Embarking on a Digital Journey by a 90 Year Old Manufacturing Company

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Caterpillar Inc.
Overview

- Who We Are
- Why Digital & Why Now
- Our Digital Strategy
- Examples
Who we are

- World’s largest manufacturer of construction and mining equipment
- A leader in diesel and natural gas engines and industrial gas turbines
- 2015 revenues of $47B – 60% sales outside of U.S.
- A leading U.S. exporter ($13B)
- Global team of 100,000 employees
- Over 3 millions products at work
- Dow Jones 30 Index Company
- 175 dealers in 182 countries (~$23.4B Net Worth)
- 28,000+ suppliers

Data based on year-end 2015
INVESTING IN R&D

$2,165M
2015 R&D Spend

190
Completed New Product Programs

33
New technologies transferred from R&D to the New Product Introduction development pipeline

15,953
Total Number of Pending and Granted Patents Worldwide

1,667
Total Patents Granted in 2015

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10 WAYS CATERPILLAR CHANGED THE WORLD

1. 1904
   Steam-powered track-type tractor

2. 1931
   Auto Patrol

3. 1931
   D9900

4. 1955
   “Low ground pressure” undercarriage

5. 1977
   Elevated sprocket

6. 1980s
   Cat® Differential Steering System

7. 2001
   Cat® D7E

8. 2001
   ACERT™ Technology

9. 2010s
   Tier 4 Final Solution

10. 2012
    Cat® 336E H
Why Digital and Why Now?
Ten Types of Innovations

Network
Connections with others to create value

Process
Signature or superior methods for doing your work

Product System
Complementary products and services

Channel
How your offerings are delivered to customers and users

Customer Engagement
Distinctive interactions you foster

Profit Model
The way in which you make money

Structure
Alignment of your talent and assets

Product Performance
Distinguishing features and functionality

Service
Support and enhancements that surround your offerings

Brand
Representation of your offerings and business

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Distinctive interactions you foster

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Rate of Change: the major force driving us now

“In the next 10 years 40% of all S&P 500 company will disappear from this list”

“The average lifespan of an S&P 500 company has decreased from: 61 years (1950s) to 18 years (today)”

“The average half life of a business competency has dropped from 30 years in 1984 to 5 years in 2014.”

“89% of Fortune 500 Companies from 1955 are not on the list in 2014”
Global Megatrends We Cannot Ignore

**DEMOGRAPHIC & SOCIAL CHANGE**

ONE BILLION expected increase in the world’s population by 2025

**SHIFT IN GLOBAL ECONOMIC POWER**

CHINA will replace the US as the world's largest economy by 2015

**RAPID URBANIZATION**

By 2025, there could be nearly 40 CITIES each with a population of OVER 10 MILLION

**CLIMATE CHANGE & RESOURCE SCARCITY**

50 YEARS of supply left in proven oil reserves

**TECHNOLOGICAL BREAKTHROUGHS**

76 Years taken for the telephone and smartphone to reach half of US households

10

**DECREASING COST OF TECHNOLOGY**

3D PRINTERS

$40,000 (2007)

$100 (2014)

INDUSTRIAL ROBOTS

$500,000 (2008)

$22,000 (2013)

400X in 6 years

20X in 5 years

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Digital Technology is Changing the Way We Do Business

- Travel Agency
- Record Stores
- Long Distance
- Yellow Page
- Retail Stores

The cost of replicating digital material is effectively zero.
Competitors partnering to capitalize on IoT and Big Data

5 MAY, 2014
Google X spinoff Flux
IS HARNESSING DATA
TO MAKE DESIGNING BUILDINGS BETTER

28 OCTOBER, 2014
IBM
Joy Global taps IBM for data product to monitor machinery

3 MARCH, 2015
Sany America uses AT&T’s telematics to manage, monitor heavy equipment machinery

14 APRIL, 2015
Komatsu and GE team up with “big-data” technology
Welcome To The Age of Smart Iron
The Age of Smart Iron

- Strategy
- Organization/Talent
- Culture
- Capability
The Age of Smart Iron - Strategy

Digital solution designed to transform productivity, efficiency, and safety at jobsites, ultimately improving profitability for our customers.
The Age of Smart Iron – Organization/Talent

• **Organization**
  – New ones formed or acquired
  – Existing organizations aligned
  – Caterpillar venture capital formed

• **Talent Acquisitions**
  – Analytics/IT professional development program
  – Analytics/IT college practicum/intern program
The Age of Smart Iron – Culture

“Think Like a Customer, Act Like a Start-Up”

• Champaign/Chicago Analytics Facilities – Exploring Emerging Technologies

• Uptake Partnership – Predictive Diagnostic Tool through Mobile Interface

• YARDCLUB Investment - Peer-to-peer Equipment Rental Start-Up
The Age of Smart Iron – Capability

- Connectivity - streamlined data acquisition
- Analytics – data driven decision making
- Harmonized IT – cloud and legacy
- Customer Experience – simple and easy user interface
Examples of Analytics Capability
Analytics Maturity Model

- **Prescriptive**
  - Optimization
  - Predictive Modeling
  - Forecasting/Extrapolation
  - Statistical Analysis
  - Advanced Analytics

- **Predictive**
  - Descriptive
  - Alerts
  - Query/Drill Down
  - Ad Hoc Reports
  - Standard Reports
  - Business Intelligence

- **Descriptive**
  - Data Availability

- **Competitive Advantage**

- **Sophistication**

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Descriptive/Predictive Analytics – CAT Asset Intelligence

Asset Intelligence

For more information
www.cat.com/assetintel   ConnectMAI@cat.com
Or contact your local Caterpillar or MaK™ Dealer

Real-time asset monitoring & Predictive maintenance and repair
Predictive/Prescriptive Analytics – Jobsite Optimization

Field Observations + Predictive Models + What If Analysis = Actionable Information
Prescriptive Analytics – Product Optimization

Integrate, Automate and Optimize

- Use existing tools (performance & cost)
- Standardize and automate process - Python
- Explore/Optimize – Dakota & Python
Prescriptive Analytics – Process Optimization

8 product models, 5 global facilities
Computer Vision, Augmented and Virtual Reality
QUESTIONS?