Dr Xiaolin Meng
Project PI

GeoSHM Feasibility Study Project (August 2013 – March 2015)
GeoSHM Demo Project (March 2016 – Sept 2018)

Demo Project Team:
GeoSHM System and Services

GNSS Satellites
EO Satellites

GNSS Base

In-situ Monitoring – Sensory System
Forth Road Bridge/Two China Bridges

SAR Image Provider

Sentinel 1– Image Processing
Proposed System and Services

Building blocks (BLs) of GeoSHM services:

• BL1: The sensory system
• BL2: The data acquisition and transmission system
• BL3: The monitoring and control system
• BL4: The structural evaluation and notification system
• BL5: The data management system

GeoSHM Data Strategy
Customers and Business Model

Business Model in Pre-operational Period
• GeoSHM has two key end-users/testbeds (Amey & China Railway);
• Address the needs for safety, through establishment of interaction of environment, loading and response;
• Verify design codes;
• Provide a base for market entry and expansion.

Business Model during full operations
• Revenues from three installations and ongoing services; consultation; system purchase/lease; new system installations; training; technical support; maintenance contracts/upgrades; subscription services
Customers from Day 1 – Chongqing, China
Customers from Day 1

- Chongqing – “City of Bridge in China”
- One city has 13,000+ bridges
- Owns 34 long bridges over total 136 built bridges over the Yangtze River
- Strategic visit by ESA GeoSHM officer in May 2017
- Return visit to UK bridge site and Nottingham for GeoSHM exploitation – joint venture by 2017

Site visit and F2F meeting with key end users

Visit by Chongqing Government Delegations to the UK from 13-16 Sept 17
Market Opportunities

Market Opportunities (span > 400m)

<table>
<thead>
<tr>
<th>Bridge type</th>
<th>UK</th>
<th>China</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspension</td>
<td>3</td>
<td>39</td>
<td>42</td>
</tr>
<tr>
<td>Cable-stayed</td>
<td>2</td>
<td>86</td>
<td>88</td>
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<tr>
<td>Arch</td>
<td>0</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>141</td>
<td>146</td>
</tr>
</tbody>
</table>

- Transport Scotland and China Railway/BRDI open the opportunities for future installations and service delivery across the infrastructure networks that they are responsible for;
- They provide a powerful baseline for the marketing, promotion and showcasing of the GeoSHM system and services;
- GeoSHM will mainly focus on large bridge monitoring market;
- Seek cooperation with potential investors and users to expand commercialisation of the system.

Spin-out second company after GVL
GeoSHM Roadmap

UNOTT

Bridge operator

GeoSHM service operation / training

GeoSHM subscription

Hardware provider (LEICA)

Provide hardware, maintenance, support

Bridge designers

GeoSHM (UbiPOS)

InSAR deformation products

Purchase hardware, support

Consultancy fees

InSAR (Punnet)

Consultancy fees

SAR products

UNOTT

SHM knowledge

Purchase hardware, support
Conclusions

Ongoing work – Intelligent Data Strategy
• Commissioning of full instrumentation set
• Developing methodology to separate effects of wind, traffic and temperature
• Comparisons with analytical models
• Identification and analysis of non-stationary loading and response

Exploitation & Roadmap
• Full engagement with potential GeoSHM users/stakeholders
• Other opportunities