildings/departments/units).

- Establish policies that will make disaster resilience pervasive at all levels of UW by integrating those activities into the daily operations of the university and linked to unit and personnel performance evaluations.

- Establish a cabinet-level executive overseeing a Department of Public Safety, which would include Police, EMS, Risk Management, Safe Campus, Environmental Health & Safety, and Emergency Management.

- Mandate that a university department/unit (TBD) take the planning and operational lead on post-disaster volunteer and donations management.

- Develop, fund, equip and train a dedicated, organic search and rescue (SAR) element and campus-based emergency response teams that will respond to emergencies where injuries are probable (reinstate the past UW CERT program).

- Establish a permanent working group to study funding and management of resources that would be required by the university during a 90-day period immediately following a catastrophic event.

- UW should establish a pre-existing program to plan and manage recovery activities after a catastrophic event to prevent disruption of more than one academic quarter.

- Procure, store and manage an inventory of food, water and basic emergency supplies (i.e., sanitary, sleeping) for those critical University employees who would provide “essential services” to respond on-site for days/weeks to re-establish critical university functions while the University recovers from a major catastrophic earthquake.
Buildings and Structures

- Commission an ASCE 31 (Tier 1) analysis of the UW Tower to predict damage and impact to operations from a seismic event.

- Require all new construction meet a standard higher than “life safety” in order to maximize resumption and continuity of operations after an earthquake.

- Develop a policy to relocate and cluster critical operations for lifelines, research and emergency services in the most seismically resilient buildings.

- Allocate resources for seismic upgrades to the “High Damage” Index Buildings (excluding URM buildings) identified in the 1991 ERAC report.

- Similar to other Pac-12 schools, provide more direct public information to the campus community about the current seismic condition of each building on campus to allow residents and occupants to be more aware of the current level of risk (and/or protection) provided to them via the physical structures in which they work or live.

- Funding should be dedicated to upgrade unreinforced load-bearing masonry structures identified in the 1991 ERAC report.

- Require large group housing not managed by Housing and Food Services (e.g. fraternities and sororities) to upgrade to meet ASCE 31 requirements for residential structures.

- Conduct a study to examine the efficacy of designing building systems that provide trigger auto-shutoff features.

Critical Lifelines and Utilities

- Develop redundancy in the power sources to include installing large capacity on-site generators strategically at various campus buildings and locations to pick up critical loads and establishing redundancy in transmission-level feeds.

- Develop an emergency water plan for UW that includes a potable water reservoir, utilization of available pooled water and making the existing infrastructure seismically resilient.

- Identify critical sewer systems on campus and define maintenance requirements to include skilled labor, pre-stage sanitation supplies around campus for emergencies, build an underground drainage system for the utility tunnels and a retention system on campus to temporarily detain/divert raw sewerage overflows.
Seismic Resilient University of Washington  
Executive Summary

- Harden and reinforce data centers in the UW Tower and the 4545 Building as well as at campus router centers, make communication methods redundant, and require Unit Response Centers (URCs) have baseline capabilities and can be up-and-running within 2 hours of an earthquake.

- Fund and maintain small non-motorized and motorized vehicles to transport people and cargo around campus after a disaster and develop a system to identify organize and activate volunteers to use personal vehicles to transport personnel. In addition, procure at least one fuel delivery truck on campus to deliver fuel to smaller emergency generators.

- Investigate the feasibility of the UW developing a commercial “freezer farm” facility to store and provide safekeeping of critical research specimens. This fee/usage-based facility would provide 24/7 reliability for backup samples and experiments to allow for uninterrupted research and academic continuity.

Non-structural Architectural Elements

- Throughout the university, equipment, machines, furniture, shelving and storage containers should be or secured in accordance to the FEMA E-74 guide, in particular mechanical rooms, and the university’s utility tunnels.

- UW should conduct a survey of and assemble a list of asbestos contamination risks in UW structures, assess the risks and evaluate exposure to UW and its mission.

- Secure the lifeline infrastructure to ensure continuity of operations in the wake of an earthquake including electrical conduit, gas lines, communications cabling, air and ventilation ducting.

- Secure interior and exterior architectural elements such as veneer behind un-reinforced masonry, parapets, secured according to FEMA E-74.

- Develop a mandatory, accountable inventory of HAZMAT quantities, points of contact, seismic resiliency status, use, and location in a central database building on MyChem.

Conclusion

These recommendations reflect the fact that much must be done to continue to evaluate, explore and implement the solutions that came out of the work group. As a result, one final set of recommendations universally sought after by the workgroup became apparent. Our task requires a standing committee and a permanent staff member whose sole responsibility is to shepherd further study and implementation of these and future recommendations. This institution’s treasure is more than its buildings, its academic wealth, its research or its students. It is all of these things. Let us now take stock in this and begin our work.