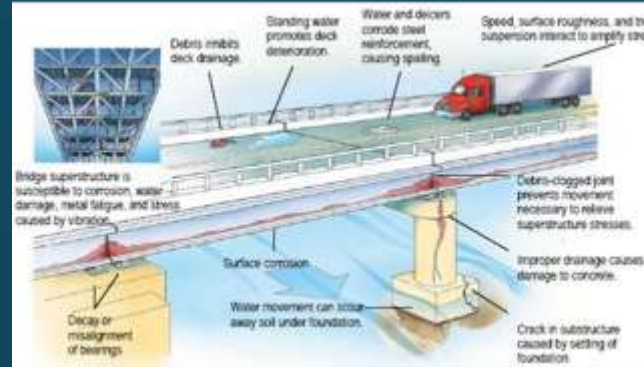


Past, Present and Future of Bridge Engineering



Atorod Azizinamini, Ph.D., P.E.

Vasant Surti Professor of Civil Engineering

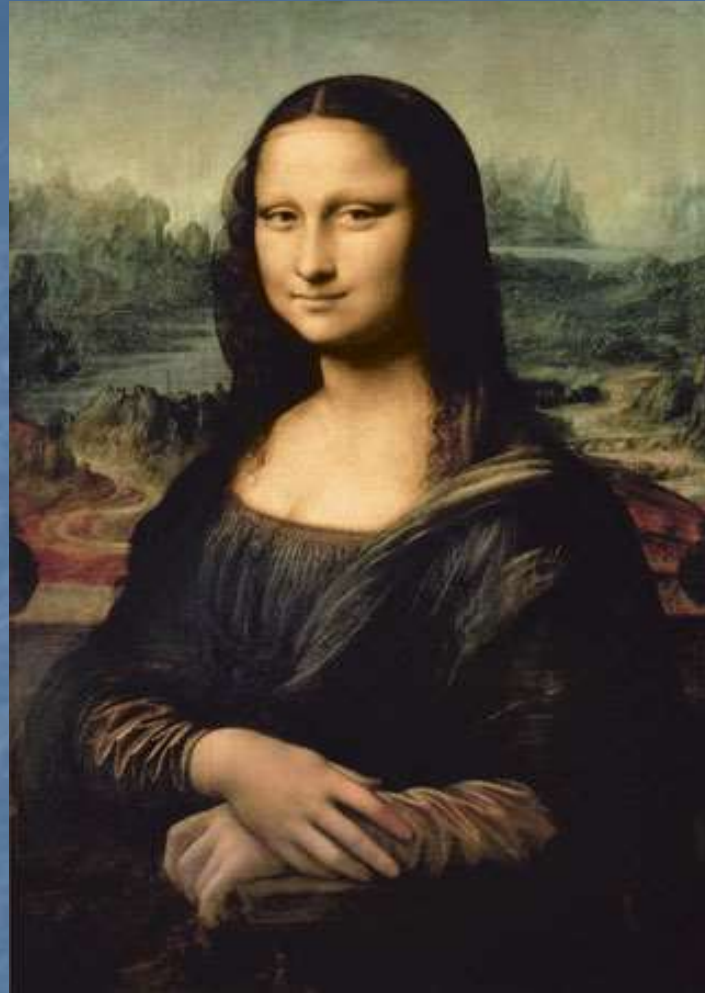
Director, Infrastructure Research and Innovation, Office of Research & Economic Development

Director, Accelerated Bridge Construction Transportation Center (www.abc-utc.fiu.edu)

Florida International University

The Pont du Gard is an ancient Roman aqueduct bridge built in the first century AD to carry water over 50 km (31 mi) to the Roman colony of Nemausus (Nîmes).[3] It crosses the river Gardon near the town of Vers-Pont-du-Gard in southern France.





Mona Lisa

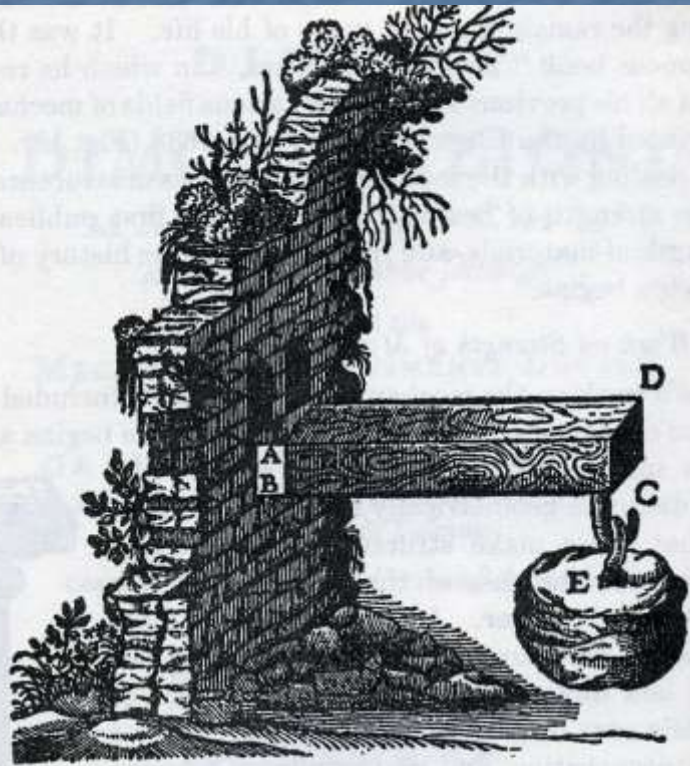


FIG. 15. Galileo's illustration of bending test.

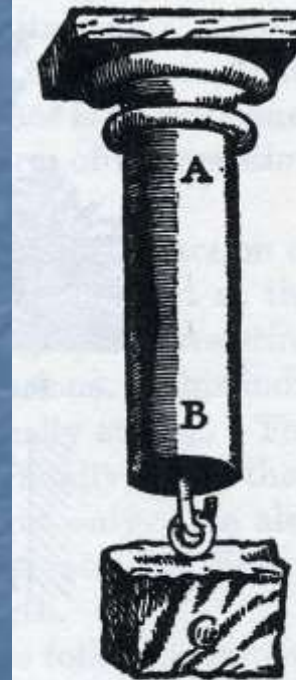
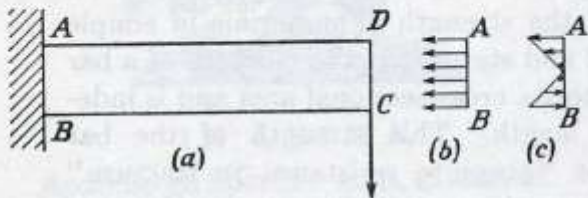


FIG. 14. Galileo's illustration of tensile test.

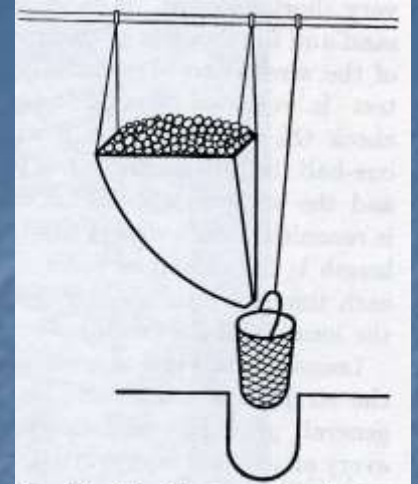


FIG. 10. Tensile test of wire by Leonardo da Vinci.

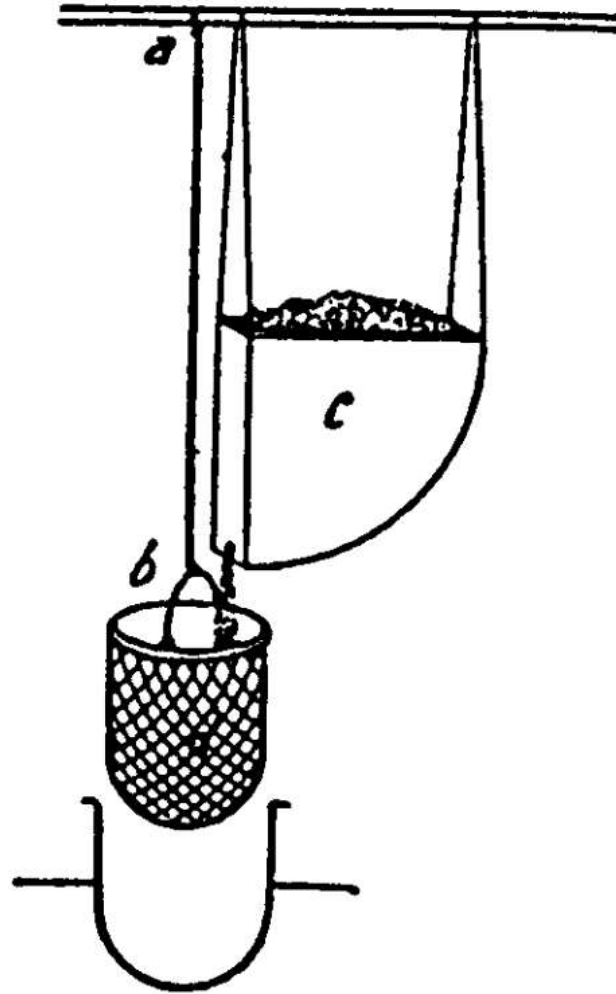
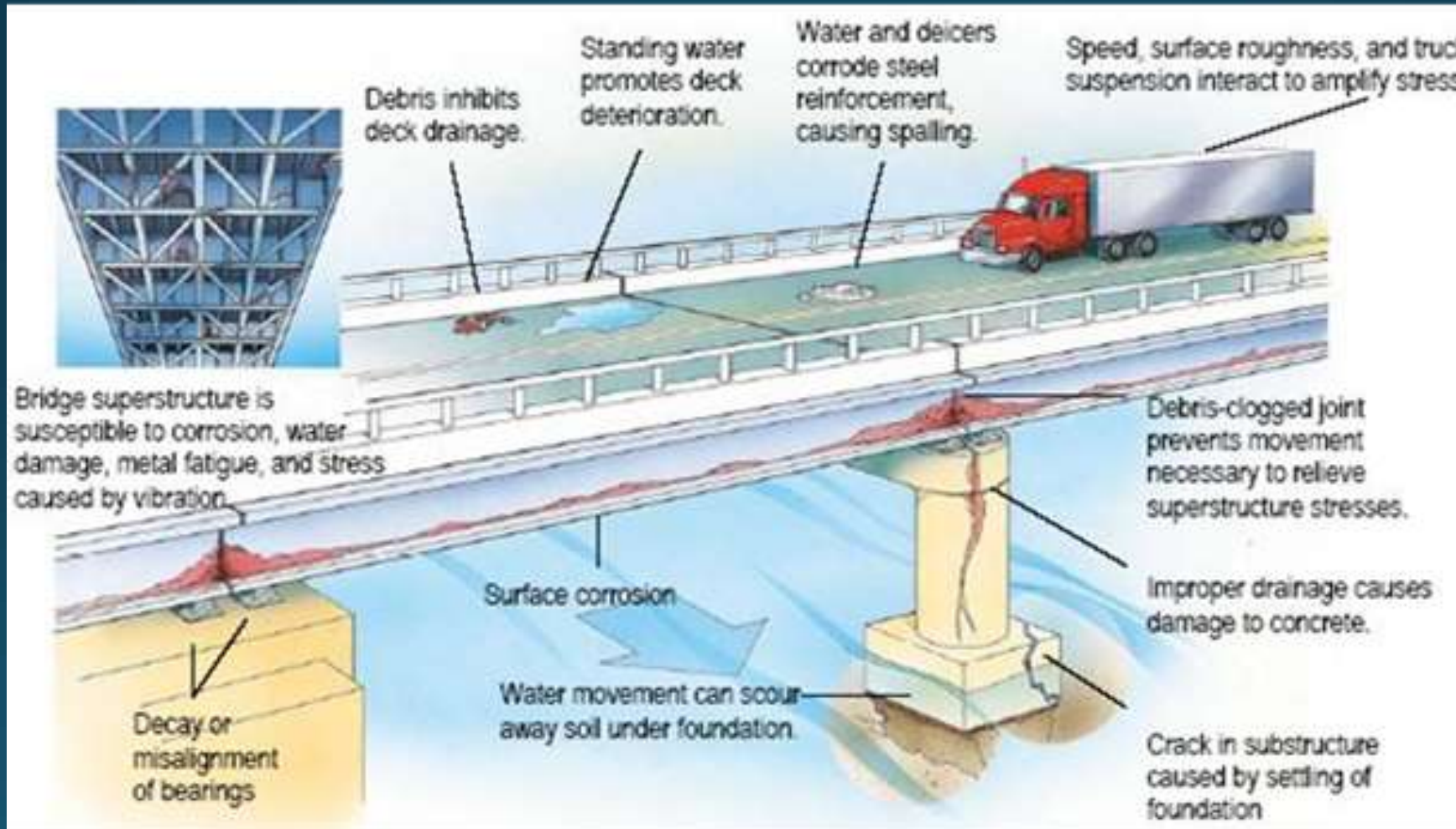


FIGURE 1 Da Vinci's hanging basket.

The origins of many design provisions, in our bridge codes are rooted in building codes that are mainly concerned with strength.



Why Some Bridges Have Lasted More Than 100 Years?



Brooklyn Bridge (140 Years Old)



Williamsburg Bridge (120 Years Old)



St. Louis's Eads Bridge (149 years old)

Why Some Bridges Have Lasted More Than 100 Years?

- Maintainable and well maintained over their 100-year lives due to extreme importance or high capital replacement cost,
- Adaptable to changes in functional use as well as service limit state demands and/or,
- Originally overdesigned.

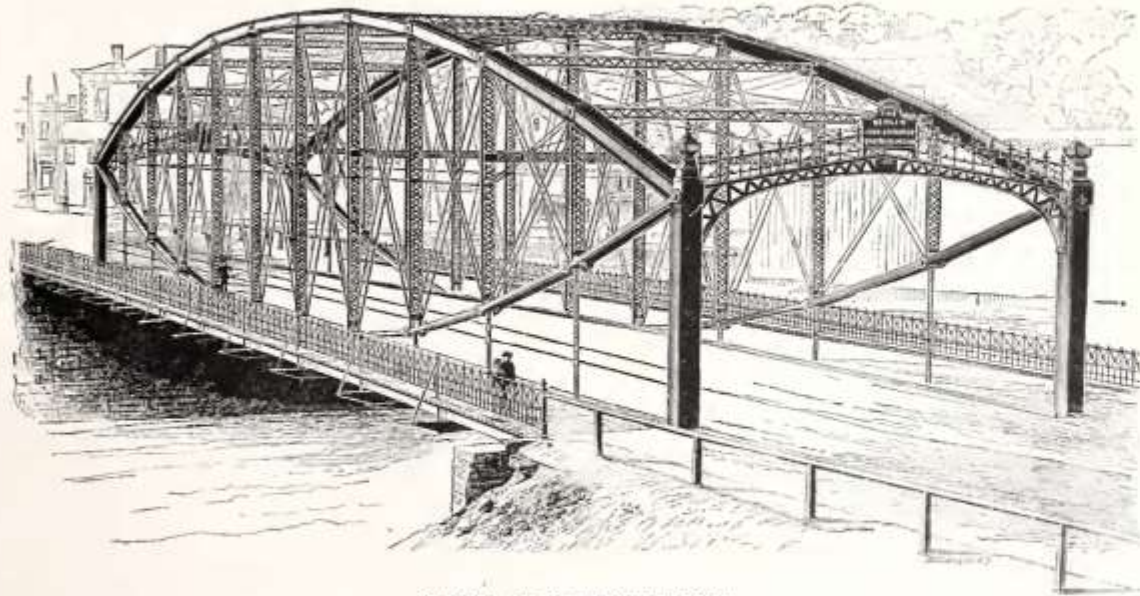
History Repeat Itself

A decorative banner with a central ribbon and two torches on either side, set against a blue textured background.

Mail-Order Bridges

Mail-Order Bridges

THE BERLIN IRON BRIDGE COMPANY,



BRIDGE AT WATERBURY, CONN

Span, 175 feet. Roadway, 27 feet wide. Two sidewalks, each 9 feet wide

EAST BERLIN, CONNECTICUT, U. S. A

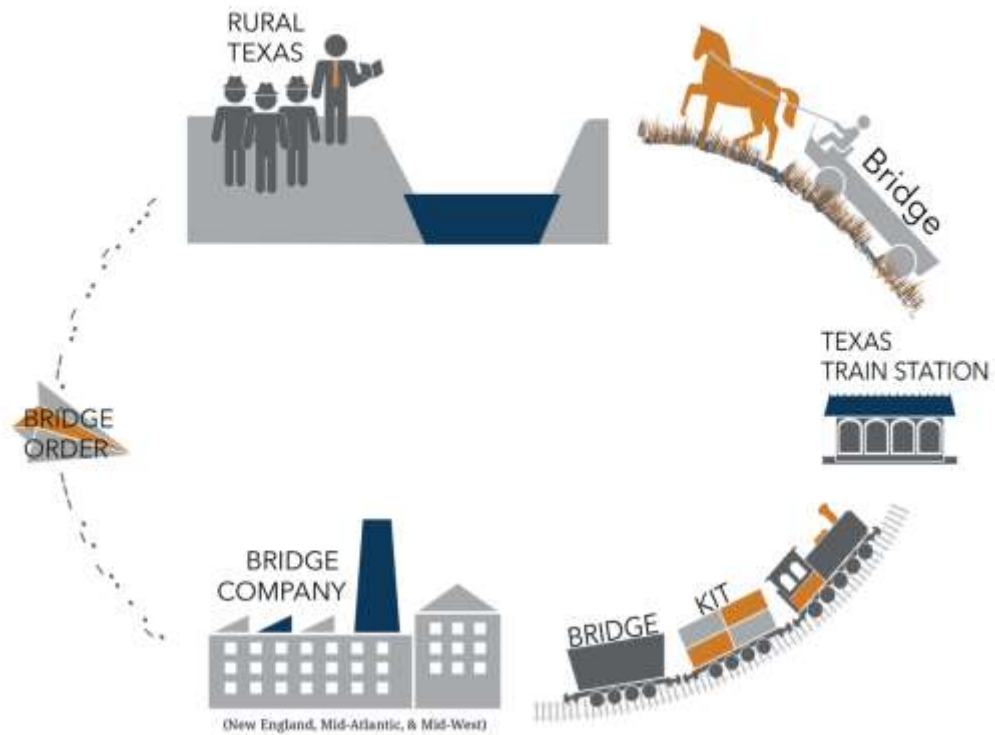
11

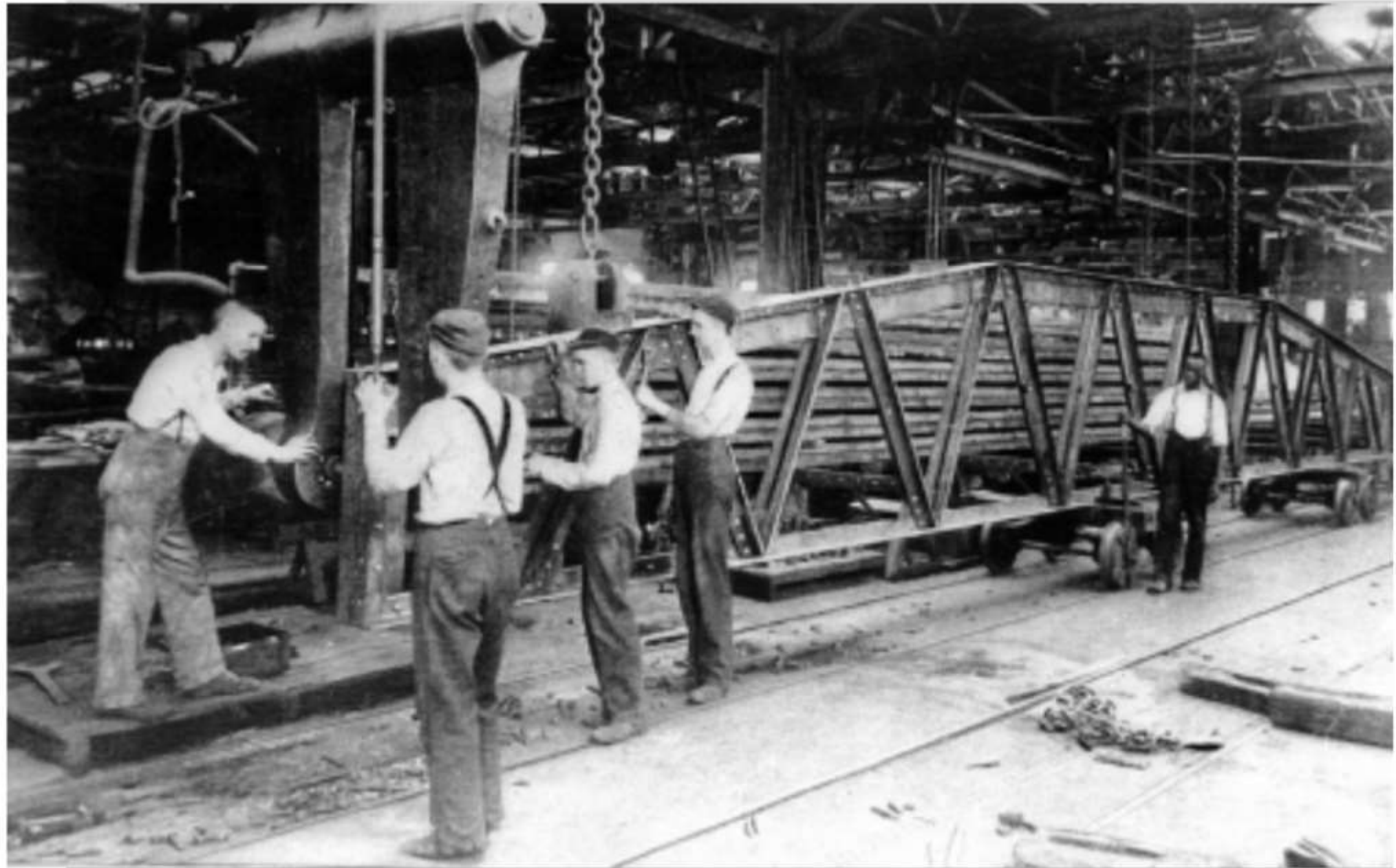


Left: Drawing from the Berlin Iron Bridge Company's 1890 catalog. Right: Brackenridge Park Bridge, San Antonio, built by Berlin Iron Bridge Company in 1890.

Mail-Order Bridges

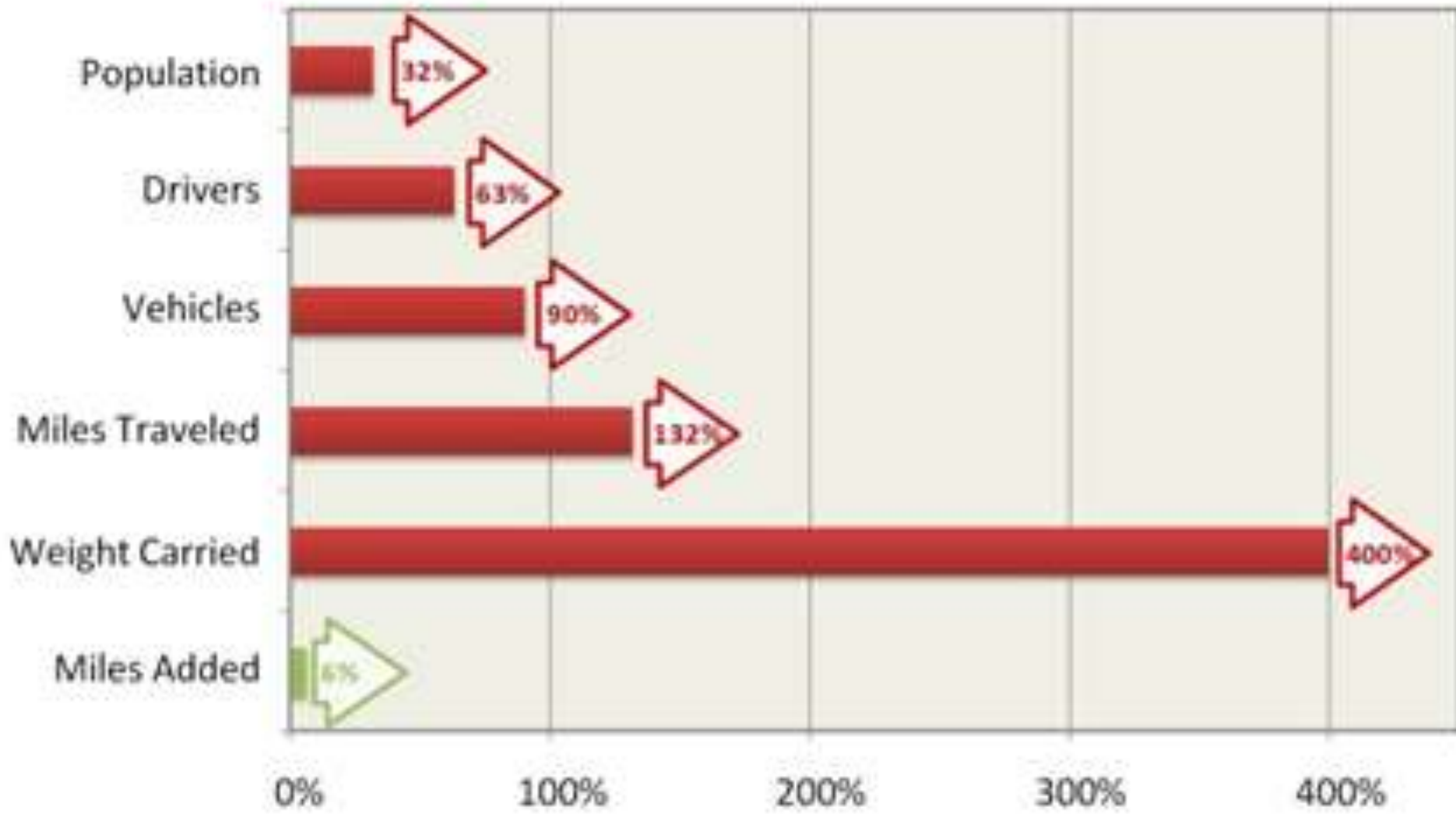
Mail-Order Bridge





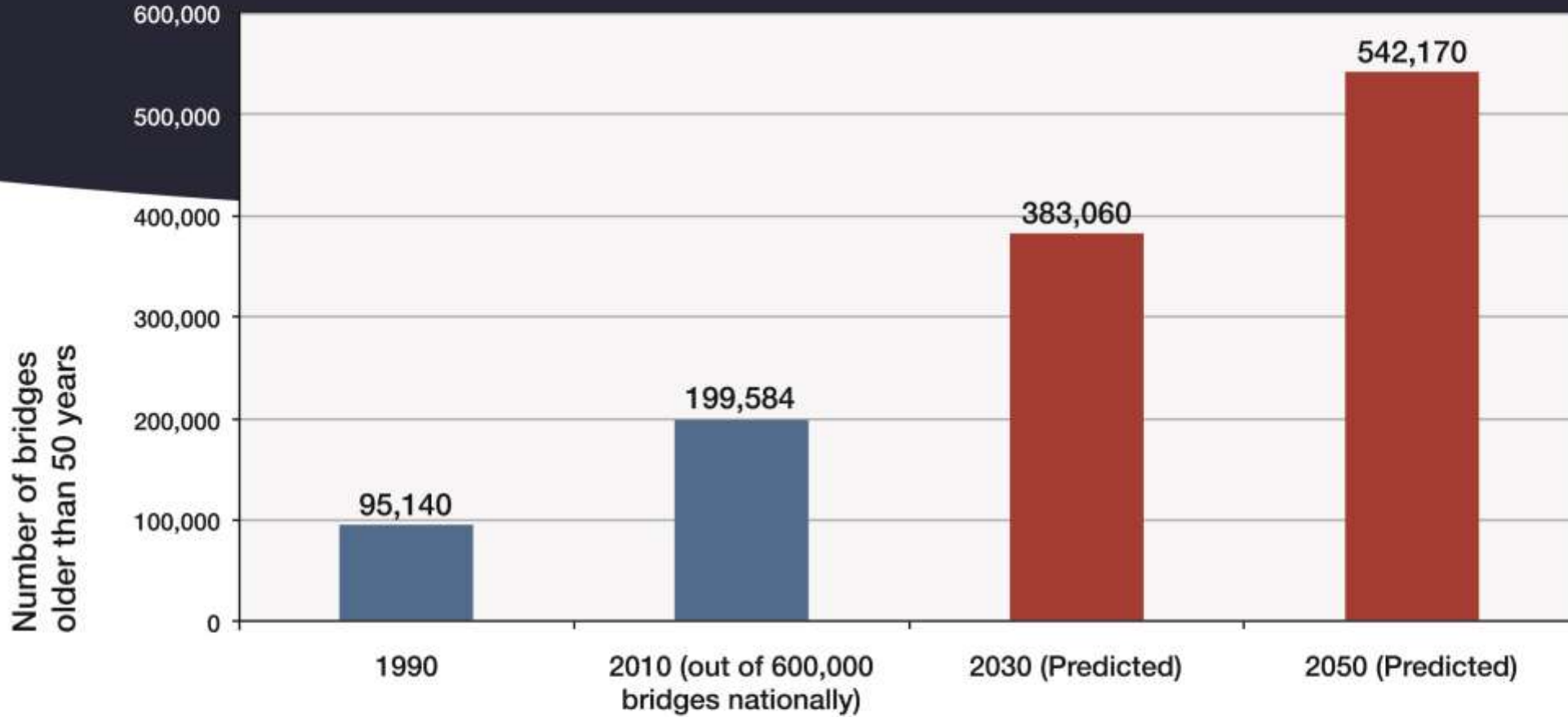
A prefabricated truss being assembled at Edge Moor Iron Works

**Back in old days we did not have
many challenges we have now**



During the 30- year period between 1975 and 2005

Source: www.t4america.org

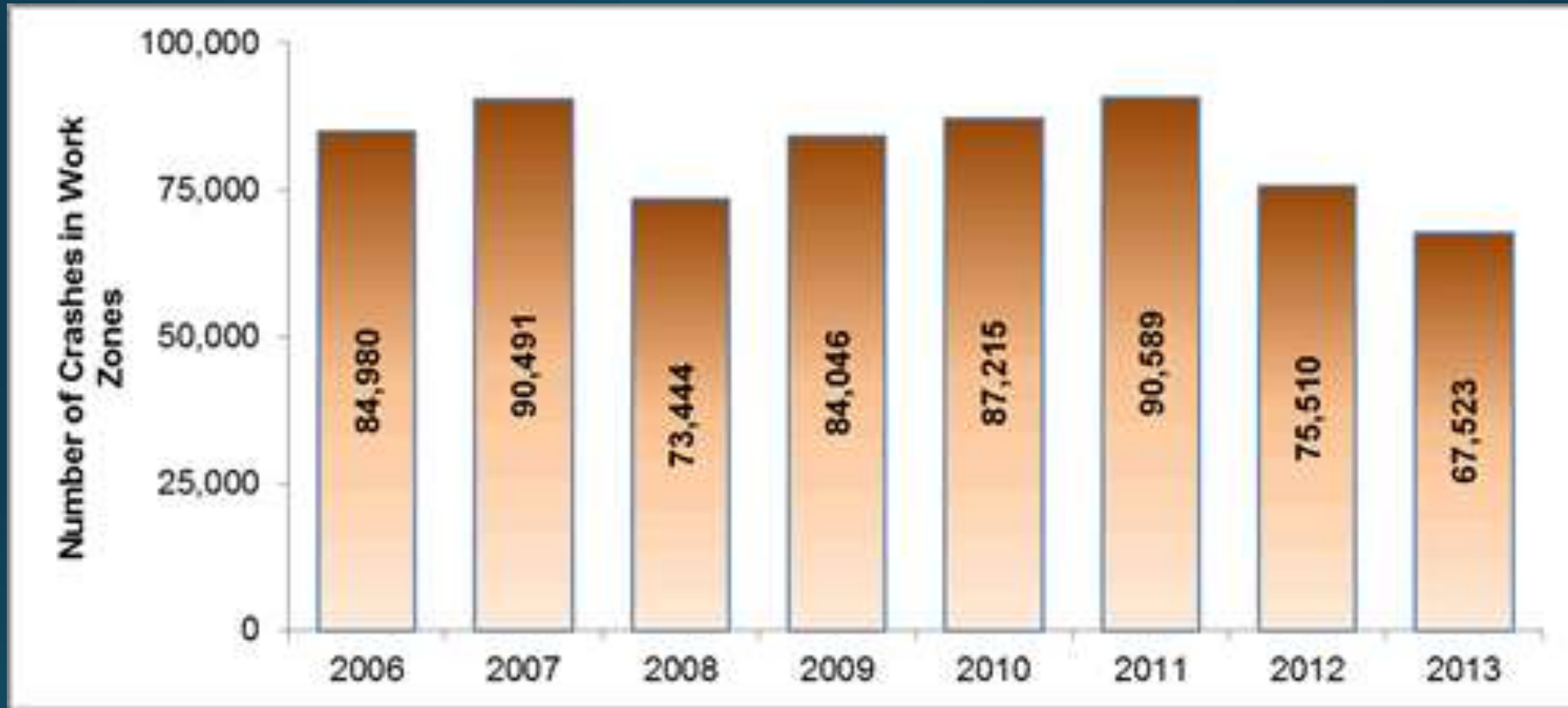


2010 — About **200,000** bridges reached their 50 year design life

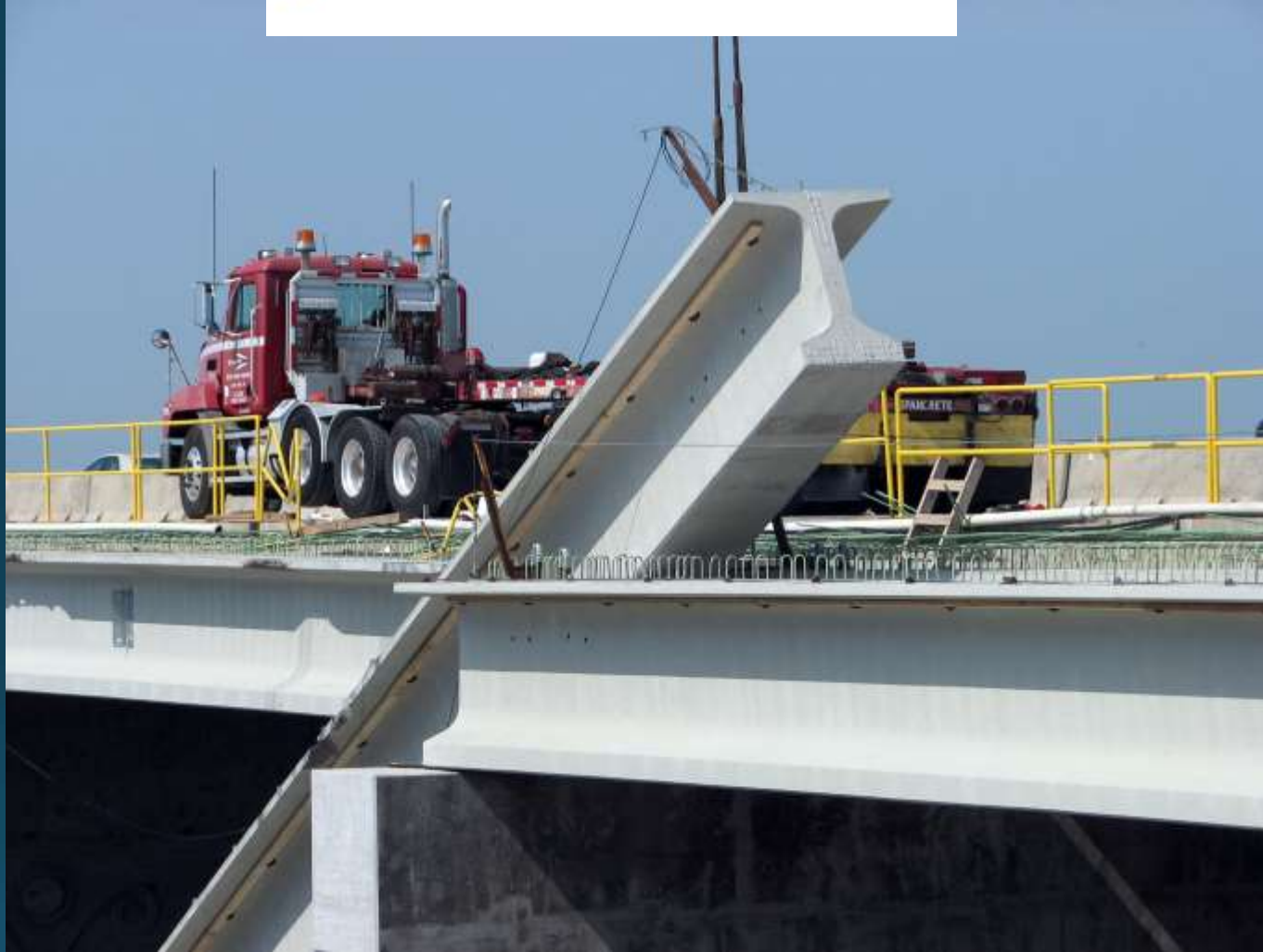
By 2030 about **400,000** bridges could reach 50 years age



Construction Zones are magnet for accident



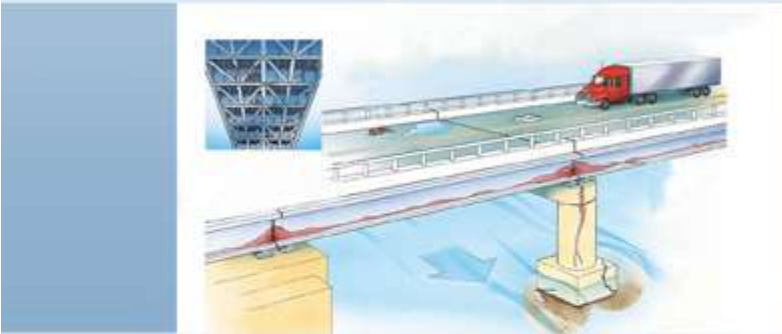




The fatal crane accident on the Butte des Morts bridge in Oshkosh on July 5, 2012 killed Joseph R. Bidler, 35, of Green Bay, and seriously injured Martin de Ridder.

Bridges for Service Life Beyond 100 Years: Innovative Systems, Subsystems and Components

SHRP 2 | Project R19A



Closing down of some of these bridges can cost society in **millions**, even for a day and *result in economic losses even in neighboring states*



**But We Also Have New
Tools**



30T+51

ABC-UTC
UNR Bridge

ABC
UTC

ABC
UTC

ABC
UTC

ABC
UTC

2 2

High Performance

Steel Bridges :

UHPC









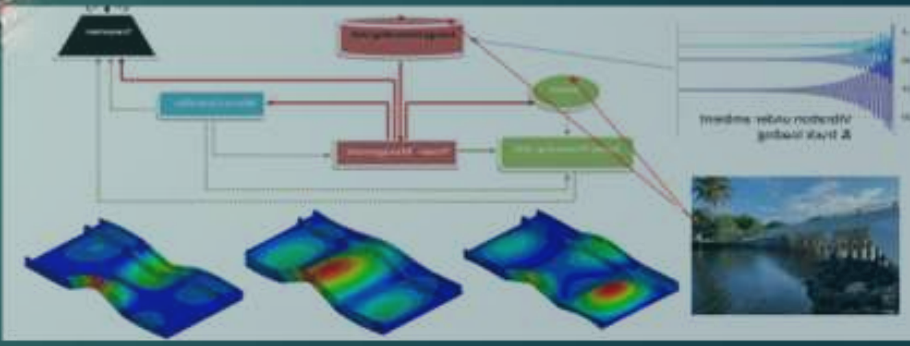
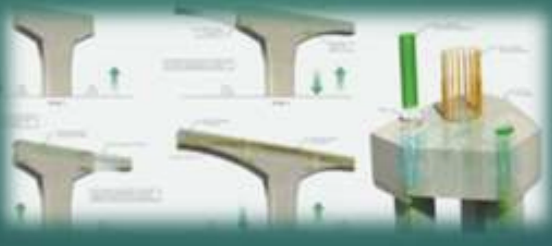
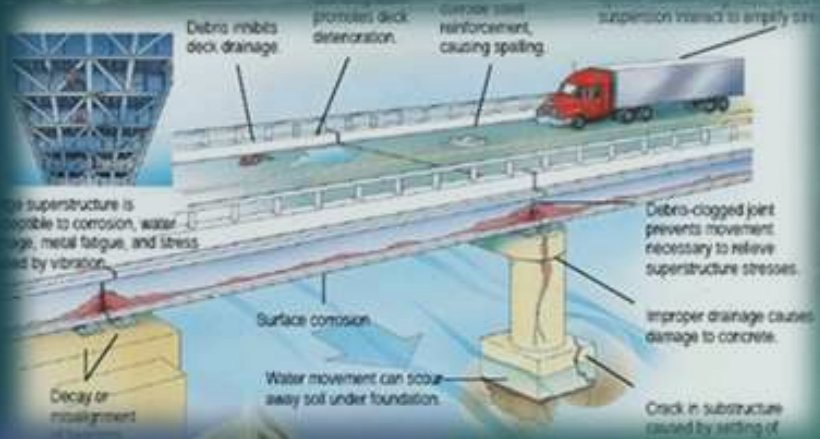
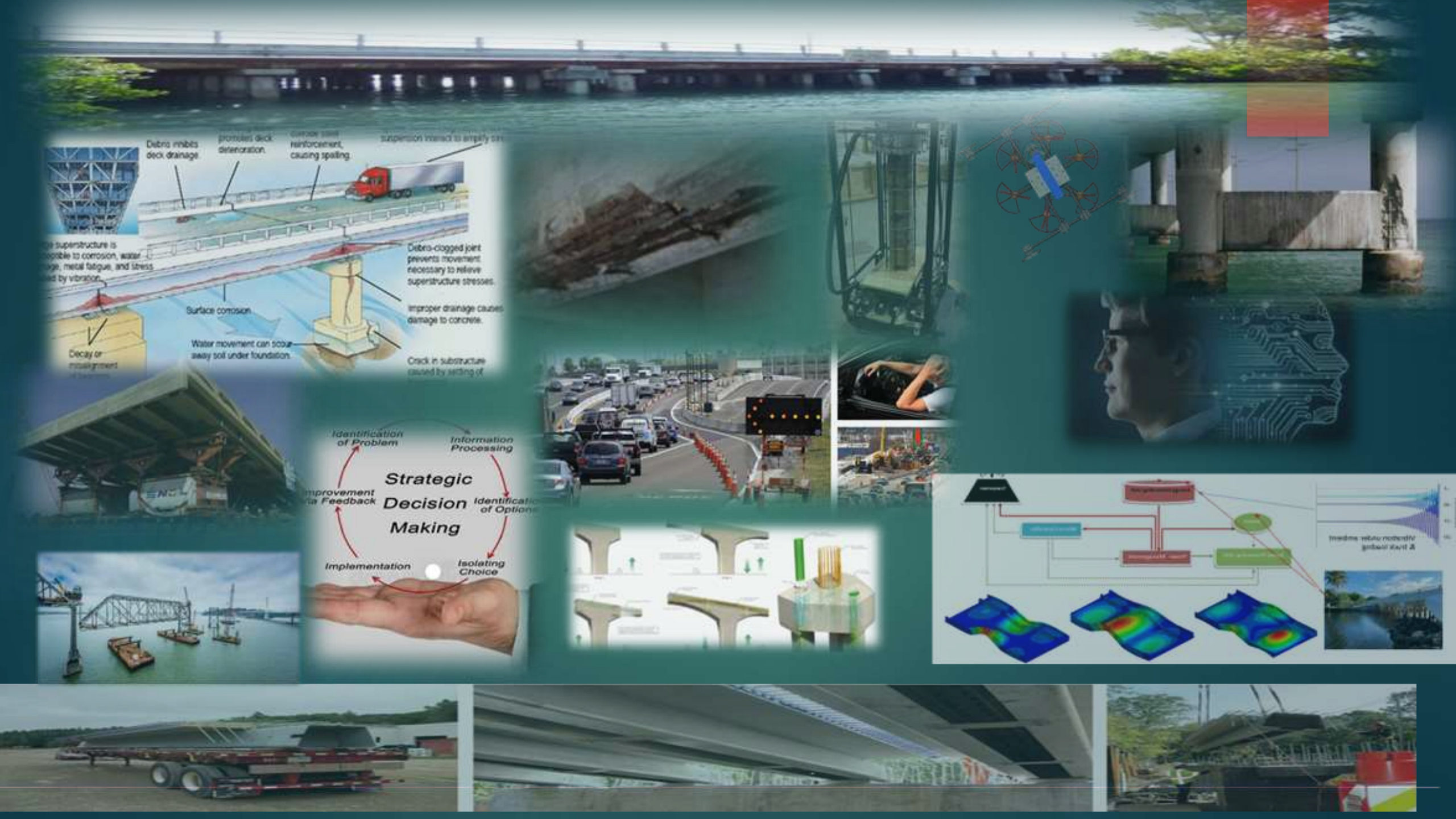


Use of Robotics in ABC Construction

Historically almost every consumable used by humans have evolved and are now built or fabricated using automated processes, except construction of our infrastructure

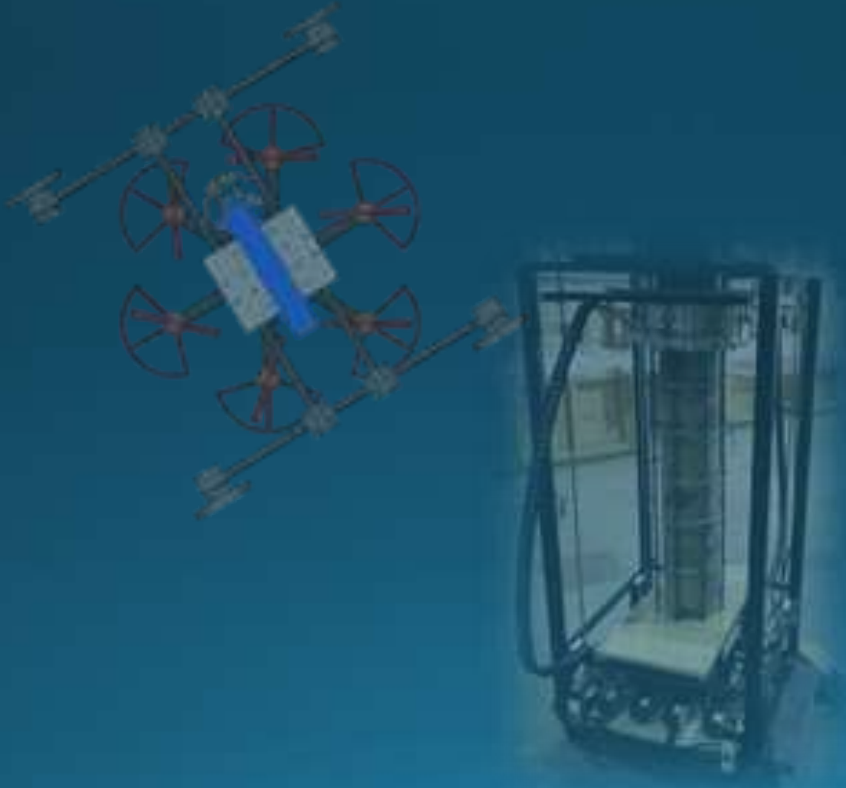
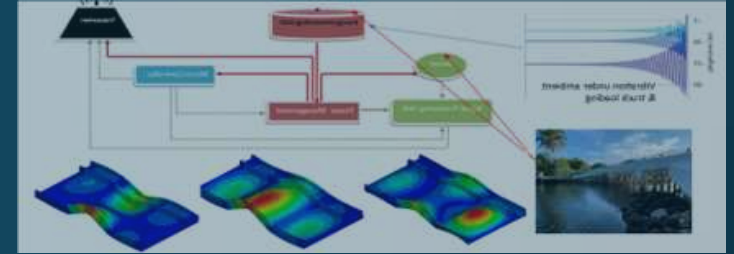
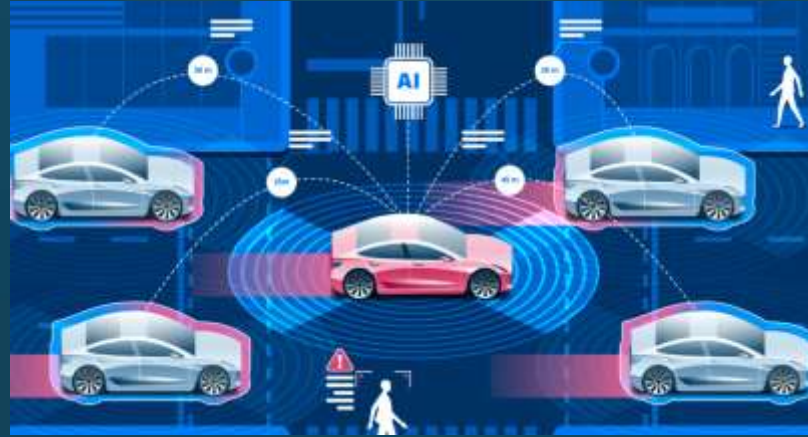
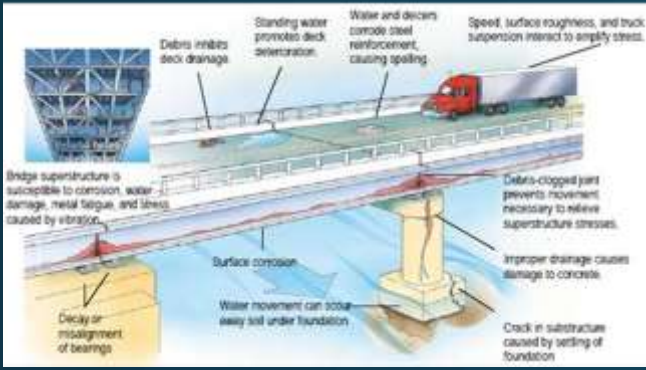


Dutch robotic printing firm MX3D

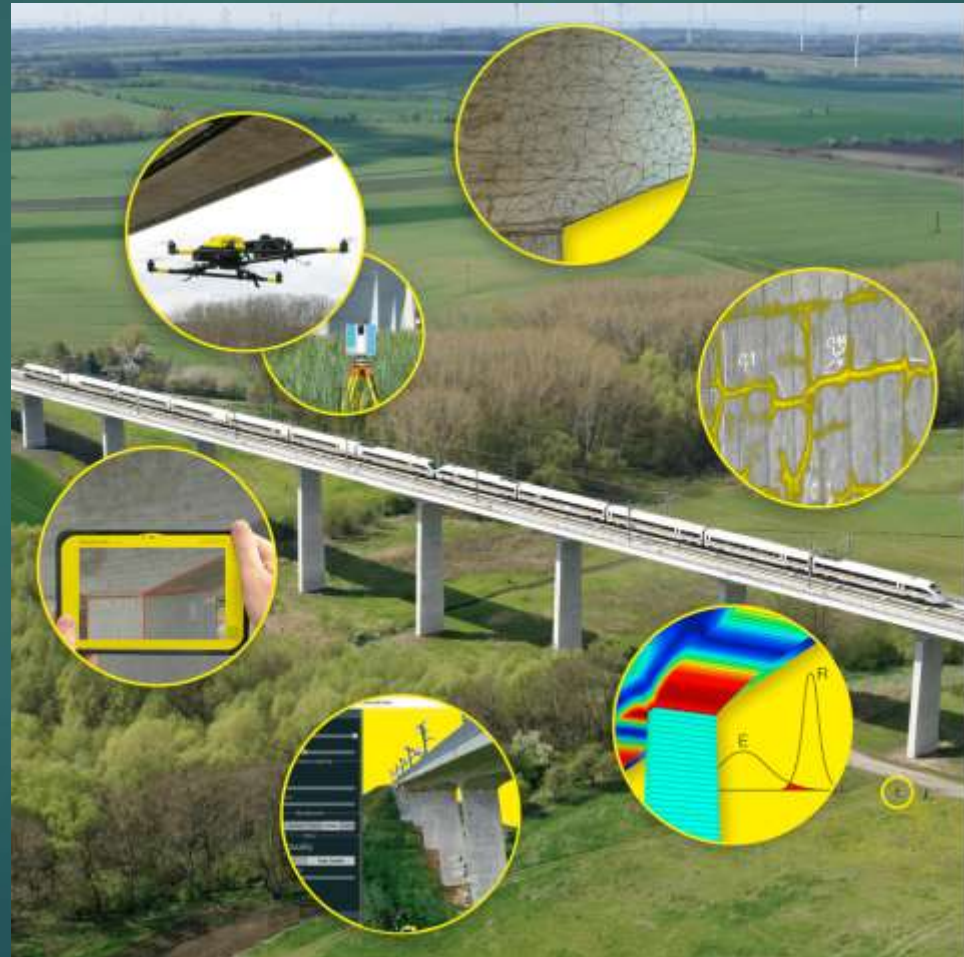


**We need to take
advantage of these new
Technologies**

High Performance



We need to develop next generation of bridge asset management system



Please send me an email to

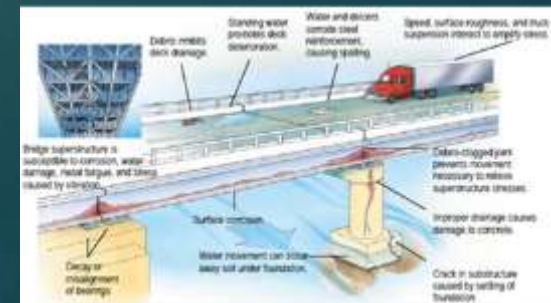
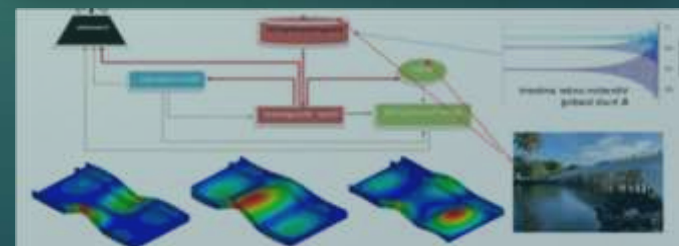
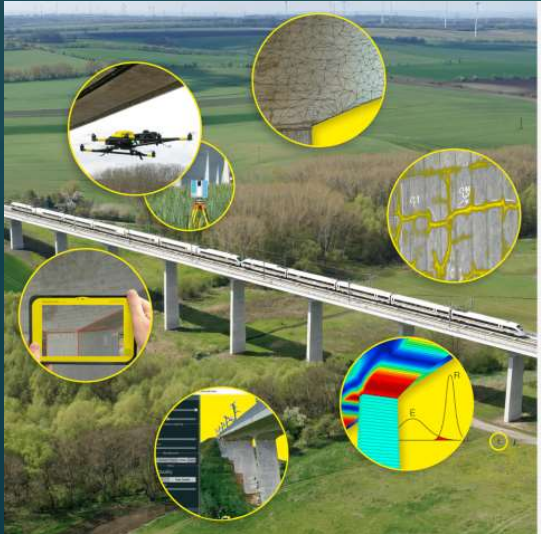
aazizina@fiu.edu

(402-770-6210)

If you are interested to nominate individuals with significant responsibilities in bridge asset management in your agencies.

Please send your nominations by June 23, 2023

It is also time to develop next generation of bridge design and construction specifications



RESEARCH, DEVELOPMENT, AND TECHNOLOGY



STRATEGIC PLAN

Fiscal Years 2022 – 2026

Building a Better Transportation Future for All



Conclusions:

Given number of innovative technologies that have emerged in recent years coupled with challenges we have with existing bridges, we have an opportunity to hand next generations bridge system that will be lasting as long as we use roads to travel.