

Structural Health Monitoring

NICTA provides decision support for owners and maintainers of civil and industrial assets. Sensing, continuous monitoring and advanced data analysis techniques enable asset managers to make more informed maintenance decisions.

The Challenge

Assets are typically maintained when something goes wrong or according to preventative maintenance schedules.

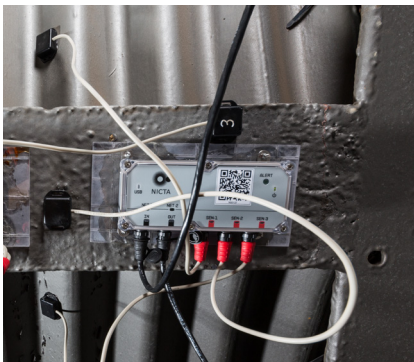
These approaches do not make the best use of limited maintenance resources.

Reacting to problems when they occur means assets operate at reduced service levels until resources are mobilised to repair the problem. Preventative (or time based) maintenance is an improvement though often inefficient as maintenance is often done too early or too late.

NICTA Approach

NICTA has developed technology to enable more informed maintenance decision making. There are three main technology components:

Sensing and Data acquisition – sensors and distributed processing capabilities to suit large and small structures.



Data Analytics – analytical techniques developed by NICTA's world-class Machine Learning Research Group provide information for specific situations such as damage detection, condition assessment, loading assessment and maintenance prioritisation.

Data sources can be from NICTA or other sensing systems, and other sources of data such as environmental data, inspection and maintenance records.



A continuous monitoring service - the service applies data management and the analytical techniques to provide asset managers and engineers with situational awareness and the information they need to make decisions. The service is hosted from NICTA data centres and available to users via web and mobile applications and database services.

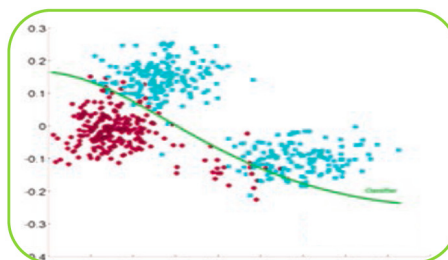
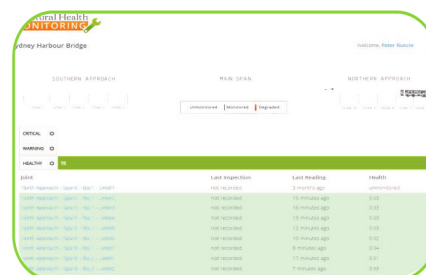
Industry Engagement

Roads and Maritime Services NSW (RMS) needs to maximise service life of the Sydney Harbour Bridge road deck without significant increase in expenditure. NICTA is implementing a bridge monitoring system using 2400 sensors. Machine Learning based predictive analytics assesses the data continuously and provides early warning of problems before bridge users are affected.

By continuously monitoring the structural health of each of 800 steel and concrete supports under the roadway, RMS can undertake condition based and predictive based maintenance.

Impact

NICTA Structural Health Monitoring enables maintenance to be scheduled based on *actual asset condition*. Predictive analytics enables maintenance and capital works decisions to be made that maximise return on resources allocated, while maintaining asset performance. The benefits are **increased productivity and extended asset life**.



This project is part of NICTA's Infrastructure, Transport and Logistics Business Team, which delivers innovative ICT solutions that transform the efficiency, safety and sustainability of transportation systems and infrastructure networks.

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Research Excellence in ICT
Wealth Creation for Australia

Leading the Way

NICTA is Australia's Information and Communications Technology (ICT) Research Centre of Excellence, driving innovation through high quality research, research training, commercialisation and contract research.

NICTA has the largest concentration of ICT researchers in Australia. Our research focuses on use-inspired basic research that benefits industry, the community and the national interest.

Since NICTA's inception in 2002, NICTA has built strong research capability in:

- Software Systems
- Networks
- Machine Learning
- Computer Vision
- Optimisation.

Our Business Teams are the market focus of our research capabilities:

- Broadband and the Digital Economy
- Infrastructure, Transport and Logistics
- Security and Environment.

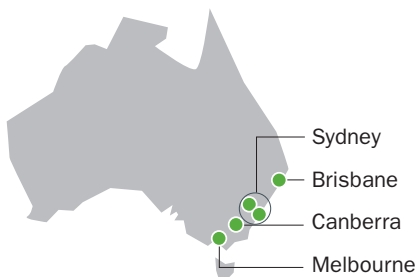
NICTA researchers work on Business Team projects supported by:

- An Engineering and Technology Development Team
- IP, Legal and other professional support.

Our work as a world-class research institute and Centre of Excellence in science and innovation brings together many of Australia's and the world's top ICT researchers. NICTA provides them with the facilities and support they require, making imagination to impact a reality.

NICTA's unique approach fosters and develops ICT research. We work closely with both industry and other research institutions to solve problems and make breakthroughs in ICT with real impact. NICTA's focus on use-inspired research means our projects have direct relevance to the challenges faced by business, government and individuals around the world. The result is breakthrough technologies that provide commercial opportunities and have a positive impact on Australia's export earnings.

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