

Presenting the HE-BIA Maturity Model v2.0: a lean assessment model of business intelligence and analytics initiatives in Higher Education

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1. Introduction

Business intelligence and analytics (BIA) have been instrumental for many years in delivering value to organizations, bridging the gap between raw data and actionable insights that can be used by business users to make more data-driven informed decisions. Typically, the development path of this type of applications is iterative and needs to take into account several critical success factors. There are several aspects that can endanger the success of BIA projects (Yeoh and Popovic 2015). The implementation of BIA systems involves a combination of technological and organizational issues that need to be secured in order to be successful. The design of maturity models tries to map this iterative and progressive path, in which an organization starts with a basic or initial stage of maturity and progresses towards a more mature state. Maturity is therefore related to this notion of evolution or progression towards full development. Maturity models are defined using a set of dimensions a sequence of levels (or stages). Maturity models can be used as a self-assessment tool to identify the strengths and weaknesses of certain areas in an organization.

Several BI maturity models have already been created, including both generic and domain-specific models (Cardoso and Su 2019). A generic model can be used across different industries, enabling benchmarking. However, this approach tends to be complex, with a large amount of assessment questions and a terminology set that is not particularly overlapping with the vocabulary and definitions of a particular domain. A previous study (Cardoso et al. 2013) reported that the use of a generic BI maturity model resulted in difficulties in assessing correctly the BI maturity level of initiatives in different Higher Education Institutions (HEI). The reasons being the lack of understanding of key BI concepts and complications in locating the right set of experts in each institution that could correctly and informedly answer the many diverse questions of the maturity model. This result led to the decision in 2019 to develop a new maturity model specific to the assessment of HE business intelligence and analytics systems. This paper presents the HE-BIA maturity model version 2.0, that enables HEI to perform a lean self-assessment of their business intelligence and analytics solutions. Specifically, the HE-BIA maturity model enables HEI to: (1) Identify their current maturity level; (2) Set a desired maturity level for the BIA initiative according to university strategic goals; (3) Identify the dimensions of potential improvement, and use them to internally devise an adequate path for improvement (roadmap) to reach the desired maturity level; and (4) Use the model as a strategic tool to raise awareness among university management of the need to invest in BIA.

2. The HE-BIA maturity model v2.0

The HE-BIA maturity model is the outcome of a research project, conducted by two BIA professors in collaboration with the BI Special Interest Group of EUNIS - the European University Information Systems organization (www.eunis.org).

The initial set of requirements that led to the development of a new BI maturity model, as opposed to use an existing one are the following: (1) The model should enable each HEI to conduct a self-

assessment exercise; (2) It should be easy to understand and use relevant terminology for HE (i.e., it should be domain-specific); (3) The model should use a lean approach (i.e., enabling a high-level assessment that can be achieved with few resources (people and time) as opposed to providing an extensive list of questions); (4) The model should capture new analytical aspects, such as the use of artificial intelligence and big data, Internet of Things and 5G, that will be increasingly more relevant in the campus of the future; and (5) It should be designed following a research methodology.

The resulting HE-BIA maturity model is divided into two parts (Technological and Organizational), seven categories, and 18 maturity dimensions, as displayed in Figure 1. It uses five maturity levels to specify the progression in each dimension: 1- pre-adoption, 2- Initial, 3- Managed, 4- Systematic, and 5- Optimized.

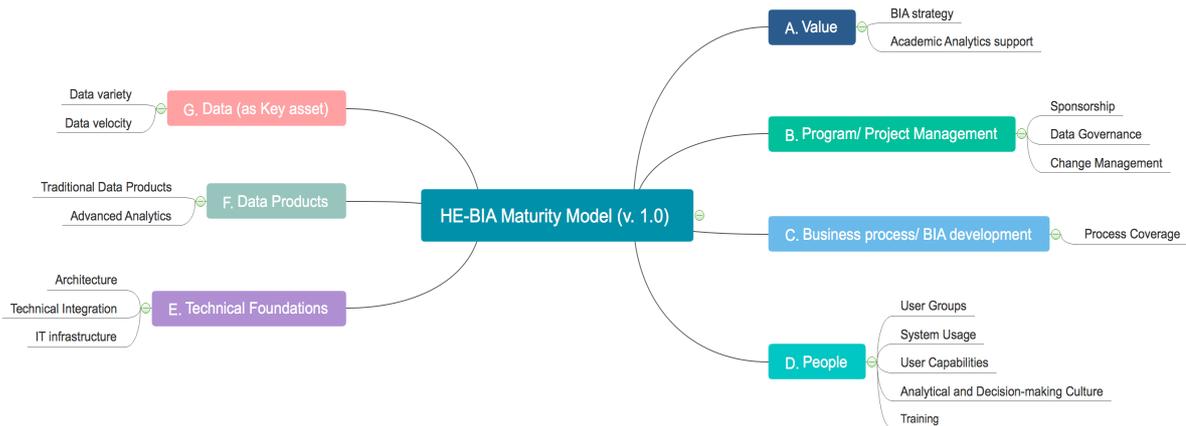


Figure 1: The HE-BIA maturity model: categories and maturity dimensions

The proposed model was developed according to the research setting displayed in Figure 2. Following a first phase of knowledge acquisition (Cardoso and Su 2019), phase 2 encompassed the first implementation design originating version 0.1 of the model. This version was discussed and validated at the BI SIG pre-congress workshop @EUNIS2019, in Norway. In phase 3, the model was tested in three case studies (with three HEI) and one joint BI SIG workshop, that took place in February 2020 in Belgium. This paper details the final version of the maturity model (v2.0) that takes into account the feedback received during phase 3. Finally, phase 4 refers to the expected outcomes that the model can bring to the activities of the EUNIS BI SIG, in particular to serve as a basis of understanding for the HE-BI community of the critical success factors of BIA deployment, with an inspirational mindset looking at the future campus.

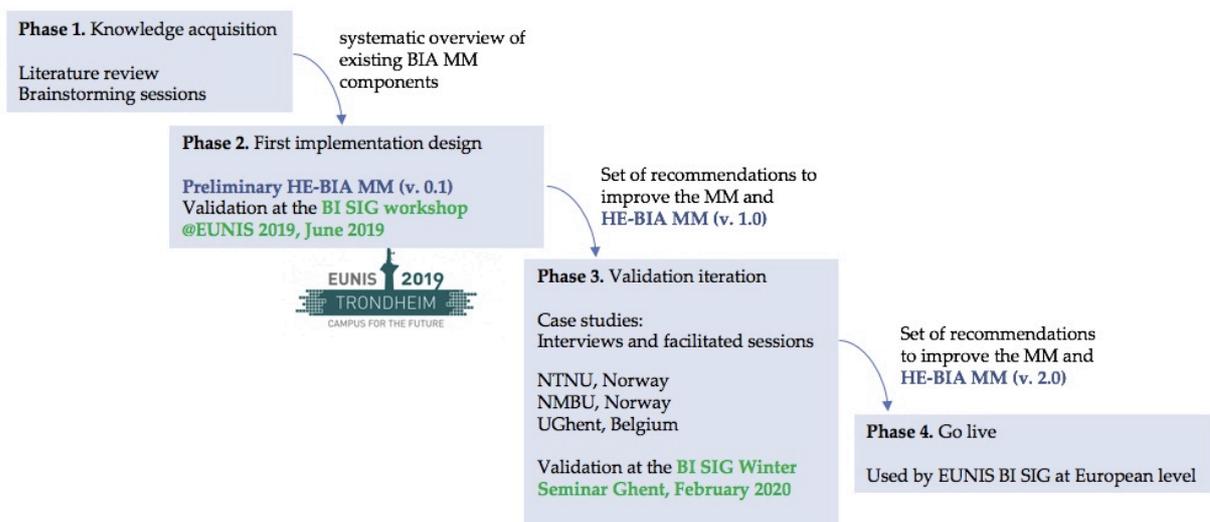


Figure 2: The HE-BIA maturity model research setting

3. REFERENCES

Cardoso, E., Alcolea, J.J., Rieger, B., Schulze, S., Rivera, M., Leone, A., Brighi, E. (2013) Evaluation of the maturity level of BI initiatives in European Higher Education Institutions: initial report from the BI Task Force @EUNIS. In 19th Int. Conf. EUNIS 2013, Riga, Latvia, June 2013

Cardoso, E., Su, X. (2019) Towards a Lean Assessment Model for Evaluating the Maturity Level of Business Intelligence and Analytics Initiatives in Higher Education. In 25th Int. Conf. EUNIS 2019, Trondheim, Norway, June 2019.

Yeoh, W., Popovic, A. (2016) Extending the Understanding of Critical Success Factors for Implementing Business Intelligence Systems. Journal of the Association for Information Science and Technology, 67(1): 134-147.

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