Define
- Organisational silos within HE prevent the lifecycle approach leading to at least 20-30% waste.
- Evidence from interviews show that there are problems with information flow affecting the efficiency of project delivery.
- There is an opportunity to improve information flow with Intelligent Products – a product-centric framework enabled by Internet of Things and BIM.

Methodology
- Literature review to identify the current state-of-the-art and the major gaps.
- Interviews with Highways England tier 1 supply chain members. Project managers, Lean practitioners and designers.
- Development of a requirements capture framework through Quality Function Deployment technique.
- Prototype development to highlight the opportunity.

Findings and analysis
- Information delivery and coordination across the Highways England supply chain are key problems affecting project efficiencies by as much as 30-40%.
- Silos prevail across Highways England and supply chain causing major problems with information flow.
- One of the key reasons is that the main project control logic is outside-in.
- Pilot studies are needed to evaluate the practical impact of the concept and actual benefits and challenges in the field.

Conclusions and Recommendations
- Intelligent products have the ability to transform the information flow and lifecycle management for Highways England bringing significant cost savings.
- Highly efficient knowledge transfer (the knowledge is embedded within the asset).
- The concept of intelligent products has strong synergies with Lean Principles and BIM.

Related projects
- Reduction of 20-30% in lead time, handling and quality errors has been achieved on other projects.
- Otaniemi3D – Real-time monitoring of assets through the lifecycle with BIM.
- S4Fleet – Intelligent Products concept applied to fleet management.
- Fin3D – Application of IP concept to the manufacturing (foundry) industry.

Deliverables
- Clear problem definition through interviews and literature review.
- A requirements framework to enable Intelligent Products in Highways England.
- A solution candidate in form of a prototype.

Planned benefits
- Savings as high as 50% on lifecycle costs.
- Improved quality and safety.
- Optimisation of long-term asset operating costs.
- Closing the gaps through feedback loops from each stage in the lifecycle.
- Holistic/lifecycle view of assets enabling flow rather than “local” optimisations.
- Ubiquitous technology that cuts across silos.

Next steps
- Benefits can only be realised if applied on a real-life project.
- Long-term pilot projects on live projects.
- Integration of Intelligent Products with Highways England supply chain.