

Fundamentals of Sound Engineering

Solihull, Siemens PLM UK

Order of the day

09:30 AM **Fundamentals of sound**

- Sound waves, frequencies, decibels
- Sound source addition
- Weighting and octaves

10:15 AM **Sound Power**

- Acoustic source strength
- Review of applicable ISO test standards
- Virtual sound power testing

11:00 AM **Break**

11:15 AM **Sound source localization**

- Intensity scanning
- Microphone array techniques
- Beamforming and holography de-mystified
- Simulation acoustic hotspot detection

12:30 PM **Lunch**

01:30 PM **Sound quality**

- How to properly measure the sound (Binaural heads)
- Subjective evaluation: audio replay and filtering
- Objective evaluation through sound metrics: loudness, articulation index, roughness and more...
- Involving your customer in your sound quality process: Jury testing

02:30 PM **Sound material and mufflers**

- Absorption
- Transmission loss
- Comparison with CAE-test

03:00 PM **Break**

03:15 PM **Source-path-receiver**

- Methodology for understanding sound paths
- Force estimation methods, including blocked force concept
- Combining CAE and test

04:30 PM **Wrap-up**

First things first...

Housekeeping

Also...

Who are we?



1847

A small garage
startup in Berlin,
Germany

Employees

10

Start-up capital

6,842

thalers

1st year revenue

3,420

thalers



Today

Leading position in Electrification, Automation and Digitalization.

Employees

377,000+

Revenue

€82.9 billion

Net Income¹

€6.1 billion

Profit margin Ind. Business

11.2%

Key figures as of Oct 2017 1 Strategic Unit

Digitalization changes everything

The next trillion dollars will be earned with data – for our customers and for our industries.

Michael Dell, founder of Dell Inc.

Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.

Pierre Nanterme, CEO Accenture

Siemens has become a major player in digitalization



24,500+

software
engineers

A top 10

global software
company

1 million+

connected
assets

250+

Digital offerings
incl. digital services
and industrial
applications

Clear focus on digitalization in R&D



€5.6bn

Estimated R&D spending
in Fiscal Year 2018

+40%

R&D spending increase
from 2014 to 2017

Digital Product

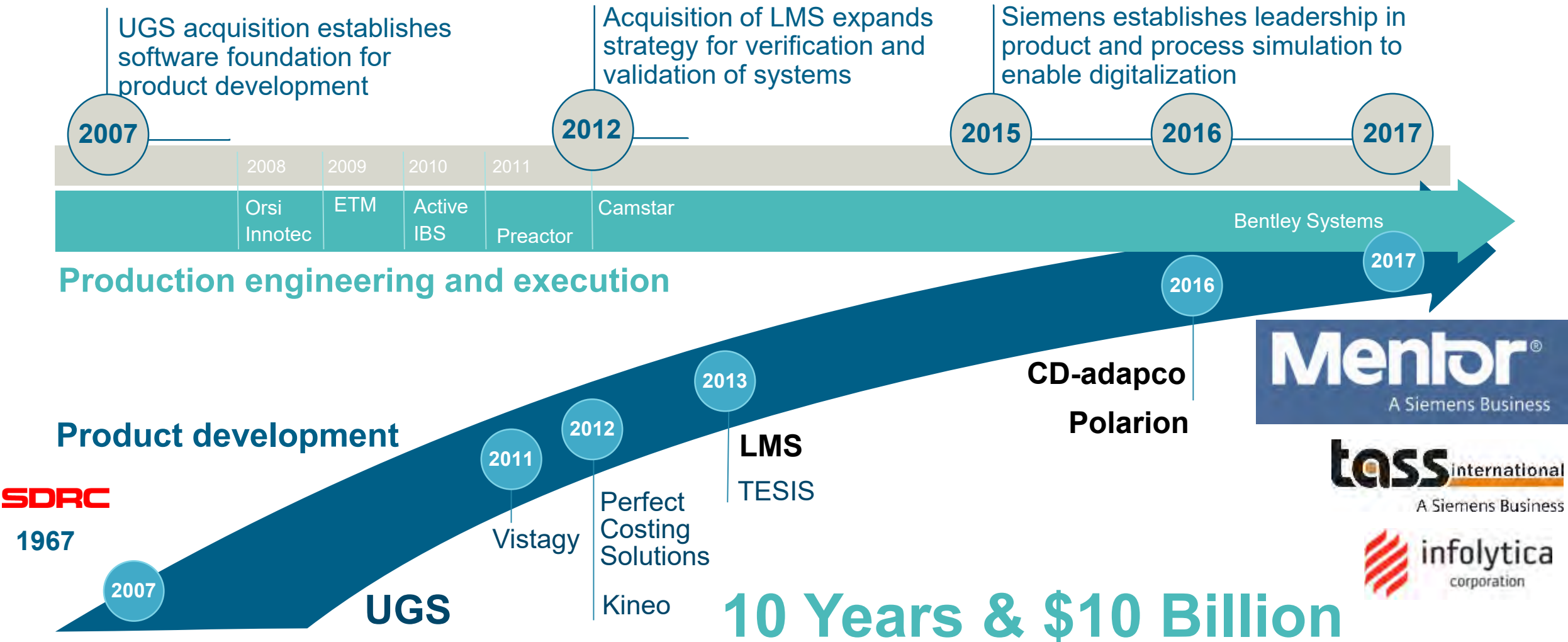
Holistic Digital Twin
Digital Production

Digital Performance



Siemens saw big change coming in 2007

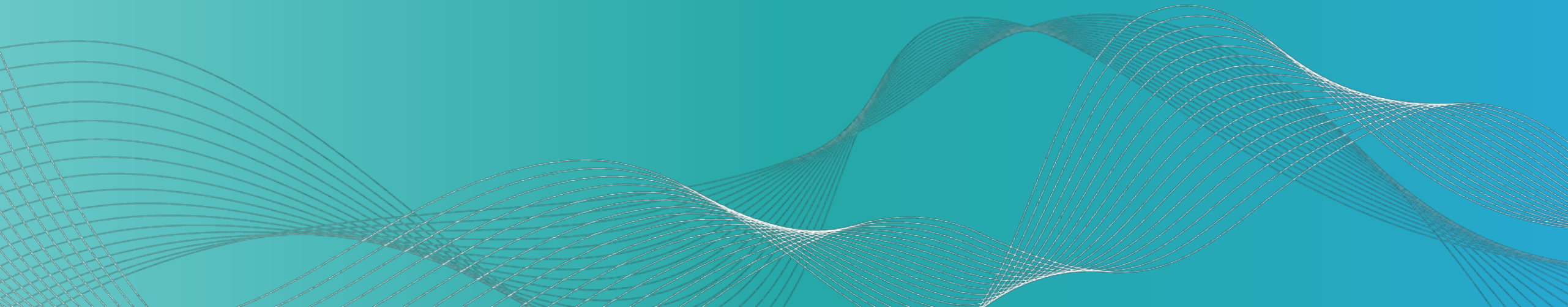
Our journey to help companies realize Digitalization



Upcoming events in 2019...



- Fundamentals of Rotating Machinery – 6th March, Solihull
- Fundamentals of Structural Dynamics – 2nd May, Solihull
- Modelling of x-EV architecture – 15th May, Solihull



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Thanks for you attention.