EUROCORES Programme

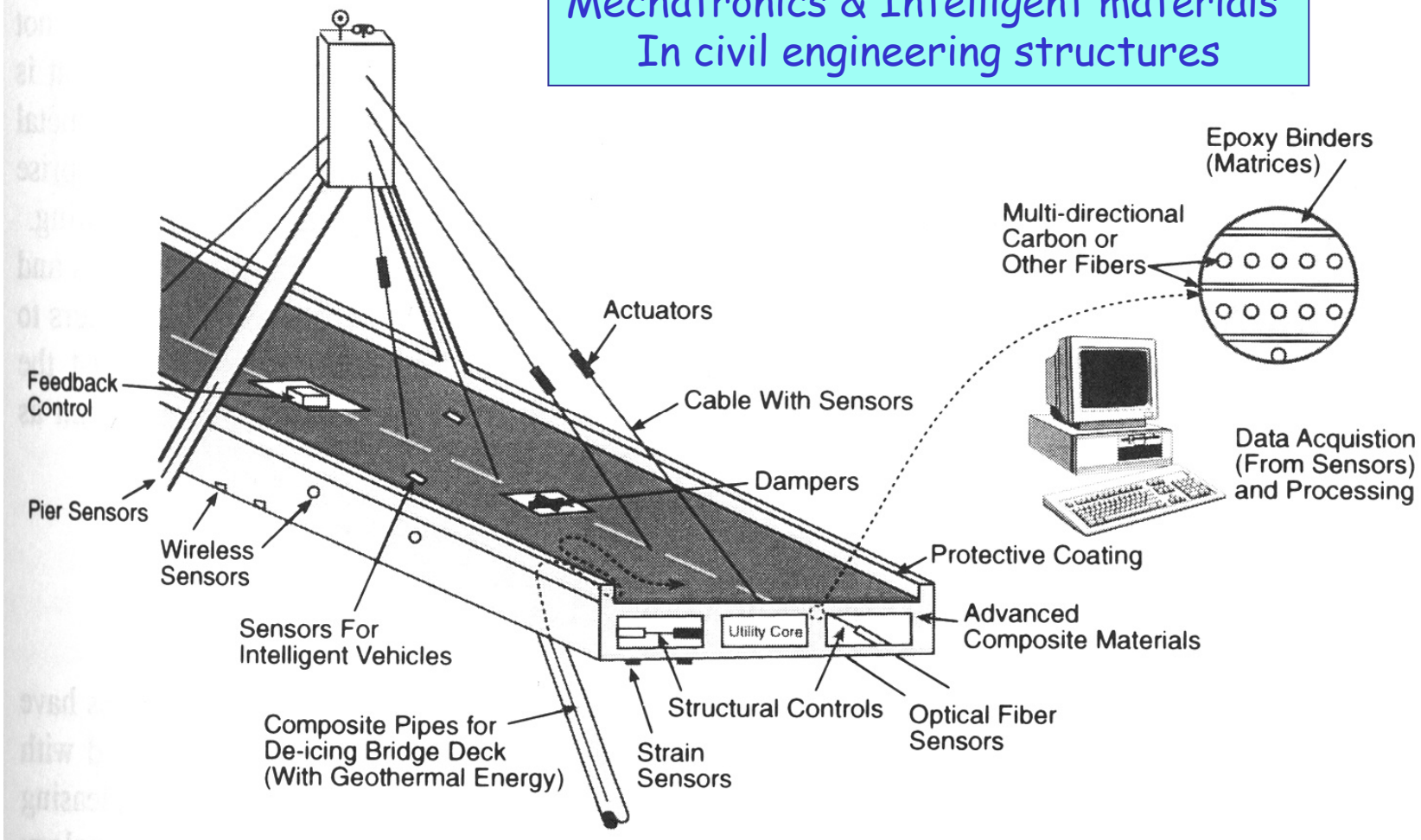
Smart Structural Systems Technologies (S3T)

Smart sensing for Structural Health Monitoring (S3HM)

Project leaders : A. Preumont and A. Deraemaeker, ULB

K. Worden (University of Sheffield),
G. De Roeck (KULeuven)
Y. Kullaa (Helsinki University)
W. Ostachowicz (IFFM Gdansk)
C. Farrar (Los Alamos)
B. Peeters (LMS Int)

Mechatronics & Intelligent materials In civil engineering structures



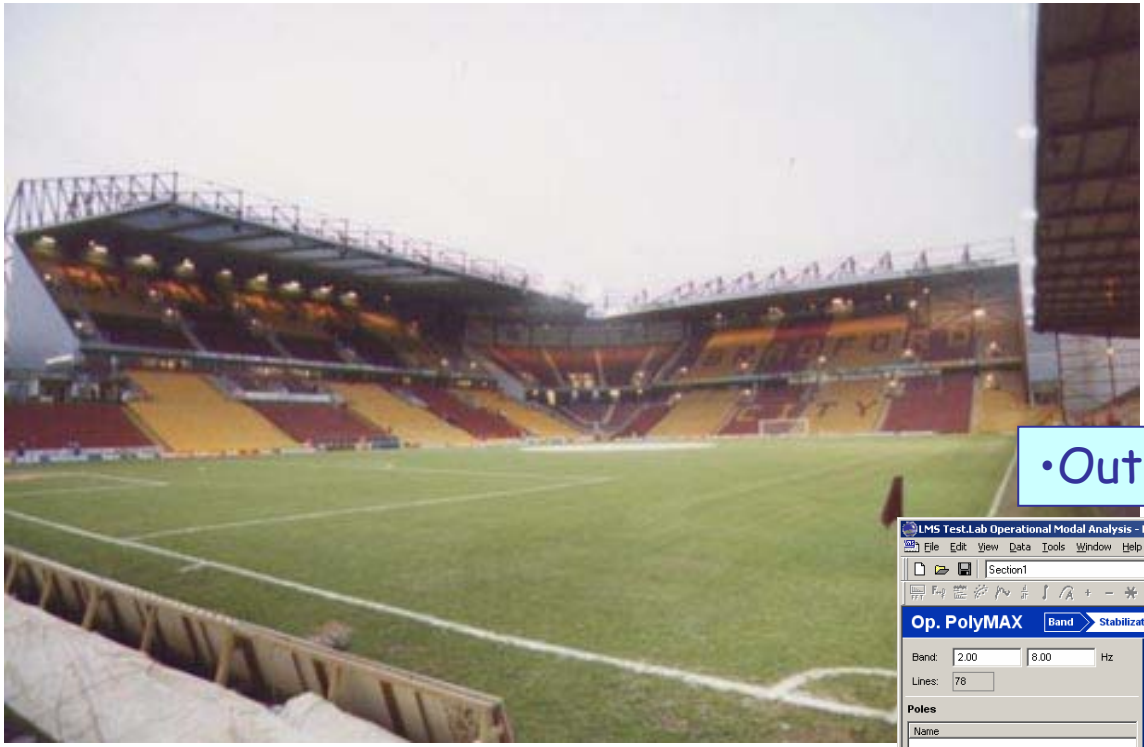
Source: USA today, March 3, 1997 (Buckley J.T.)

The four levels of
Structural Health Monitoring:

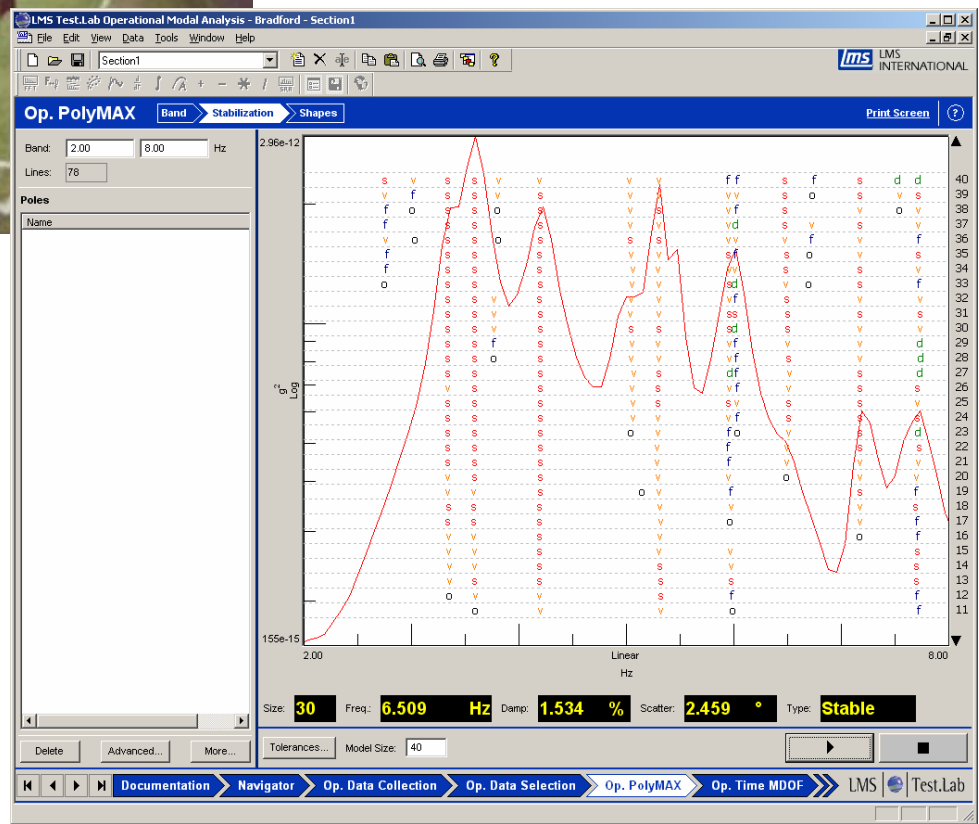
1. Detection
2. Localization
3. Quantification
4. Residual lifetime prediction

Additional requirements:

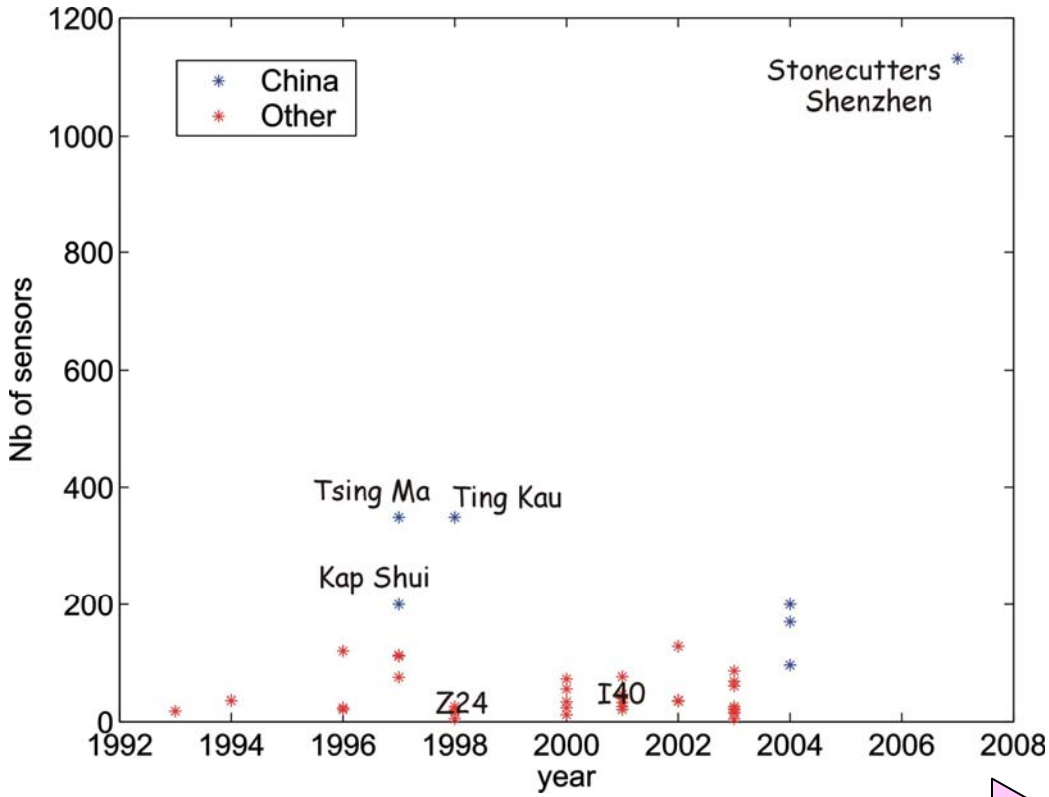
- Use Large sensor networks
- Use output-only measurements
- Eliminate environmental effects



- Output-only modal identification



Number of Sensors vs. Time in Bridges

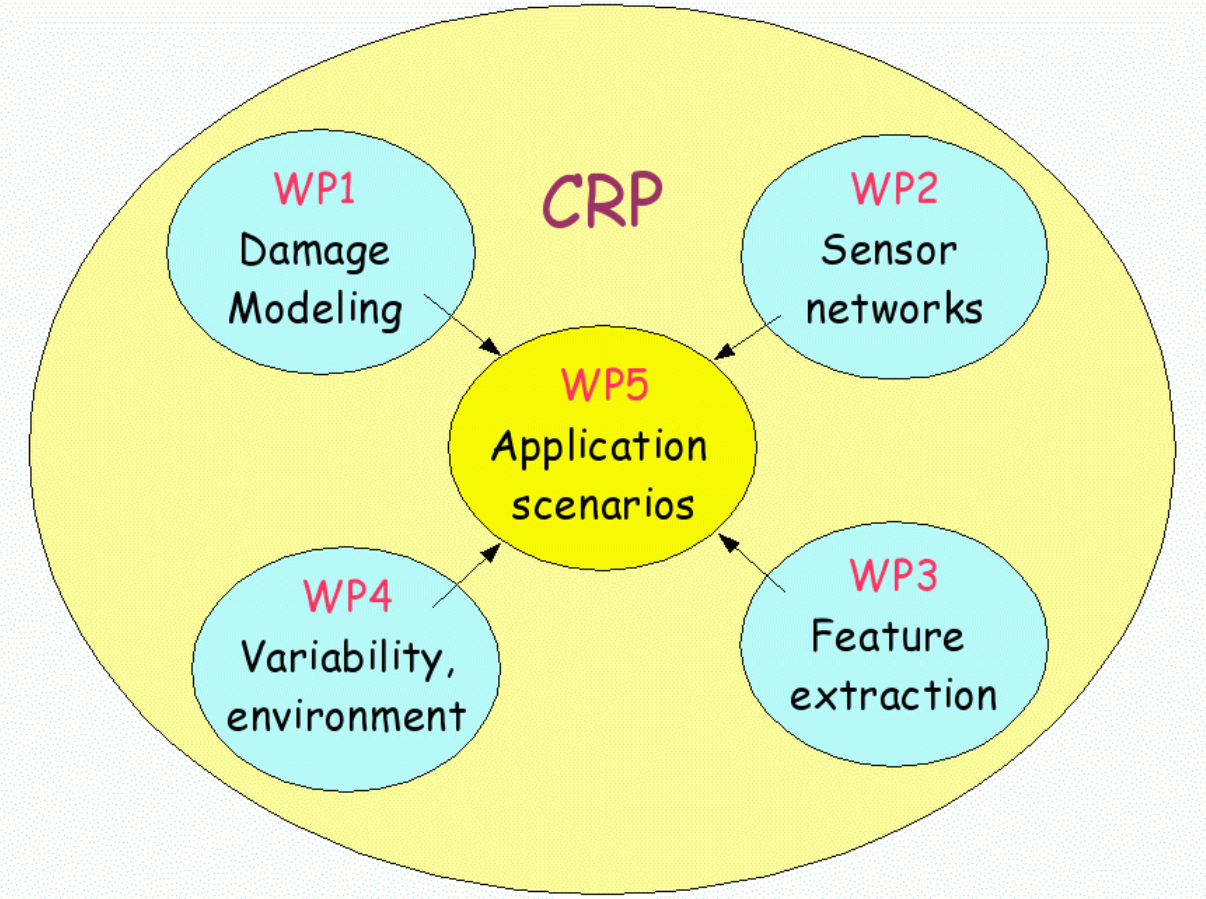


Moving towards sensor arrays

Collaborative Research Project : aims and objectives

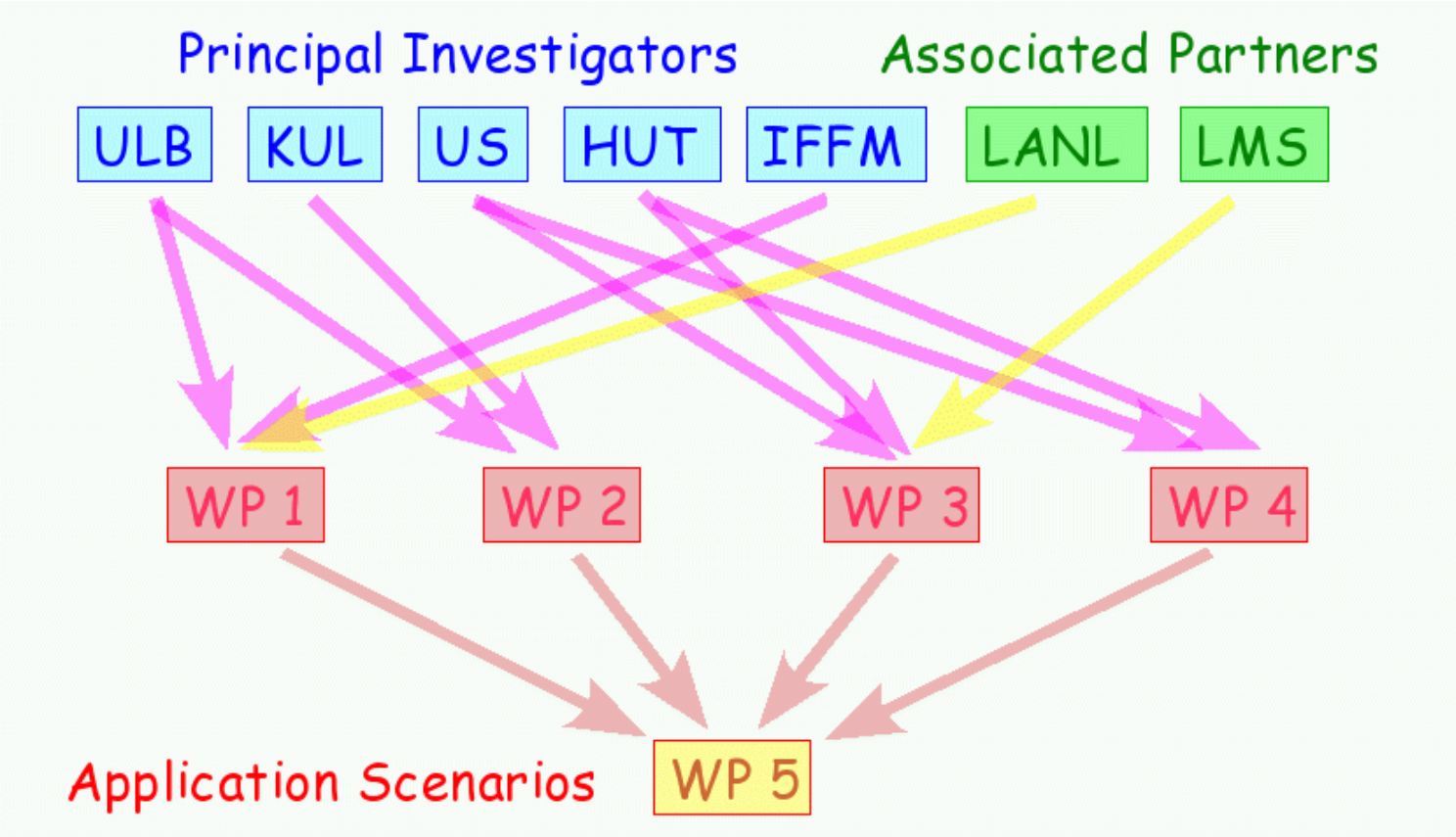
- Using smart sensing/actuation technologies for SHM
- Signal processing of large sensor arrays
- Extracting features relevant to damage and immune to variability & environment
- Designing robust methods for autonomous SHM systems

CRP Organization



	Year 1				Year 2				Year 3			
	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4
WP 1 : Modeling of damage and wave propagation in structures							D1					
WP 2 : Optimal sensor networks					D2		D3		D4			
WP 3 : Robust feature extraction and pattern recognition					D5		D6		D7			
WP 4 : Environmental and operational conditions									D8			
WP 5 : Experimental evaluation and assessment of SHM systems												D9

CRP Organization



Consortium expertise:

Partners:

K. Worden (University ofSheffield):
Machine learning, Pattern recognition for robust damage detection

G. De Roeck (KULeuven):
Feature extraction (output-only modal analysis), Sensors for strain measurements, Model updating for damage localization

W. Ostachowicz (IFFM Gdansk):
Modeling of damage, Wave propagation methods

A.Preumont & A.Deraemaeker (ULB – ASL):
Smart materials and structures, Active vibration control, Sensor networks, Spatial (modal) filtering

Y.Kulaa (HUT):
Removal of environmental effects, Multivariate statistics (control charts)

Associate partners:

B. Peeters (LMS Int): Output-only modal identification, Industrial applications

C. Farrar (Los Alamos): Extreme value statistics, remote monitoring

Funding situation

- ULB : OK
- US : OK
- HUT : OK
- IFFM : OK
- KUL : FWO funding was not granted. Will continue with alternative resources
- No funding for Associate Partners

Formal kick-off:
Monday September 18, 2006, in Leuven, during the ISMA conference

Experimental set-up built at ULB within S3HM