



Big Data and Operation & Maintenance

ECOWinds Conference
September 2015

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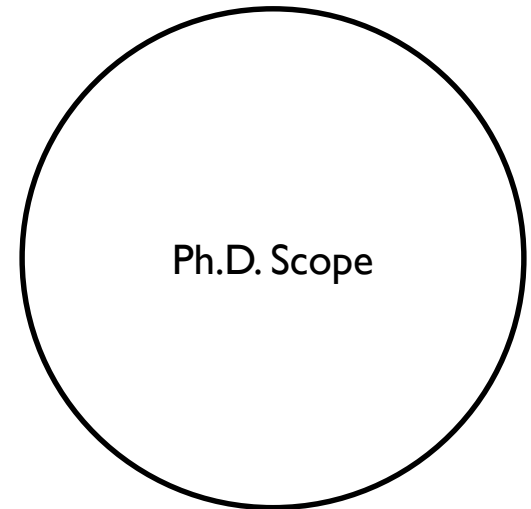
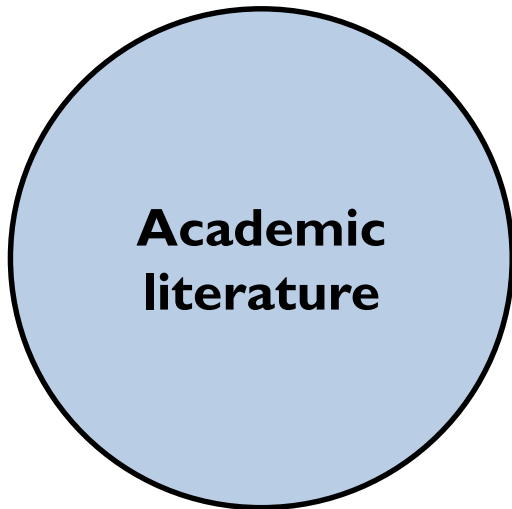


CV, Morten Brinch

- Industrial Ph.D., Siemens Wind Power, 1st Oct. 2015 – 30th Sep. 2018
 - Project title: "Big data and operation and maintenance in the offshore energy sector"
 - Big data, operation & maintenance (O&M) and supply chain management
- Research assistant, September 2015
- Product specialist and consultant, Danish Production Universe, 2014-2015
- Master of Science in Economics and Business Administration, Southern University of Denmark, Kolding, 2014
- Bachelor degree in Value Chain Management, VIA University College, Horsens, 2012

Agenda

- Big Data in academic literature
- Big Data's challenges and potentials for O&M practice and performance
- The scope and focus for my Industrial Ph.D.
 - “Big Data and Operation and Maintenance in the Offshore Energy Sector”



The definition of big data

1. Davenport *et al.* (2012)
 - “Big data differs from traditional data analytics, where information sets isn’t formatted in rows and columns”
 - “Big data uses real-time information from sensors, radio frequency identification and other identifying devices to understand their business environments, to create new products and services and to respond to changes in usage patterns as they occur”

2. Goes (2014)
 - “Big data differs from data analytics in relation to the 4 V’s:
 - Volume (Amount of data)
 - Velocity (Frequency of data)
 - Variety (Different types of data)
 - Veracity (Validation of data)”

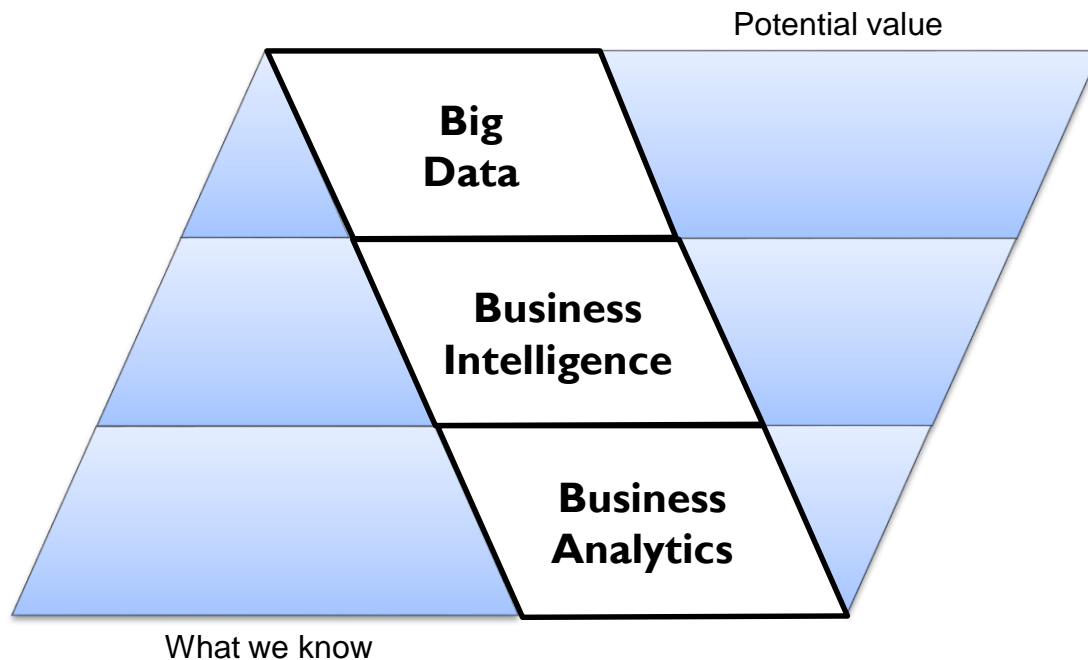
3. Mauro *et al.*, (2015)
 - “Big data is centered around information, technologies, methods and impact”
 - “Big data represents the information assets characterized by such a high volume, velocity and variety to require specific technology and analytical methods for its transformation into value”

Big data research - So far

- Has mostly been conducted in social media and healthcare (Chen & Storey, 2012)
 - It is considered an emergent research area related to business intelligence and business analytics.
- It is considered a disruptive technology that changes businesses (McKinsey, 2013)
- It allows wind turbines to be a smart connected product that is transforming the competitive forces (Porter & Heppelmann, 2014)
 - Capabilities: Monitoring, Control, Optimization and Autonomy
- Maintenance execution is highly dependent on data and is a key component to achieve operational excellence (Utne, 2010)
- Companies that characterize themselves as data-driven perform better on objective measures (McAfee & Brynjolfsson, 2012)

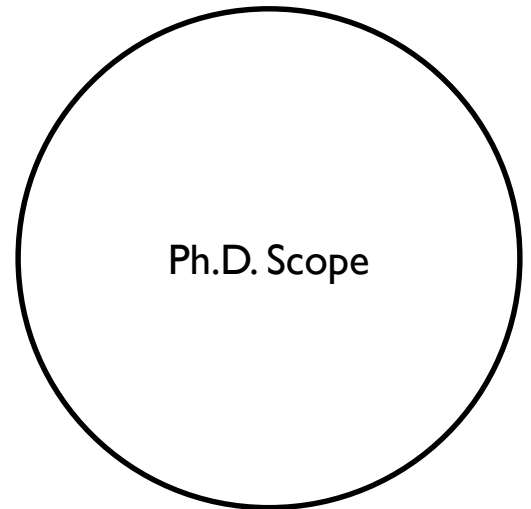
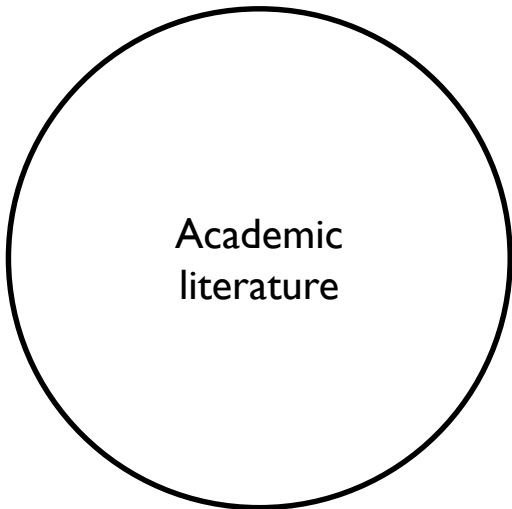
So what is Big data?

Big data is currently a buzzword that is weakly understood in theory and practice



Big data in a supply chain context:

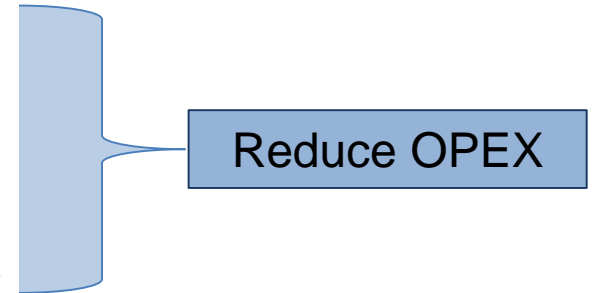
Big data is a way to understand highly complex data sets (4 V's) from different technologies, systems and sources with the purpose to drive strategic, tactical and operational processes and its decision making.



The challenges

O&M related:

- O&M practices are very costly
- To limit break down times
- To improve the annual energy production (AEP)
- To plan O&M practices due to weather conditions

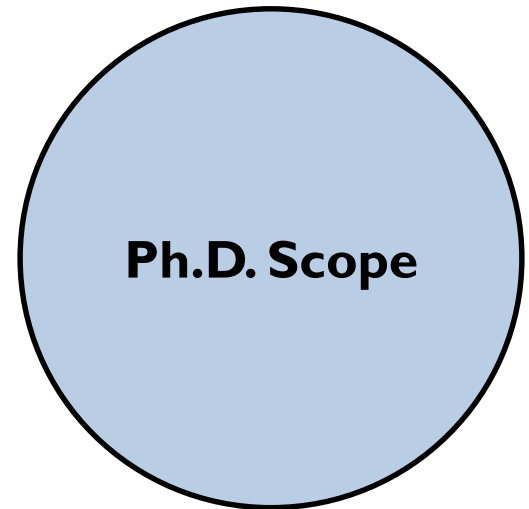
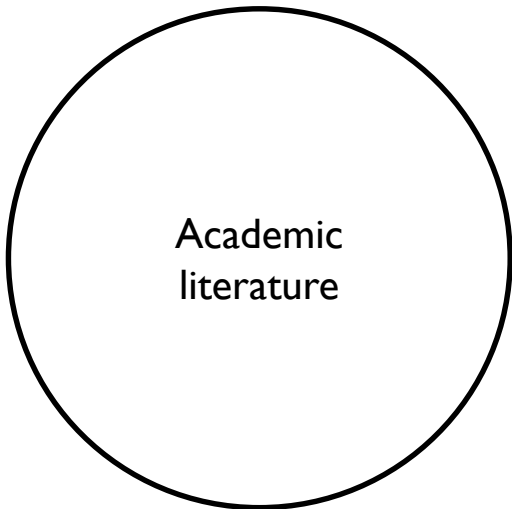


Big data related:

- To understand what big data is
 - For example: How big is big data?
- To understand the big data available
 - Data located in different pools and is not utilized in business processes
- To generate knowledge from the big data available
 - Data → Information → Knowledge → Decisions
- A very high complexity level makes it difficult and costly to gain value

The potentials

- Big data is an enabler for condition based maintenance
- Big data can generate and develop new and existing business models
 - New and improved service offerings
- Big data can be an important element in reducing O&M costs
 - Organizational setup, effective decisions, improved planning, logistical solutions etc..
- Big data can improve forecast predictions
- Big data can make the wind turbine autonom.
- Ect.



The vision for O&M practices at Siemens

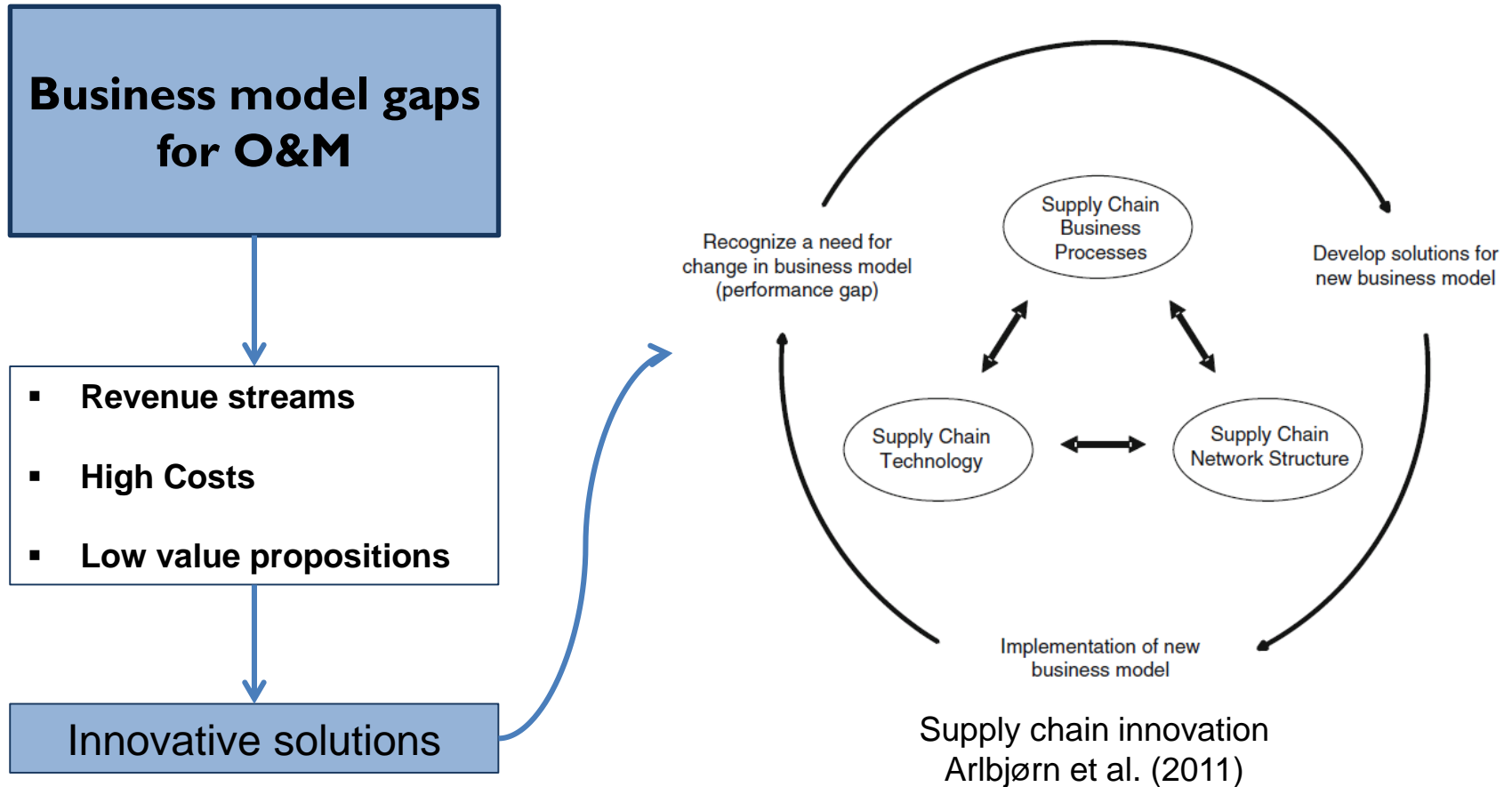
“To make the offshore wind turbine initiate its own service when needed and at the right time, while being cost effective and performance focused”

Big data is an important element in:

- Maximizing the uptime
- Maximizing the performance
- Having an market adaptive service portfolio



The framework



The work packages

Work package 1: The AS-IS situation

- What is big data practice in an O&M offshore wind context?
- How can big data be applied in an O&M context in offshore wind?

Work package 2: New service business models in offshore wind

- How can big data change the service business model in the offshore wind sector?

Work package 3: Design for serviceability

- What are drivers and barriers for big data in the design for serviceability of offshore wind parks?

Work package 4: Big data's impact on performance

- What is the financial impact on OPEX when using big data in offshore wind parks?

Methodology

- **Case study approach**

- Veja Mate planned, to be commissioned in 2017
- London Array Wind Park, operating since 2013

- **Field study**

- On O&M practices and its use of data for London Array Wind Park

- **Interviews**

- Management of Siemens
- Technicians
- Stakeholders

Objective

1. To develop new knowledge and theories on big data in the context of O&M
2. To gain insight on how big data can be an enabler for reducing OPEX
3. To gain insights on how big data can change businesses and new business models
4. To disseminate the project results in international peer reviewed journals, conferences and in industry relevant magazines

Summary

- Big data is a disruptive technology that is changing businesses, business models, decision-making processes, best-practices and affects the competitive forces of industries.
- Big data is weakly understood in theory and practice, however its potential value to industrial companies are high. Not much empiric research has been made, especially not from a supply chain perspective.
- Big data is an important element for reducing OPEX in O&M practices. In the nearest future even more data is captured and build into strategic and operational processes, which will change the current practices.
- Researching big data in an O&M and service supply chain context is a novelty.
 - I'm looking for knowledge, inputs, experiences, cases and attitudes towards big data.

Questions ?



Thank you

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