



## Digital Construction and BIM Research in Ireland 2016-20

Roger P. West, Trinity College Dublin

Alan Hore, Technological University Dublin

Barry McAuley, Technological University Dublin



**5th CitA BIM Gathering Virtual Conference**  
21 - 23 September 2021

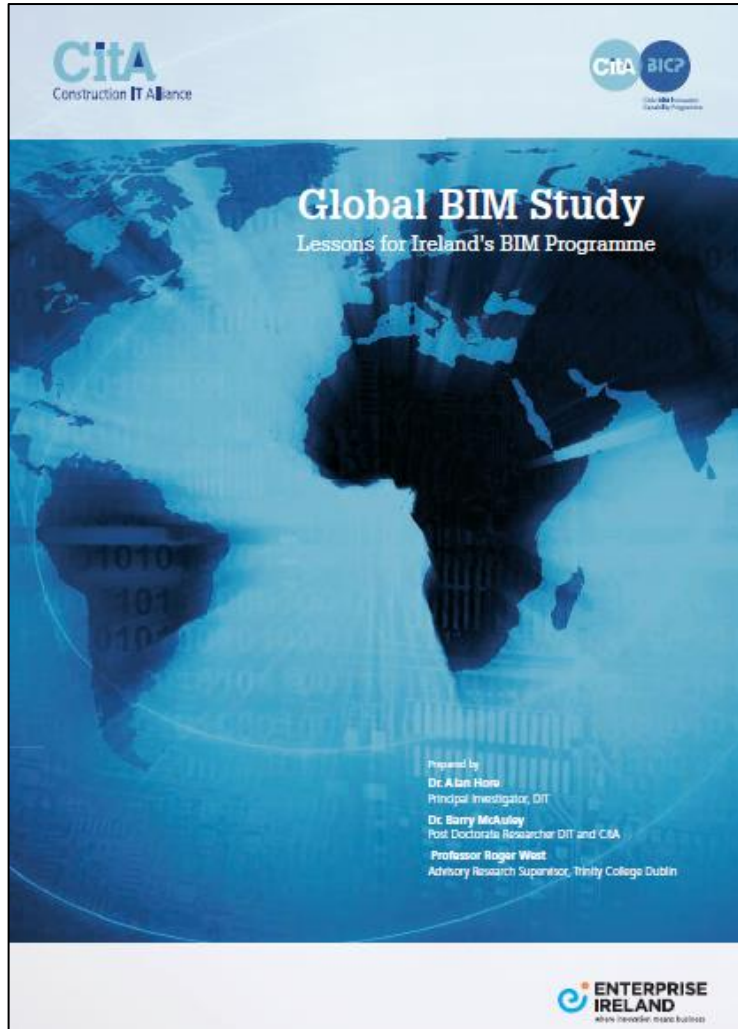




Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



# Background





Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



# Predominant Source - CitA's BIM Gatherings



## Proceedings

14-15 November 2013



An Integrated Future

CitA  
BIM Gathering 2015

## CitA BIM Gathering Proceedings

12th and 13th November 2015  
The Gibson Hotel, Dublin, Ireland



Building Capabilities  
in Complex Environments

CitA  
BIM Gathering 2017

## CitA BIM Gathering 2017 Proceedings

Supported by

CitA BIM Gathering 2017, Croke Park, November 23rd & 24th, 2017

Delivering better outcomes  
for Irish Construction

CitA  
Construction Skills Partnership

## CitA BIM Gathering 2019 Proceedings



4th CITA BIM Gathering 2019, November 20th, 2019, Grangefield Hotel





Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



# Paper on Irish BIM Publications 2015 - 2019 at Civil Engineering Research in Ireland 2020

## BIM Research in Irish Academic Institutions 2015-19

Roger P. West<sup>1</sup>, Alan V. Hore<sup>2</sup> and Barry McAuley<sup>3</sup>

<sup>1</sup>Department of Civil, Structural and Environmental Engineering, Trinity College, University of Dublin, Dublin 2

<sup>2</sup>School of Surveying and Construction Management, Technological University Dublin, Bolton Street, Dublin 1 <sup>3</sup>School of Multidisciplinary Technologies, Technological University Dublin, Bolton Street, Dublin 1

email: [rwest@tcd.ie](mailto:rwest@tcd.ie), [alan.hore@tudublin.ie](mailto:alan.hore@tudublin.ie),  
[barry.mcauley@tudublin.ie](mailto:barry.mcauley@tudublin.ie)

**ABSTRACT:** The use of BIM in the Irish construction industry has become pervasive in the last decade and it is an essential element in improving productivity in the market. The developments in BIM education and training in supporting the increase in Ireland's BIM maturity has been well documented in recent years, principally through the proceedings of the BIM Gatherings and the BIM in Ireland 2017 and 2019 reviews. Similarly, the public and private sectors have been surveyed to establish their readiness for digital transformation on their BIM journey. However, BIM research undertaken by Irish academics, while individually strong, has not been strategic at national level nor has it yet met all the needs of industry. This paper will review the learned publications of all research-active academics on this island in the various aspects of the field of BIM-related research in the last 5 years. It will categorise and analyse their achievements, acting as a national reference source for all parties in this industry. It will also suggest areas where further research opportunities exist in support of the continuing fast-paced evolution of this digital technology in the construction industry, nationally and internationally.

**KEYWORDS:** BIM Gathering, BIM research, Academic institutions.



# Paper Objective

- Review of Digital Construction related publications from 2016-2020 by Irish Academics
- How prolific are these researchers in Ireland? Who is doing what?
- Objective was to create
  - A reference source for student and academic researchers and industry
  - A listing of which academics are “expert” in which areas of digital construction in Ireland
  - A signpost for future research clusters



# Methodology and Limitations

- Contact academics working in third level institutions on this island – 22 such institutions exist of which 16 have been active in Digital Construction related teaching and/or research
- Conduct survey seeking lists of peer-reviewed conference and journal publications over five years 2016-20
- Omitted MSc and PhD theses and technical reports due to lack of access as a consequence of Covid-19
- Reliant on academics responding to call for publications lists



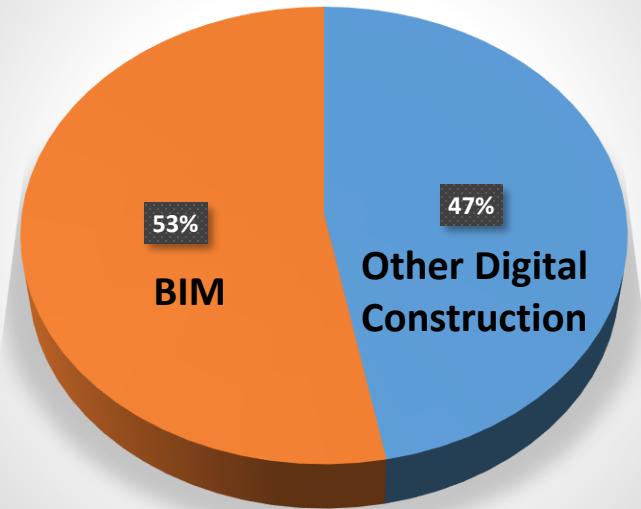
# Key contact list in the third level institutions

Institution	Contact name	Institution	Contact name
Athlone IT	Finola <u>Deavey</u>	Sligo IT	Trevor <u>McSharry</u>
Carlow IT	Eoin Homan	Technological University of Dublin	Barry McAuley
Munster Technological University	Ted McKenna	Trinity College Dublin	Roger P. West
Dundalk IT	Eamon <u>Cushnahan</u>	University College Cork	<u>Paraic</u> Ryan
Galway-Mayo IT	Mark Kelly	University College Dublin	James O'Donnell
Letterkenny IT	Anne Bonner	University of Limerick	Javier Buran
Limerick IT	Paul Vesey	University of Ulster	David Comiskey
Queens University Belfast	Tara Brooks	Waterford IT	Gordon Chisholm

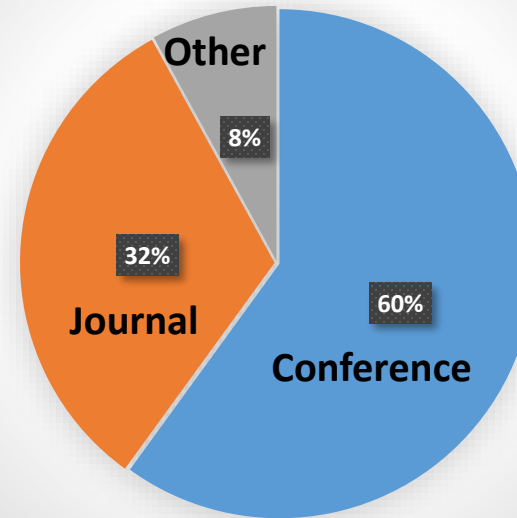


# Paper statistics

Total Papers 167



Paper Types







Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin





Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



# Digital Construction Topics

Topic	Number of Papers
Digital age	14
Remote sensing	21
Data transfer	5
PM and FM	5
Building energy	8
Recycling	4
Education	6
Others	13



Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



# BIM Topics

Topic	Number of Papers
Lean construction	4
BIM maturity	5
Knowledge management	8
Management approaches	5
Public sector	3
Facilities management	5
5D BIM	3
Big data	4
Thermal performance/Digital Twins	8
GEOBIM/Historic BIM	8
Education	20
Use cases	11



# Index of Papers – top 50 list

Alshehri, F.: 47, 121, 122, 123	Eadie, R.: 17, 66, 112, 138, 140, 141, 157	Lydon, D.: 34, 39, 73	McKenna, T.: 8, 110, 153, 165	Pinheiro, S.: 55, 100, 121, 124
Bazjanac, V.: 54, 55, 56, 100, 124	Frisch, J.: 55, 100, 124	Lydon, M.: 34, 38, 39, 73	Meng, X.: 96, 97, 98, 101, 102, 109, 113	Rebelo, E.: 146, 147, 148
Behan, A.: 130, 146, 147, 148, 156, 160	Hamilton, A.: 146, 147, 148	Lynch, S.: 146, 147, 148	Millar, P.: 12, 23, 25, 81	Rice, M.: 138, 140, 141
Bruton, K.: 41, 42, 57, 128	Hester, D.: 34, 35, 36, 39	Magee, B.: 23, 25, 40, 79, 80, 138	Motawa, I.: 28, 52, 59, 64, 75, 76, 111, 119, 120, 132, 135	Robinson, D.: 34, 39, 73
Cao, J.: 24, 55, 100	Hoare, C.: 45, 46, 47, 53	Maile, T.: 54, 55, 56, 100, 124, 125	Nicholson, G.: 149, 150, 152	Sonebi, M.: 39, 82, 83
Clarke-Hagan, D.: 18, 50, 62, 84, 85	Hore, A.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 88, 89, 90, 91, 107, 108, 142, 143, 155, 166	Matthews, M.: 93, 95, 117, 161	O'Brien, E.: 37, 72, 73, 74	Spillane, J.: 18, 62, 84, 85
Comiskey, D.: 12, 13, 14, 43, 44, 65, 66, 81, 131, 137, 151, 154, 157, 158	Kehily, D.: 10, 11, 114, 115, 139	McAuley, B.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 51, 88, 89, 90, 91, 92, 107, 108, 142, 143, 146, 147, 148, 166	O'Connor, J.: 149, 150, 152	Taylor, S.: 34, 38, 39, 48, 49, 72, 73
Corry, E.: 24, 53, 58	Kelly, M.: 86, 149, 150, 152	McCormack, P.: 146, 147, 148	O'Donnell, J.: 24, 45, 46, 53, 55, 56, 58, 99, 100, 121, 122, 123, 124, 125	Van Treeck, C.: 55, 100, 124
Costello, M.: 149, 150, 152	Kenny, P.: 47, 121, 123	McGettrick, P.: 35, 36, 101, 109, 113	O'Kane, E.: 12, 13, 14	Wang, H.: 96, 97, 98, 101, 102, 109, 113
Curran, M.: 18, 50, 62, 84, 85	Kuang, S.: 88, 107, 108, 142	McKane, M.: 43, 44, 66, 131, 151, 154, 157, 158	O'Sullivan, D.: 41, 42, 57, 128, 156	West, R.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 70, 88, 89, 90, 91, 94, 107, 108, 127, 142, 143, 166





# Index of Papers

Comiskey and McKane  
- technology  
- data sharing  
- education

Alshehri, F.: 47, 121, 122, 123	Eadie, R.: 17, 66, 112, 138, 140, 141, 157	Lydon, D.: 34, 39, 73	McKenna, T.: 8, 110, 153, 165	Pinheiro, S.: 55, 100, 121, 124
Bazjanac, V.: 54, 55, 56, 100, 124	Frisch, J.: 55, 100, 124	Lydon, M.: 34, 38, 39, 73	Meng, X.: 96, 97, 98, 101, 102, 109, 113	Rebelo, E.: 146, 147, 148
Behan, A.: 130, 146, 147, 148, 156, 160	Hamilton, A.: 146, 147, 148	Lynch, S.: 146, 147, 148	Millar, P.: 12, 23, 25, 81	Rice, M.: 138, 140, 141
Bruton, K.: 41, 42, 57, 128	Hester, D.: 34, 35, 36, 39	Magee, B.: 23, 25, 40, 79, 80, 138	Motawa, I.: 28, 52, 59, 64, 75, 76, 111, 119, 120, 132, 135	Robinson, D.: 34, 39, 73
Cao, J.: 24, 55, 100	Hoare, C.: 45, 46, 47, 53	Maile, T.: 54, 55, 56, 100, 124, 125	Nicholson, G.: 149, 150, 152	Sonebi, M.: 39, 82, 83
Clarke-Hagan, D.: 18, 50, 62, 84, 85	Hore, A.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 88, 89, 90, 91, 107, 108, 142, 143, 155, 166	Matthews, M.: 93, 95, 117, 161	O'Brien, E.: 37, 72, 73, 74	Spillane, J.: 18, 62, 84, 85
Comiskey, D.: 12, 13, 14, 43, 44, 65, 66, 81, 131, 137, 151, 154, 157, 158	Kehily, D.: 10, 11, 114, 115, 139	McAuley, B.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 51, 88, 89, 90, 91, 92, 107, 108, 142, 143, 146, 147, 148, 166	O'Connor, J.: 149, 150, 152	Taylor, S.: 34, 38, 39, 48, 49, 72, 73
Corry, E.: 24, 53, 58	Kelly, M.: 86, 149, 150, 152	McCormack, P.: 146, 147, 148	O'Donnell, J.: 24, 45, 46, 53, 55, 56, 58, 99, 100, 121, 122, 123, 124, 125	Van Treeck, C.: 55, 100, 124
Costello, M.: 149, 150, 152	Kenny, P.: 47, 121, 123	McGettrick, P.: 35, 36, 101, 109, 113	O'Kane, E.: 12, 13, 14	Wang, H.: 96, 97, 98, 101, 102, 109, 113
Curran, M.: 18, 50, 62, 84, 85	Kuang, S.: 88, 107, 108, 142	McKane, M.: 43, 44, 66, 131, 151, 154, 157, 158	O'Sullivan, D.: 41, 42, 57, 128, 156	West, R.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 70, 88, 89, 90, 91, 94, 107, 108, 127, 142, 143, 166





# Index of Papers

## Comiskey and McKane

- technology
- data sharing
- education

## Motawa and O'Donnell

- big data
- building performance

Alshehri, F.: 47, 121, 122, 123	Eadie, R.: 17, 66, 112, 138, 140, 141, 157	Lydon, D.: 34, 39, 73	McKenna, T.: 8, 110, 153, 165	Pinheiro, S.: 55, 100, 121, 124
Bazjanac, V.: 54, 55, 56, 100, 124	Frisch, J.: 55, 100, 124	Lydon, M.: 34, 38, 39, 73	Meng, X.: 96, 97, 98, 101, 102, 109, 113	Rebelo, E.: 146, 147, 148
Behan, A.: 130, 146, 147, 148, 156, 160	Hamilton, A.: 146, 147, 148	Lynch, S.: 146, 147, 148	Millar, P.: 12, 23, 25, 81	Rice, M.: 138, 140, 141
Bruton, K.: 41, 42, 57, 128	Hester, D.: 34, 35, 36, 39	Magee, B.: 23, 25, 40, 79, 80, 138	Motawa, I.: 28, 52, 59, 64, 75, 76, 111, 119, 120, 132, 135	Robinson, D.: 34, 39, 73
Cao, J.: 24, 55, 100	Hoare, C.: 45, 46, 47, 53	Maile, T.: 54, 55, 56, 100, 124, 125	Nicholson, G.: 149, 150, 152	Sonebi, M.: 39, 82, 83
Clarke-Hagan, D.: 18, 50, 62, 84, 85	Hore, A.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 88, 89, 90, 91, 107, 108, 142, 143, 155, 166	Matthews, M.: 93, 95, 117, 161	O'Brien, E.: 37, 72, 73, 74	Spillane, J.: 18, 62, 84, 85
Comiskey, D.: 12, 13, 14, 43, 44, 65, 66, 81, 131, 137, 151, 154, 157, 158	Kehily, D.: 10, 11, 114, 115, 139	McAuley, B.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 51, 88, 89, 90, 91, 92, 107, 108, 142, 143, 146, 147, 148, 166	O'Connor, J.: 149, 150, 152	Taylor, S.: 34, 38, 39, 48, 49, 72, 73
Corry, E.: 24, 53, 58	Kelly, M.: 86, 149, 150, 152	McCormack, P.: 146, 147, 148	O'Donnell, J.: 24, 45, 46, 53, 55, 56, 58, 99, 100, 121, 122, 123, 124, 125	Van Treeck, C.: 55, 100, 124
Costello, M.: 149, 150, 152	Kenny, P.: 47, 121, 123	McGettrick, P.: 35, 36, 101, 109, 113	O'Kane, E.: 12, 13, 14	Wang, H.: 96, 97, 98, 101, 102, 109, 113
Curran, M.: 18, 50, 62, 84, 85	Kuang, S.: 88, 107, 108, 142	McKane, M.: 43, 44, 66, 131, 151, 154, 157, 158	O'Sullivan, D.: 41, 42, 57, 128, 156	West, R.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 70, 88, 89, 90, 91, 94, 107, 108, 127, 142, 143, 166



# Index of Papers

## Comiskey and McKane

- technology
- data sharing
- education

## Motawa and O'Donnell

- big data
- building performance

## Hore, McAuley and West

- BIM
- education

Alshehri, F.: 47, 121, 122, 123	Eadie, R.: 17, 66, 112, 138, 140, 141, 157	Lydon, D.: 34, 39, 73	McKenna, T.: 8, 110, 153, 165	Pinheiro, S.: 55, 100, 121, 124
Bazjanac, V.: 54, 55, 56, 100, 124	Frisch, J.: 55, 100, 124	Lydon, M.: 34, 38, 39, 73	Meng, X.: 96, 97, 98, 101, 102, 109, 113	Rebelo, E.: 146, 147, 148
Behan, A.: 130, 146, 147, 148, 156, 160	Hamilton, A.: 146, 147, 148	Lynch, S.: 146, 147, 148	Millar, P.: 12, 23, 25, 81	Rice, M.: 138, 140, 141
Bruton, K.: 41, 42, 57, 128	Hester, D.: 34, 35, 36, 39	Magee, B.: 23, 25, 40, 79, 80, 138	Motawa, I.: 28, 52, 59, 64, 75, 76, 111, 119, 120, 132, 135	Robinson, D.: 34, 39, 73
Cao, J.: 24, 55, 100	Hoare, C.: 45, 46, 47, 53	Maile, T.: 54, 55, 56, 100, 124, 125	Nicholson, G.: 149, 150, 152	Sonebi, M.: 39, 82, 83
Clarke-Hagan, D.: 18, 50, 62, 84, 85	Hore, A.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 88, 89, 90, 91, 107, 108, 142, 143, 155, 166	Matthews, M.: 93, 95, 117, 161	O'Brien, E.: 37, 72, 73, 74	Spillane, J.: 18, 62, 84, 85
Comiskey, D.: 12, 13, 14, 43, 44, 65, 66, 81, 131, 137, 151, 154, 157, 158	Kehily, D.: 10, 11, 114, 115, 139	McAuley, B.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 51, 88, 89, 90, 91, 92, 107, 108, 142, 143, 146, 147, 148, 166	O'Connor, J.: 149, 150, 152	Taylor, S.: 34, 38, 39, 48, 49, 72, 73
Corry, E.: 24, 53, 58	Kelly, M.: 86, 149, 150, 152	McCormack, P.: 146, 147, 148	O'Donnell, J.: 24, 45, 46, 53, 55, 56, 58, 99, 100, 121, 122, 123, 124, 125	Van Treeck, C.: 55, 100, 124
Costello, M.: 149, 150, 152	Kenny, P.: 47, 121, 123	McGettrick, P.: 35, 36, 101, 109, 113	O'Kane, E.: 12, 13, 14	Wang, H.: 96, 97, 98, 101, 102, 109, 113
Curran, M.: 18, 50, 62, 84, 85	Kuang, S.: 88, 107, 108, 142	McKane, M.: 43, 44, 66, 131, 151, 154, 157, 158	O'Sullivan, D.: 41, 42, 57, 128, 156	West, R.: 1, 2, 3, 4, 5, 6, 7, 19, 20, 21, 70, 88, 89, 90, 91, 94, 107, 108, 127, 142, 143, 166



# Potential Large Growth Areas

- Remote sensing
- BIM and dynamic digital twins
- Building performance analysis
- Lean sustainable construction
- Life Cycle Analysis





# Observations

- Average number of papers is over 30 per annum for all academics – Digital construction and BIM being about half each
- Continue to support the BIM Gathering which provides an important national forum for academia and industry alike
- Note the limitations of this study
- Expand in future to capitalise on the increasing number of MSc and PhD theses on these topics



## Closing remarks

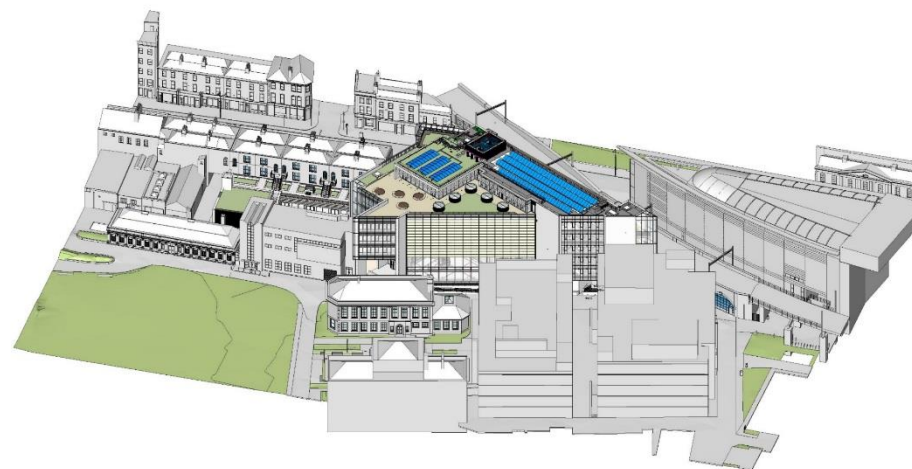
- Repository of 167 peer-reviewed paper titles has been compiled
- One third of papers were published in journals
- Joint government and industry funding for a central body is vital for the academic and industrial communities in supporting young researchers in their careers in education/training, research and practice
- What research opportunities will exist and must be supported by the Roadmap to Digital Transition of the Irish Construction Industry, 2022 – 2025?



### Roadmap to Digital Transition

For Ireland's  
Construction Industry  
2018-2021





Thank you for listening in to this presentation on DC research in Ireland



Source: TBS with thanks to **Scott Tallon Walker Architects**



# Gathering21

Construction Innovations  
for Future Generations

CitA

## **Digital Construction and BIM Research in Ireland 2016-20**

Roger P. West, Trinity College Dublin

Alan Hore, Technological University Dublin

Barry McAuley, Technological University Dublin

Thank you  
for attending