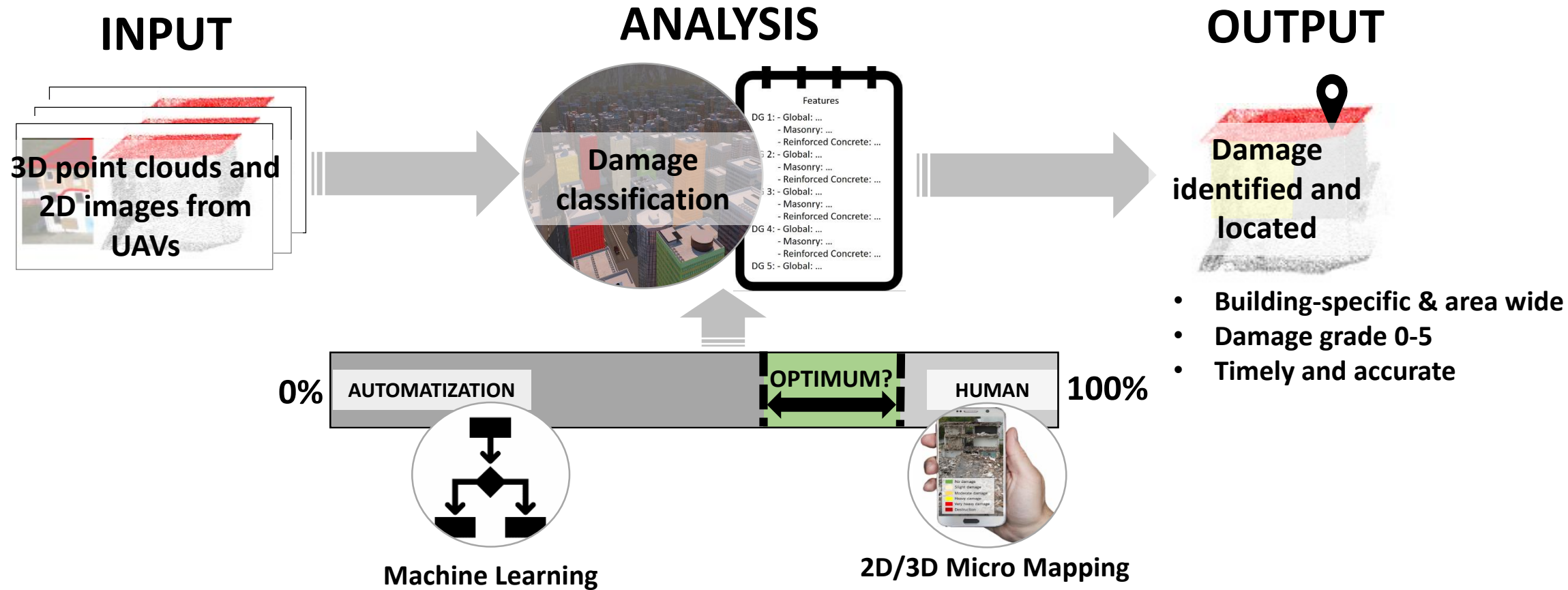
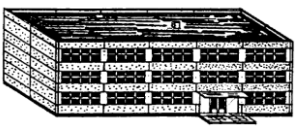
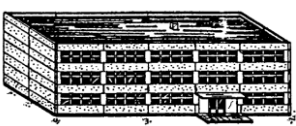


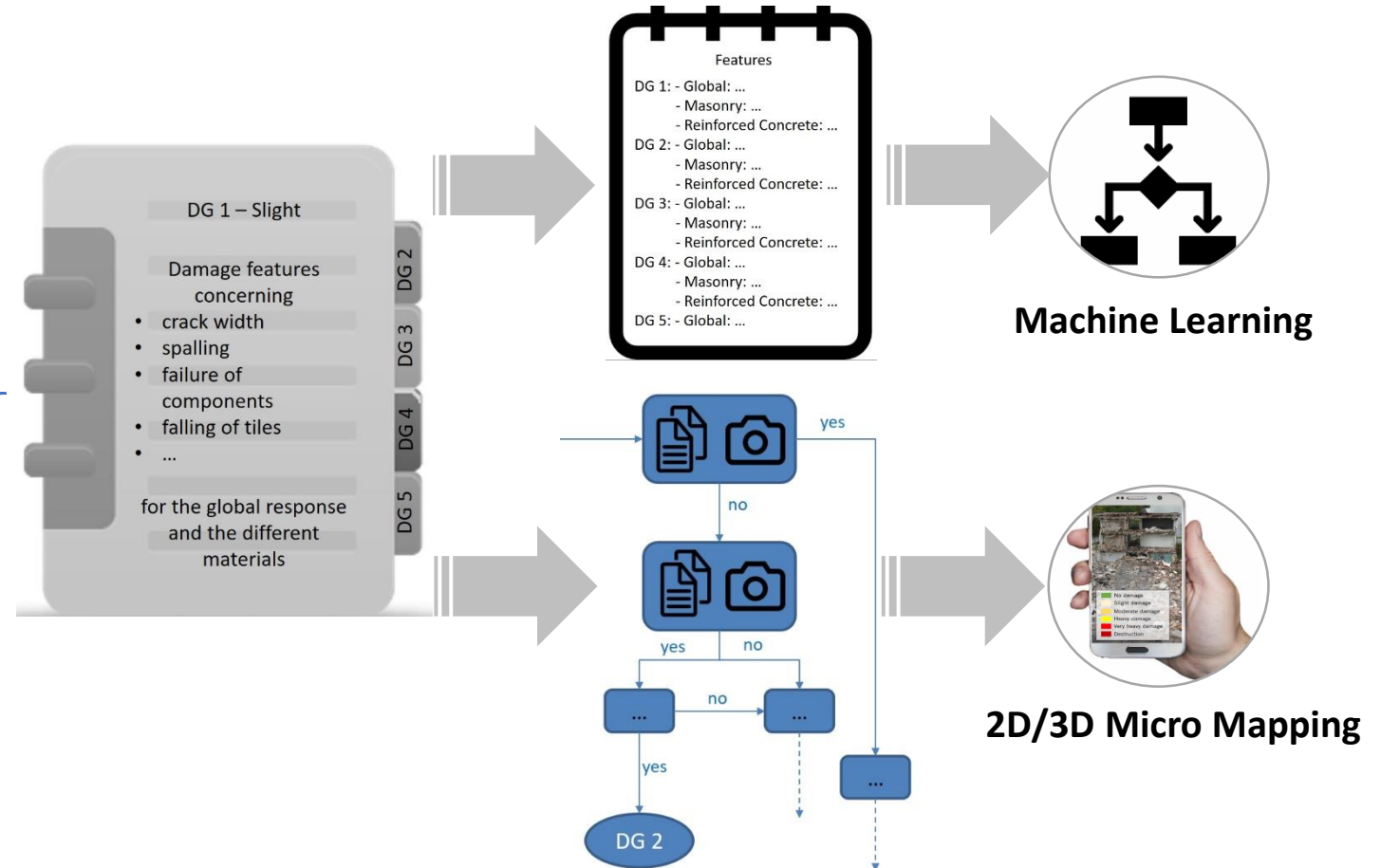
3D Point Cloud-Based Assessment of Detailed Building Damage: A Combination of Machine Learning, Crowdsourcing and Earthquake Engineering



Damage Catalogue – Decision Basis for Damage Classification

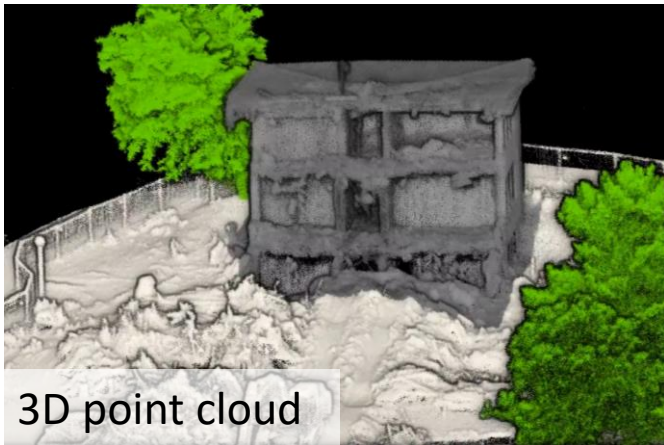
Damage grade		
		1 – Slight damage
		2 – Moderate damage
		3 – Heavy damage
		4 – Extreme damage
		5 – Destruction

[EMS-98]



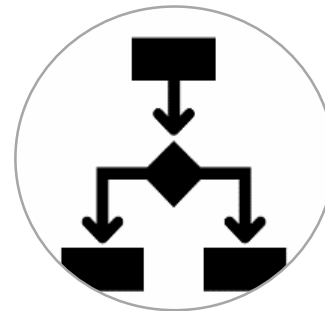
Combining Automatic and Crowdsource-Based Approaches for Damage Classification

INPUT



CLASSIFICATION

Machine Learning



2D/3D Micro Mapping

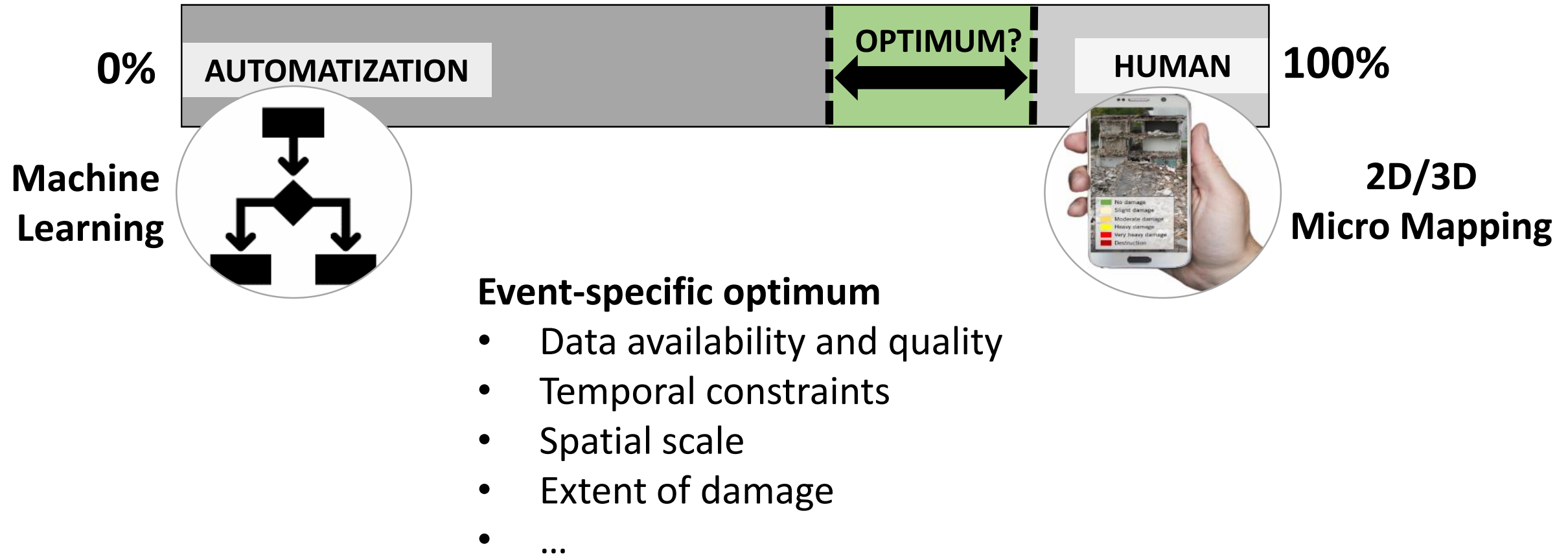
OUTPUT

Building-specific damage

- No damage
- Slight damage
- Moderate damage
- Heavy damage
- Extreme damage
- Destruction



Combining Automatic and Crowdsource-Based Approaches for Damage Classification



LOKI – Airborne Observation of Critical Infrastructures

Current earthquake damage assessment



Timespan: Weeks or months



Data: Only available after several days



Experts: Play a key role

LOKI

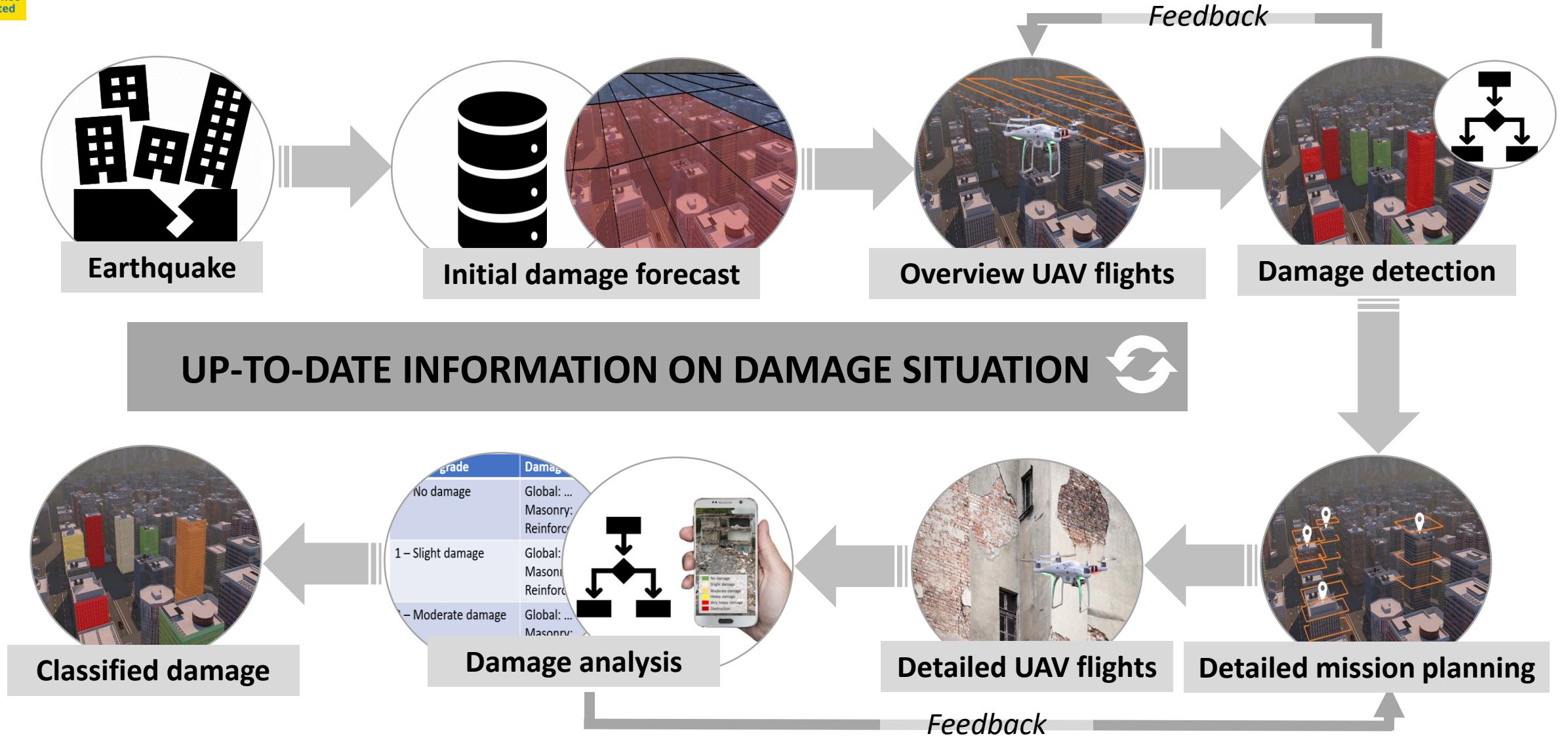
Improved response time & efficient use of resources

Timely and detailed recording of damage

Volunteers support experts

Automated procedures & visual interpretation

LOKI – Airborne Observation of Critical Infrastructures



LOKI – Airborne Observation of Critical Infrastructures



Heidelberg University (Prof. Dr. B. Höfle, Prof. Dr. A. Zipf)
Crowdsourcing and automated damage detection and classification



Aeromey GmbH (H. Mey)
UAV infrastructure and hardware



FZI Research Center for Information Technology (Dr. K. Glock)
Mission planning for UAVs



German Research Center for Geoscience Potsdam (Dr. D. Schorlemmer)
Exposure modelling



Karlsruhe Institute of Technology (Prof. Dr. L. Stempniewski)
Damage classification

LOKI – Airborne Observation of Critical Infrastructures



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