

# **Digital Performance Data Management in Higher Education.** **Concepts of Smarter Universities and Institutional Reality**

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- **Organisational Background: HEIs as ‘Specific Organisations’**
- **DPDM: Smart(er) University**
- **DPDM: Methodology and Research Questions**
- **DPDM: Empirical Exploration of Real Universities**
- **Conclusions and Outlook**

# DPDM: Smart(er) University

- ‘In a **smarter** university the **ultimate technological solutions** foster **collaboration and cooperation among individuals**’ (Coccoli et al. 2014, p. 1010).
- HEIs can use the **huge amounts of data** being generated for creating ‘**smarter universities**’ (Lane 2014) by
  - Refining the operations and management of HEIs
  - Cultivating the education pipeline
  - Educating the next generation of data scientist
  - Fostering research
  - Supporting effective community outreach

# DPDM: Smart(er) University

DPDM is the **digitised** ‘collection, analysis, use, and appropriate dissemination of HEI-generated, actionable data with the purpose[s] of creating appropriate cognitive, administrative, and effective support’ (Slade & Prinsloo, 2013, p. 1512) for various HEI achievers’ success; enhancing performance quality; improving HEI governance

- Enthusiastic version:  
**‘Each university should be able to control all its parts from a “single virtual automated room”, thanks to analytic and forecasting platforms that should help in managing the risks, the financial exposures, and anything else’** (Coccoli et al. 2014, p. 1010).

– ‘encouraging’ ‘initial experiments’ done in the U.S. (e.g., University of California; North Carolina State University; Kent State University; Tulane University; Syracuse University)

# DPDM: Methodology and Research Questions



- Which **DPDM** areas are established – Collect, Analyse, Use data – by sample HEIs?
- Which core data & performance indicators are used?
- Which types of analysis are applied?
- How are evaluated data used?

# DPDM: Empirical Exploration of Real Universities

- Theoretical sample: 9 Unis, 20 UASs, Cooperative State University, Pedagogical Universities, Universities of Music and Arts
- **Explored sample:** 8 Unis, 3 UASs
  - Sources
    - Document analysis
    - Survey interviews on mission statements and performance indicators
    - Informal conversation
    - Counseling workshops
  - (Currently) **No comprehensive overview possible**
    - **Complex** matter
    - Currently lot of **change**
    - **'Specific organisation'**: While data in HEIs are growing 'most of it is scattered across desktops, departments and come in various formats, making it difficult to retrieve or consolidate' (Daniel, 2015, p. 917).
    - **Limited transparency** (e.g., island solutions; competition between HEIs; pressure from HE politics; HEIs fed up with surveys)



# DPDM: Smart(er) University

- L&T areas where HEIs can get smarter by DPDM
  - **Admission practices and recruitment strategies**
  - **Measuring and improving student success**
  - **Measuring and improving organisational success**
  - **Support institutional decision making**

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Admission practices and recruitment strategies'	Core data/ performance indicators	CAU data
<b>Sociocultural and educational biographical data</b>		8/8 Unis 3/3 UASs
<b>Online self-assessment</b>	Knowledge, expectation, motivation towards programs	1/8 Unis 0/3 UASs
<b>On-boarding</b>	Motivation, expectation, knowledge of freshman (surveys)	1/8 Unis 0/3 UASs
<b>Applicant online surveys</b>	Motivation, expectation, knowledge of applicants	0/8 Unis 0/3 UASs



# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Admission practices and recruitment strategies'	Core data/ performance indicators	CAU data
Mathematics pre-test for all students; Feedback to faculties individually; Information about support offers for underperformers	Test results	0/8 Unis 1/3 UASs
Self-assessment of mathematical skills by drop-outs	Assessment results	1/8 Unis 0/3 UASs
Extended offer of mathematics pre-courses		1/8 Unis 0/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Measuring and improving student success'		CAU data
<b>Digital teaching and learning</b> (Virtual Learning Environment/ VLE)	Augmented teaching & learning (e.g., virtual laboratories; wearable computing)	0/8 Unis 0/3 UASs
	Online courses	7/8 Unis 2/3 UASs
	Web conferencing	1/8 Unis 0/3 UASs
	Video conferencing & storage	0/8 Unis 0/3 UASs
	Social media tools	0/8 Unis 0/3 UASs
<b>Learning Analytics</b>		0/8 Unis 0/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Measuring and improving student success'	Core data/ performance indicators	CAU data
Drop-out	Drop-out rate; Self-assessment 'reasons for drop-out'	8/8 Unis 3/3 UASs
Consulting & orientation/self-management workshops for first-year students		2/8 Unis 0/3 UASs
First-year courses in academic learning & (inter-) disciplinary scientific methods	Drop-out, reasons for drop-out, biographical risk factors, self-assessment 'security in decision on course/on taking up studies'	1/8 Unis 0/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Measuring and improving student success'	Core data/ performance indicators	CAU data
Occupational consulting within the first year (in cooperation with job agency)	Dto.	1/8 Unis n/3 UASs
Invitation to information/ consulting meeting on study support to all underperformers in exams	Exam results first 3-4 semesters	2/8 Unis 2/3 UASs
Monitoring study success & drop-out for different student groups and ascertaining their individual demands	ECTS-points, drop-out data	3/8 Unis 2/3 UASs
Orientation exam to be passed by the end of the third semester	Exam results	1/8 Unis 0/3 UASs
'Writing Center' and student mentoring programme 'writing partnership'	Self-assessment academic writing skills by graduates & drop-outs	1/8 Unis 0/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Measuring and improving student success'	Core data/ performance indicators	CAU data
Screening and analysis of individual study conditions as part of counseling interview		1/8 Unis n/3 UASs
Translation of all important documents and certificates into English, information workshops in English		1/8 Unis 0/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Measuring and improving organisational success'		CAU data
<b>Digital stakeholder communities:</b> connectivity, communications, collaboration	For students (digital campus ILIAS: course application; exam application; documentation of courses and lectures; MOOCs; online classrooms; web-based trainings, e-tests, self-assessments)	7/8 Unis 2/3 UASs
	For academic staff (digital campus: dto.)	
	For administrative staff (digital campus: courses management)	
	<b>Alumni</b> <b>Research partners</b> <b>Government funding bodies</b> <b>Business partners</b> <b>Local colleges, schools and academies</b>	0/8 Unis 0/3 UASs

ILIAS = „Integriertes Lern-, Informations- und Arbeitskooperations-System“

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Measuring and improving organisational success'		CAU data
<b>Digital campus</b>	Building control & management	n/8 Unis n/3 UASs
	Security & access control	n/8 Unis n/3 UASs
	Video & information systems	0/8 Unis 0/3 UASs
	Energy monitoring & control	n/8 Unis n/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM issues 'Support institutional decision making'		Have it	Plan to have it
<b>Digital strategy:</b> 'how newest digital technology can enable major performance improvements including enhancing stakeholder experience and organisational success'	Mission statements (university level)	0/8 Unis 0/3 UASs	?/8 Unis ?/3 UASs
	Structure & development plans	?/8 Unis ?/3 UASs	?/8 Unis ?/3 UASs
	Mission statements (sub-university levels)	?/8 Unis ?/3 UASs	?/8 Unis ?/3 UASs
	Designated responsible person(s) in management	n/8 Unis n/3 UASs	



# DPDM: Empirical Exploration of Real Universities

<b>DPDM issues</b> <b>‘Support institutional decision making’</b>	<b>Core data/ performance indicators</b>	<b>CAU data</b>
Objective agreements related to learning & teaching (e.g., low drop-outs)	Student satisfaction with study and examination regulations; drop-out data	1/8 Unis 0/3 UASs
Planning meetings with rectorate and faculty	Applications, admissions, secondary school grades, drop-outs, graduates	1/8 Unis 1/3 UASs
Data sheets for rectorate and faculty	Applications, admissions, drop-outs, graduates	8/8 Unis 3/3 UASs

# DPDM: Empirical Exploration of Real Universities

DPDM areas	CAU data (incl. plans for improvement & integration)
<b>Admission practices and recruitment strategies</b>	5/8 Unis; 2/3 UASs
Measuring and improving <b>student success</b>	6/8 Unis; 0/3 UASs
Measuring and improving <b>organisational success</b>	7/8 Unis; 2/3 UASs
Support <b>institutional decision making</b>	2/8 Unis; 1/3 UASs
DPDM competence development of stakeholders (digital methodologies; digital information ethics; student privacy)	0/8 Unis; 0/3 UASs
Measuring and improving research success	n/8 Unis; n/3 UASs

## Conclusions and Outlook

- **Focus goals of sample HEIs in (D)PDM in L&T driven by concrete problems (not by ‘Big Strategy’)**
  - Improve on flexibility of (individual) design of studies
  - Take into account heterogeneity of students with specific foci on migration backgrounds and gender
  - Support orientation in study entrance phase
  - Increase students’ retention rates

## Conclusions and Outlook

- Sample HEIs **do not have comprehensive, integrative DPDM in place** (which would be definitely more than virtual logistic course management and various island solutions)
  - Sample HEIs' current systems of performance data collection appear **complicated** and **incoherent** (e.g., dispensible duplications of data definition; data collection; data delivery)
  - Basic **DPDM areas 'under development'**: **student admission, retention, performance, success**
  - Basic **DPDM areas largely missing**: budget and workload planning; performance benchmarking; research interests, performance and output
  - **No educational data mining and learning analytics**
- Sample HEIs **do not have a sustainable digital strategy** with clear leadership responsibilities; DPDM is not part of organizational identity



## Drivers of HEI Digital Performance Data Management (DPDM)

- Improve/support decisions (faster, more evidence-based)
- Improve data quality
- Improve quality/access of performance measurement tools
- Remove data silos
- Integrate competing data management and storage
- Deliver fast, properly filtered performance measurement data

## Enablers/Success Factors of HEI DPDM

- High data quality
- Trust in/reliability of DPDM (e.g., participation of stakeholders as agents; proper data availability, access, protection & privacy; good DPDM expertise & practices; no reducing of DPDM to technocratic enterprise)
- Interoperability of institutional data systems
- Clear framework conditions (organisational; legal)
- Sufficient funding

## Strategy of HEI DPDM

- Improve performance quality
- Grow competitiveness and market share of HEIs/HE systems
- Increase stakeholder value (e.g., retention; attractiveness)
- Improve risk management

## HEI DPDM Road Map

## Valuableness of HEI DPDM

- Quality data (relevance; reliability)
- Ease of adequate data access
- Valuable decisions and actions
- Data for evaluation of HEI outputs, outcomes, impacts
- Flexibility and integrated risk analysis for decision-making

Red: not fulfilled

Blue: neutral/ undecidable

Green: at least partially fulfilled

Completely modified after (Liebowitz 2017, p. 9)

# Conclusions and Outlook

## (Reassurance and inspiration at the same time)

- **Choice of sample HEIs which are reported to be active in, and have **some DPDM** implemented** (cf. Sclater et al., 2016; CISCO, 2016)
  - Plymouth University
  - University of New South Wales
  - Deakin University
  - Nottingham Trent University
  - Open University, UK
  - Edinburgh Napier University
  - Sam Houston State University
  - Purdue University, Indiana
  - University of Maryland
  - California State University
  - Marist College, New York
  - New York Institute of Technology
  - The Open Universities Australia
  - University of New England, Australia
  - Wollongong University Australia
  - Edith Cowan University, Perth
- **Only 1.9 % of UK HEIs have ‘fully implemented and supported’ **learning analytics**, while 17 % have it ‘partially implemented’, 34 % are ‘working towards implementation’, and 47.2 % have it ‘not implemented at all’** (HEC, 2016, p. 22)

## Conclusions and Outlook

- Sample HEIs are planning and starting initiatives
  - Research information systems
  - Core data & performance indicators for all performance areas (ministry)
- Sample HEIs are
  - Using approximately 100 performance indicators in learning and teaching
  - Not eager to compare and compete with each other directly, too explicitly
  - Not keen on developing a core data set in learning and teaching

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