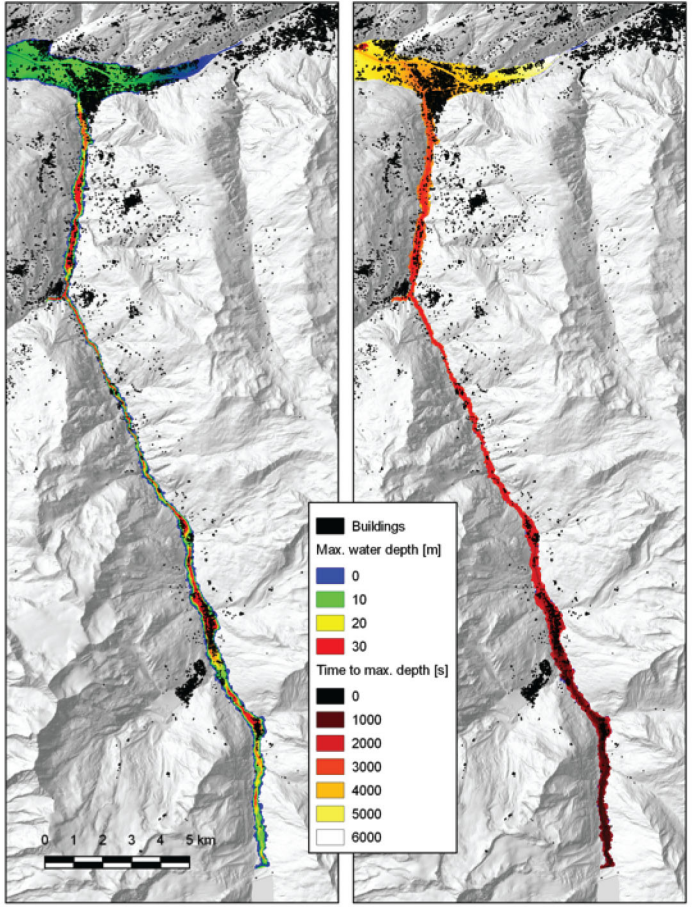
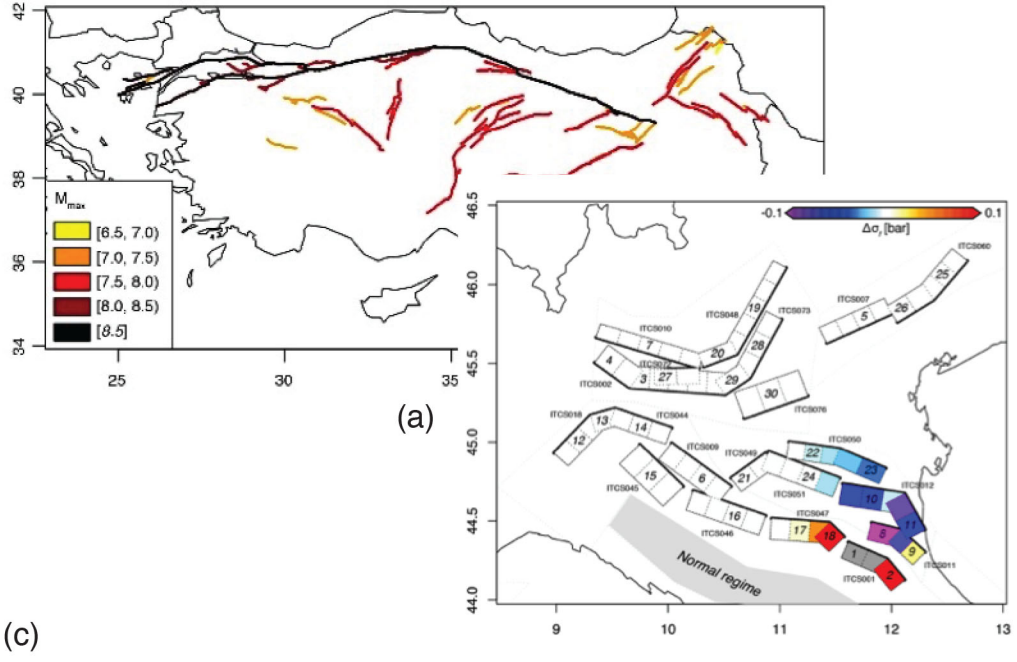


(b)



(a)

(c)

Fig. 1: Examples of hazard models developed in STREST to consider extreme events in risk analysis: (a) Earthquake models including fault rupture propagation and spatiotemporal clustering; (b) Downstream flooding at dams; (c) Site-specific tsunami hazard.

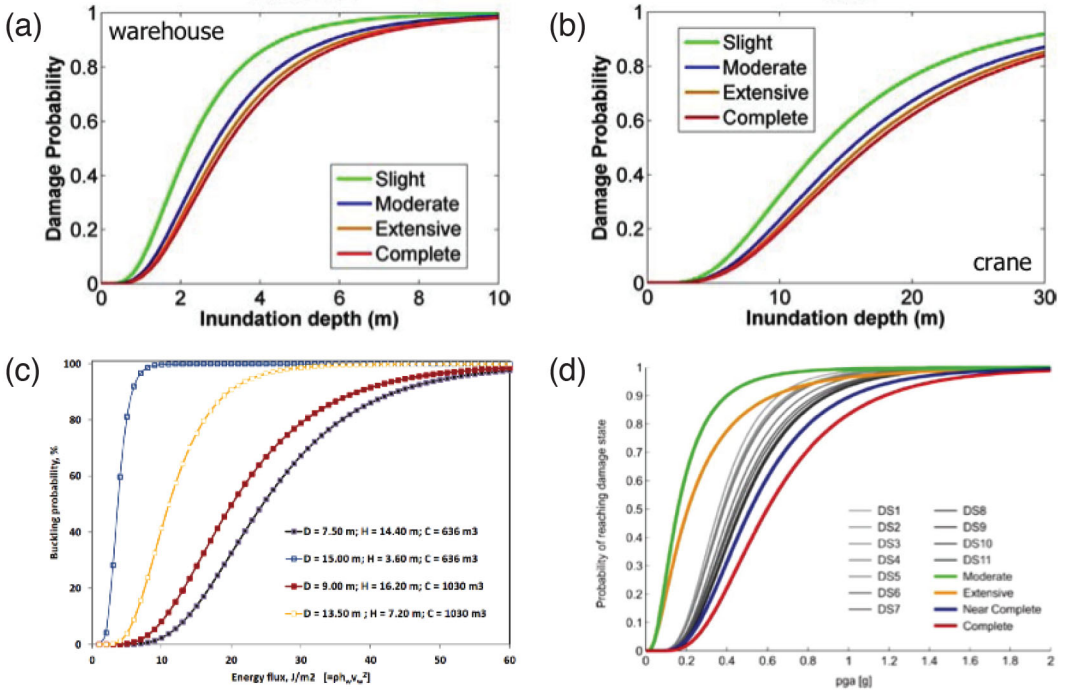


Fig. 2: Examples of fragility curves developed in the STREST project: (a) warehouses, (b) cranes and (c) atmospheric tanks for tsunami hazard and (d) structural and non-structural components of industrial buildings for earthquake hazard.

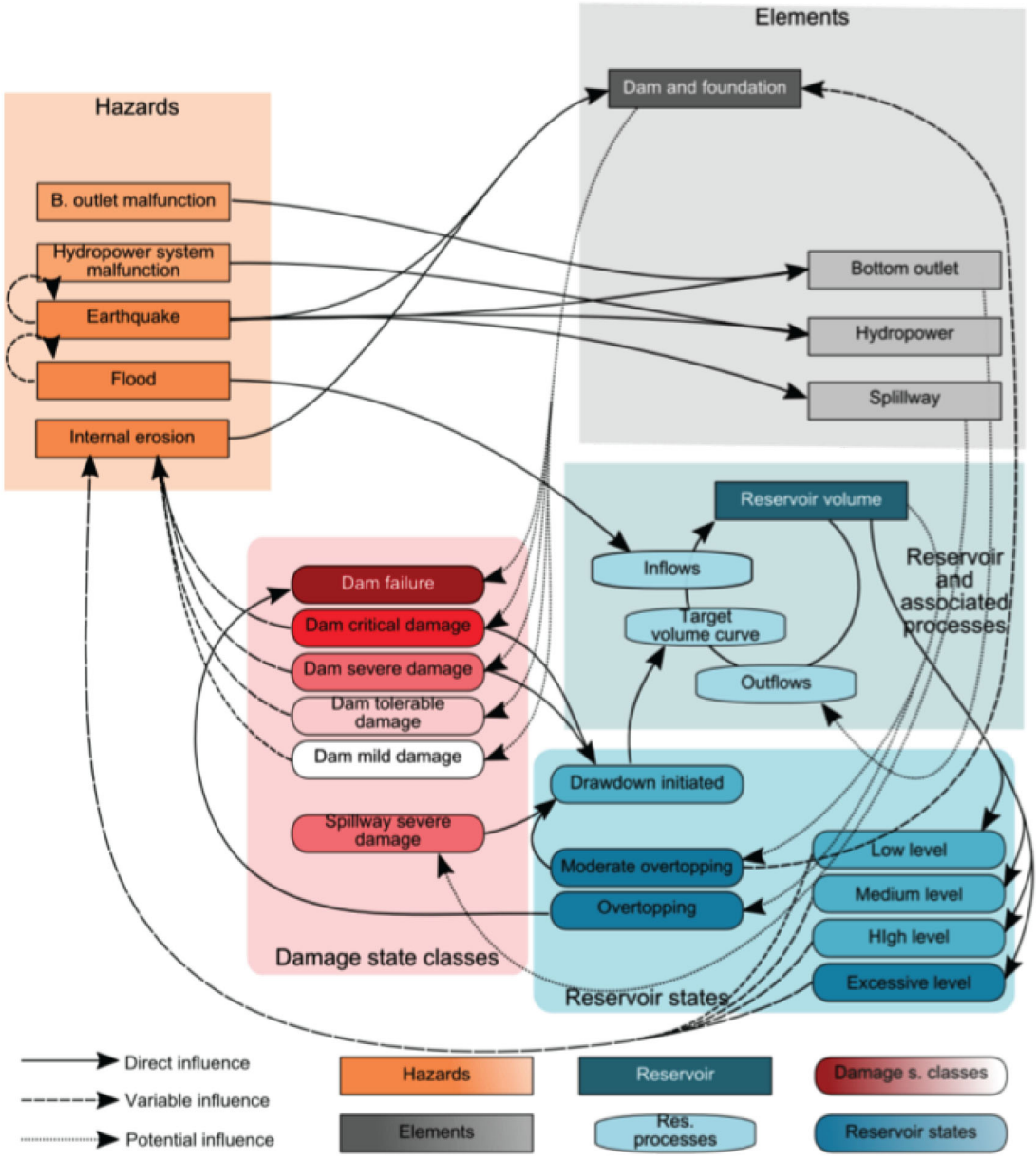


Fig. 3: Example of system-level risk analysis: Case of the hydropower dam interface with multiple interactions between hazard and system elements implemented and simulated in the Generic Multi-Risk (GenMR) framework.

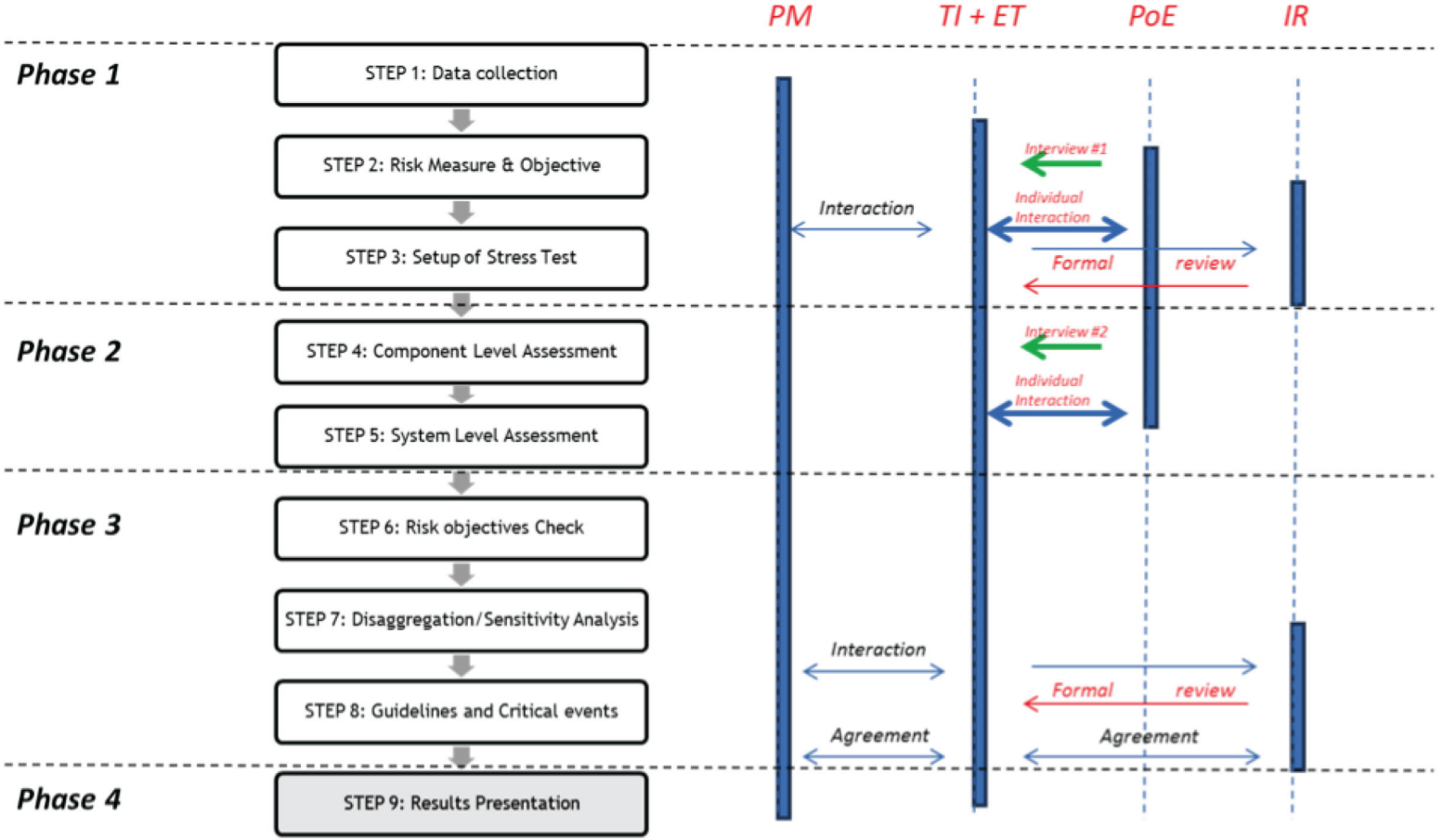


Fig. 4: The STREST stress test workflow (ST@STREST). PM: Project manager, TI: Technical integrator, ET: Evaluation team, PoE: Pool of experts and IR: Internal reviewers.

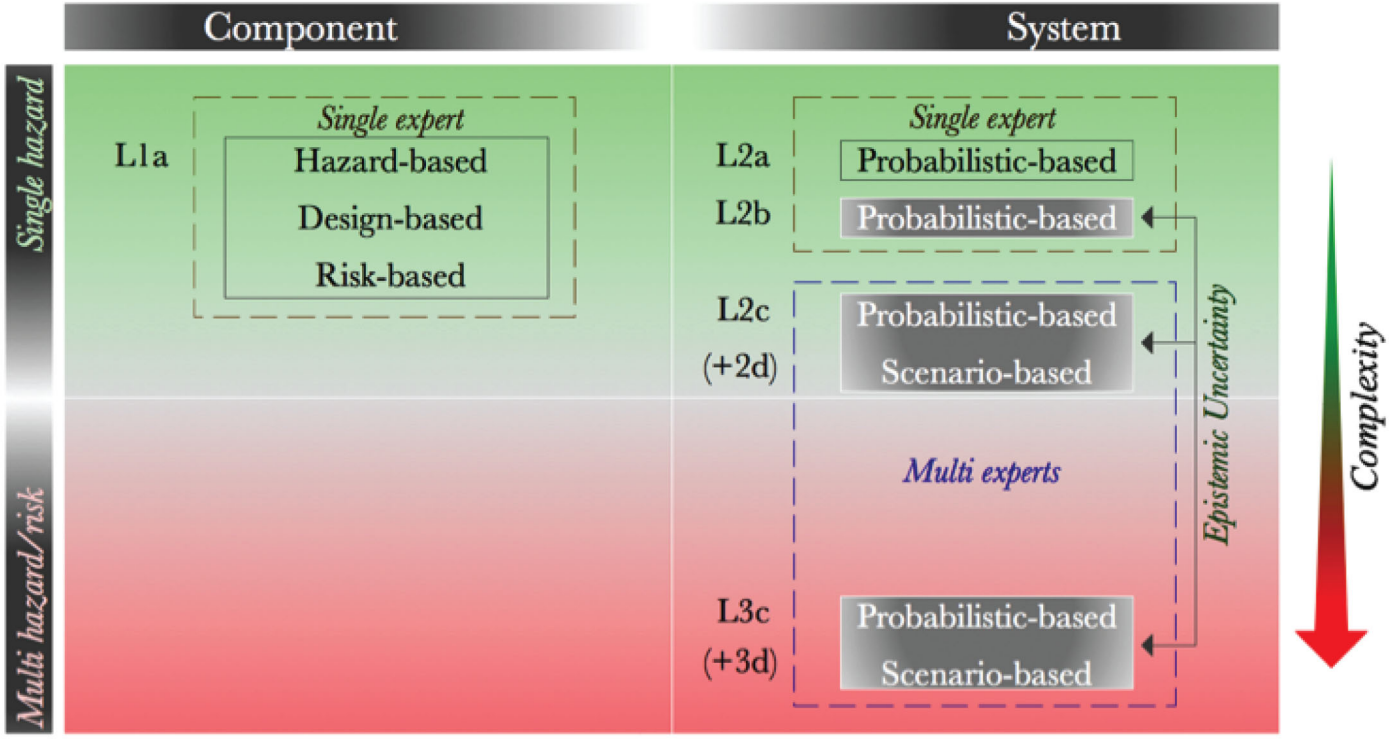
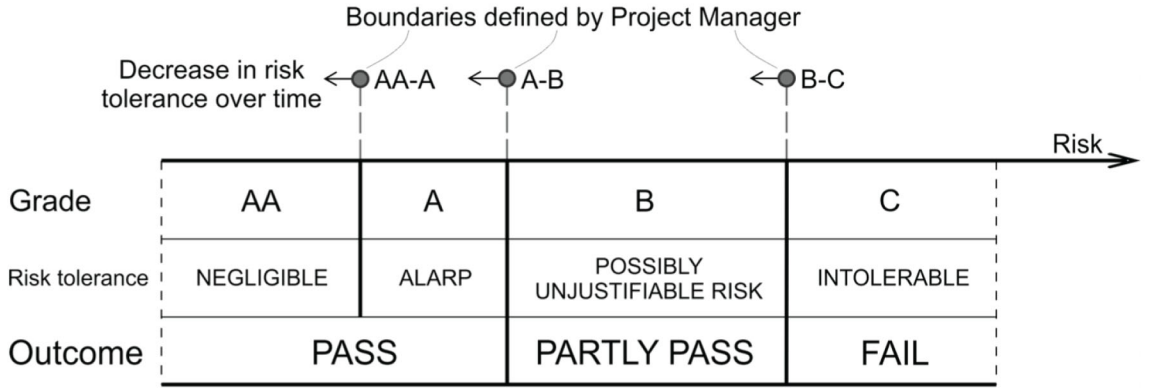


Fig. 5: The different levels of the STREST stress test workflow (ST@STREST), increasing in complexity from L1 to L3.

Fig. 6: STREST summary results: ST-Lxx labels represent the different levels of the stress test framework from L1a (component level) to L3d (system level + Multi-hazard). CI-xx labels represent the different pilot sites, in order: refinery, dam, pipelines, gas network, harbour and industrial district.



Case study	Hazard	Grading range								
		ST-L1a	ST-L2a	ST-L2b	ST-L2c	ST-L2d	ST-L3a	ST-L3b	ST-L3c	ST-L3d
CI-A1	Earthquake	AA-C	-	AA-C	-	AA-C	-	-	-	-
	Tsunami	AA-C	-	AA-C	-	AA-C	-	-	-	-
CI-A2	Earthquake/ Flood/ Internal erosion/ Outlet malfunction/ Hydropower system malfunction	AA-A	-	AA-A	-	AA-A	-	-	AA-A	AA-A
CI-B1	Earthquake	B	B	-	-	-	-	-	-	-
CI-B2	Earthquake/ Liquefaction	AA-A	AA-A	-	-	-	-	-	-	-
CI-B3	Earthquake	C	-	-	-	-	-	-	-	-
	Tsunami	AA-C	-	AA	-	-	-	-	-	-
	Earthquake/ Liquefaction	-	-	B	-	AA-C	-	-	-	AA-C
CI-C1	Earthquake	B-C	-	B-C	-	-	-	-	-	-

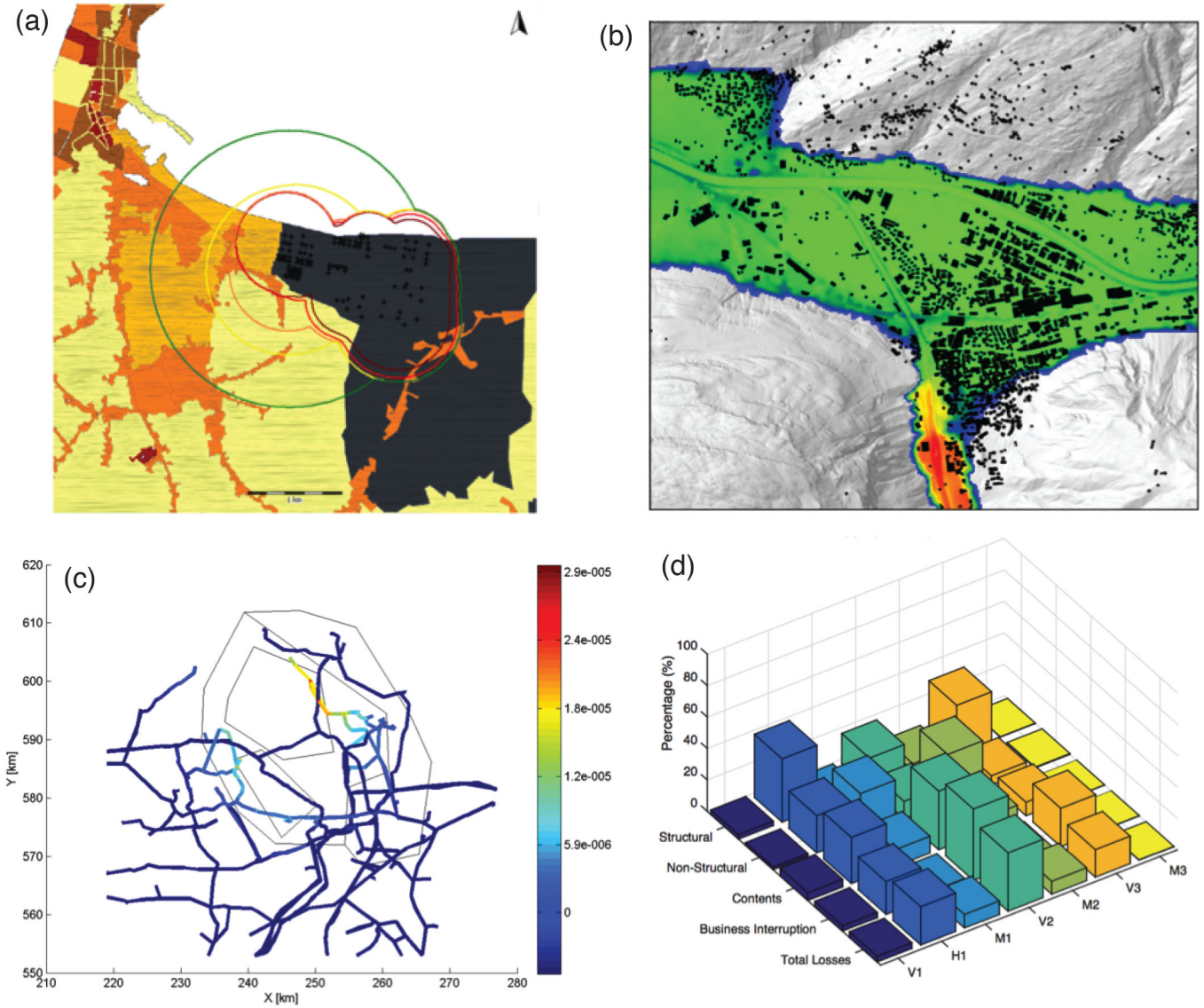


Fig. 7: Examples of results at different STREST pilot sites: (a) Natech risk by combining seismic, tsunami and industrial hazards at a refinery; (b) Inundation map downstream of a hydropower dam; (c) Network failure analysis in a gas network under induced seismicity; (d) Disaggregation of risk causing stress test failure at an industrial district.