

Improving the Certainty of Outcomes Project Briefing

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CWCT Conference

22nd September 2015

- Main Contractor Challenges
- Risks of Uncertainty
- Technology in context
- Tag and Track research project
- Other research?

Product and package selection criteria:



- Health & Safety



- Economically Effective



- Compliance to specification or performance criteria & design



- Sustainability and Environmental impacts



- Quality controls and checks

Product and package selection criteria (cont'd):



- Ethical procurement standards & Code of Conduct



- Financial stability of suppliers



- Ability to meet delivery schedule



- Legal Obligations



- Accountability & Auditability

Supply:

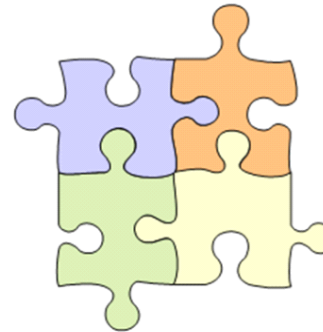
- Certainty of outcome



Scheduling, Delivery & Installation

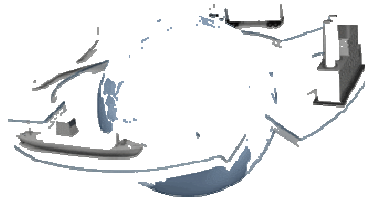
Knowing what goes where:

- Multiple mix of types, sizes & systems
- Complex interface details
- Integration with other systems



Lead-in times

- Understanding of implications of damage, changes to sequence
- Understanding criticality of suppliers further up the chain



Logistics

- Handling Plans
- Lost Materials/Stock control
- Unscheduled deliveries
- Manufacturing process control



Sustainable & Environmental sourcing

- Proof of origin
- Protection of environment
- CSR

Post Installation & maintenance

- Retrieval of correct information at the right time incl Health & Safety data
- Performance information & early Identification of problems & their root causes
- Down-time/SLA's
- Dismantling and disposal

 Information

- Exponential information growth
- Information Management
- Information validity

The tag and track research project is co-funded by:

Innovate UK

- 2 Year project to look at tagging components of a project throughout its lifecycle
- Captures data from different Supply Chain Partners in a common format
- Marking components gives real time monitoring throughout lifecycle
- Potential to allow monitoring of progress against plan & timescales
- Semi-automated – link with schedule supporting JIT deliveries
- Advanced notification of delays
- Partners – Skanska, BRE, MAC, Leaderflush

Wheel Invented

4000BC

5834 Years

First Mechanical Computer

1834

Commercial Light Bulb

1879

Radio

1895

181 Years

Man on Moon

1969

Amstrad ZX Spectrum

1981

Driverless cars

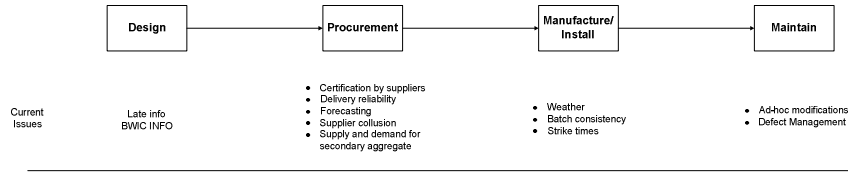
2015

Next 50 Years

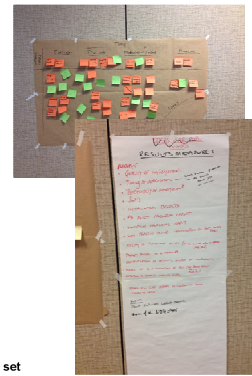
Technology is a great enabler.
A great result is only achieved through the efficient integration of technology with People & Processes to achieve true value.



Concrete Frame

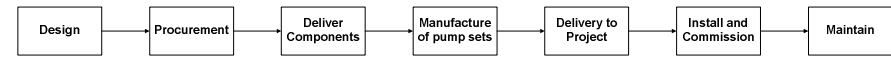


- Mix Design
 - Rough Design
 - Stress Calcs
 - Fabrication Drawings
 - Fabrication quotes
 - Requirements
 - Materials
 - Loadings
 - Cash-in items
 - Public Health interfaces
 - Recycling
 - Research
 - Environment/CO2
 - Design for de-construction
- Manufacturing processes*
- Risk
 - Ready mix concrete procurement
 - Pre-cast columns
 - Material spec options
 - Pre-cast stairs
 - Procurement-scope out suppliers
 - Procurement-request terms/quotes
 - Define supply chain
 - Batched on/off site
- On-site risks*
- Quality inspections
 - Concrete wagons KPI's
 - Bill of materials
 - Cube tests (maturity)
 - Water proofing
 - Capacity planning
 - Cast in-situ
 - Temporary works inspections
 - Raw materials/stock
 - BWIC
 - Formwork-re-useable?
 - Fabrication
 - IFE
 - Logistics
 - Quality
 - Diamond drilling inefficient
 - Plant
 - Install drawings
- Demolition
 - Client modifications
 - Information
 - Area specific loadings (safety)
 - Pre-cast manufacture



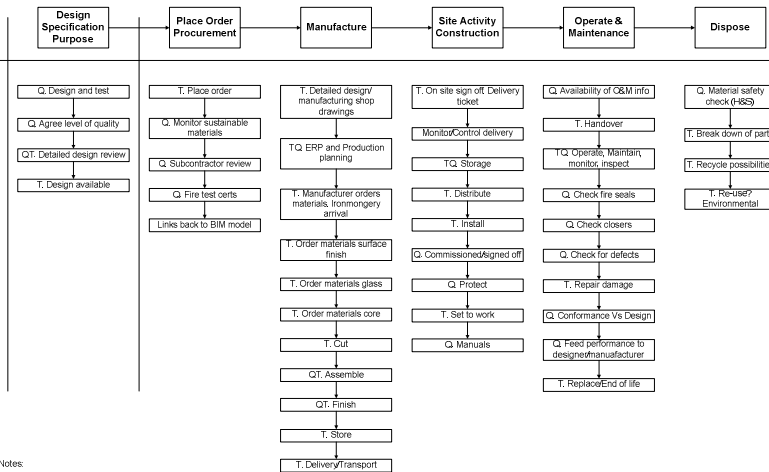
Doors/Concrete/M&E

Mechanical & Electrical - Pump set



Power rating/load supply	UK/Abroad	Track key parts	Casing, Impellers, flanges	Logistics/just in time	BMS	Lifespan
Mounting type	Tagtrack in place?			Storage	Safe system of work	Replace
capacity	When to tag component				BWIC	
Consultant design	Manufacture time				Testing/commissioning	
Contractor coordination	Lead in time				Snag	
Plan installation method	Final selection					

Doors/Process



Notes:
Q - Quality
T - Time

- Map Lifecycle
- Identify customer
- Customer needs?
- KPI's



Component Data Requirements

- Accurate product/component source information to support all stakeholder needs from design/manufacture through to maintenance and disposal that is available at the time and location required throughout the full lifecycle of the component linked to a digitally engineered BIM environment.
- Ability to track defined stages and locations of a component throughout its life thereby reducing waste and supporting the smooth flow of the manufacture, construction, maintenance and disposal processes along with associated commercial transactions/processes.
- Ability to track 'life history' & maintenance information of component from 'cradle to grave' linked into project BIM data bases.

Component Data Requirements (cont'd)

- Support control of material waste calculations
- Intelligent sensors providing information on performance and supporting Planned Preventative Maintenance and whole life costing could be linked with a Tag & Track system.

System Requirements

- Avoid duplication/replication of current systems – ‘one version of truth’.
- System should interface with BIM model data without duplication so that the ‘one version of truth’ can always be accessed.
- System should be able to function in a ‘stand-alone’ mode.
- Simple, effective exchange of data.

General Requirements

- Individual customer requirements will differ for the type of product being tracked
- System must therefore be flexible/adaptable
- Tag & Track other general requirements will be developed during course of the two year project.

Time/Cost/Quality Benefits

- Quality of information
- Root causes
- Waste reduction
- Less disputes
- Improved FM SLA's
- Health & Safety
- Retrievability of information
- Timing of information
- Reduced cost of storage
- Identification of problems early
- Reduced down-time
- Improved information
- Reduce component loss
- Improved project monitoring and reporting
- Efficiency savings
- Reduction in risk profile
- Increased reliability & transparency

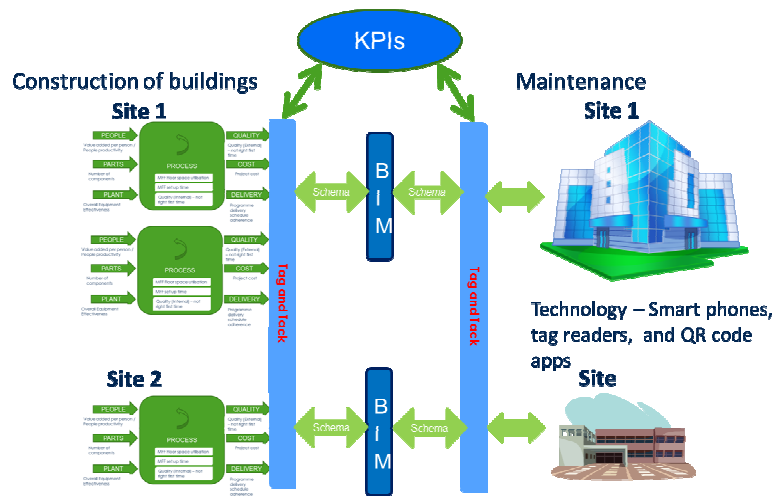
Other Benefits

- Lessons Learnt store
- Paperless invoicing, ordering and delivery
- Issue resolution

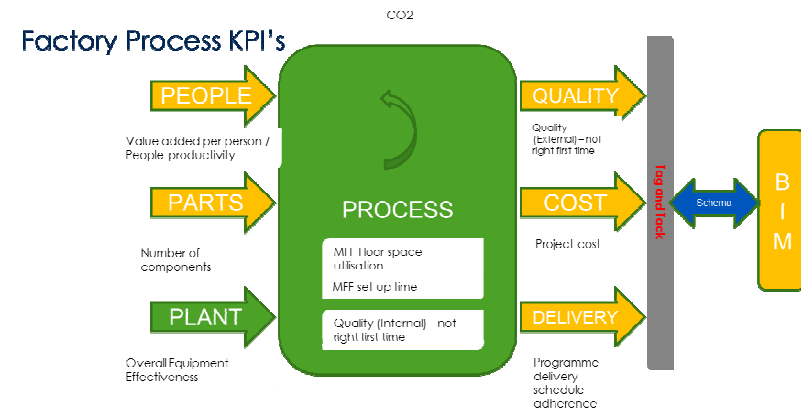
Business Improvement KPI's

- Factory Process
- Logistics
- Component Installation
- Post Installation
- Decommissioning

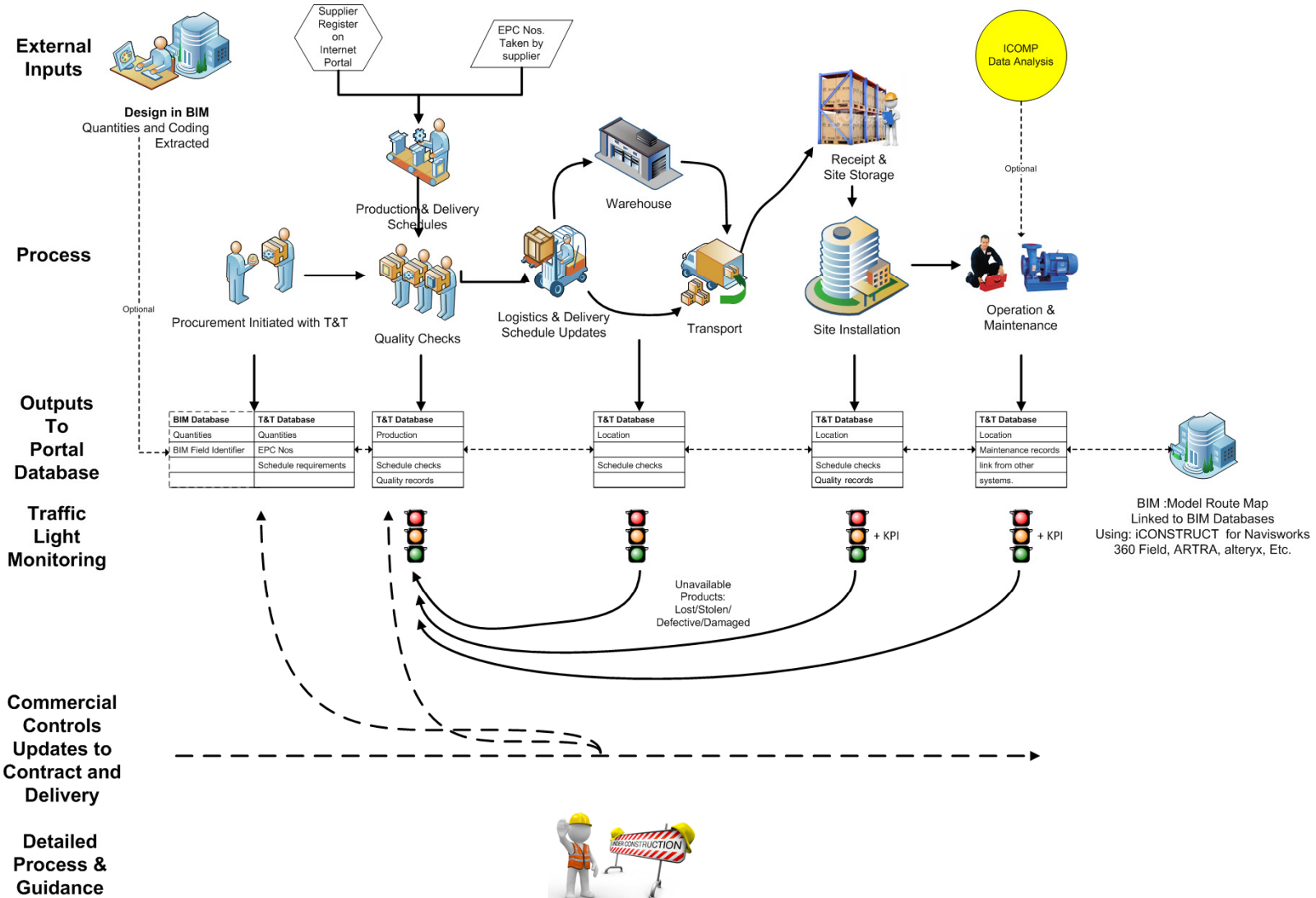
- Planned Vs Actual & Forecast



T&T for Skanska - Site



TAG & TRACK PROCESS PICTOGRAM – RESEARCH PROJECT



Finland – RFID

Schedule

External walls

Resources

3D Model

SK

External walls

Activity

Linked Components

Visualization

Activity Task

Linked Tree Node

Node Name	Start Time	End Time	Duration	Resources
SK-33	17-07-07 11:00	17-07-07 11:31	0:31	
SK-35	17-07-07 11:31	17-07-07 12:03	0:31	
SK-31	17-07-07 12:03	17-07-07 12:35	0:31	
SK-25	17-07-07 12:35	17-07-07 13:07	0:31	
RK-30	17-07-07 13:07	17-07-07 13:38	0:31	
SK-20	17-07-07 13:38	17-07-07 14:10	0:31	
S-15	17-07-07 14:10	17-07-07 14:42	0:31	
S-12	17-07-07 14:42	17-07-07 15:14	0:31	
S-7	17-07-07 15:14	17-07-07 15:45	0:31	
RK-37	17-07-07 15:45	18-07-07 07:17	0:32	
RK-34	18-07-07 07:17	18-07-07 07:48	0:31	

Resources

Attach Resource

Resource Usage

Item timings

Start Time

End Time

Duration

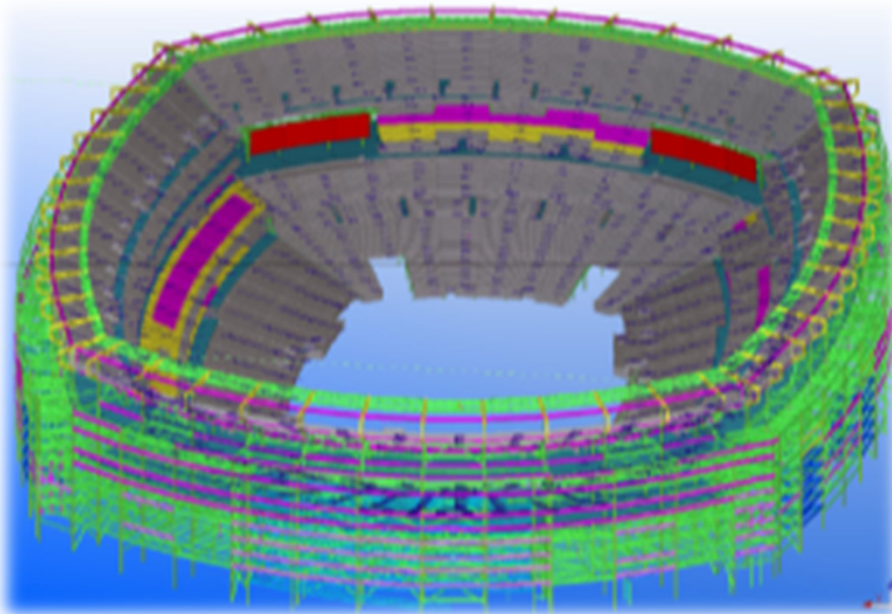
Hours

Minutes

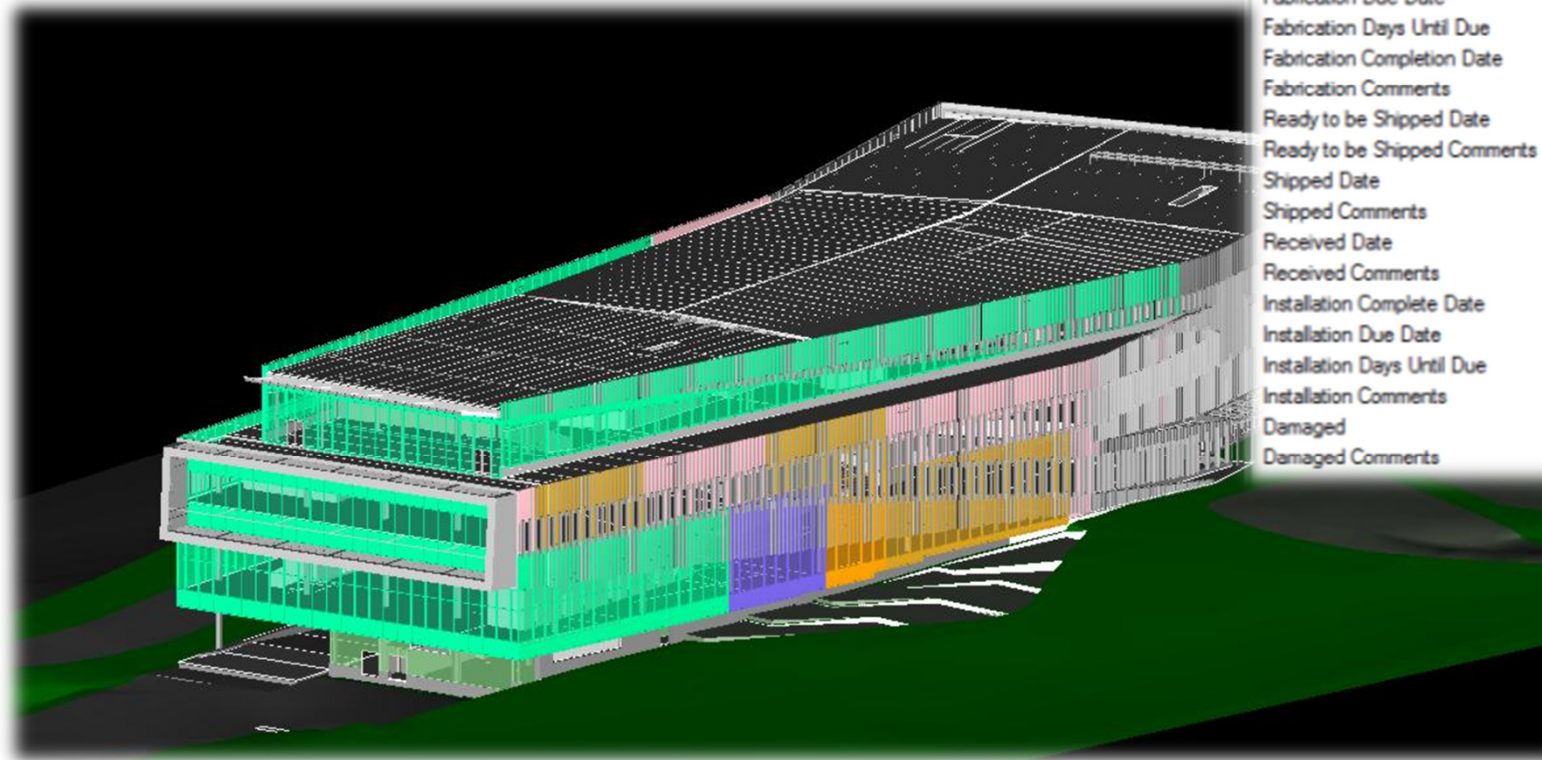
Tekla Model Server

- Monitor status of supply chain

Material Tracking for Unitized Curtain wall



Material Tracking for Unitized Curtain wall



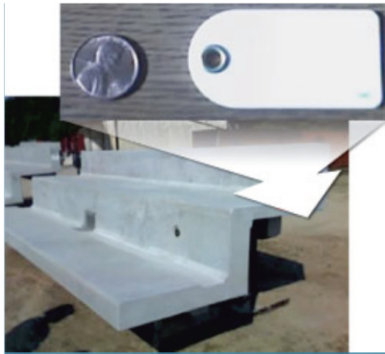
Properties

Property	Value
Status	SHIPPED
Fabrication Start Date	1/20/2011 11:0...
Fabrication Due Date	2/9/2011 12:00...
Fabrication Days Until Due	-19
Fabrication Completion Date	2/28/2011 8:56...
Fabrication Comments	
Ready to be Shipped Date	2/28/2011 8:56...
Ready to be Shipped Comments	
Shipped Date	2/28/2011 10:2...
Shipped Comments	
Received Date	
Received Comments	
Installation Complete Date	
Installation Due Date	2/22/2011 12:0...
Installation Days Until Due	-6
Installation Comments	
Damaged	False
Damaged Comments	

Exterior Envelope

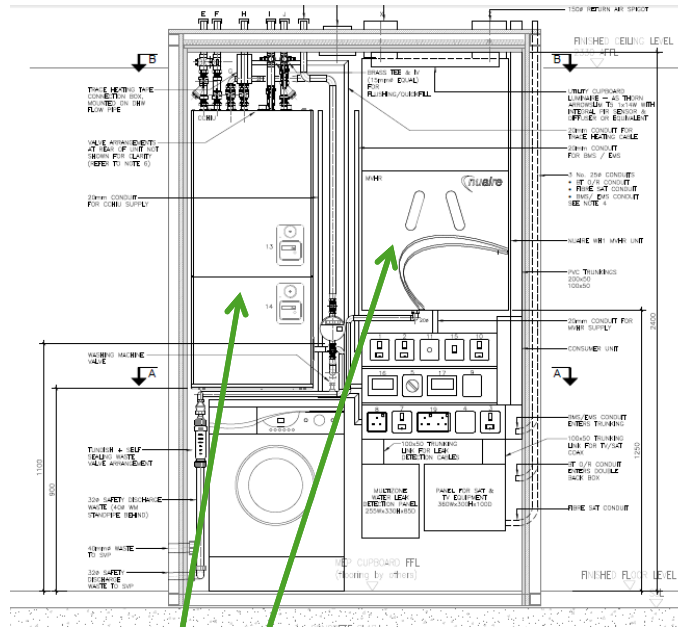


Tracking Precast Components with RFID



T&T - Battersea

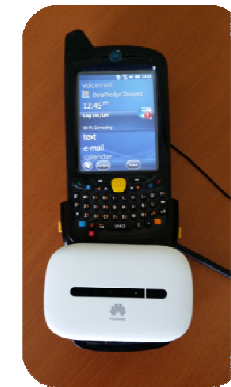
Battersea
Utility
Cupboard



- HUI
instillation
- Boiler
installed
- HUI
Instillation
- 2nd
pipes
installed
- HUI
Instillation
- Connect
HIU
- HUI
Instillation
- Pipes
installed
- MVHR -
Drain
discharge
- MVHR -
Installed
- MVHR-
Pipes
installed
- CU
Installed
- AV
installed
- Soil
pipe -
Installed
- Soil
pipe -
Soil
pipe
boxed
- Sockets
- Fit
- Sockets
- Fit
spur
- Socket -
Fit
trunking
- Dist
board
fitted
- Wrap
- Storage

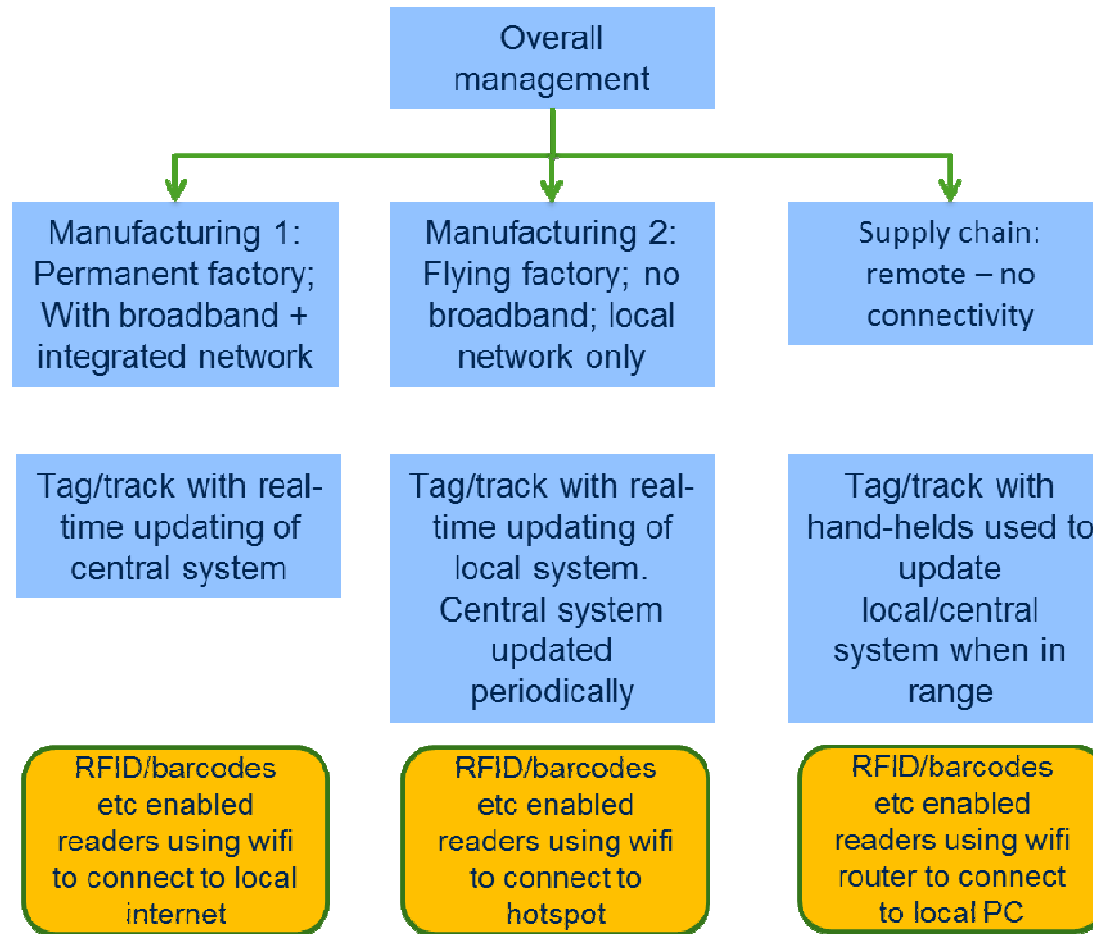


- Process map developed from plan
- Steps identified for possible route
- Sub assemblies identified
- Tag and track developed



- Pilot proves technology works
- Easy set up – website, hardware and wifi
- Obtained useful KPIs

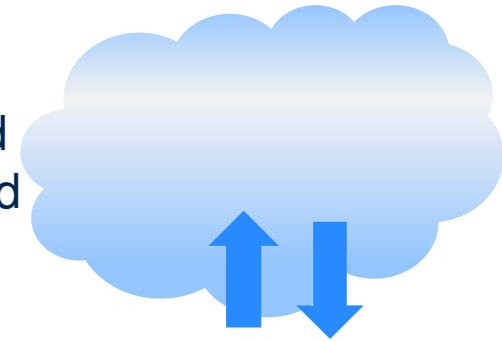
- Technology must always work
- People/Process/Technology aligned



What's New?

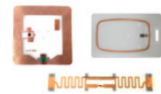
Hardware + (Price)

Widespread use of Cloud Technology



Barcode Scanners

- CCD (1D)
- Advanced Linear (1D)
- Area Imager (1D&2D)
- Area Imager (1D&2D) w/ License Decryption



Rfid Read/Write

- HID ICLASS-SE (dual frequency 125kHz/13.56MHz)
- Low Frequency (125kHz read only)
- Low Frequency (125/134.2kHz)
- Long Range Low Frequency (125/134.2kHz)



Through life, live tracking across whole Project with effective processes applied in a practical manner using the latest smart technology

Other research being undertaken by Skanska and their partner which are aligned with Tag & Track

- Modern Flying Factories
- iCOMP – Condition Based Maintenance of rotating machinery
- BIM interfaces

The above research where relevant has been indicated in this presentation and **Innovate UK** have provided funding for these projects also.

T&T for Cemex by the BRE

- Pilot to show “Cradle to Cradle” of rail way sleepers
- Two pilots planned for late 2015
 - 100 tagged geo-polymer sleepers
 - 100 tagged low carbon sleepers
- Location
 - Cardiff possible
 - Lincoln possible



Tag & track provides the controls needed for:

- Effective implementation of industrialised construction activities, Leading to certainty of outcome & reduced costs.
- Progress on projects can be monitored against plan.
- The project will develop a solution for real-time tracking of component status during manufacture which can utilise different tag/track approaches.
- It will also develop a 'schema' to capture data from multiple supply chains in a standard format for integration into 4D BIM models.
- This work will be piloted in supply chains for real projects. Implementation will accelerate uptake of BIM throughout supply chains
- Project aligns with PAS1192 and BIM Level 3.



SKANSKA

Questions