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ADAPTATION OF A BIM POLICY ACTIONS MODEL FOR INDUSTRY ASSOCIATIONS

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Abstract: Building information modelling (BIM) is not a simple straightforward set of technologies. Comprised of many processes, technology and policy components, its inherent complexity and disruptiveness are seen as major hindrances to its take-off in the architecture, engineering and construction (AEC) sector. As industry associations (IAs) have played a central part in the diffusion of other complex technologies such as electronic data interchange in the grocery sector, this article focuses on their role in BIM diffusion. This first part of an ongoing research project involving two laboratories from Europe and Canada proposes a model classifying the BIM diffusion actions of IAs as a way to help assess their role in BIM diffusion on a market. **Keywords**: BIM, industry association, diffusion.

1 Introduction

BIM adoption in its broad sense is not a binary problem/solution system, nor a simple problem-solving linear process that can be addressed with the usual engineering problem-solving skillset. It involves confronting unchanged biblical practices that are deeply rooted in centuries of practice and decades of personal education and training in an effort to unlock a vast, untapped potential. But embracing BIM's potential means embracing its conflictual, its inherent structure-disruptiveness and, as few mentioned, politically destabilising nature. As Winner's argues in his controversial paper on technology and politics, technologies are fraught with (harsh) consequences that can be qualified in political terms regardless of their deployment or the initial intentions behind its creation (Winner 1980). In that sense, social studies are a way in which scholars can address technological issues from another perspective, particularly when such technologies are firmly interwoven into a fragmented context.

The diffusion and successful adoption of BIM-like innovations require active commitment of numerous players and institutions, such as public agencies, local and national governments, standardization organisations and non profit organisations defending collective interests. Fitting within this last category, industry associations (IAs) are playing a central part in diffusion amongst their membership as well as an impactful political role upon their local market. A particular interest is vested in this category of actors specifically because of its potential market-wide influence.

This paper is divided as follows. We begin by briefly describing aspects of BIM and its context and the empirical research features. We then proceed by presenting the adapted framework and its potential regarding the assessment of industry associations roles in BIM diffusion with respect to the results of the research.

2 BIM and its context

BIM can be assimilated to a complex, highly networked and systemic set of technologies. These technologies are characterized by the variety of organizational levels in which they operate and by the potential to considerably improve overall productivity (Webster 1995; Taylor & Levitt 2004). Systemic technologies in the construction industry, as in other sectors, present idiosyncratic challenges to widespread adoption (Harty 2005). As Lindgren (2016) recently put it: “each organization [in the construction industry] focuses on its work and not [on] the inter-organizational aspects” even though the industry is known to be highly interdependent (Dubois & Gadde 2002). Because of this organizational interdependence and its interlocked processes, technologies and policies (Succar 2009), BIM as an innovation needs a coordinated adoption by all key stakeholders in order to deliver its full potential (Singh, Gu & Wang 2011).

But as mentioned by many academics, the fragmented and project-based nature of the AEC sector highly impede knowledge transfer from a project to another and thus impede any attempt to coordinate adoption on the micro and meso level (organizations and projects level) on the long run (Forgues, Koskela & Lejeune 2009; Eastman 2011; Succar 2009). In this regard, IAs could provide a structure in which BIM knowledge could be embedded and sustained on the fringes of projects.

Taking a step back in the analysis of information diffusion channels between individuals by considering markets relations instead of individual relations also enables one to avoid the complexity related to individual communication channel analysis that experienced numerous scholars using an actors-network analysis (e.g. Larsen 2011; Windahl et al. 1992). Succar & Kassem (2015) proposed five models for macro-BIM adoption intended to study BIM diffusion from a previously unseen market perspective. One of these models, the Policy Actions model v.1.4 (figure below), was intended to be used to classify actions taken by policy makers in order to influence BIM diffusion and adoption upon their local markets. This model provides a general structure composed of nine actions families coming from three activities (communicate, engage, monitor) mapped against three implementation approaches (passive, active, assertive).

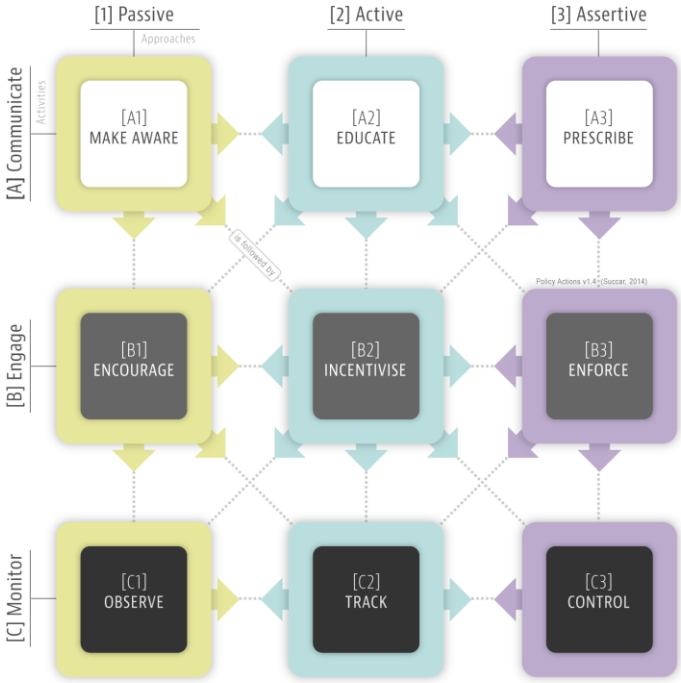

Figure 1: Policy Actions model v1.4 from Succar & Kassem, 2015

This actions model was perceived as highly relevant and therefore was adopted as a basis for our analysis.

IAs play an important role in market-wide innovation diffusion and policy shaping, which is echoed in Succar & Kassem's conceptual structures (from which comes the model) as they consider IAs to be groups of process players producing policy deliverables. The contribution of this paper is to adapt this particular model to the IAs to create a tool for the assessment of their impact on BIM diffusion.

3 Industry associations' context of intervention

Because the model was not initially conceived to be directly applied to IAs, the authors reviewed previous papers on IAs in order to confront the perceived appropriateness of the three activities (communicate, engage and monitor) in this new context.

Firstly, Kshetri & Dholakia (2009) state that industry associations are key components of the markets they bloom in. They are typically regrouping actors from a sector in order to represent their common political interests (Damsgaard & Lyytinen 2001). Their membership may be more or less homophilous, depending on their sphere of attention (Boch 1987). Rogers (1963) defines homophily "as the level of similarity (beliefs, education, social status, etc.) between two individuals interacting with each other". In respect to this approach, the more homophilous the group, the better the communications flow between members (Rogers 2010). As a result, a narrow sphere of attention coincides with a high degree of information transfer through better communications amongst members, which is a key element to successful innovation diffusion (Rogers 2010). Therefore, the need to assess communication activities, represented in the model as a category (Communicate activities), is paramount because of its impactful potential on diffusion.

Secondly, industry associations have long been identified as strong, policy-shaping actors (Coleman & Jacek 1983; Potters & Sloof 1996). In respect of his BIM fields' definitions, Succar (2009) depicts them as groups of process actors developing policy deliverables. While participating in shaping the market in which they take place -- notably through isomorphic pressures (DiMaggio & Powell, 1983) -- the IA are themselves subject to such pressures (Nordqvist, Picard & Pesämaa 2010; Greenwood, Suddaby, & Hinings 2002). For instance, they are known to be prone to conflicts between the interests of their members. As proposed by Boch (1987), when joining an IA, members surrender a part of their sovereignty to the association (Damsgaard & Lyytinen 2001). This forfeiture puts pressure on the IA to constantly legitimize its actions (Nordqvist, Picard, & Pesämaa 2010). The association therefore thrive on the autonomy that its members have ceded, but will likely try to reduce its dependency on members, for instance by developing a unique body of knowledge or new standardization services (Boch 1987; Damsgaard & Lyytinen 2001). As they work with and for their members, IAs develop a trust-based relationship with its membership and conveniently, trust is known as a cornerstone of effective information and knowledge sharing (Rogers 2010). As associations depend on trust building to maintain its membership, they are therefore an excellent medium to diffuse information about innovations. In that sense, the Engage activities proposed in the model stick to previous finding and is still coherent (but dissimilar enough to be considered as a category in itself) with the Communicate activities.

Finally, even though the Monitor activities are less covered in the previous literature in a membership perspective (IAs are in fact more often acknowledged as market and trends monitors, c.g. Kshetri & Dholakia 2009; Nordqvist, Picard & Pesämaa 2010; Damsgaard & Lyytinen 1998), Adler, Kwon & Heckscher (2008) propose that, in collaborative communities like IAs, its participants coordinate their activities to reach collective goals. In that regard, they must monitor each other through an organisation to ensure and improve performance and track progress. Collaborative communities are said to build trust on contribution, collegiality and value-rationality (Adler, Kwon & Heckscher 2008), three characteristics particularly relevant that once again connect the Monitor activities to the Communicate and Engage activities.

4 Adaptation of the model

Because of its initial focus on the policy makers, the model had to be adapted to fit the particular IA's taxonomy. Therefore, a specific industry associations-centered version of the model proposing relevant actions was derived from the generic model. To help differentiate actions from each other and to help clarify the limits between each approaches, a list of potential actions for each approach was drafted. To ensure coherence with the macro-BIM adoption conceptual structures (Succar & Kassem 2015), a group of 6 scholars from architectural and IT research groups, including Dr. Succar and Dr. Kassem, was consulted to validate the initial proposition before testing it in interviews.

	Passive	Active	Assertive
Communicate	**Make aware** Inform members of the importance, benefits and challenges of a system/process through formal and informal communications	**Educate** Generate informative guides to educate members of the specific deliverables, requirements and workflows of the system/process	**Prescribe** Detail the exact system/process to be adopted by members in a sector-wide eco-system.

Fig. 2: Communicate activity mapped on 3 approaches

Depending on the approach, each activity had a specific list of actions. For instance, the Communicate activity list was composed of actions like:

- Publish newsletters, magazine, general information pamphlet regarding BIM, etc.;
- Generate and publish BIM knowledge specific to its context;
- Propose specific BIM formations;
- Publish standards, protocols, guides dedicated to the membership/specialization;
- etc.

	Passive	Active	Assertive
Engage	**Encourage** Conduct workshops and networking events to encourage members to adopt the system/process	**Incentivise** Provide rewards and financial incentives to members adopting the system/process	**Enforce** Favour or penalise members based on their respective adoption of the system/process

Fig. 3: Engage activity mapped on 3 approaches

The Engage activity list was composed of actions like:

- Host conferences with academics, workshops, networking events;
- Finance research and development projects;
- Provide support services to members;
- Create a dedicated membership for BIM compliant members;
- etc.

	Passive	Active	Assertive
Monitor	**Observe** Observe as (or if) members have adopted the system/process.	**Track** Survey, track and scrutinize how/if the system/process is adopted by members	**Control** Establish financial triggers, compliance gates and mandatory standards for the prescribed system/process

Fig. 4: Monitor activity mapped on 3 approaches

The Monitor activity list was composed of actions like:

- Document who adopted BIM within its members;
- Document BIM adoption within members (reasons, tools, ways, process, barriers, etc.);
- Monitor (actual and expected) changes in the scope of work of its membership;
- Define BIM roles and related competencies for its members;
- etc.

These lists were meant to help classifying the actions regarding the approach that was perceived as the most relevant.

5 Assessment of the adapted model

5.1 Method

The team then proceeded to evaluate the assumptions and to confirm or infirm postulates that came from the adaptation of the initial framework with a data collection using semi-structured interviews and archival material collect and review.

Five interviews were conducted with executives and directors from three different luxembourgish IAs, namely an architect and engineer association, a contractor association and a general industry association. The associations were chosen based on their homophilic character and the apparent historical influence they exerted on the market - previous research proposes that architects and contractors are two of the most influential groups in terms of innovation in the AEC sector (Slaughter 1993; Larsen 2011), which support our choice of associations.

All interviews were recorded and transcribed. Notes from the interviewers were collected and added to the transcriptions in order to build a case story for each interview. The cases' content was broken down and classified by diffusion actions in order to identify recurrent patterns. Data collected with the interviews was complemented with data extracted from archival materials. The actions identified in the data set were finally compared with the adapted framework to test and broaden (if needed) existing concepts.

5.2 Results and discussions

At first hand, the interviews provided a large quantity of information fitting surprisingly well in the proposed model. Each action made or in the process of being made was falling in one of the three activity categories, which can be interpreted as an overall positive sign of the applicability of the adapted model. It was relatively easy to assess the nature of the actions as to which activity they corresponded. The difficulty was to classify the action in one of the three approaches, as the description proposed by Succar and Kassem were relatively elastic. Some actions, particularly in the Communicate activities, were easily identified because of their explicit nature. For instance, one of the IAs was publishing newsletters and magazines, informational pamphlets and was in the process of producing more advanced documentation as guides and standards for their members. All of these artifacts that are linked to the actions are easily discernible. That being said, the Monitor and Engage actions took more ambiguous forms as their boundaries were not as clear as the Communicate activities. Their artifacts were more vaporous as they

represent complex actions or group of actions. For instance, one IA engaged with its membership through a BIM implementation service it offered. This service was composed of a set of knowledge transfer actions (i.e. documentation transfer, training, on-field support in the first project, etc.) which are less clearly circumscribed. Moreover, an Active or Assertive action was usually more ambiguous than a passive one, which seemed to be more straightforward in nature. For instance, an IA was working on the publication of BIM standards for its members to help them adapt their work to the particular context of BIM. These standards were taking different forms that can be attributed to the active and assertive approaches of the Communicate activities. In that regard, the perceived ambiguity is the main hindrance to a broad application of the model. More research could be focused on apportioning the activities in order to clarify the boundaries between each approach.

On another note, specific characteristics were perceived as recurrent through all of the approaches regardless of the considered activity. Besides representing a degree of implication from the membership perspective, the data propose that the gradation of the approaches is linked to a gradation of financial investment in the support of the IA's members. An assertive approach was perceived as a more financially intensive approach compared to a passive approach. Risks associated to the embracement of an assertive approach were also perceived as higher than the risks associated to the passive approach.

6 Conclusion and future research

The literature review and the data collected from archival material and interviews suggest a confirmation of the exploitability of the model for a BIM diffusion impact assessment in regard to actions falling into the three proposed categories. But as the three IAs that the team met were predominantly active and passive in their approach to diffusion, the assertive approach should therefore be investigated thoroughly in future work in order to apportion the approaches. On a larger scale, the link between the markets' global approach to BIM diffusion (top-down, middle-out or bottom-up, see Sucar & Kassem 2015) and the IAs' approach to diffusion were perceived as an interesting future investigation topic.

The central question of aforementioned Winner's paper "Do Artifacts Have Politics?" (1980) focuses on broader social impacts of technologies, e.g. on democracy and freedom, but the fundamental question is still relevant to our interests: can technologies (such as BIM) be introduced as a way to sustain or perpetuate existing hierarchical structures? If this question was not in the immediate scope of this research, it is still certainly an interesting one to be asked.

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