The Natural Hazards and Disasters Reconnaissance Facility (RAPID Facility)

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Mission

The RAPID Facility enables transformative research by providing investigators with the instrumentation, software, and support needed to collect, process, and analyze perishable data from natural hazard events and from disasters.

Values

The RAPID Facility promotes reconnaissance-based science, shared resources, open data, convergence research, community engagement, and innovation to reduce the adverse impacts of natural hazards.

Strategic Activities

To achieve its mission, the RAPID facility engages in the following strategic activities.

- Acquire, maintain, and operate state-of-the-art data collection instrumentation for natural hazard and disaster investigations
- Develop and support the mobile application RApp for field data collection to advance interdisciplinary reconnaissance and enable convergence research
- Provide advisory services and essential logistics support for reconnaissance investigations
- Facilitate widespread use of collected data through systematic processing, visualization, and publication with DesignSafe-CI
- Train a broad and diverse user base through workshops and other activities
- Engage the public through mission-related community outreach and education

Fig. 1: RAPID Facility Instrumentation (Berman et al. 2020)

Science Plan

- Aligns with NHERI Science Plan (Edge et al. 2020) and its identified Grand Challenges
- Driven by natural hazards community—2017 Facility Workshop
- Updated in 2020 to reflect improved understanding of socioeconomic factors
- Facilitate collection, analysis and synthesis of data that is multidisciplinary in order to establish relationships between hazard events, their antecedents, and their broad consequences, ultimately leading to an improved ability to model, manage, and mitigate disaster risk to communities.

Fig. 2: RAPID Facility Science Plan (Wartman et al. 2020)

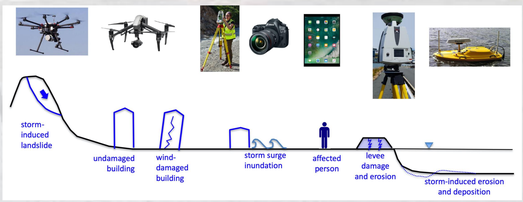


Fig. 3: RAPID Facility Multidisciplinary and Multi-Scale Data Collection (Berman et al. 2020)

Instrumentation Portfolio

- Advanced Geomatics Technologies
- Seismic and Coastal Instrumentation
- Social Science Reconnaissance Equipment
- Advanced Drone Fleet
- Ground Investigation
- Imaging Equipment
- Software tools
- Full list on RAPID website

Rapp (RAPID App)

- In the App Store NOW
- Developed for the Reconnaissance Community Based on User Feedback
- Photos, Notes, Audio recordings, Questionnaires, KML, and More
- Customizable Menus
- Automatically Syncs Data to DesignSafe

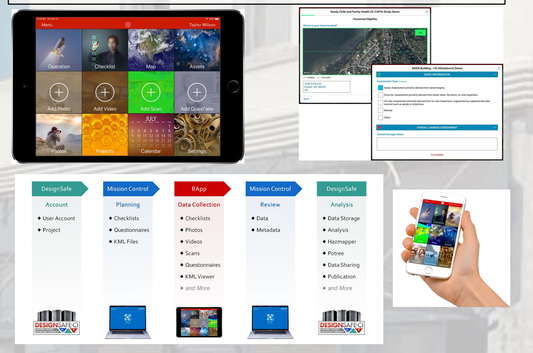
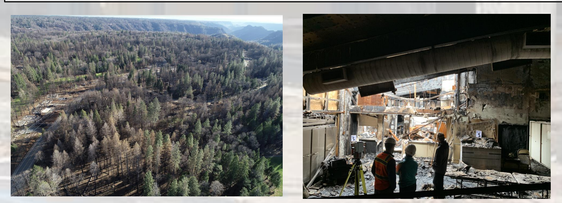


Fig. 4: Rapp Main Screen, Questionnaires, Workflow, iPhone App

Example Mission: Camp Wildfire, California

- Goals: Data collection on wildfire urban interface for schools and hospitals
- Lead by Erica Fischer (Oregon State University), NSF Award 1917298



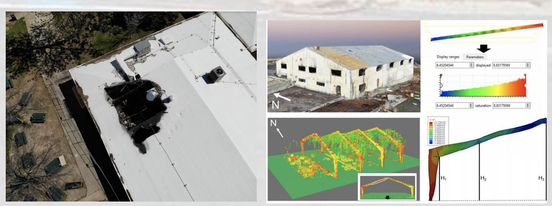
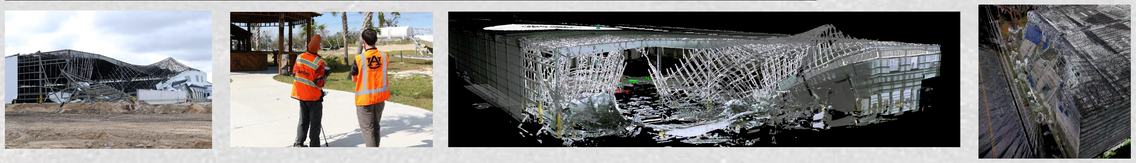


Fig. 5: Camp Wildfire Data Collection and Subsequent Analysis of Damaged Buildings (Schulze et al. 2020)

Example Mission: Hurricane Michael, Florida

- Goals: Documented damage to 10+ low-rise, large-volume buildings with similar failure mode during Hurricane Michael; examine failure modes, calculate likely wind loads, develop recommendations for design
- Lead by David Rouche (U. Auburn), NSF Award 1904327



Mission Support

- Since beginning field operations in September 2018, the facility has supported of over 150 natural hazard deployments worldwide for over 60 organizations.

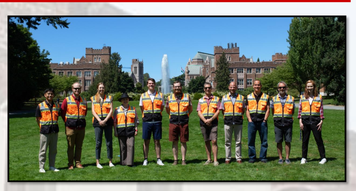


Fig. 6: RAPID Deployments

Example Mission: Palu, Indonesia Earthquake and Tsunami

- High-resolution orthomosaic mapping across multiple km^2
- GEER (Geotechnical Extreme Event Reconnaissance) mission, NSF Award 1826118

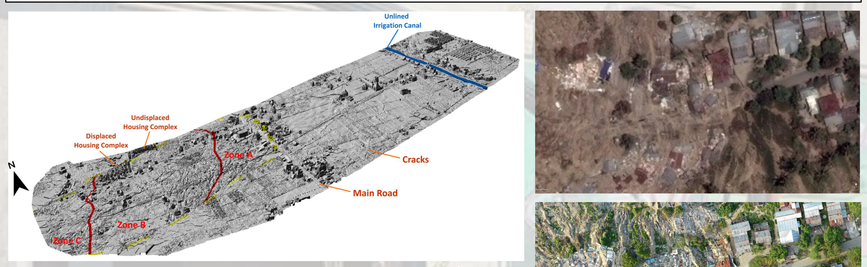


Fig. 7: Palu Co-Seismic Landslide Mapping (DEM, satellite imagery, RAPID UAS imagery) Mason et al. (2021)

Example Mission: Seattle COVID 19 Streetview

- Goals: Data Collection on long term urban recovery from COVID
- Lead by Nicole Errett, Joe Wartman, Youngjun Choe (UW), NSF Award 2031119

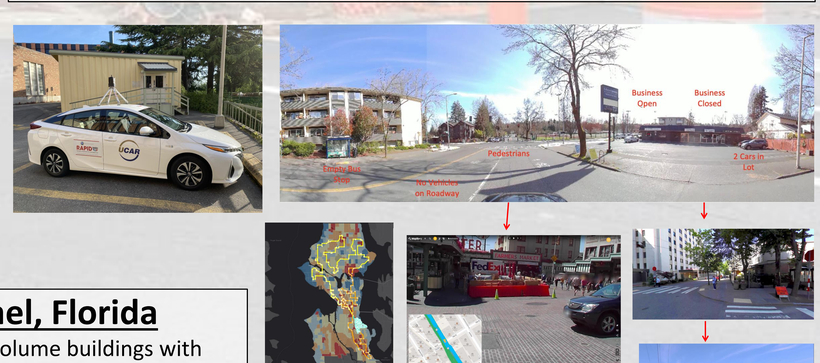


Fig. 8: Seattle COVID Streetview Car, Route map, 360 Photos, AI Identification of Features

Fig. 9: Hurricane Michael Damage to Large-Volume Buildings and 3D Point Cloud Models

Acknowledgements: The authors would like to acknowledge funding support from NSF award # 1611820 and 2130997. The authors and the University of Washington acknowledge the Coast Salish peoples of this land, the land which touches the shared waters of all tribes and bands within the Suquamish, Tulalip and Muckleshoot nations.

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