“E-Collaboration and Information Management: An Inside View of Britain's Railway Market”

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Why information?

My inspiration...

“information is an unusual good: the more widely is shared, the more people benefit from it”
(UK Government, 2013)

“There is a growing realisation that information is an organisation’s third capital asset and should be given the same level of focus as cash and human resources”
(Hulme, 2012)

challenge & opportunity:
What is e-collaboration?

'...collaboration among individuals engaged in a common task using electronic technologies'.

Kock et al. (2001)
What is BIM?

BIM = technology + collaborative work process

(software + 3D models + collaborative work process + information management + asset management + more...)

“Building Information Modelling (BIM): “the process of generating, building and managing data through the life of a project by using model-based technologies linked to a database of project information”

(Crossrail)

*Building = the verb not the noun, which describes the process of developing information models to improve the business performance.

Why BIM?

BIM= e-collaboration + information management = innovation = game changer
AEC Industry

cost + change management

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Transformation of stakeholders' relationships = opportunities

- transparency + simplicity
- early involvement
- better coordination
- role changes

'a reminder of the old world’

'BIM world'

Source: Crossrail
technical core + social parts = a complicated process

disadvantages

- Not clear defined/perceived
- Various users' purposes/expectations
- Incompatibility of software (large organisations using their own systems)
- Cultural shift is required
- Lack of legislation/ standardisation
- Training costs
- High costs for implementation (especially for SMEs)
Britain's railway: adoption of BIM + interest

**Crossrail**

- Collaborative 3D environment = contractual requirement
- Crossrail BIM ‘academy’ = interoperability
- 1 centralised set of linked databases

**hs2 engine for growth**

- "We want to build, operate and maintain a virtual railway before we go anywhere near a shovel" (MacNaughton, 2015)

**BCRRE**

- Research interest

**Network Rail**

- 2014 Asset Management strategy
- Working on its procurement strategy
- Follow UK Government BIM strategy

**railalliance**

- Support of firms (SMEs)
- Appointment of BIM specialist
- Support seminars + training

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- BIM Level 2
- Appointment of BIM specialists
- 3D models transferred to 2D deliverables for the client progress monitoring

- 2015 conferences
BIM awareness

Are you aware of BIM?

- Almost three fifths (57%) of the participants are aware of BIM.
- The awareness of the respondents can be characterised as sufficient, because of the current conditions of BIM use in the rail industry.

BIM potentials

Do you believe that BIM could be beneficial for the company?*

*Answers among the participants who are NOT aware of BIM

Note: The BIM definition and further information were provided before the question.

Almost half of the BIM unaware respondents support that: ‘BIM could be beneficial for my company’.

BIM awareness in depth

<table>
<thead>
<tr>
<th>Definition</th>
<th>Among the aware respondents (57%)</th>
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<tbody>
<tr>
<td>Construction, digital model-oriented:</td>
<td>A way of working and managing information in a team environment, enabling everyone to understand a building by using a digital model.</td>
</tr>
<tr>
<td>Do not know/cannot decide</td>
<td>7.7%</td>
</tr>
<tr>
<td>Project, 3D model-oriented:</td>
<td>A process that involves creating and using an intelligent 3D model to inform and communicate project decisions.</td>
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<tr>
<td>Commercial, information sharing model-oriented:</td>
<td>A process of business collaboration through shared information models.</td>
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<tr>
<td>Project whole lifecycle (asset), digital model-oriented:</td>
<td>A process of designing, constructing or operating a building or infrastructure asset by using electronic object-oriented information.</td>
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Awareness of the Governmental target (Use of BIM-Level 2 by 2016)

- 49% BIM aware respondents
- 51% Total respondents
- 33% BIM aware respondents
- 67% Total respondents
- 33% BIM aware respondents
- 67% Total respondents
- 33% BIM aware respondents
- 67% Total respondents

BIM means different things to different people.

Encouragingly, the majority defines BIM either as a commercial process based on information sharing, or as an asset management process for the whole lifecycle of a project.

49% of the respondents (85% of the BIM aware) are aware of the Governmental target.
29% of the respondents (51% of the BIM aware) participated in a BIM project.

The BIM projects' participants are at an adequate level regarding the governmental strategy (use of BIM-Level 2), especially those from large firms.
BIM SWOT

**Major Strengths**
- Reduction of work duplication: 48.5%
- Early involvement in a project: 48.5%
- Reduction of errors: 38.2%
- Improved cost estimation and time planning: 33.8%
- Higher grade of transparency: 33.8%
- Don't know/No opinion: 25.0%
- Reduction of cycle time: 22.1%

**Major Weaknesses**
- Industry structure does not allow for the effective adoption of BIM: 45.6%
- Software issues (i.e., incompatibility between partners’ systems): 41.2%
- Skilled personnel is required: 30.9%
- Don’t know/No opinion: 27.9%
- Liability risks: 14.7%
- Other*: 7.4%

*Other:
- Not clearly defined/misunderstanding.
- Lack of understanding by the clients.
- Modelling of existing rail assets.
Major Opportunities

- Provision of better services and products to existing clients: 60.3%
- Introduction of new knowledge/skills into the industry by the SMEs: 32.4%
- Provision of new services and products to new clients: 32.4%
- Provision of new services and products to existing clients: 26.5%
- Don’t know/No opinion: 23.5%
- Other*: 7.4%

*Other:
- Use of created (existing) information for new projects.
- Better and more detailed specifications will be developed.

Major Threats

- Lack of support from larger organisations/partners: 36.8%
- Confidentiality of data and privileged information: 33.8%
- Long duration for standardisation: 29.4%
- Don’t know/No opinion: 29.4%
- Market domination by software companies: 23.5%
- The BIM adoption will affect the firm’s strategy: 4.4%
- Other*: 5.9%

*Other:
- Lack of resources/skills.
- Cost restrictions (SMEs).
- Loss of imaginative skills.

BIM barriers

In your opinion which of the following are the main barriers for the BIM adoption by your company?

- Unfamiliarity with BIM: 54.4%
- Cultural change is required: 30.9%
- Lack of skilled personnel: 27.9%
- First cost of implementation is too high: 25.0%
- Our partners’ procurement policies are not encouraging adoption of BIM: 20.6%
- Not useful for company’s area of work: 19.1%
- Implementation costs outweigh the potential benefits: 19.1%
- Implementation benefits are not tangible: 14.7%
- Don’t know/No opinion: 10.3%
- Risk due to liability reasons: 8.8%
- Other*: 4.4%

*Other:
- Not part of our clients’ wider policy.
- Lack of team and client engagement with BIM.
Ways to overcome the barriers

“Development of sharing culture”
“Standardisation”
“Better understanding of benefits (clients & large firms)”
“The end users need to be aware of the benefits of a supplier to become almost a consultative partner”
“A rail industry wide leadership forum is required”

Conclusion

long-term change

technology
interoperability software/BIM Railway platform skilled personnel

culture/mentality
sharing culture collaboration & trust

financial + commercial
better definition + understanding invest in BIM large firms + clients support SMEs standardisation

process
‘BIM friendly’ procurement non-adversarial contracts flexibility reassessment of confidentiality
Recommendations

- Further investigation of the firms’ innovative/BIM capabilities
- Comparative study (BIM in Railway vs BIM in AEC)
- Standardisation and regulations + clearer definition of BIM (Asset management + collaboration)
- Development of a BIM strategy for the industry - achievable & measurable targets
- Development of a collaborative ‘BIM friendly’ culture
- Creation of a multi-professional and cross-sectoral BIM panel
- Protection - Hazard of domination by software companies
development of a common BIM railway platform widely available at low cost
(BIM Task Group - supporting BIM software (COBie) is available for free)
- ‘Crossrail Academy’ paradigm

Further opportunities

- New business area - SMEs opportunity
  creation and management of information models for the existing UK railway assets
- BIM for Asset Management
  information for the end-users (citizens, TOCs, FOCs), the network owner (NR) and the suppliers.
- 'Smart'/ Digital UK Railway
  Smart City concept, Diigiital Built Britain