Intro and Overview for Structural Health Monitoring and Bridges

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LOST
CONFUSED
UNSURE
UNCLEAR
PERPLEXED
DISORIENTED
BEWILDERED


SNAKE OIL
ORIGINAL FORMULA
Structural
Health Monitoring
CURES FOR WHAT AILS YA • ACCEPT NO SUBSTITUTES

Structural Health Monitoring – Los Alamos

The process of implementing a damage identification strategy for aerospace, civil and mechanical engineering infrastructure. Damage is defined as changes to the material and/or geometric properties of these systems, including changes to the boundary conditions and system connectivity, which adversely affect the system's performance.

Structural Health Monitoring – Chris Notes

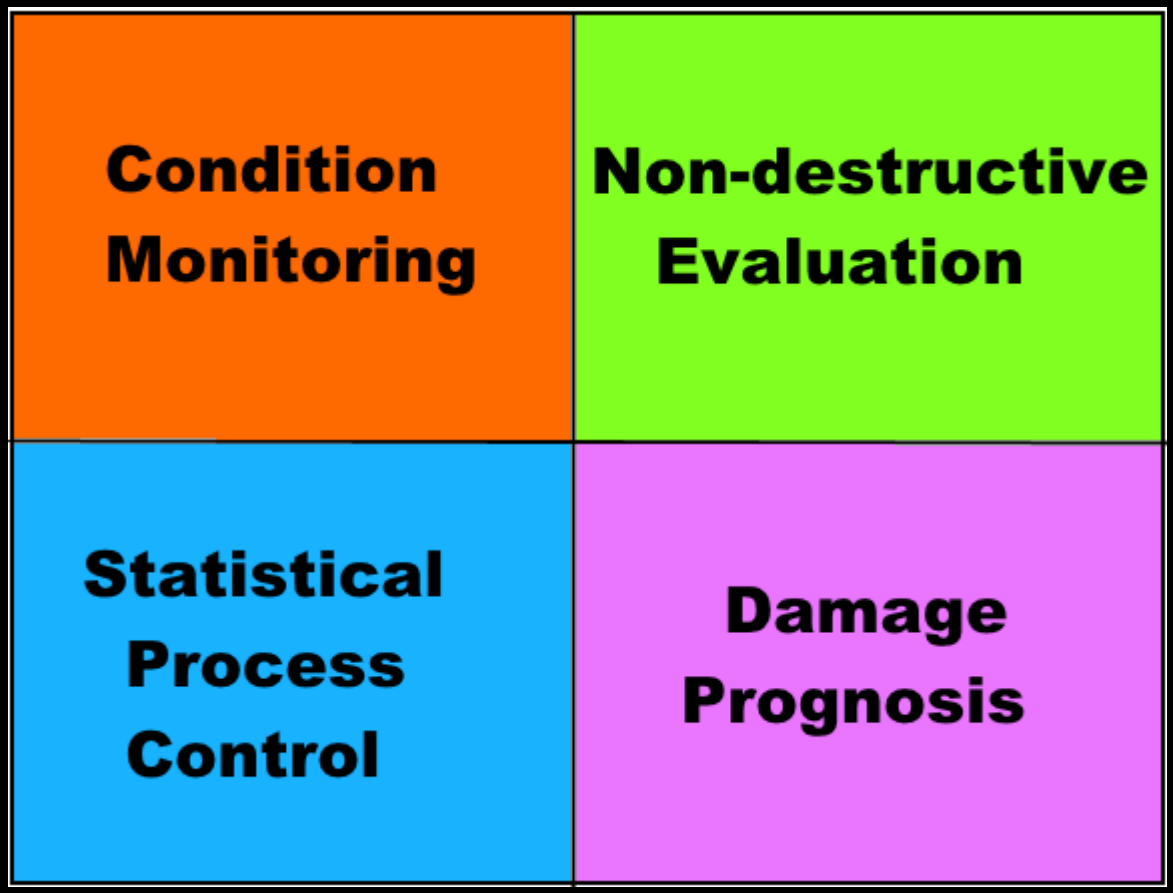
Technology + procedures to maximize operating efficiencies and minimize the potential to cause harm.

Structural Health Monitoring - Origins

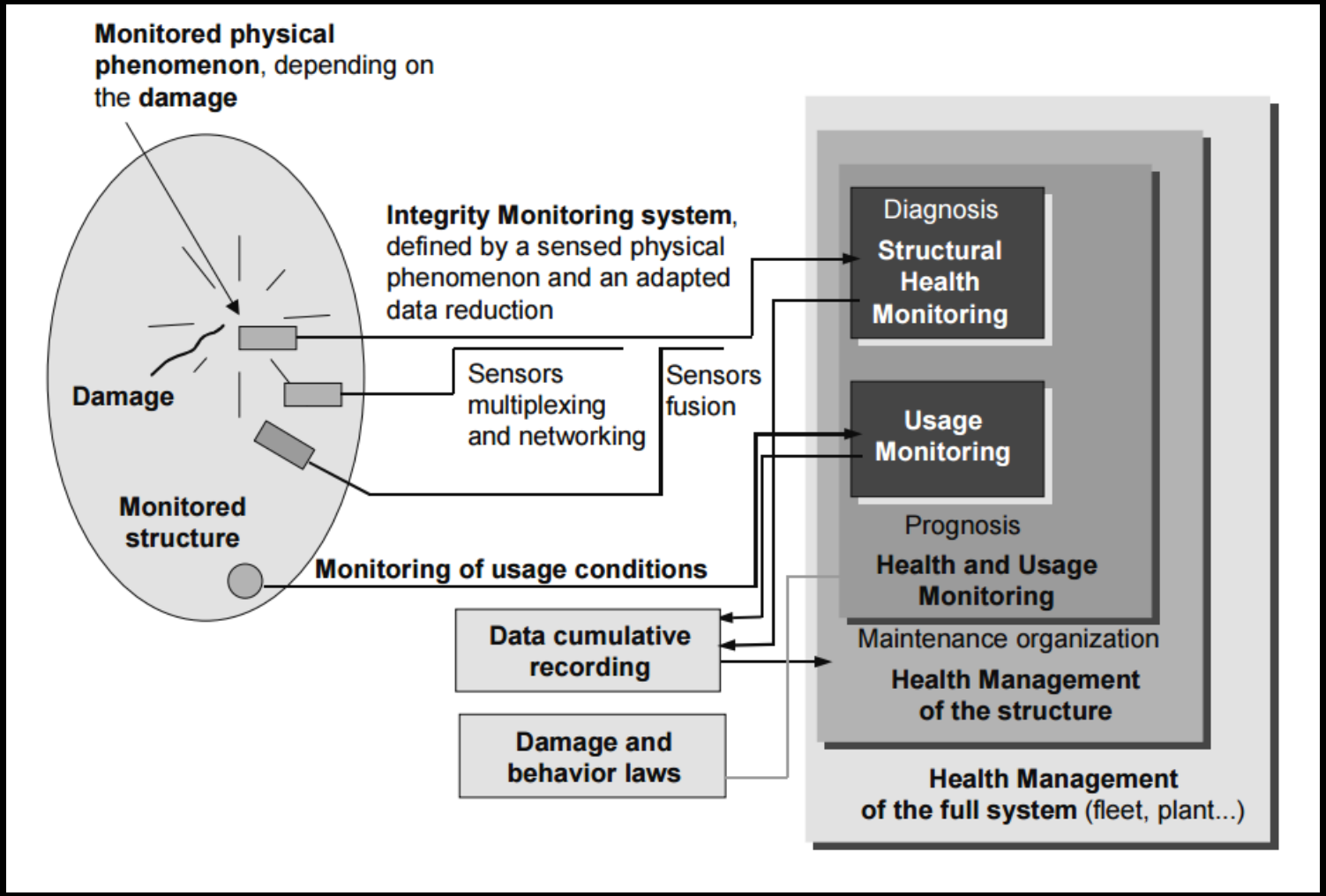
Structural Health Monitoring – Birthing Environment

- Heavy use of instrumentation and analysis to determine performance
- Short to medium service life
- Mass-produced products
- Established life-cycle management programs

Structural Health Monitoring – Contributors



Structural Health Monitoring – 40 years of Evolution



Structural Health Monitoring – Bridge Environment

- Very long service life

- Most damage progresses slowly and indications of damage are usually visual.

- Highly varied population

- Sensor-based damage detection techniques are not fully developed or accepted.

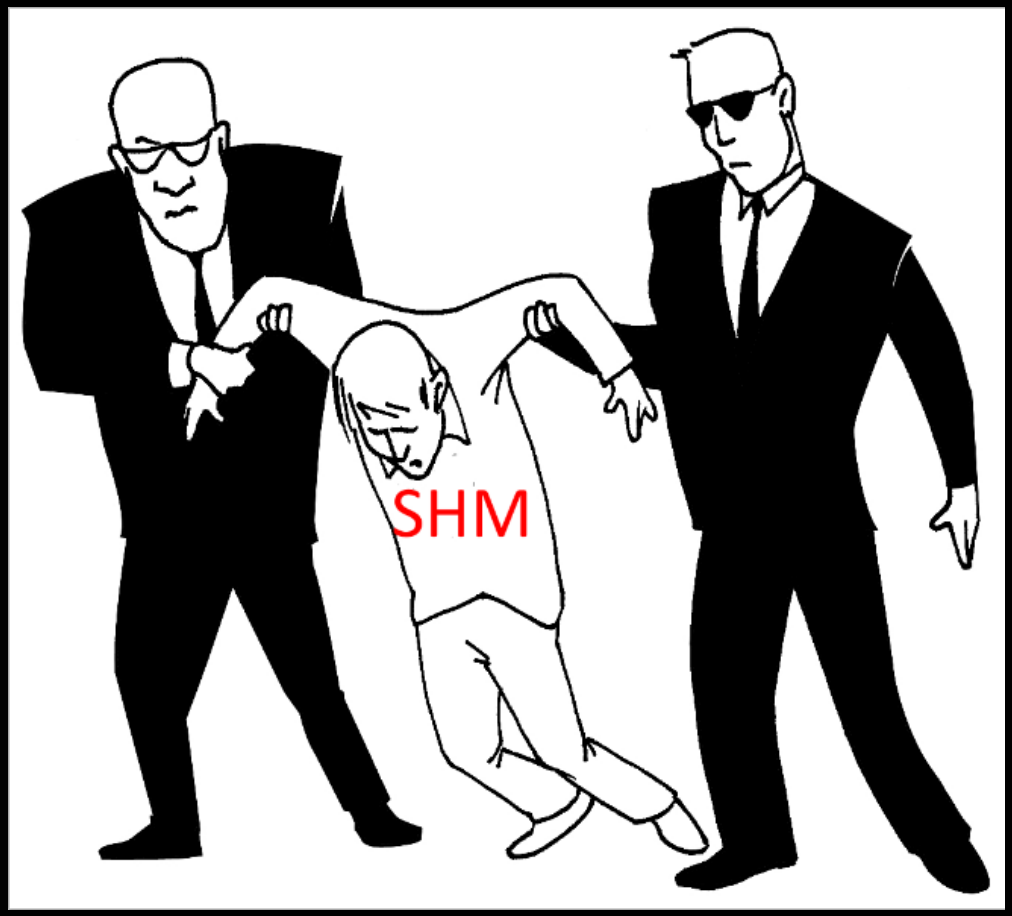
Structural Health Monitoring – Bridge Monitoring

Measure

Meaning

Result

Structural Health Monitoring – Bridge Monitoring



Structural Health Monitoring – Bridge Monitoring

- Developing applications
- Scaling applications

Structural Health Monitoring – Bridge Monitoring

- A problem may exist but confirmation is difficult to determine.

- A problem may develop if a specific set of driving circumstances occur

Structural Health Monitoring – Substructure Monitoring

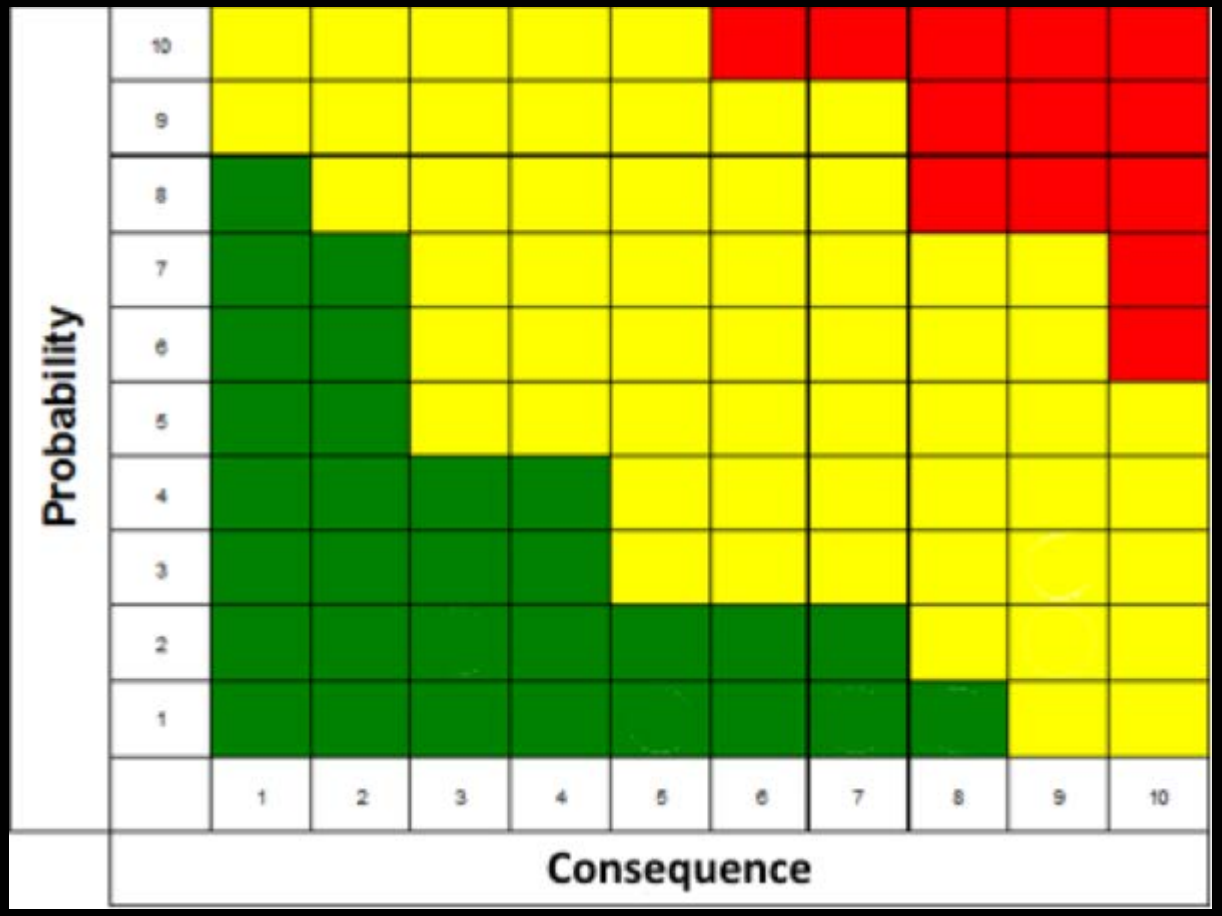
Scour, collision detection, settlement, masonry crack propagation, adjacent construction damage, and bearing functionality.

Structural Health Monitoring – Deck and deck support monitoring

Vibration monitoring, crack propagation, strain monitoring, load monitoring and chloride intrusion

Structural Health Monitoring – 3 comp. for success.

Risk analysis has to show the need



Structural Health Monitoring – 3 comp. for success.

Detectable parameters in which assessment can be based upon

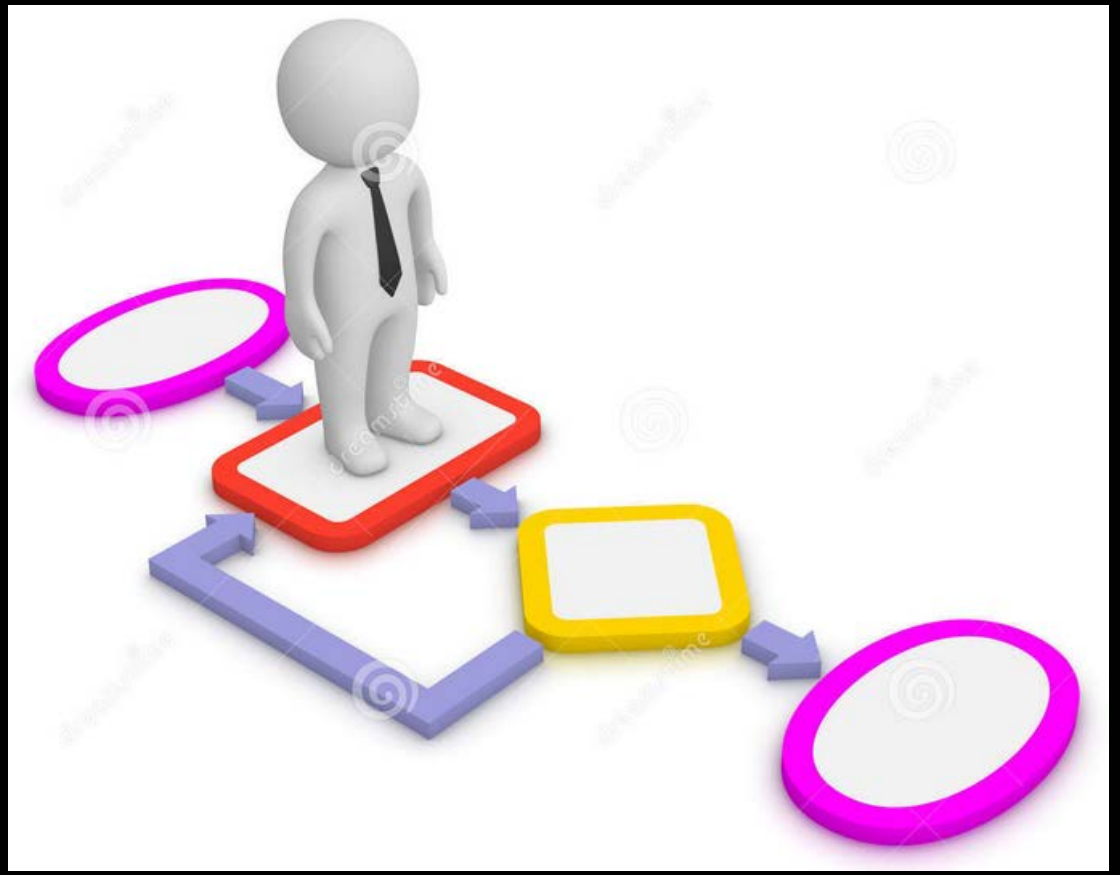
SI Derived Units

Derived Quantity	Name	Symbol	Equivalent SI units
Frequency	hertz	Hz	s^{-1}
Force	newton	N	$m \cdot kg \cdot s^{-2}$
Pressure	pascal	Pa	N/m^2
Energy	joule	J	N·m
Power	watt	W	J/s
Electric charge	coulomb	C	s·A
Electric potential	volt	V	W/A
Electric resistance	ohm	Ω	V/A
Celsius temperature	degree Celsius	°C	K*

*Unit degree Celcius is equal in magnitude to unit kelvin.

Structural Health Monitoring – 3 comp. for success.

Know what to do when specific measurements or trends are realized.



Structural Health Monitoring