



# 123 Forum - NDT and SHM: Are They the Same?

## Same Physics - Different Approaches

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## Non-destructive evaluation (NDE)

### Non-destructive testing (NDT)

- Intermittent - few measurements
- Active - stimuli known/controlled
- Absolute - to determine as-is



Radar testing of bridge deck.  
Photo: Schumacher.

### Structural health monitoring (SHM)

- Continuous - short or long-term
- Passive - stimuli unknown
- Relative - to capture change



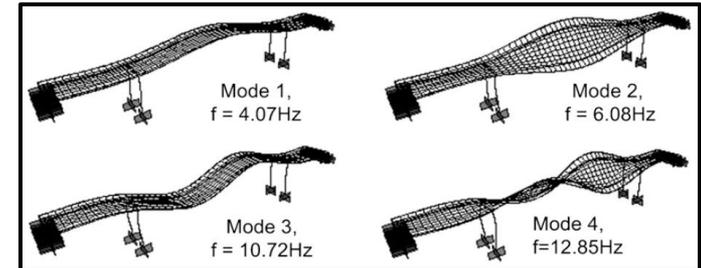
Indian River Inlet Bridge. Source:  
Skanska USA.

Sensors – Data acquisition – Data analysis – Evaluation

# Techniques and their physics

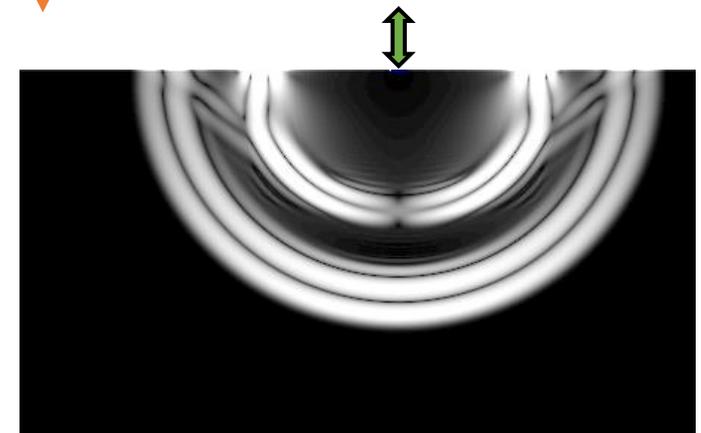
## Example: Wave motion, vibrations

- Modal analysis → NDT/SHM
- Impulse response → NDT
- Impact echo → NDT
- Ultrasonic velocity → NDT/SHM
- Acoustic emission → SHM
- Ultrasonic wavefields → NDT/SHM



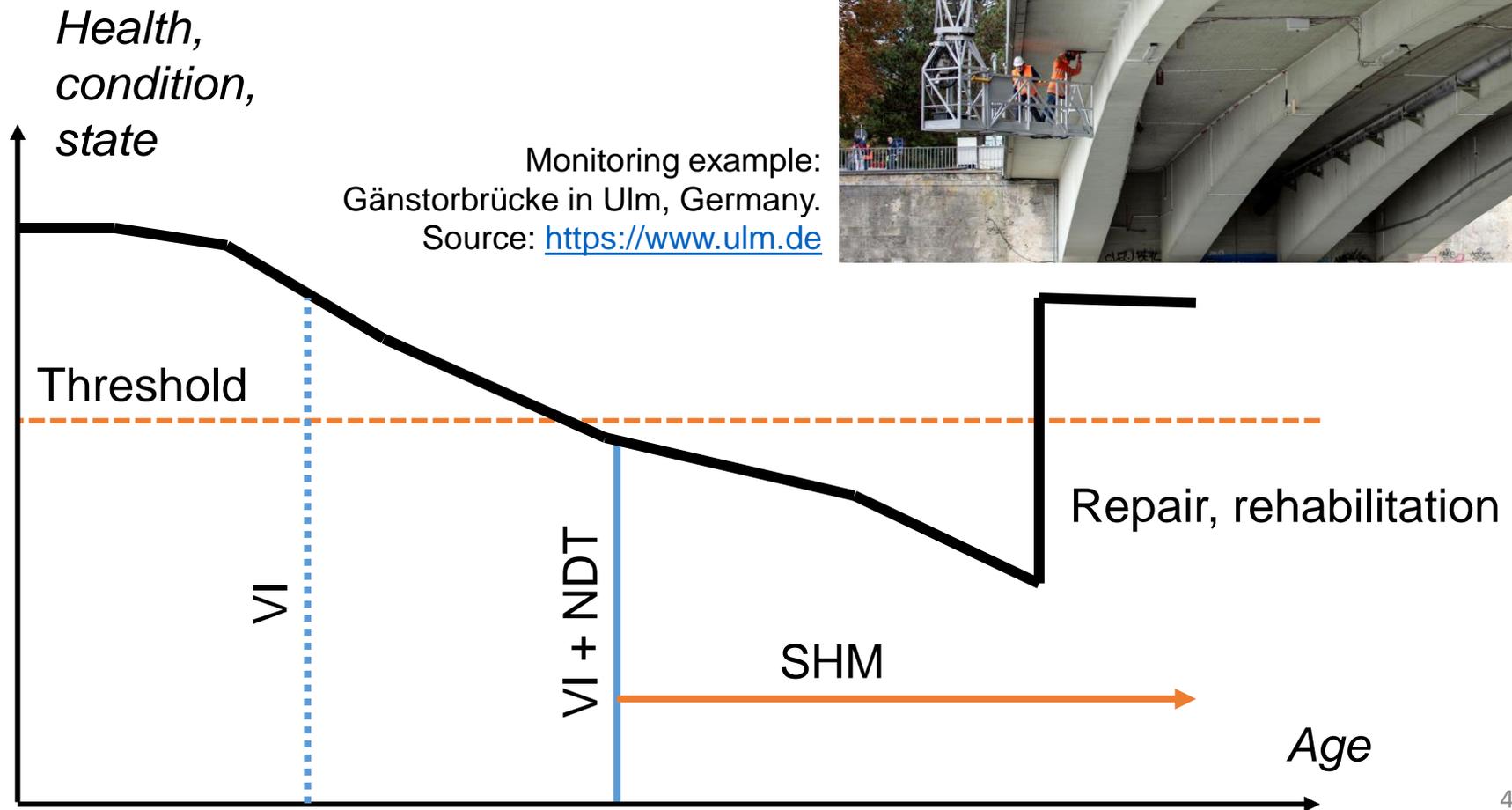
First four modes of a bridge. Source: Siringoringo et al., 2013

*Increasing frequency,  
decreasing wavelength*



Wavefield snapshot using Wave2000. Schumacher.

# One potential NDE framework



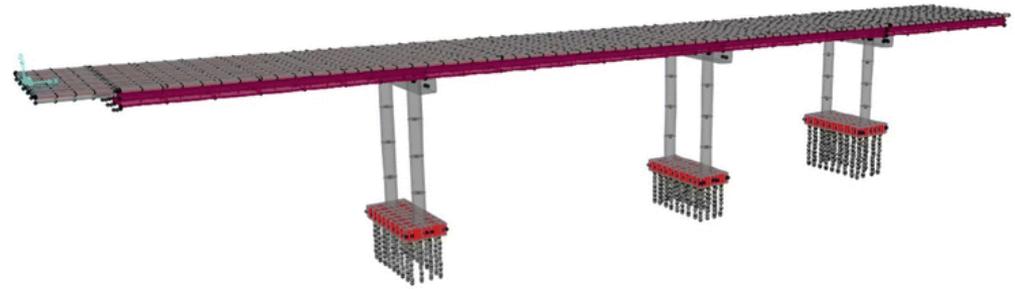
Monitoring example:  
Gänstorbrücke in Ulm, Germany.  
Source: <https://www.ulm.de>



# Summarizing thoughts

NDT and SHM are complementary approaches that can help with...

Photo: Schumacher



Source: [https://doi.org/10.1007/978-3-319-29751-4\\_19](https://doi.org/10.1007/978-3-319-29751-4_19)



Source:  
[https://doi.org/10.1061/\(ASCE\)CF.1943-5509.0000396](https://doi.org/10.1061/(ASCE)CF.1943-5509.0000396)

Photo: Schumacher

