

**P
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Core Research Program

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Deputy Director for Research



PEER 2003 Annual Meeting

Thrust Area Strategic Research Plans

Year



1	2	3	4	5	6	7	8	9	10
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Knowledge and Technologies (indicates milestones at end of year)

- THRUST AREA OBJECTIVES
- Meaningful PBEE Objectives
- Tools for Economic Evaluation of PBEE
- Modeling of Losses and Costs
- Identify Barriers to Adoption and Implementation

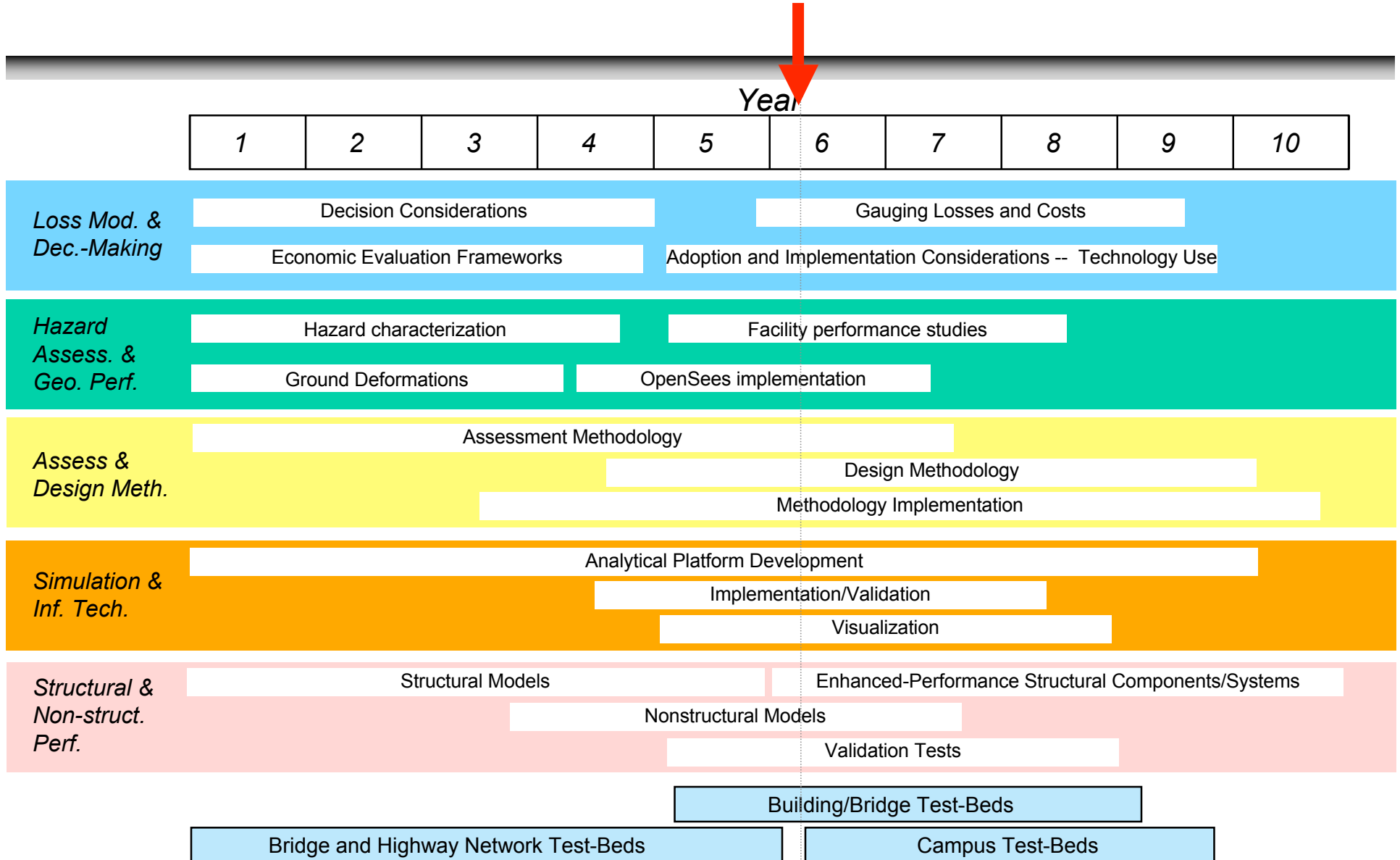
Decision Considerations -- Making Tradeoffs					<ul style="list-style-type: none"> • (yr 5) Performance considerations • (yr 6) Performance metrics and communication 				
Economic Evaluation Frameworks				<ul style="list-style-type: none"> • (yr 4) Relevance of economic frameworks (synthesis reports) • (yr 6) Applications of economic frameworks to testbeds 					
Gauging Losses and Costs						<ul style="list-style-type: none"> • (yr 6) Non structural costs • (yr 8) Indirect Losses 			
Adoption and Implementation Considerations -- Technology Use									
<ul style="list-style-type: none"> • (yr 5) Adoption barriers & issues 				<ul style="list-style-type: none"> • (yr 7) Implications for existing systems of building regulation • (yr 9) Strategies for disseminating PBEE products 					

Technology Integration – Contribution to Test-Beds

Bridge and Highway Network Test-Beds									
				Building Test-Beds					
					Campus Test-Bed				
<ul style="list-style-type: none"> • These are the settings for testing and refining frameworks and tools identified under this thrust area • These also provide the setting for linking socio-economic and engineering considerations 									



Composite - Thrust Area Plans




PEER - PBEE Methodology Components

Loss Models

Performance
(Damage) Models

Simulation Models



• Decision Variable
(*\$ loss, downtime, life-safety*)



• Damage Measure
(*condition assessment,
necessary repairs*)



• Engrg. Demand Param.
(*drift, acceleration*)



• Intensity Measure
(*S_a, S_v, duration ...*)

PBEE – Probability Framework Equation

$$v(DV) = \int \int \int G\langle DV | DM \rangle | dG\langle DM | EDP \rangle | dG\langle EDP | IM \rangle | d\Omega(IM)$$

Alternative Performance Descriptions:

PROBABILITY

MANAGEMENT

SCENARIO

Expected

where

IMC

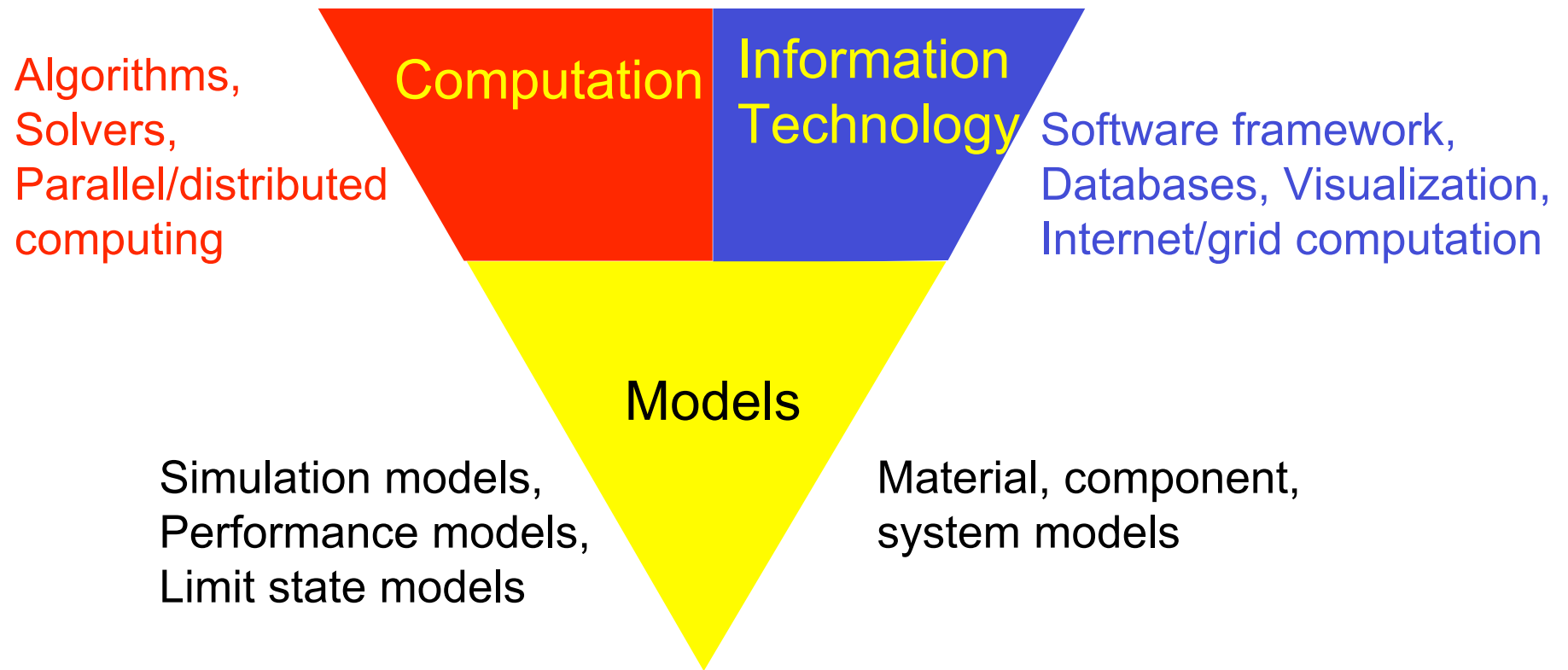
Expected loss can be specified with a probability of non-exceedence

Implementation Through

LRFD-like Format on EDPs:

$$\int \int_{D|S_a} \cdot \hat{D}_{S_a^{Pf_0}} \int \int_C \cdot \hat{C} \quad [., S_a(T_1)]$$

Integrated Simulation/Assessment Platform

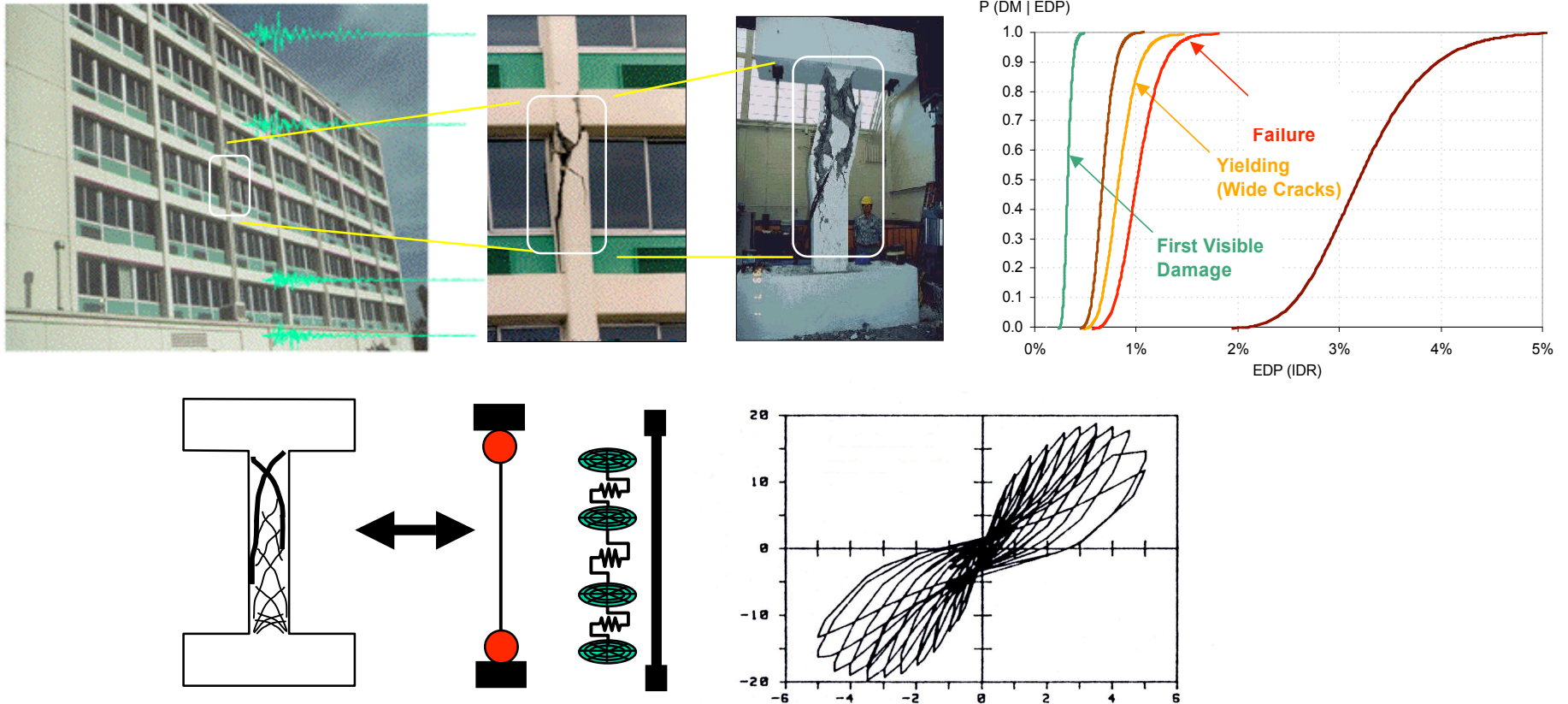


OpenSees

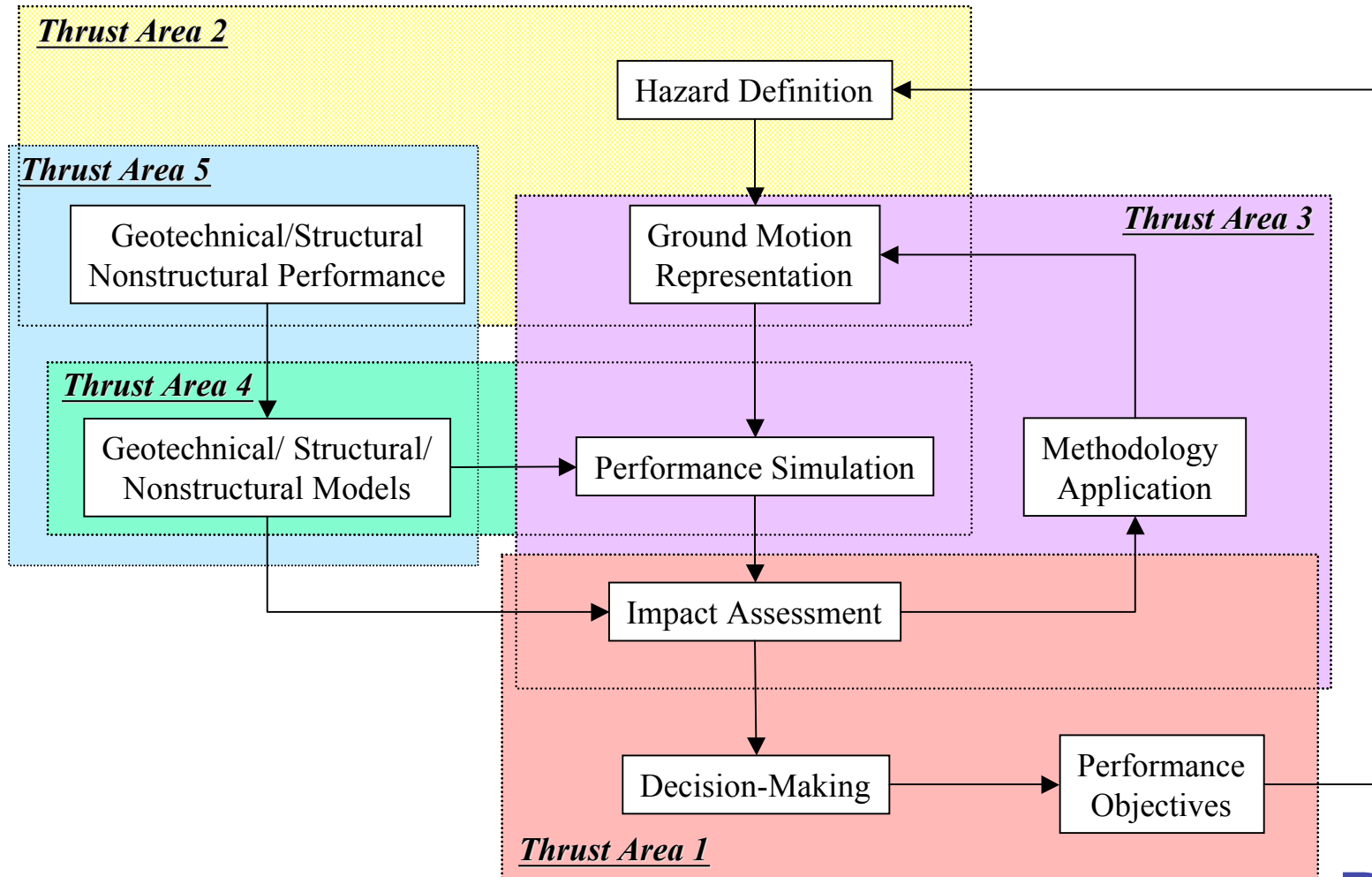
<http://opensees.berkeley.edu>



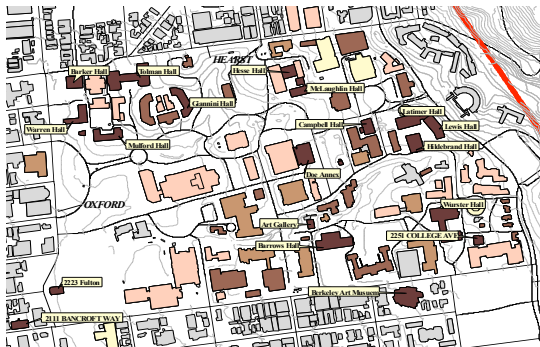
Tests --- Simulation & Performance Models



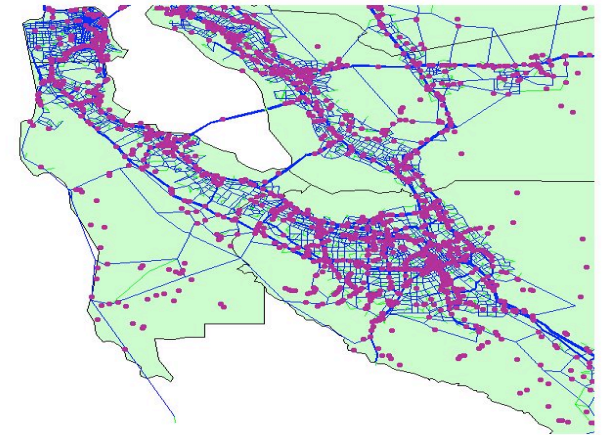
PEER Research Elements & Thrust Area Coverage



Integrative Testbeds



- Buildings
 - Van Nuys
 - UC Sciences
 - UCB Campus
-
-
- Bridges
 - Humboldt Bay
 - I-880 Viaduct
 - Bay Area Highway Network



Testbed – Objectives

- Exercise methodology and tools on systems with real world complexities
- Assess and improve methodology and tools
- Facilitate research integration
- Identify gaps and needed research
- Facilitate technology transfer
 - involve industry partners
 - standardization of methodology
 - develop illustrative examples

Testbed Progress and Calendar

- See Testbeds webpage for reports, data, meeting notes
- Stay in touch with testbed leaders and coordinator (Keith Porter)
- Key Dates
 - Site visit: May 19/20
 - Late spring/summer meetings
 - Oct. 2003: Wrap Up Meeting
 - Jan. 2004: Formal reports at PEER Annual Meeting
- Follow-up & continuations?



Research Collaboration & Coordination

- Core Program and Lifelines Program
- Core Program Interactions
 - Thrust Areas
 - Testbeds
 - Topical Areas (task working groups)
 - Investigator to Investigator
 - Investigator to BIP members
- External Collaborations (USGS, SCEC, ...)



Project Reporting & Outputs

- Refereed Papers
- PEER Technical Reports
(Janine@peer.berkeley.edu)
- PEER Research Digests
- Published Software & Documentation
- Conference Papers and Presentations
- Professional & Public Outreach
- Students (Undergrad, MS, and PhD)

