BRIDGE OWNERS FORUM – GRAND CHALLENGES

THEME	CURRENT POSITION	CHALLENGES	ACTIONS/FIRST STEPS	LONG TERM ASPIRATION OR GOAL

How do we obtain a better understanding of new and existing structures assets to reduce cost and improve safety and whole life performance?
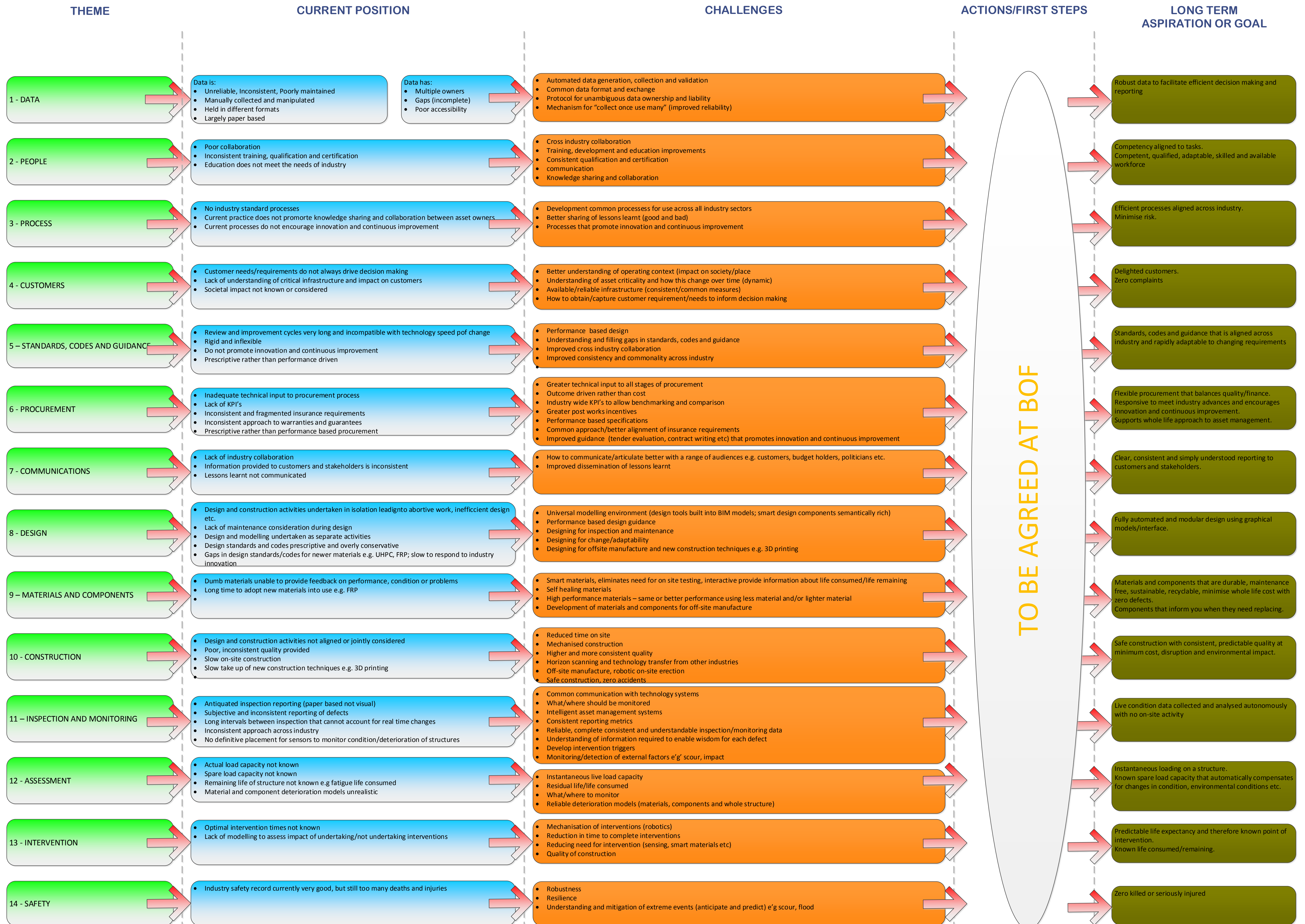
TO BE AGREED AT BOF

ENABLES SAFE REAL-TIME NETWORK MANAGEMENT

1 - DATA
Current Position:
Data is:
- Unreliable, Inconsistent, Poorly maintained
- Manually collected and manipulated
- Held in different formats
- Largely paper based

Data has:
- Multiple owners
- Gaps (incomplete)
- Poor accessibility

Challenges:
- Automated data generation, collection and validation
- Common data format and exchange
- Protocol for unambiguous data ownership and liability
- Mechanism for "collect once use many" (improved reliability)

Long Term: Robust data to facilitate efficient decision making and reporting

2 - PEOPLE
Current Position:
- Poor collaboration
- Inconsistent training, qualification and certification
- Education does not meet the needs of industry

Challenges:
- Cross industry collaboration
- Training, development and education improvements
- Consistent qualification and certification
- communication
- Knowledge sharing and collaboration

Long Term: Competency aligned to tasks. Competent, qualified, adaptable, skilled and available workforce

3 - PROCESS
Current Position:
- No industry standard processes
- Current practice does not promote knowledge sharing and collaboration between asset owners
- Current processes do not encourage innovation and continuous improvement

Challenges:
- Development common processes for use across all industry sectors
- Better sharing of lessons learnt (good and bad)
- Processes that promote innovation and continuous improvement

Long Term: Efficient processes aligned across industry. Minimise risk.

4 - CUSTOMERS
Current Position:
- Customer needs/requirements do not always drive decision making
- Lack of understanding of critical infrastructure and impact on customers
- Societal impact not known or considered

Challenges:
- Better understanding of operating context (impact on society/place
- Understanding of asset criticality and how this change over time (dynamic)
- Available/reliable infrastructure (consistent/common measures)
- How to obtain/capture customer requirement/needs to inform decision making

Long Term: Delighted customers. Zero complaints.

5 – STANDARDS, CODES AND GUIDANCE
Current Position:
- Review and improvement cycles very long and incompatible with technology speed pof change
- Rigid and inflexible
- Do not promote innovation and continuous improvement
- Prescriptive rather than performance driven

Challenges:
- Performance based design
- Understanding and filling gaps in standards, codes and guidance
- Improved cross industry collaboration
- Improved consistency and commonality across industry

Long Term: Standards, codes and guidance that is aligned across industry and rapidly adaptable to changing requirements

6 - PROCUREMENT
Current Position:
- Inadequate technical input to procurement process
- Lack of KPI's
- Inconsistent and fragmented insurance requirements
- Inconsistent approach to warranties and guarantees
- Prescriptive rather than performance based procurement

Challenges:
- Greater technical input to all stages of procurement
- Outcome driven rather than cost
- Industry wide KPI's to allow benchmarking and comparison
- Greater post works incentives
- Performance based specifications
- Common approach/better alignment of insurance requirements
- Improved guidance (tender evaluation, contract writing etc) that promotes innovation and continuous improvement

Long Term: Flexible procurement that balances quality/finance. Responsive to meet industry advances and encourages innovation and continuous improvement. Supports whole life approach to asset management.

7 - COMMUNICATIONS
Current Position:
- Lack of industry collaboration
- Information provided to customers and stakeholders is inconsistent
- Lessons learnt not communicated

Challenges:
- How to communicate/articulate better with a range of audiences e.g. customers, budget holders, politicians etc.
- Improved dissemination of lessons learnt

Long Term: Clear, consistent and simply understood reporting to customers and stakeholders.

8 - DESIGN
Current Position:
- Design and construction activities undertaken in isolation leadingto abortive work, ineficcient design etc.
- Lack of maintenance consideration during design
- Design and modelling undertaken as separate activities
- Design standards and codes prescriptive and overly conservative
- Gaps in design standards/codes for newer materials e.g. UHPC, FRP; slow to respond to industry innovation

Challenges:
- Universal modelling environment (design tools built into BIM models; smart design components semantically rich)
- Performance based design guidance
- Designing for inspection and maintenance
- Designing for change/adaptability
- Designing for offsite manufacture and new construction techniques e.g. 3D printing

Long Term: Fully automated and modular design using graphical models/interface.

9 – MATERIALS AND COMPONENTS
Current Position:
- Dumb materials unable to provide feedback on performance, condition or problems
- Long time to adopt new materials into use e.g. FRP

Challenges:
- Smart materials, eliminates need for on site testing, interactive provide information about life consumed/life remaining
- Self healing materials
- High performance materials – same or better performance using less material and/or lighter material
- Development of materials and components for off-site manufacture

Long Term: Materials and components that are durable, maintenance free, sustainable, recyclable, minimise whole life cost with zero defects. Components that inform you when they need replacing.

10 - CONSTRUCTION
Current Position:
- Design and construction activities not aligned or jointly considered
- Poor, inconsistent quality provided
- Slow on-site construction
- Slow take up of new construction techniques e.g. 3D printing

Challenges:
- Reduced time on site
- Mechanised construction
- Higher and more consistent quality
- Horizon scanning and technology transfer from other industries
- Off-site manufacture, robotic on-site erection
- Safe construction, zero accidents

Long Term: Safe construction with consistent, predictable quality at minimum cost, disruption and environmental impact.

11 – INSPECTION AND MONITORING
Current Position:
- Antiquated inspection reporting (paper based not visual)
- Subjective and inconsistent reporting of defects
- Long intervals between inspection that cannot account for real time changes
- Inconsistent approach across industry
- No definitive placement for sensors to monitor condition/deterioration of structures

Challenges:
- Common communication with technology systems
- What/where should be monitored
- Intelligent asset management systems
- Consistent reporting metrics
- Reliable, complete consistent and understandable inspection/monitoring data
- Understanding of information required to enable wisdom for each defect
- Develop intervention triggers
- Monitoring/detection of external factors e'g' scour, impact

Long Term: Live condition data collected and analysed autonomously with no on-site activity

12 - ASSESSMENT
Current Position:
- Actual load capacity not known
- Spare load capacity not known
- Remaining life of structure not known e.g fatigue life consumed
- Material and component deterioration models unrealistic

Challenges:
- Instantaneous live load capacity
- Residual life/life consumed
- What/where to monitor
- Reliable deterioration models (materials, components and whole structure)

Long Term: Instantaneous loading on a structure. Known spare load capacity that automatically compensates for changes in condition, environmental conditions etc.

13 - INTERVENTION
Current Position:
- Optimal intervention times not known
- Lack of modelling to assess impact of undertaking/not undertaking interventions

Challenges:
- Mechanisation of interventions (robotics)
- Reduction in time to complete interventions
- Reducing need for intervention (sensing, smart materials etc)
- Quality of construction

Long Term: Predictable life expectancy and therefore known point of intervention. Known life consumed/remaining.

14 - SAFETY
Current Position:
- Industry safety record currently very good, but still too many deaths and injuries

Challenges:
- Robustness
- Resilience
- Understanding and mitigation of extreme events (anticipate and predict) e'g scour, flood

Long Term: Zero killed or seriously injured