ATC-67 Project Overview and Rapid Observation of Vulnerability and Estimation of Risk (ROVER) Software



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August 2, 2008



- ATC-67: Task Order 7 of FEMA Task Order Contract
- During Phases 1, 2 and 3:
 - evaluated potential enhancements to the existing paper-based RVS procedure
 - developed a conceptual overview of needed software functionality
 - conducted a User Needs Assessment and a User Needs
 Assessment Report (continually updated)
 - developed Alpha and Beta versions of Rapid Observation of Vulnerability and Estimation of Risk (ROVER) software
 - Beta tested the ROVER software in Salt Lake City, UT



Phase 4 objective

- release Version 1.0 of the ROVER software
- enhance the ROVER software to include extra data fields, making it capable of performing post earthquake safety evaluations (Beta version of the ATC-20-1, *Field Manual, Postearthquake Safety Evaluation of Buildings*)
- conduct a second field exercise, in Southern California in the fall of 2008
- complete a ROVER Field Manual
- develop a 50% Draft Open Source Business Plan



Personnel

- Keith Porter, Principal Investigator
- Instrumental Software Technologies, Inc., software developer



- Schedule
 - Complete ROVER version 1.0 by 8/1/08
 - develop the Beta version of ATC-20i by 9/15/08
 - conduct the 2nd field test of ROVER/ATC-20i by 11/08
 - complete a ROVER Field Manual by 2/10
 - develop a 50% Draft Open Source Business Plan by 11/09



ROVER Software

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Figure 5-11 Completed Data Collection Form for Example 2, 3711 Roxbury Street.



FEMA 154

- Screening tool: which buildings need detailed seismic evaluation
- Can we automate this?

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ROVER: Rapid Observation of Vulnerability and Estimation of Risk



- ◆ Implements FEMA 154 on smartphone and tablet PC
- Funded by FEMA (C. Carlisle, Program Officer)
- Objective: rapidly (10-20 min/building) create an inventory buildings exposed to risk; ID those warranting detailed examination
- Enhancements to FEMA 154 efficiency, accuracy & data handling:
 - Integral database, GPS, photos, sketches
 - Site-specific automated soil & hazard lookup
 - Enhanced risk scoring
 - Integrated with HAZUS & ShakeCast





Assignment list

- Download from city records, etc.
- Field worker leaves office with list of buildings to examine already on forms
- Or record new sites on the fly



Rover Site Data	⊡ +* Y _X ⊀€ ok	
Number Of Stories	Year Built 1915 •	
Total Floor Area (sq ft) 3600		
Other Identifiers		
Use		
SFD		
Address Into Sketch Save Cancel Help	Photo Occupa	

Info tab

- Stories
- Year built
- Square footage
- Other identifiers (e.g., parcel no)

Use





Sketch tab

- Freeform sketch
- Encourages field worker to walk around the building—see it from all sides
- Can note important features, e.g., "HAZMAT stored here"
- Sketch accompanies data in electronic database





Photo tab
Use built-in smartphone camera 2 MPix+
Server adds a watermark





ACTC

Occupancy tab
Occupancy type
Approx. number of occupants





Soil tab

- A-F scale, like IBC
- Soft soil tends to amplify motion
- Server can add soil from built-in global USGS map





Hazards tab

- Falling hazards: chimneys, parapets, etc.
- Space for general observations







Scoring tab

- Choose possible building type
- Click building features
- "Risk score" calculated below; better math than paper form
- Server can update basic score with built-in USGS site hazard map



Wireless or wired synch to server

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	9 004 J.T. Kingsbury Hall	1395 Presidents Cir	Salt Lake City UT	3	1928	100000		edit Worksh	eet
	10 005 George Thomas Building	1390 Presidents Circle		2	1933			edit Worksh	eet
	11 006 William Stewart Building	270 S 1400 E	Salt Lake City UT	2	1928	10000		edit Worksh	eet
	12 007 Life Sciences Building	255 S 1400 E	Salt Lake City UT	2	1915			edit Worksh	eet
	13 028 Alice Sheets Marriott Center for D	330 S 1500 E	Salt Lake City UT	3	1988			edit Worksh	eet
	14 066 Pioneer Memorial Theatre	300 S 1400 E	Salt Lake City UT	5	1958			edit Worksh	eet
	15 072 S.J. Ouinney Law Library	332 S 1400 E	Salt Lake City UT	1	1979			edit Worksh	eet
	16.082 Aline Wilmot Skaggs Biology	259 S 1400 E	Salt Lake City UT	4	1964			edit Worksh	eet
	17 083 James C Fletcher Building	115 S 1400 E	Salt Lake City UT					edit Worksh	eet
	18 084 Biology Building	257 S 1400 E	Salt Lake City UT	3	1965			edit Worksh	eet
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Design document

Intro; objectives Options considered & selections made - Hardware, OS, GPS, photos & sketches, open source license... ♦ Site-specific calcs: - Soil, hazard, score Enhanced math RedROVER specs...



Enhancements to FEMA 154



Same basic methodology, plus:

- Site-specific hazard from USGS
- Site-specific soil from USGS
- Automated latitude & longitude location
- Integral photos & sketches
- Enhanced scoring (some fancy math)
 - Mods & basic score -> Poisson arrivals 50-yr probability of "complete" damage -> S
- No transcription of paper data
- Integration with other risk software

ROVER's roll in seismic risk management data



ATC-20i

Pre-earthquake Inventory of buildings at risk Screen for potential seismic risk Prioritize risk-mitigation efforts Emergency planning HAZUS Response Prioritize inspections

- Safety inspection, cost estimates

- Learning from earthquakes (recon, etc.)

Lear. Reconnaissance in Earthquakes -- eXpress? (REX) SSIE)

- Manage repairs—permitting, etc.

RedROVER, ShakeCast & HAZUS



- FEMA's HAZUS: pre-event risk analysis
- RedROVER: an import tool to port ROVER field data into either ShakeCast or HAZUS
 - University of Utah RedROVER InCAST edition: Summer 2008
 - USGS RedROVER ShakeCast edition: Summer 2008

Thanks

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