EUNIS 2019 TRONDHEIM
CAMPUS FOR THE FUTURE

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Towards a lean assessment model for evaluating the maturity level of BI&A initiatives on Higher Education

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The current BI&A landscape

Performance Management

Business Intelligence

Data Warehouse

Data Visualization

Decision Support Systems

Data Mining

Analytics and Predictive Analytics

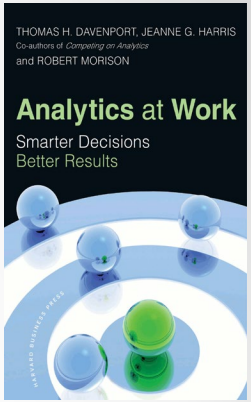
Big Data Analytics

- "Putting analytics to work is about **improving performance** in key business domains using data and analysis.

- "By analytical we mean the **use of analysis, data, and systematic reasoning to make decisions**."

Source: Davenport et al., 2010

Analytics: types of questions



	Past	Present	Future
Insight	How and why did it happen? (Modeling, experimental design)	What's the next best action? (Recommendation)	What's the best/worst that can happen? (Prediction, Optimization, simulation)
Information	What happened? (Reporting)	What is happening now? (Alerts)	What will happen? (Extrapolation)

Source: Adapted from Davenport et al., 2010


MATURITY

Defining maturity

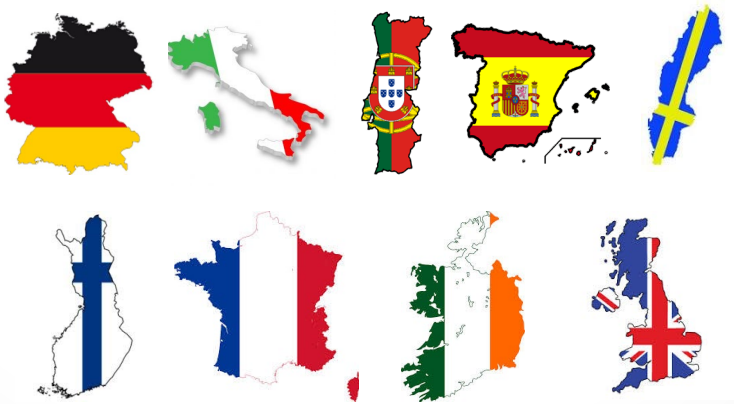
- Maturity is the quality or state of being mature; associated with **full development**

- Measured using **Maturity Models** (**MM**) with:
  - Set of Dimensions
  - Sequence of levels (or stages)

- Self-assessment tool:
  - identify strengths and weaknesses of certain areas in an organization
  - Benchmark against peers

2013 BI Maturity Survey

- **Global response: 66**
- 9 countries
- Mostly Public HEI (92%)
- TDWI 2012 survey was used with its 40 questions in 8 dimensions. Only minor changes were introduced to better reflect the HE terminology.



Survey results

- Value dimension overrated: expected vs. real value!...
- Lack of understanding of BI key concepts
- The four most underperforming dimensions are linked to the CSF of BI projects
    - Funding
    - Architecture
    - Data
    - Development

2019

Revitalization of the BI SIG

Research setting

Phase 1. Knowledge acquisition

Literature review
Brainstorming sessions

systematic overview of existing BI&A MM components

Phase 2. First implementation design

Preliminary HE-BI&A MM (v. 0.1)
Validation at the **BI SIG workshop @EUNIS 2019**

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Set of recommendations to improve the MM and **HE-BI&A MM (v. 1.0)**

Phase 3. Validation iteration

Case study with NTNU, Norway
Interviews and facilitated sessions

Set of recommendations to improve the MM and **HE-BI&A MM (v. 2.0)**

Phase 4. Go live

Used by EUNIS BI SIG in a European survey

Phase 1: Knowledge acquisition

- Overview and analysis of existing BI maturity models

  - Data Warehousing stages of growth (Watson et al. 2001)
  - Data Warehousing process maturity (Sen et al. 2006)
  - Capability Maturity Model for Business Intelligence (Raber et al. 2012)
  - Data Warehouse capability maturity model (Spruit and Sacu 2015)
  - HP Business Intelligence Maturity Model (HP 2007, 2009)
  - Gartner's Business Intelligence and Performance Management Framework (Gartner 2010)
  - TDWI Maturity Model (TDWI Research 2012)
  - TDWI Analytics Maturity Model (Halper and Stodder 2014)
  - TDWI Modern Data Warehousing Maturity Model (Halper 2018)
  - Institutional Intelligence White Book Maturity Model (OCU 2013)

Literature review – *full paper Eunis 2019*

Initial requirements for a new MM

- Self-assessment experience
- Domain specific: easy to understand and relevant terminology for Higher Education
- Lean approach
  - existent MM tend to have too many extensive questions
  - high level assessment that can be achieved with few resources
- Capture new analytical aspects (AI, big data, IoT, 5G...) that will be increasingly more relevant in future campus

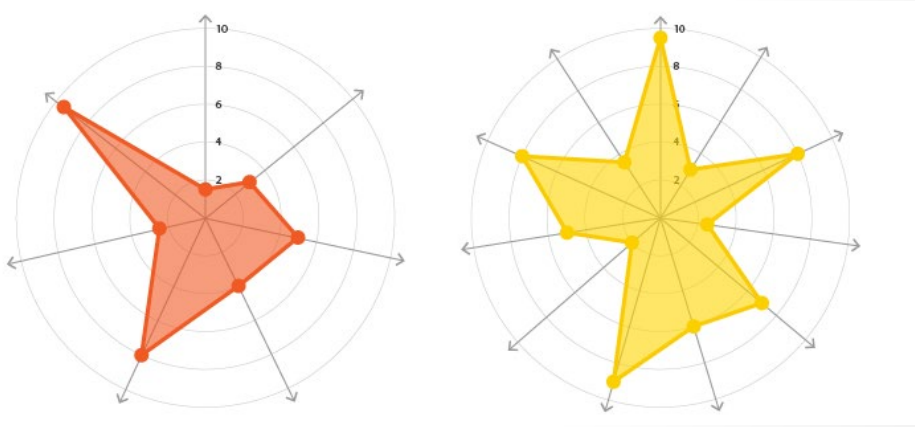
Expected outcomes

- A tool to HEI to assess internally their BI&A initiatives, that could be used to raise awareness with leadership about
  - potential use of BI&A
  - gap analysis
  - strategizing

- A basis of understanding for the HE-BI community of the critical success factors of BI&A deployment, with an inspirational mindset looking at the future campus

Phase 2: Preliminary HE-BI&A MM (v. 0.1)

- Five maturity levels
- 3 TECH and 4 ORG maturity categories
- total of 18 maturity dimensions



HE-BI&A MM (v. 0.1)

TECH view

Maturity categories	Maturity dimensions
Data (as key asset)	Data variety
	Data velocity
Data products / Models / Analytic models	Traditional data products
	Advanced analytics
BI&A Architecture and IT infrastructure	Architecture
	Technical integration
	Cloud computing infrastructure

HE-BI&A MM (v. 0.1)

ORG view

Maturity categories	Maturity dimensions
Value	Performance management
	BI&A strategy
Program/ Project management	Sponsorship
	Data governance
	Change management
Business process / BI&A development	Process coverage
People	User groups
	User engagement
	User capabilities
	Analytical culture
	Training

HE-BI&A MM (v0.1)

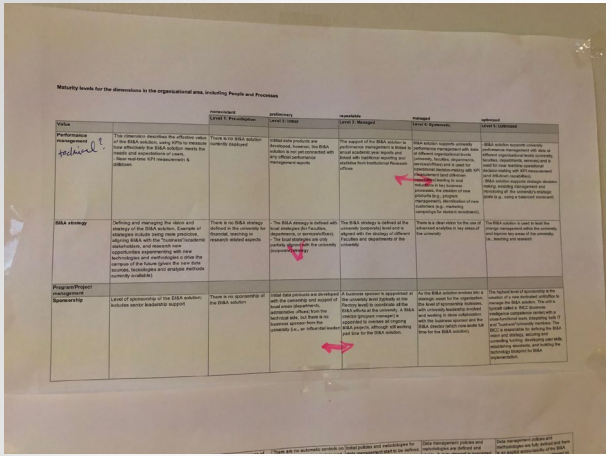
		Level 1: Pre-adoption	Level 2: Initial	Level 3: Managed	Level 4: Systematic	Level 5: Optimized
Data products / Models / Analytic models						
Traditional Data products	Development and utilisation of reports, dashboards, scorecards, OLAP and data visualisation technologies to display output information in a format readily understood by its users e.g. managers and other key decision-makers.	Only static and parameter-driven reports are available.	Business intelligence tools are in place for enterprise reporting. Ad-hoc reporting and OLAP are supported.	Enterprise-wide definitions are in place for key business metrics. Power users create data mashups from multiple sources.	Organizations have broad user access to BI using embedded dashboards within key applications and mobile BI. Users can perform ad hoc analyses and visualizations. Well-defined data dictionaries and data governance policies are established.	Organizations have established interactive and streaming BI dashboards for enterprise-wide KPIs. Business users are enabled to use BI tools to customize their view of the state of business and identify opportunities and risks through user-defined, custom alerts.
Advanced analytics	Development and utilisation of sophisticated statistical and data mining software to explore data and identify useful correlations, patterns and trends and extrapolate them to predict what is likely to occur in the future.	Currently not applicable.	Limited ability for statistical modeling, typically performed on-off.	Limited use of predictive and statistical modeling capabilities mostly through manual calculation and forecasting. Basic batch predictive models have begun to emerge.	Predictive models have been developed for multiple purposes such as student retention analysis and predictive maintenance for equipment. Organizations begin to develop prescriptive models that generate recommended actions for users based on analysis of data.	Predictive models are based on real-time data streams and update dynamically. Models are deployed within key business applications to support real-time operational decision making and personalized recommendations. Data scientists have the ability to build, refine, and select the best model after having run multiple in parallel.

BI SIG Workshop

First validation feedback

Exercise & Validation

Qualitative feedback



- 30 people
- primarily BI practitioners, IT directors and Vice-Rectors

Usefulness of the model

- "Helps to focus on the right things"
- "Useful for making management more aware the need to invest in BI"
- "Great help for discussion (such that one does not forget important aspects)"
- "Useful as a reference maturity model"
- "Great tool for benchmarking. Will help HEI to strategically implement BI&A and to plan activities"

Qualitative feedback

- Dimensions
  - Overall positive feedback: adequacy & relevance
  - Some terms need clarification
  - Cloud computing ?? (it's a generic IT infrastructure issue, and it uncertain that it is an advantage for HEI to evolve into a ever increasing cloud presence

- Levels
  - How to represent the presence in between two levels (best case/worst case)?
  - Clarification required for some levels:
    "Sometimes evaluation is problematic. We question if level 5 is really better always?"

Conclusions

- Very encouraging first validation of the model
- Strong interest of the BI SIG community to try out the model

Phase 3. Validation iteration

Case study with NTNU, Norway
Interviews and facilitated sessions

Set of recommendations to improve the MM and **HE-BI&A MM (v. 2.0)**

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- Possible online tool for self-assessment and benchmarking to be discussed

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