OAQHE
الجمعية العُمانية للجودة في التعليم العالي
Oman Association for Quality in Higher Education

Utilising data for informed decision-making

The power of data in higher education

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Today's Agenda

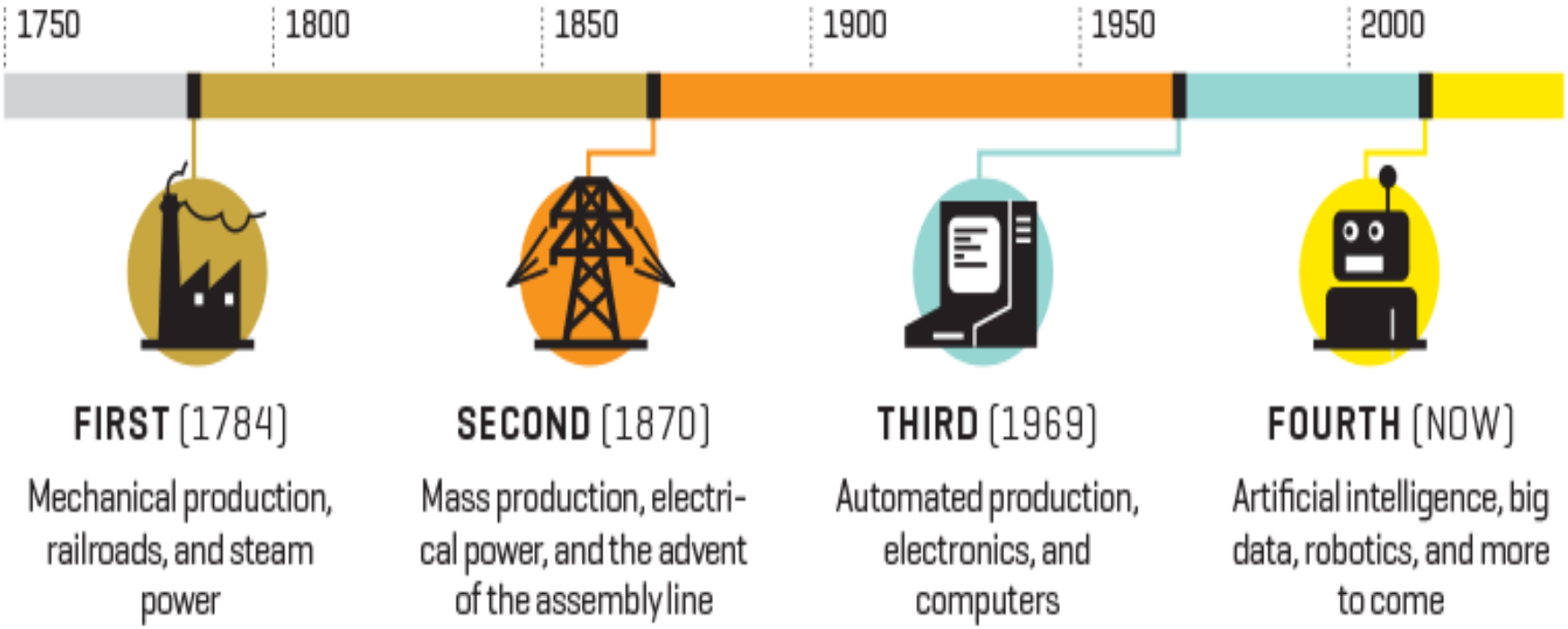
- Why data is important and how it has evolved
- Introduction to "Big Data", and how it is used
- Data analytics
- Case Study
- Challenges
- Recommendations : Some tips for successful data analytics

Nowadays Voice

- Quantum computing
- Big data
- Internet of Things (IOT)
- Artificial Intelligence
- Robotics
- Smart cities
- Science fiction is becoming science fact

Digital transformation world

The four industrial revolutions



https://fortune.com/2016/03/08/davos-new-industrial-revolution/

Why data is important and how it has evolved

- To get better investment
- To help HEIs to identify challenges, capitalize on opportunities and reduce the cost
- To close the achievements - GAPs
- Data should address strategic questions
- For the purposes of policy making, enhance student learning and success, etc
- To take better decisions
- To maximize strategic outcomes
- To achieve students success
- To protect and develop your brand and stay competitive

Different Purposes

1. To develop
2. To solve problems
3. To evaluate
4. To improve strategies, systems, policies, programmes, and services

Various data categories: input, outcome, process, and satisfaction data

- Quantitative data analysis of quantitative data help to the development of "why" and "how" questions that qualitative data can answer better.
- Qualitative data collected through , interviews ,focus groups, surveys with open-ended questions, and observation to answer questions of "why" and "how" that result from quantitative data.*
- (Marsh, Pane, & Hamilton, 2006b), recognizes that decisions may be affected by multiple types of data, such as input data (ex. university cost), process data (ex. quality of instruction), output data (ex. student grades), and satisfactory data (ex. Teacher and students opinion)*
- A mixed-methods approach is often better

*BUILDING INSTITUTIONAL CAPACITY FOR DATA-INFORMED DECISION MAKING, William E. Trueheart President & CEO

Introduction to "Big Data" and how it is used

The six Vs of big data

Big data is a collection of data from various sources, often characterized by what's become known as the 3Vs: *volume, variety and velocity*. Over time, other Vs have been added to descriptions of big data:

VOLUME	VARIETY	VELOCITY	VERACITY	VALUE	VARIABILITY
The amount of data from myriad sources.	The types of data: structured, semi-structured, unstructured.	The speed at which big data is generated.	The degree to which big data can be trusted.	The business value of the data collected.	The ways in which the big data can be used and formatted.

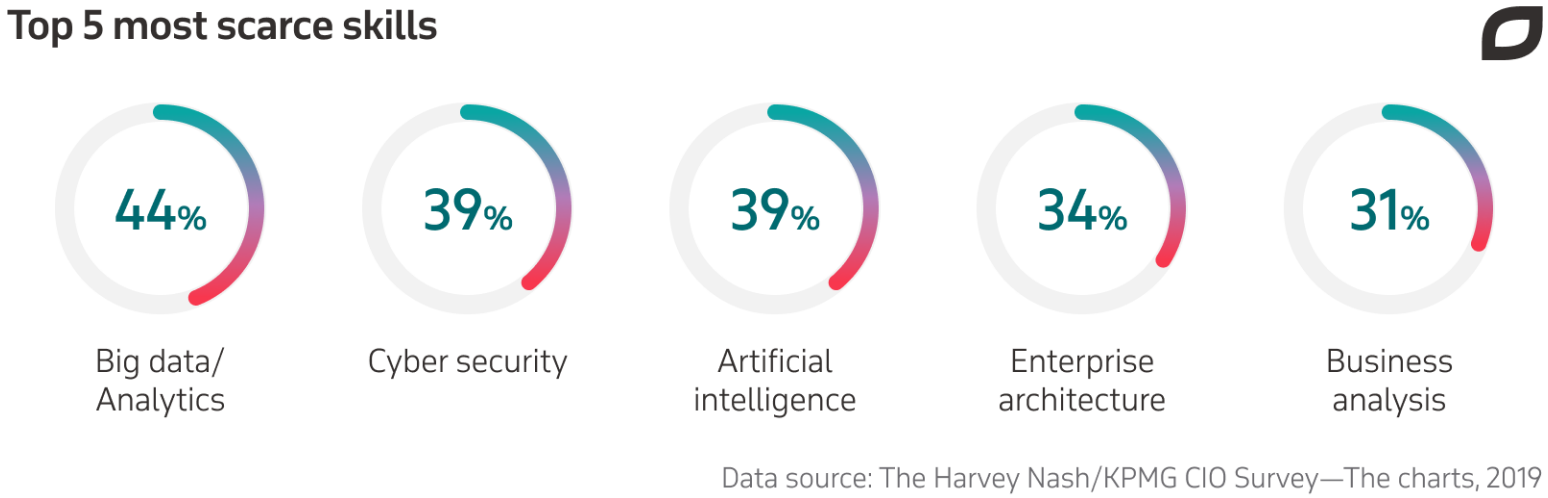





https://searchdatamanagement.techtarget.com/definition/big-data

Predictions of Big Data

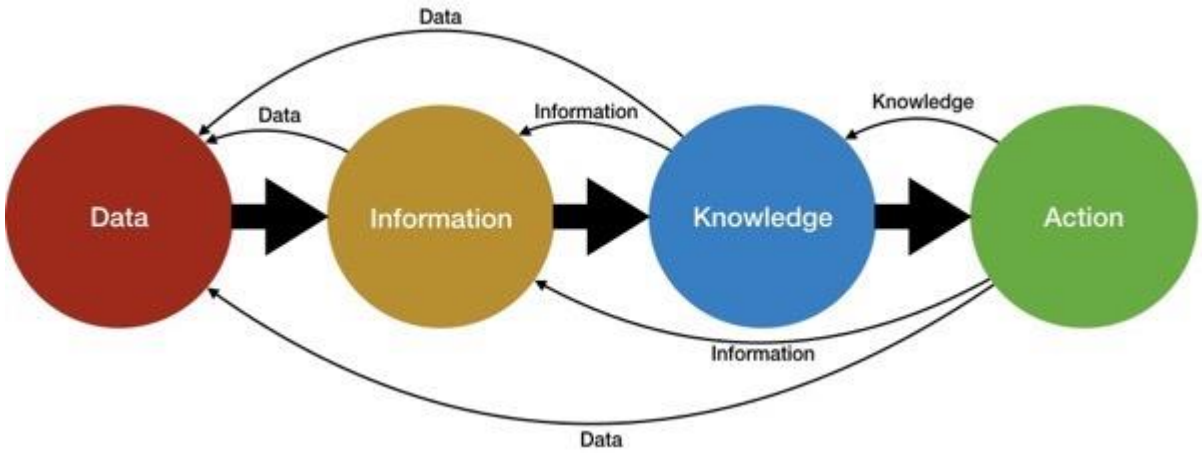
- Data volumes will continue to increase and migrate to the cloud
- Machine learning will continue to change the landscape
- Data scientists will be in high demand
- Privacy and ethical uses of data will remain a hot issue



https://www.itransition.com/blog/the-future-of-big-data

How advanced would you say the data analytics capability is at your institution?

- The Power: data alone cannot make better decisions , shape better policies or answer questions
- One must go from **data** to **knowledge** to **results**



Data analytics (Sceinec)

- Analytics is the use of data, statistical analysis, explanatory and predictive models to gain insight into the variables under study to get the desired results*.

- It is a structured approach or process to the collection, analysis, dissemination of results, and the taking of an action *

Analytics Barriers , culture , cost,
To overcome this invest in analytics professionals and asses your use of the data

*Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations, Jacqueline Bichsel, EDUCAUSE Center for Applied Research, Technical Report · August 2012

Data Mining & Data Analysis

Data Mining	Data Analysis
is a systematic process of discovering patterns in large data sets using learning machines, statistics, database known “as Knowledge Discovery in Databases”	is a superset of data mining that involves transformation, modeling, visualization, and extraction.
helps to understand collect data better	leads to results (take decisions)

Data visualization is the presentation of data in a graphical format (graphic reveletion of data).

Analytical Software Tools (commercial and open source)

- SPSS
- SQL
- R Programming.
- Tableau
- SAS
- Apache Spark
- Excel
- RapidMiner
- KNIME
- QlikView.

Fuelled By
Digitization
Mobilization
Automation

Figure 4. Perceived Benefits of Analytics for Higher Education

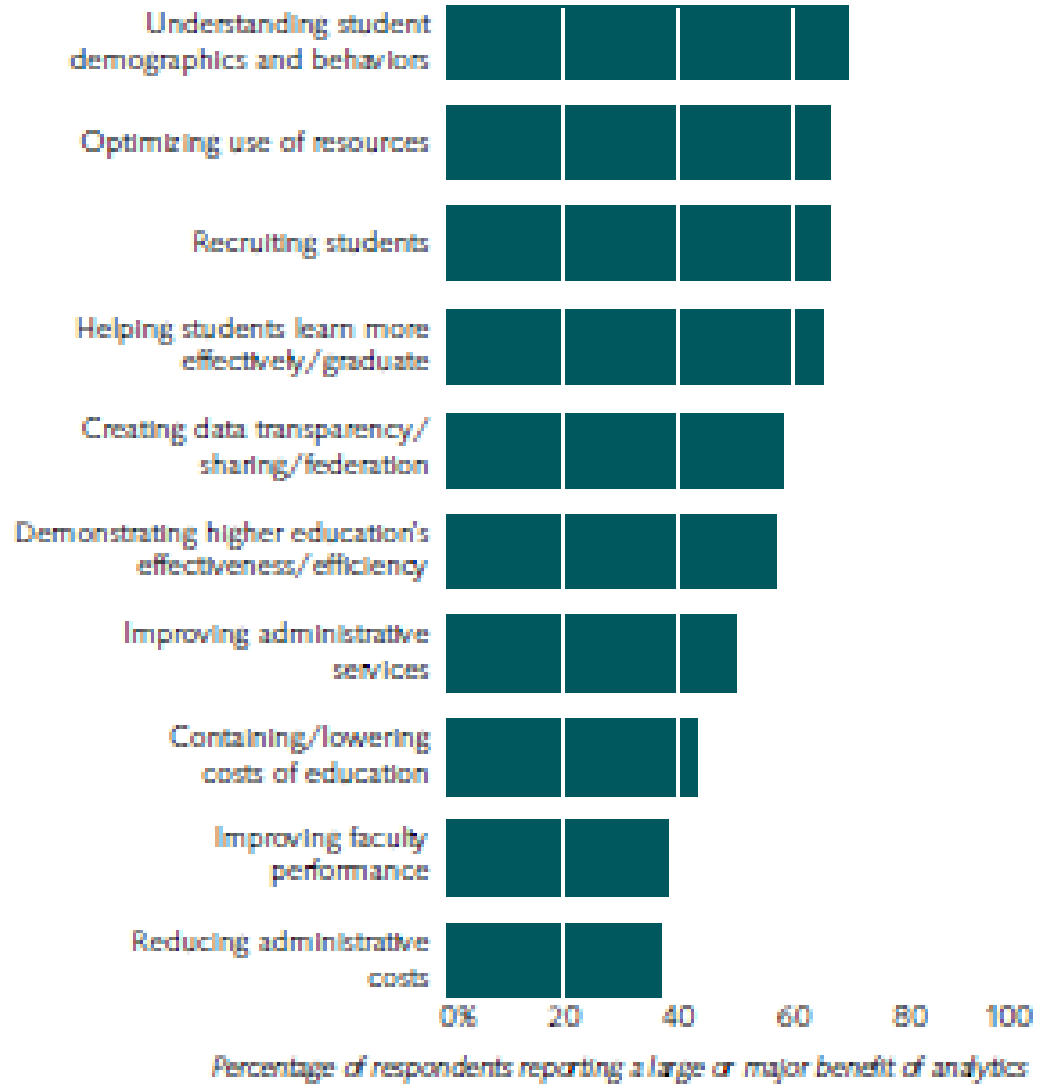
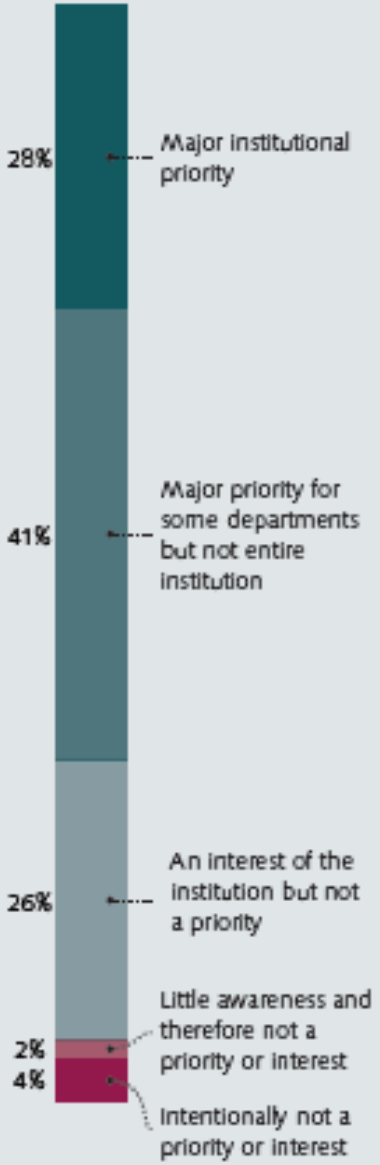


Figure 1. Priority of Analytics



Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations, Jacqueline Bichsel, EDUCAUSE Center for Applied Research, August 2015

Figure 5. Concerns about the Growing Use of Analytics in Higher Education

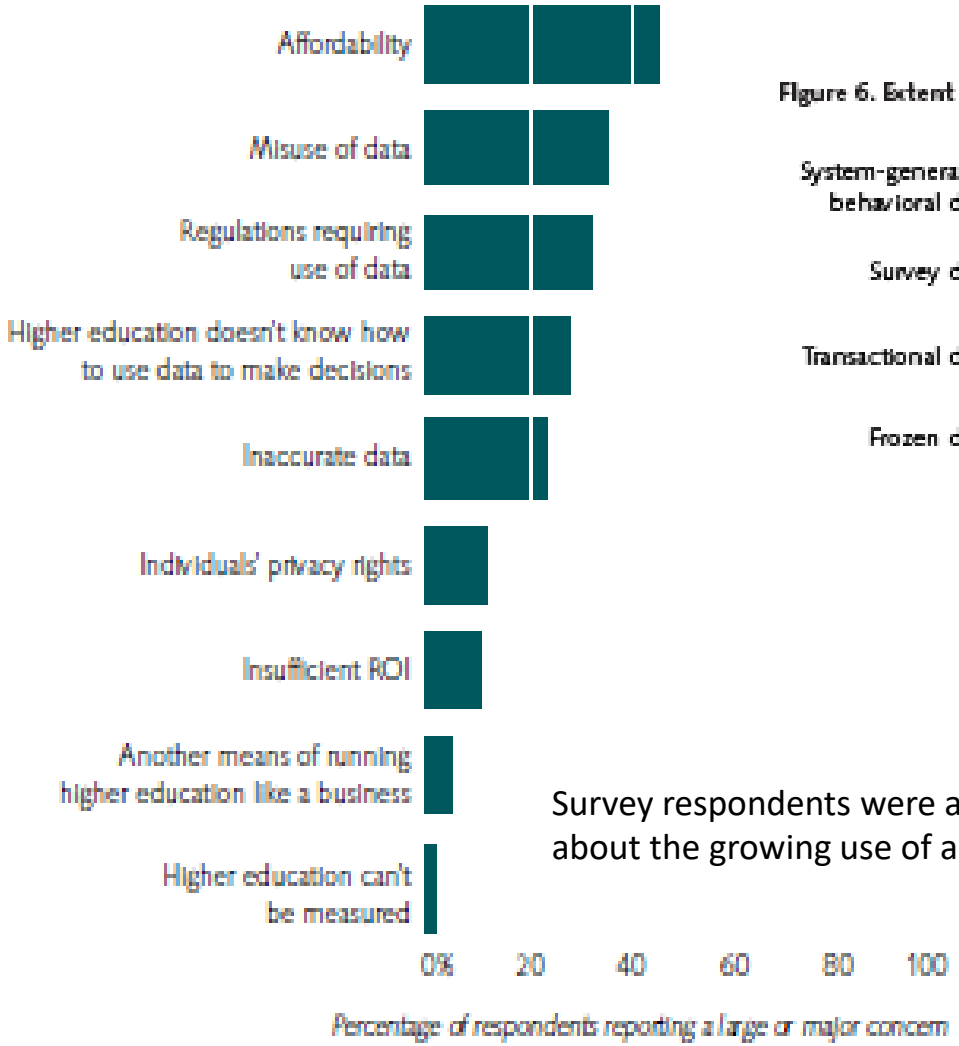
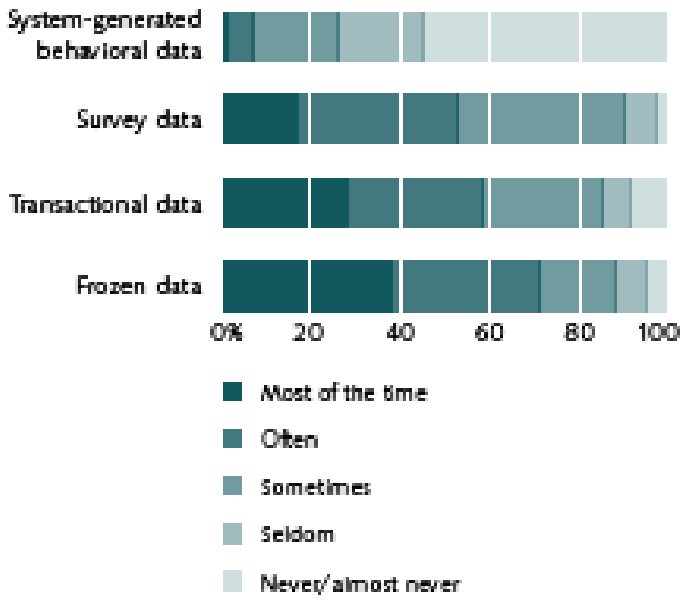


Figure 6. Extent to Which Various Types of Data Are Used in Analytics Activities



Survey respondents were asked to rate various concerns about the growing use of analytics in higher education

Source: "The Future of Finance," John Hugo, VP Financials Products - Workday

How to think strategically and analytically about which data matters ?

- ✓ A purpose ----- (mission and ,vision , **SP)**
- ✓ Internal Data (continuous quality improvement
- ✓ External Data
- ✓ Internal stakeholders
- ✓ External Stakeholders

Think about

1) How old the data is
2) Variables & indicators
3) Limitations of the data
4) Reliability of the data

Introduction to a framework for conducting Data Analysis

Ask Q

Methods & tools

EASY

Need to map your strategic initiatives to the data

PLAN & IDENTIFY OUTCOMES

Identify which key areas to target

COLLECT DATA

cleaned and error free

Challenges ,Opportunities

Assessment Cycle

ASSESS IMPACT OF CHANGE

We Cannot Improve at Scale What We Cannot Measure

ANALYZE DATA

Tools
Partners
IR+IT
DATA
Scientist

Promotes continuos conversations

A research protocol

Show results

IDENTIFY & IMPLEMENT CHANGES

SHARE RESULTS

HARDEST

HARDER

Ethical policies & codes of practice

DO NOT question and challenge the value of the data collection

Source: Adapted from Jillian Kinzie, Pat Hutchings, and Natasha Jankowski, "Fostering Greater Use of Assessment Results"

Keys

The implementation and effective use of data analytics require

- A structural change of culture in all level
- plan or systemic set of modifications in the way in which the various activities are conducted and assessed*.
- Partnership

*Data Analytics and Decision-Making in Education: Towards the Educational Data Scientist as a Key Actor in Schools and Higher Education Institutions, Tommaso Agasisti, Alex J. Bowers Agasisti & Bowers (2017)

Case Study:Retention Rate

Goal:- to enhance students learning and success + improve the retention rate by 10%	
Outcomes **Think and set strategic questions**	**Data Collections**
Which batches of students show the most retention reduction? In which year does the most reduction happen? How to decrease the dropout? Who should be involved (academic advisors, instructors, Reg Centre, data scientist) List variables and indicators (gender , years , ,,)	List the data to be collected (quantitative and qualitative) - Number of students with the reasons , - Number of courses with high F grades Develop a survey for staff and students Source :- Registration Centre , HoDs
Analysis	**Results**
SPSS Focus group Interviews	Diff reasons for each year Gender issue Language issue Credit hours culture issue Program and specialization issue Homesick

Goal:- to enhance students learning and success + improve the retention rate by 10%	
Sharing Results and conservation	**Decision making and implantation**
University leader **Parents** **HoD** **academic advisors** **Instructors** **Head of Registration Centre** **Quality assurance coordinator** **data scientist**	Create A Perfect foundation year experience Develop Retention Strategies set up learning communities review the study plan for year 1 enhance the IT facilities for year 2 Review the academic advising policy Expanding tutoring services.
Assess the change (New data (need analytics)	**outcomes and aims**
Survey + analyses + sharing	

Challenges

- Commitment to data-informed change
- Expertise and Knowledge (Data scientists)
- Diff programs with so many diff variables
- Factors overlapping
- Many types of teachers, students , Cultures
- Large data networks
- Data security and privacy, ethical uses of data
- Storage and processing
- Quality of data

Recommendations:
Some tips for successful data analytics

- Leaders should change the data culture, emphasize the importance of partnership, communication and commitment
- Leaders should consider investing in professional development, Invest in people over tools.
- All polices should have the list of data to be collected (if it is worth doing, it is worth being documented)
- Emphasize the important technology and data infrastructures
- Always set strategic questions and develop a plan to address those questions with data
- Benchmark to gauge your institution's current standing in analytics, set goals for future analytics success, and measure your institution's progress.*

*."ECAR Analytics Maturity Index."

Ref

- Western Association of Schools and Colleges, “Evidence Guide: A Guide to Using Evidence in the Accreditation Process: A Resource to Support Institutions and Evaluation Teams,” Working Draft (January 2002), 5; online at https://www.csusm.edu/wasc/evidence_guide_jan_02.pdf.

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- Data Analytics and the Imperatives for Data Informed Decision-Making in Higher Education Karen L. Webber, Institute of Higher Education, University of Georgia, kwebber@uga.edu & Henry Zheng, The Ohio State University, IHE Research in Progress Series 2019-004 Submitted to series: April 22, 2019

- DATA-INFORMED DECISION MAKING: A SHORT PRIMER, By Jonathan Martin and Amada Torres

- The change is exponential
- Are you driven the change ?or are you being driven by it
- We need to even beyond our technology and data to reach human ideas
- Strong Performance of higher education sector in Oman
- Thank You