



EUROPEAN TECHNOLOGY & INNOVATION  
PLATFORM ON WIND ENERGY

# Digitalization Enables the Network Effect

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[etipwind.eu](http://etipwind.eu)

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# What is Digitalization?

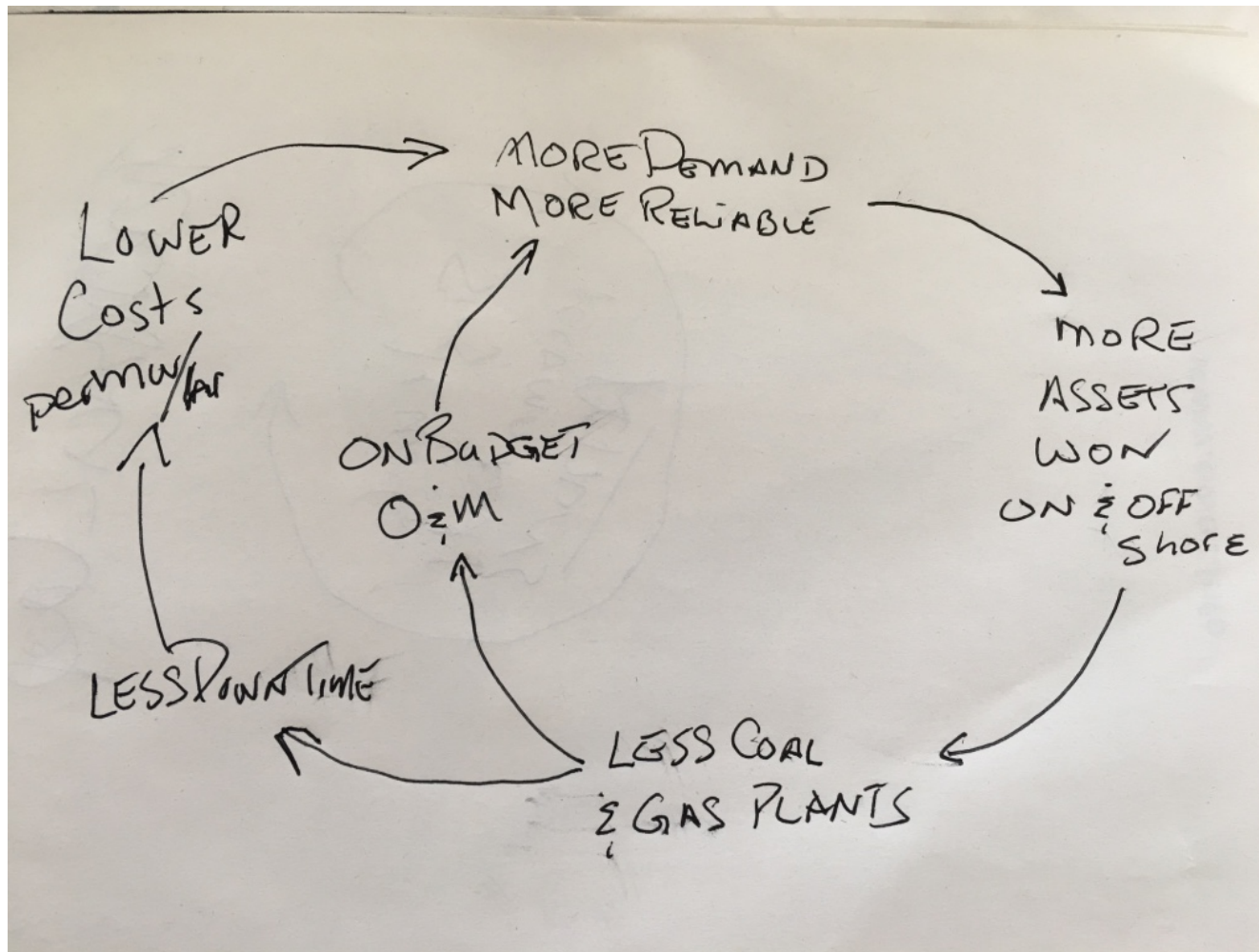
## Gartner Definition:

The use of digital technologies **to change a business model** and provide **new revenue and value-producing opportunities**;

## Harvard Business Review Definition:

- **Demand-side** economies of scale, also known as **network effects**.
- It occurs when a **product or service becomes more valuable to its users as more people use it**

# Single Customer Value becomes Eco-System Value

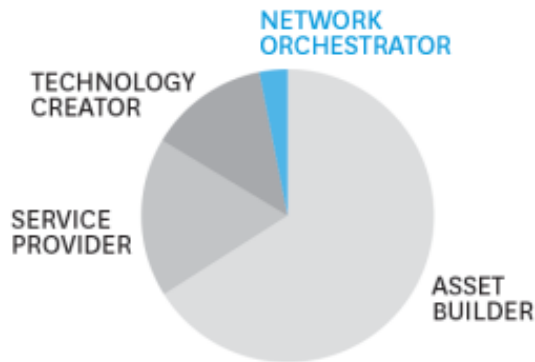


Operations & Business Value

# Value & Valuations in Digitalization

**NETWORK ORCHESTRATORS ARE RARE, DESPITE SUPERIOR PERFORMANCE**

S&P 500 BUSINESS MODEL COMPOSITION, AS OF NOVEMBER 2013



SOURCE BARRY LIBERT, JERRY WIND, AND MEGAN BECK FENLEY

HBR.C

TYPE	Return to End Customer w/o PTC	Business Valuation Multiple Revenue	Example in Energy	Examples Outside in outer market	Actual Valuations in USD Market Cap
Asset Builders	< 1 X	2 X	Vestas	GE, Siemens	GE \$266 B Siemens \$90B
Service Providers	1 X	2.6 X	Vestas	AT&T	\$265B
Software Technology Creators	1 X	4.8 X	Big Data	Dassault Systems	\$19B
Network Orchestrator (Network Effects)	5X or 10 MW/Hr	8-20 X	Sentient Science	UBER, AirBnB, Facebook, Whats App	UBER - \$67B, AirbBnB = \$30B Face Book - \$300B on its way to 1T? WhastApp - \$19B

# # of Digitalization Companies – Network Effect Business

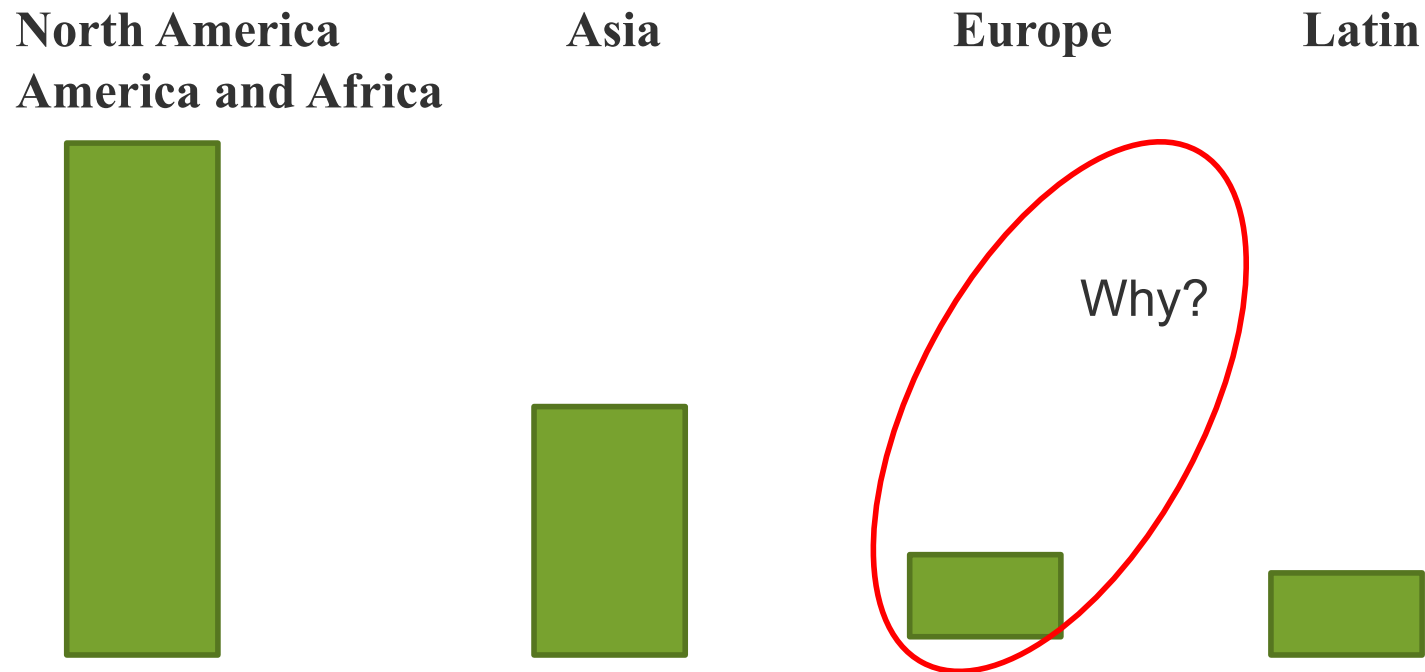


Figure 1.1. North America has more platform businesses creating value, as measured by market capitalization, than any other region in the world. Platform businesses in China, with its large, homogeneous market, are growing fast. Platform businesses in Europe, with its more fragmented market, have less than a quarter the value of such businesses in North America. Source: Peter Evans, Center for Global Enterprise.

# Example: NextEra 5400 Wind Turbines – Digitalized Fleet

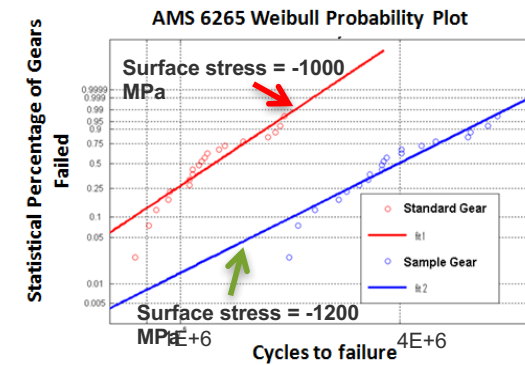
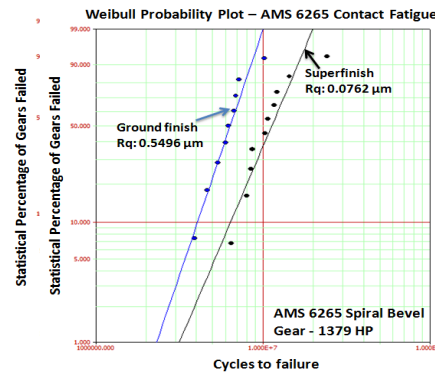
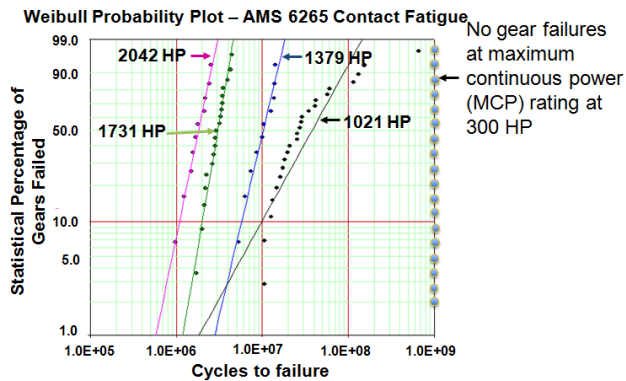
## Small Data from Material Science vs Big Data from Sensors



# Example Aerospace: Boeing Apache:



## Apache Spiral Bevel Gear Digitalization Model Validation against Physical Test - DigitalClone®

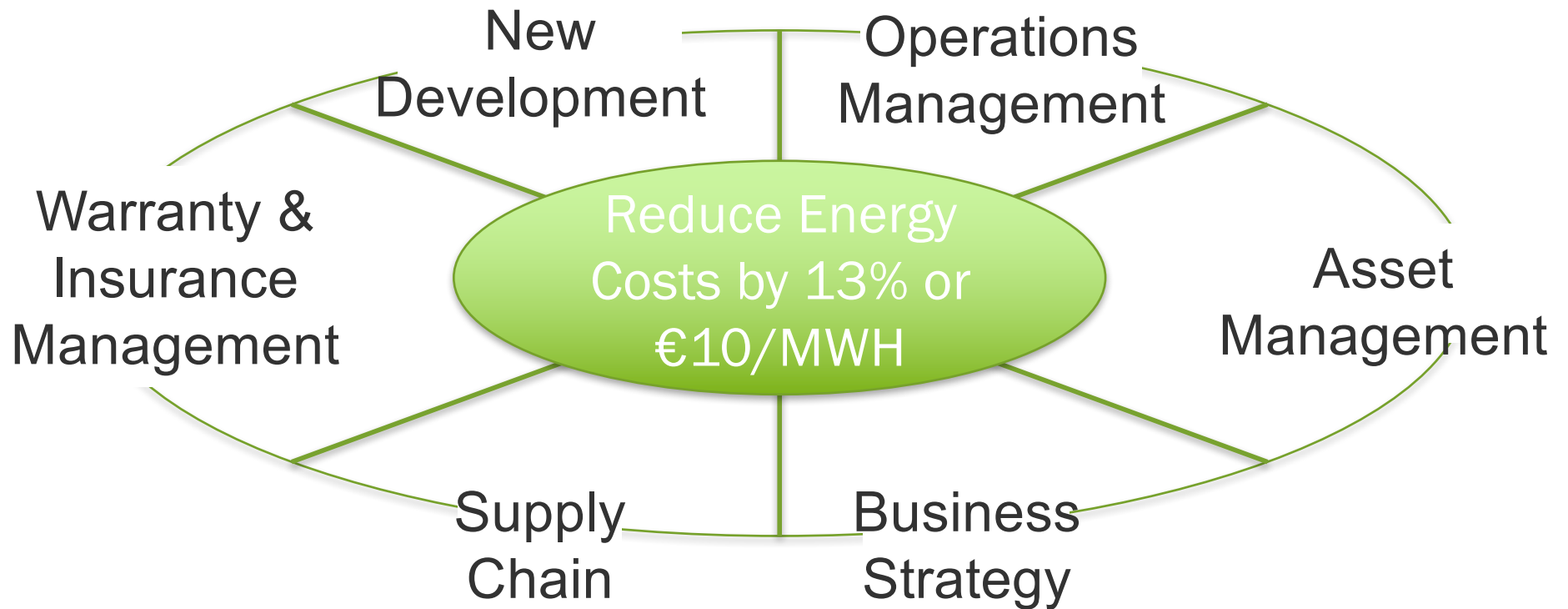


Load Case	Weibull, Life/Eta	Weibull, Slope
300 HP	Run-out	Run-out
1021 HP	5.14E+07	1.72
1379 HP	1.26E+07	3.32
2042 HP	7.49E+06	3.84
1731 HP	2.97E+06	4.28

Surface Finish	Weibull, Life/Eta	Weibull, Slope
Superfinish	1.26E+07	3.32
Ground finish	6.96E+06	4.17
Life ratio	1.81	



# What Business Functions Are Effected by Digitalization



6 Areas of Business Impact, Value and Focus



# Net Return on Life Extension Investment – O&M

			2015	2016	2017	2018	2019
5 year Investment	\$3,750,000	@500/MW/year	\$750,000	\$750,000	\$750,000	\$750,000	\$750,000
<b>Cost Avoidance and/or Savings:</b>							
		WTGs/Year					
1. Smart Derating GBX Life Extension		17.00	\$2,693,911	\$3,420,839	\$4,276,049	\$4,276,049	\$4,276,049
2. Long term Watchlist Planning		35.00	\$1,017,968	\$1,292,658	\$1,615,822	\$1,615,822	\$1,615,822
3. Supply Chain Improvements		9.00	\$400,746	\$508,884	\$636,105	\$636,105	\$636,105
4. Main Bearing Coupling		13.00	\$197,883	\$251,280	\$314,100	\$314,100	\$314,100
5. Main Bearing Life Extension		7.00	\$239,749	\$304,443	\$380,554	\$380,554	\$380,554
		Savings/Year:	\$4,550,257	\$5,778,104	\$7,222,630	\$7,222,630	\$7,222,630
Net Return	<b>\$28,246,250</b>	Net Return/Year	\$3,800,257	\$5,028,104	\$6,472,630	\$6,472,630	\$6,472,630
5 Year NPV	<b>\$23,900,904</b>						
5 Year IRR	<b>160%</b>						
5 Year ROI	<b>873%</b>						

DigitalClone® Live for Life Extension of Wind Turbines



Who are we?

[www.sentientscience.com](http://www.sentientscience.com)

# Sentient Science Life Extension Renewable Family – Over 20,000 Wind Turbines on Contract

Agregating Operator Demand  
World's Lowest Operational Cost Products

Bring Supply to Operator Demand  
World's Most Tested Products



• 2016 WindEurope Conference - Hamburg

[etipwind.eu](http://etipwind.eu)

# Sentient Science Pedigree

**\$21B of EU money coming – Experience - We helped our Operator and OEM partners raise \$70B in USA Digitalization Funds**



**2001-2016**

*\$25M in R&D Funding*

From the world's largest operator of heavy equipment



**2010**

*NASA Validation*

Of game changing technology, DigitalClone®



**2014**

*Tibbett's Award*

White House honors DigitalClone® technology- "decoding the Material Genome"



**April 2016**

*New Energy Pioneer Award*

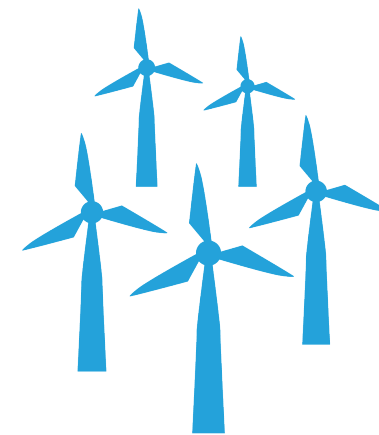
Michael Bloomberg honors commercial impact of DigitalClone® technology in Sentient's 1<sup>st</sup> Clean Energy market

“Small Data from material sciences versus big data from sensors”

# Sentient Live Testing & Database

## Digitalizing the Fleet – For Life Extension

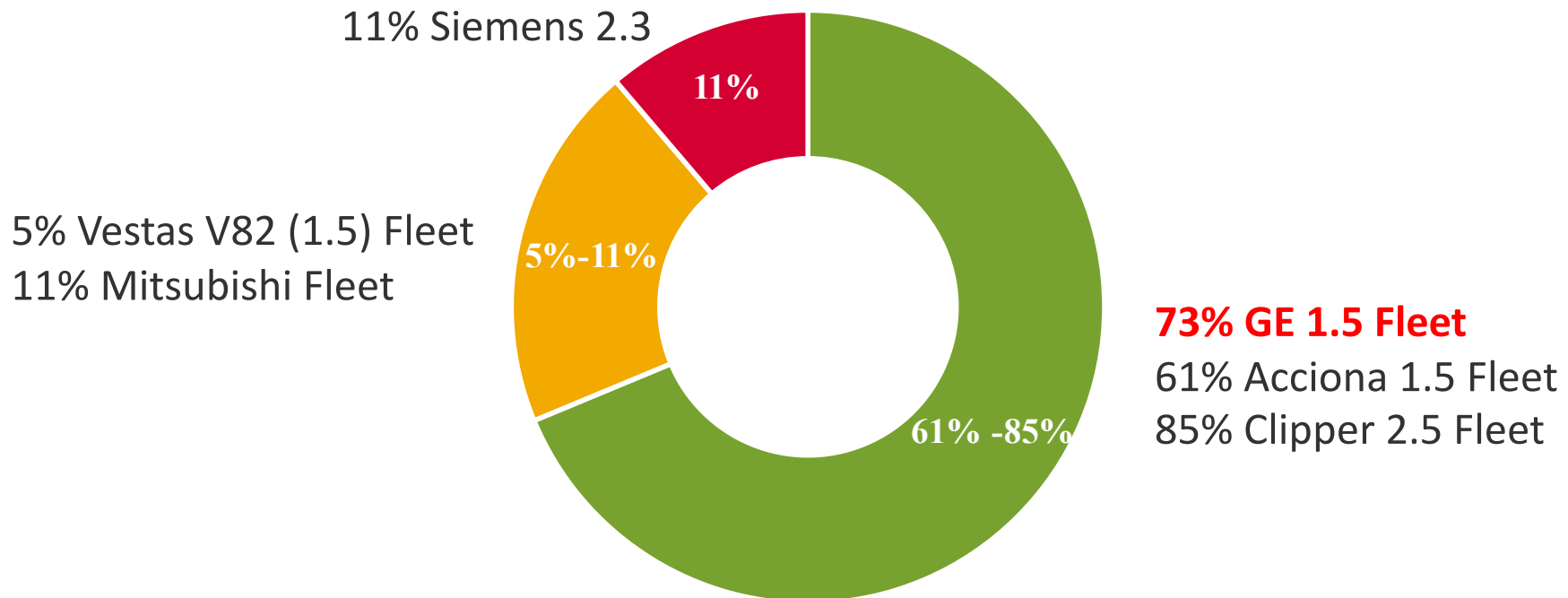
- Replace Coal 100%
- Helps to replace the PTC (USA)
- 62,000 Live Life Models by Turbine by 2016
- 205,000 Live Life Models by Turbine by 2020
- 100,000 Live Assets under mgmt. by 2018
- Save \$10 MW/hr  
5:1 Ratio



# Sentient Live Testing & Database 2016

- Example: # Turbines as % OEM Fleet - Live Life Models

OEM Live Life Models as % of the  
OEM's total installed base



*“Live” means DigitalClone® Models connected to  
live SCADA feed from each asset*



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Thanks for your attention

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