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"Defining Job Titles and Career Paths in BIM"

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Abstract –

Ireland is undergoing a digital transformation. Some industries particularly in the areas of travel and retail have been radically transformed. However many industries are facing their biggest challenge in their existence already weakened by the economic crisis and constrained by their legacy business, it will be difficult for them to adapt and embrace the new rules dictated by digital change. Ireland's design and construction industry is on the cusp of a digital transformation with early adopters now deriving some benefits from a move to a building information modeling (BIM) process. Digital transformation cannot happen unless there are personnel with the right skillsets to tackle the new methods of working. This move opens new dynamics into which domain specific skillsets supported by BIM technologies often overlap. New skillsets emerge while traditional ones submerge. One of those skillsets that has emerged is in the creation and management of building information through the digital model. New roles have emerged and are organically growing. Some of these roles are titled BIM Technician, BIM Coordinator and BIM Manager but here is confusion in the industry as to the meaning and interpretation of these titles. With a design and construction industry that is made up of traditional domain specific professionals where does industry go to find these "BIM" specific professionals. Do 3rd level education providers create new courses to fill this need or is there a design and construction course that has already many of the competencies required to fulfill the role? This paper sets out to explore these questions.

Keywords – BIM Education, BIM Learning Outcomes, BIM Careers

I Introduction.

"What are you going to be when you grow up?" It's a question asked of every child and often answered with the most recognizable title in the child's mind's view. Job titles are important. They convey an educational standard and a place in social standing. They identify the holder as a person with a skillset and someone you might want or need to talk to. It is often the first thing we search for if we are in need of a service, the job title comes first followed by the person's name. Job titles are so important that professional bodies will often seek to have their title protected by law. This is to stop unqualified people from using the title and to protect the consumer seeking to employ the services of a qualified person.

Innovation in industry is constant. New products are invented, new processes are created, new tools are invented to drive that process and new skillsets are required to operate the tools. Language is

expanded to incorporate descriptions of the product, the process, the tools and the skill-set. Industry forever strives to be more efficient and as history tells us there are moments where new technologies have an immense effect on industry and consequently human society.

II Digital Transformation.

Marsh describes this digital epoch as the fourth industrial revolution. ¹ The design and construction industry is on the cusp of a digital transformation. It could be argued that the majority of design and construction companies are failing to understand this. Those companies that are still standing have come through the worst recession in the history of economic development in modern Ireland. Happy to have survived they are trying to rebuild their businesses. The economic crash happened in 2008, we are now in 2015 and the world has moved on.

Companies that are rebuilding based on legacy technologies and processes are in danger of losing out to competitors because of new innovation in their industry. Digital transformation has its own history of doing this. The temporary economic crisis is being replaced with long term structural crisis that is impacting the very essence of their being.² Companies need to look now at how digital innovation is affecting their industry and then look inward at their own process. You don't have to look far to see how radically digital transformation can alter the status quo, for example we can look at printing and the way we consume the written word, travel and the way we visit the world, finance and the way we conduct our financial business, all radically different to how we did things even 10 years ago. The design and construction industry is multifaceted, it is people and process orientated and produces a product at the end of the day. It is ripe for the kind of transformation that digital can bring. However it is not all doom and gloom, Digital in itself is not a destructive power. It is a power that emancipates people, companies and movements, a power that creates new opportunities and ways to do things that were previously unthinkable.³

III Standards and Learning Outcomes

For the purpose of this paper i am confining the geographical boundary to the United Kingdom and Ireland. The United Kingdom is well advanced in terms of its digital transformation in the design and construction industry. In 2011 the UK Cabinet office published its construction strategy, in introducing this then then minister stated.

"This Governments 4 year strategy for BIM implementation will change the dynamics and behaviors of the construction supply chain, unlocking new more efficient and collaborative ways of working".

At the heart of the construction supply chain are people, those wanting to have a career in the industry and those that are already there. These people will need to be educated at undergraduate level and reeducated at postgraduate level. Both of these groups face significant and different challenges. The education community faces challenges in integrating the learning of these new technologies and the incumbent dynamic and behavioral changes they will foster. The UK is again rising to these challenges in a structured way. The BIM Academic Forum (BAF) was set up in

late 2011 and is a group of representatives from a large number of UK universities with some participation from Irish Institutes of Technology (IOT) The BAF has been formed to promote the academic aspects of BIM. In particular, BAF is focused on the development of a 'BIM academic framework'.⁴

Their first report "Embedding Building Information Modelling (BIM) within the taught curriculum"⁵ was published in June 2013.

"The framework covers three levels of need: strategic, management and technical...the framework endeavors to interpret broad outline headings (resulting from the initial review of BIM learning needs for Government departments) into learning outcomes".

The initial BIM learning outcomes produced by BAF are very generic and over-arching. They are non-domain specific and non-technology specific as one would expect. There is more of a concentration on the role that BIM will play in the development of a digital economy and the reasons why BIM is needed. This initial set of learning outcome's give the design and construction industry the first clue in a requirement for new skillsets for AEC professionals and the development of new job roles.

IV Framework for Learning

The second iteration of the BAF BIM Learning Outcomes are more specific connecting the learning outcomes to the requirements for UK BIM Level 2 contextualized within the UK Government's Construction 2025 strategy. Again the learning outcomes are overarching and are information management centered and process driven. It's a high bar to achieve particularly when starting from zero knowledge in undergraduate education and the culture change that will be required in postgraduate education. To achieve these outcomes professional educators will need to be break down these overarching learning outcome's into more bite sized chunks, allowing for a progression of understanding, knowledge and ability in BIM Technologies and within BIM Process. Creating BIM specific learning outcomes for a measured delivery is the responsibility of each education provider. In Ireland there is no guidance on how to go about this. It has been left to individual educators who have taken a lead in this area to plot out BIM development in both

undergraduate and postgraduate pedagogy.

In Ireland, there is no Government BIM mandate. There is no central driving force for BIM. Those within the Irish design and construction industry who have adopted BIM are doing so because they recognize the benefits it can bring to their business. They are acknowledging the onset of digital transformation. Many of these firms work in the UK and will be subject to the UK BIM Level 2 mandate beginning in 2016. Enterprise Ireland is the government organization responsible for the development and growth of Irish enterprises in world markets and is offering grants to Irish firms wanting to tender in the UK market for Level 2 BIM under the UK Government mandate.⁶

However, it can be said that BIM in Ireland is growing organically as needs arise. Central to the growth of awareness and ability within the Irish AEC industry has been the CITA organization whose mission is to encourage the Irish Construction sector to take full advantage of current and emerging Information and Communications Technologies.⁷ It must be acknowledged that the initial crop of BIM skilled graduates in Ireland and the UK have come primarily from the Architectural Technology courses. The introduction of BIM specific learning outcomes covering BIM technologies and information management has been a hand in glove fit for Architectural Technology.

What is clear from the BAF Learning Framework is that there will be a host of new skills across all domains required to deliver on the UK BIM Level 2 mandate. This is the same for Ireland and this posits a question, where will the people with these skillsets come from?

V Seriously, Where does BIM live?

A quick Google search reveals 13 Masters Programs in the UK that have BIM in the title. It is interesting to note that most are not BIM alone but BIM “and” or BIM “in”. The courses are associated with another previously attained qualification, within a specific domain. This gives us a clue to the question “seriously, where does BIM live?”. The answer to that is that BIM lives everywhere in the AEC industry. It is cross domain and multifaceted. When you consider this you can understand why the BAF Learning Framework for BIM is so generic and overarching.

Is BIM a discipline in its own right? Or is it an add-on skillset to more developed professions? It is worth taking a look at an education course comparison. Nanoscience and nanotechnology is the study and application of extremely small things that can be used across all the other science fields such as chemistry, biology, physics, materials science, and engineering.⁸ Nanoscience is multidisciplinary; professionals working in this area come to the domain armed with a base degree. They need to work with others to make nanoscience. They use a set of technologies made for the task. You are an engineer working in the field of nanoscience, you are a physicist working in the area of nanoscience. Collaboration is very much to the fore in nanoscience. This industry has many similarities with BIM. To do nanoscience, you bring knowledge from your domain develop new skills to create small things, using new robust technologies and most important collaborate with others in an effort to solve complex problems.

To do BIM, you bring knowledge from your domain and develop new skills, using new robust technologies and most important collaborate with others in an effort to solve complex problems. So it is reasonable to define BIM not as a discipline in its own right but as an additional set of skills on top of a base built environment qualification. As with the new skillsets developed in nanoscience, it will be necessary that the new skillsets in BIM will permeate into undergraduate education as well as catering for postgraduate reeducation.

VI BIM Education

Where does your BIM education start? This is easier to answer at postgraduate level. You start by adding to your domain specific qualification with a PG course. In the Dublin Institute of Technology this has been addressed with Irelands first MSc in applied BIM/M. This course is designed for post graduate learning. It is part time and setup on a Cert/Diploma/MSc basis, 3 x 30 ects allows potential students to begin and travel along their BIM journey as needs require, pocketing 5/10 ects modules as they go. The learning outcomes have been tailored to provide a roadmap to eventually achieve the BAF learning framework, this being the most suitable reference at present.

BIM undergraduate education faces a different difficult set of problems. The first question asked is how do you integrate BIM into an already full, base degree be it within the domain of architecture, engineering or construction. There is plenty of

literature available charting different approaches and the results of pilot modules both in a single domain and as cross domain collaboration but there are no easy answers. The AEC education domains have for many years been honed into what they are. The disruptive nature of a digital transformation will be as much prevalent in AEC education as it is in industry. There is already a resistance building up within particularly set education curriculums that will either not embrace BIM or leave it to postgraduate study or worse will BIM wash⁹ themselves and their students.

From this authors experience in undergraduate education, there is only the choice, embrace BIM wholeheartedly or not at all. Embracing BIM wholeheartedly will involve a top to toe review of the program in an effort to critically align BIM learning outcomes in all relevant modules. To do this a stark choice has to be made, what learning outcomes do you take out to put BIM learning outcomes in. What now is less important in the evolving digital transformation within your domain that can make room for the now more important new skillsets required? The second problem to be faced is within the staff delivering the program. They must “by in” and upskill to effectively deliver on the new learning outcomes. In many cases this is the most difficult problem to be faced.

VII BIM Titles and Career Paths

There are a myriad of BIM titles out there, a quick search in Google highlights, CAD/BIM Technician, BIM Technician MEP, BIM Coordinator, BIM Modeler, 3D/4D CAD/BIM Modeler, Revit Architectural Technician, BIM Technologist, Revit MEP Technician, BIM Manager, BIM Discipline Manager, BIM Design Coordinator, BIM Engineer.¹⁰ On deeper investigation a title like BIM Coordinator could mean working in any domain and in any discipline within that domain. There is no draw distinction between domains and skillsets. The same applies for BIM Manager, the role is defined very often by the perceived industry need. Only mechanical, electrical, plumbing (MEP) engineering had a specific designation attached to some of the job titles advertised, where MEP is attached identifying the discipline within the domain. If we are to view BIM as an additional skillset on top of an original degree for the moment, there needs to be a more formal method of identifying the role and the skillsets required for the role relevant to

the domain operation.

PAS 1192 02¹¹ sets out a team task based structure consisting of Information Originator, Interface Manager, Task Information Manager, Task Team Manager, Lead Designer, Project Delivery Management, and Information Management. This structure is non domain specific and is generic in its description of responsibilities. Using this generic framework, this author will propose a base structure suitable for the industry in Ireland and the UK. There are 4 elements to consider, the National Framework of Qualifications¹², BIM Learning Outcomes within an undergraduate base degree, BIM Learning Outcomes as a postgraduate addition to a base degree and industry expectations.

The National Framework of Qualifications (NFQ) and it's equivalent in the UK gives academic or vocational value to education and training qualifications. We will concern ourselves with the NFQ level 7; ordinary degree, the level 8; honors degree and level 9; master's degree for this paper.

The four titles this paper proposes are BIM Technician, BIM Coordinator, BIM Project Manager and BIM Manager. The first 3 are followed with a domain identifier ie.

BIM Coordinator (Eng) (Arch) etc. The identifier assumes you have a primary degree and skillset in that area. The notion of “boundary crossing”, having a skillset that is applicable to more than one domain is prevalent within design and construction and is made even more feasible by the level of collaboration promoted by BIM processes, Architectural Technology is particularly suited for boundary crossing and it is not unusual to find ATs working in the engineering, construction and surveying domains. The BIM Manager role does not need a domain identifier as this is an overarching role within the organization covering all aspects of collaborative information management, standards management and process planning.

The BIM skillset can be developed at undergraduate level in conjunction with the base degree as far as Level 8 provided there is a commitment to embrace BIM fully within the structure of the course. Postgraduate courses can allow for the development of Level 7 and level 8 BIM skills as an addition to a base degree. PG students have an advantage of project experience and with their underlying knowledge their pace of

learning is accelerated and puts them into the position of taking on the BIM Project Manager role. The role of the BIM Manager is set at Level 9 Masters where there is a deeper cognitive requirement to analyze, synthesize and evaluate impact of BIM within their industry. At this level you are hitting the learning outcomes from the BAF Learning Framework. The chart below sets out a suggested framework for BIM job titles, set against an academic achievement level developing from undergraduate into postgraduate learning.

BIM Title with Career Structure - Undergraduate

BIM Technician – (designation with base degree)

Level 7 educated (Arch Tech), (Eng MEP)
(Eng, Struct), (Eng Civil), (Geo)

BIM Coordinator –(designation with base degree)

+ 1 years office experience;
Level 8 educated (Arch Tech), (Eng MEP)
(Arch Design), (Eng, Struct), (Eng Civil), (CM),
(QS), (Geo)

BIM Title with Career Structure - Postgraduate

BIM Technician – (designation with base degree)

Level 8 entry to BIM PG Cert;
(Arch Tech), (Eng MEP) (Arch Design),
(Eng Struct), (Eng Civil), (Geo)

BIM Coordinator –(designation with base degree) Collaborative

Level 8 entry + PG Cert + BIM PG Diploma + 1
years office experience; (Arch Tech), (Arch
Design), (Eng MEP), (Eng Struct), (Eng Civil),
(CM), (QS), (Geo).

BIM Project Manager –(designation with base degree)

Collaborative

Level 8 entry + PG Cert on to BIM PG Diploma +
3/5 years project running experience; (Arch Tech),
(Arch design), (Eng MEP), (Eng Struct), (Eng
Civil), (CM), (QS)/CCE - specific for complex
contracts.

BIM Manager – no designation

Level 8 entry + complete Level 9 MSc aBIMM +
3/5 years office/project management experience;

VIII Conclusion

This paper set out to investigate job titles and career paths in BIM. There is no formal structure within the field that identifies a BIM skillset with a level of academic learning. Many academic courses are only coming to terms with the changes that this digital transformation is bringing.

The learning outcomes of DITs MSc in aBIMM 13 are a solid beginning for a BIM Learning Framework for Ireland's AEC industry. They provide for a transition from level 7 to 8 to 9 academic learning into the titles of BIM Technician, BIM Coordinator to BIM Manager. The proposal that BIM skills are in addition to domain specific learning and as BIM specific learning outcomes are added into undergraduate education there should be a mechanism for Recognised Prior Learning RPL so exemptions made within the postgraduate PG Cert, PG Diploma in aBIMM.

This paper has proposed a system to clarify for industry BIM Titles and to clarify for 3rd Level education some career paths. The proposal comes with academic levels associated with it and a core set of learning outcomes associated to the NFQ. It will have the effect for the student of setting entry levels and prospective career paths in this exciting transformational shift in design and construction in Ireland.

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