

# Nahr al Fidar Bridge

# Nahr al Fidar Bridge

- Built in 2006-2007
- Concrete girder bridge
- 130 m length
- 5 spans
- 100 precast post-tensioned girder.
- The bridge is located on the main international highway.
- The bridge is a vital commercial artery,
  - thus no traffic disruption is allowed, since it leads to great economic losses



- No previous assessment
- No monitoring system on the bridge.
- We just have the AutoCAD files of the bridge with structural details.

# First field mission

- During the field mission the following was noticed (Photos are attached):
- **The bridge is in a good state**
- Only the joint in the middle seems to be leaking a little when it rains. As well as some humidity was noted at one of the abutment walls (at the two extremities of the same wall).
- One guard rail is partly falling probably from a car accident.

# First field mission



**Joint** in the middle seems to be leaking a little when it rains





- some humidity was noted at one of the **abutment walls**





- One guard rail is partly falling probably from a car accident.



- *The main problem is:*
- **The overloading of the bridge.** In the last 6 years, Lebanon is found to host around 1.5 million permanent visitors, using private and public transportation.
  - Therefore even though the bridge was newly designed in 2006, after 10 years of its life, it is already supporting overloads generated by unprecedented and unpredictable increased traffic, which was not taken into consideration during the design.



- What is the best parameter to monitor?  
Methods to use?
  - Loss of prestress / loss of stiffness
  - Load increase

- SHM short term using ambient vibration method. (2 velocimeters, 12 accelerometers and 2 data acquisition system).
- Ground penetrating radar

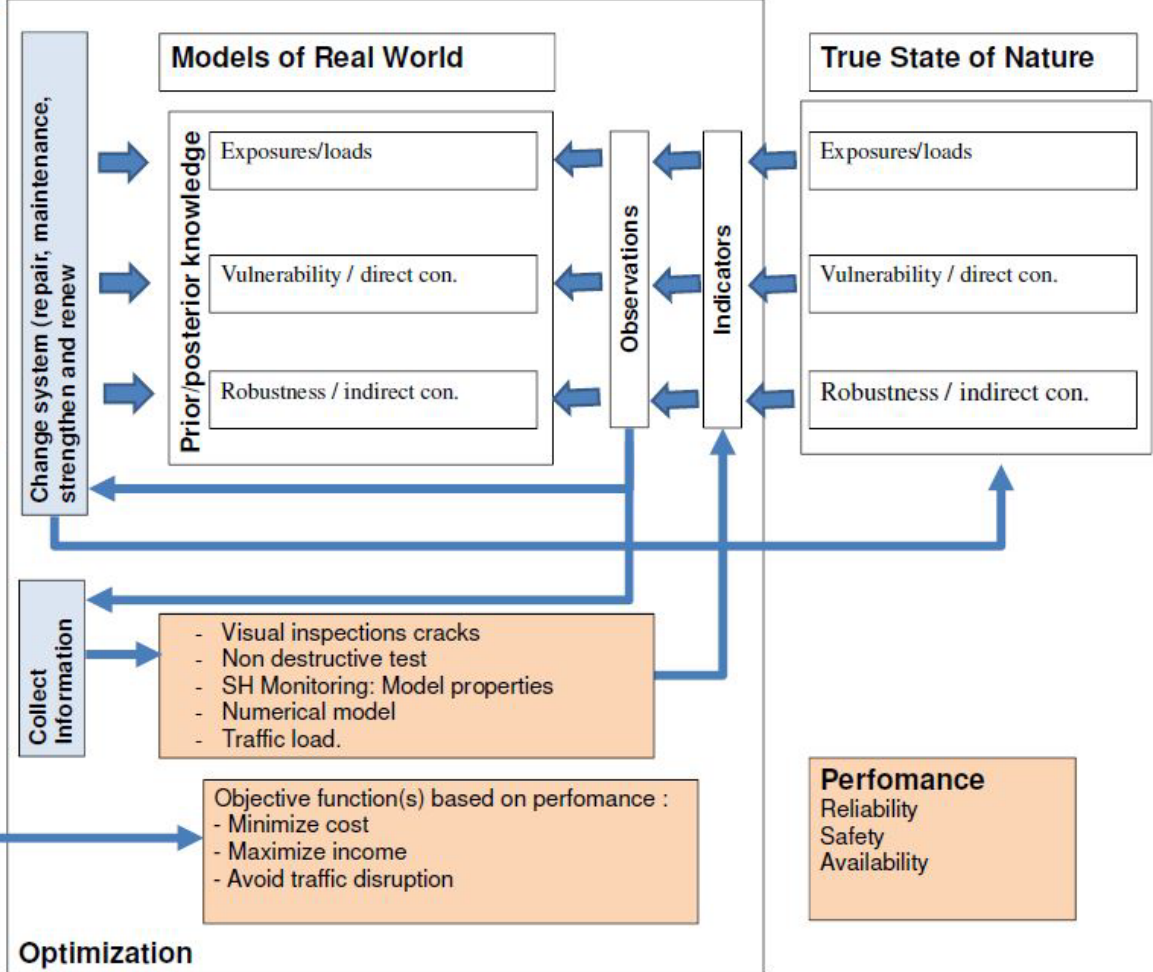
- Remedial actions**
- Do nothing
  - Repair if needed
  - Retrofitting
  - Restrict traffic
  - Close bridge

- Indicators**
- Deflections
  - Cracks
  - Modal properties

- Knowledge on decision context**
- Decision maker (public authority, CDR ...)
  - Additional stakeholders ( Dar Al Handasah Shair and Partners, Municipality, )
  - Constraints: No permanent budget allocated, no bridge management strategy, no regular inspection, overload of the bridge,
  - Fulfill functionality, safety (code requirements)

- Asset information**
- Built: 2007
  - Concrete Girder Bridge
  - Total length: 130m
  - Overloaded
  - Vital commercial connection: the disruption will lead to important economic losses.
- Existing Records:
- As built information (AutoCAD drawings)

- Objectives**
- Minimize operational, maintenance, inspection costs
  - Maximize income
  - Minimize disruption and indirect costs such as time lost in traffic congestions.



- Performance**
- Reliability
  - Safety
  - Availability