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

Chris Ha
Caterpillar Inc.

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Overview

- Who We Are

- Why Digital & Why Now

- Our Digital Strategy

- Examples

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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

Industries we serve

Resource

Construction

Energy and Transportation

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CURRENT
BRAND
PORTFOLIO
21
BRANDS

PROGRESS RAIL SERVICES
A Caterpillar Company

HINDUSTAN

Perkins®

PYROBAN®

ELECTRO MOTIVE

Solar Turbines
A Caterpillar Company

MaK

MWM
Energy. Efficiency. Environment.
A Caterpillar Company

TURNER
POWERTRAIN SYSTEMS

FG WILSON

OLYMPIAN™

CAT®

HAICO
Rock Tools

UNIT RIG™

HYPAC™

Turbomach
A Caterpillar Company

ANCHOR
Anchor Coupling Inc.

ASIATRAK

PRENTICE

SEM

Zhengzhou SIWEI

797F

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

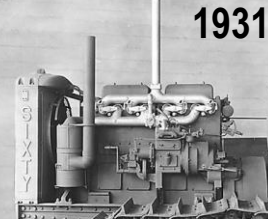**1.** 1904
Steam-powered track-type tractor

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

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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 | Network | Structure | Process | Product Performance | Product System | Service | Channel | Brand | Customer Engagement |

CONFIGURATION · OFFERING · EXPERIENCE

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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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 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"

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

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Global Megatrends We Cannot Ignore

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Digital Technology is Changing the Way We Do Business

Travel Agency

Record Stores

Long Distance

Yellow Page

Retail Stores
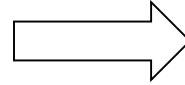
The cost of replicating digital material is effectively zero.

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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

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Caterpillar's Digital Journey - The Age of Smart Iron

Welcome To The Age of Smart Iron

Welcome to the Age of Smart Iron.

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The Age of Smart Iron

- Strategy

- Organization/Talent

- Culture

- Capability

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The Age of Smart Iron - Strategy

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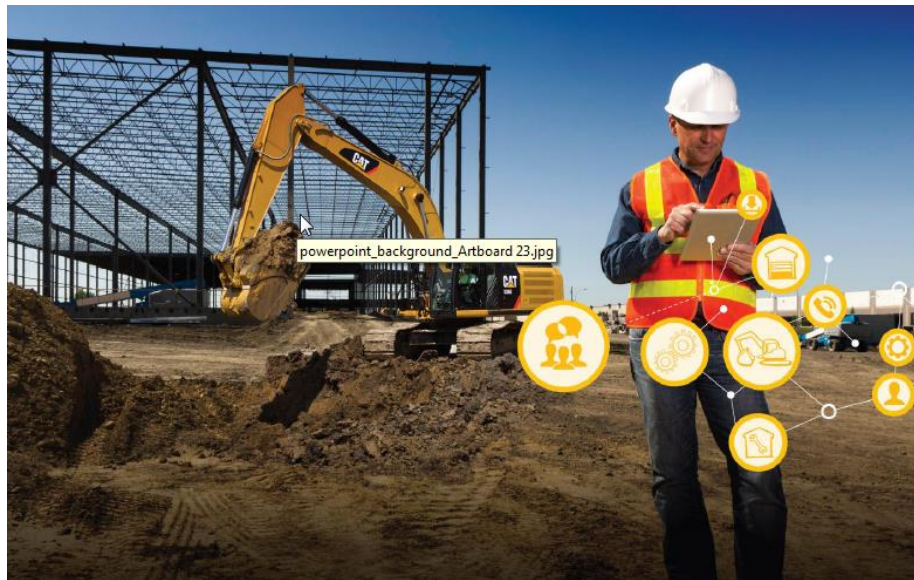
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The Age of Smart Iron – Organization/Talent

- ## 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

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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**

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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

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Examples of Analytics Capability

Analytics Maturity Model
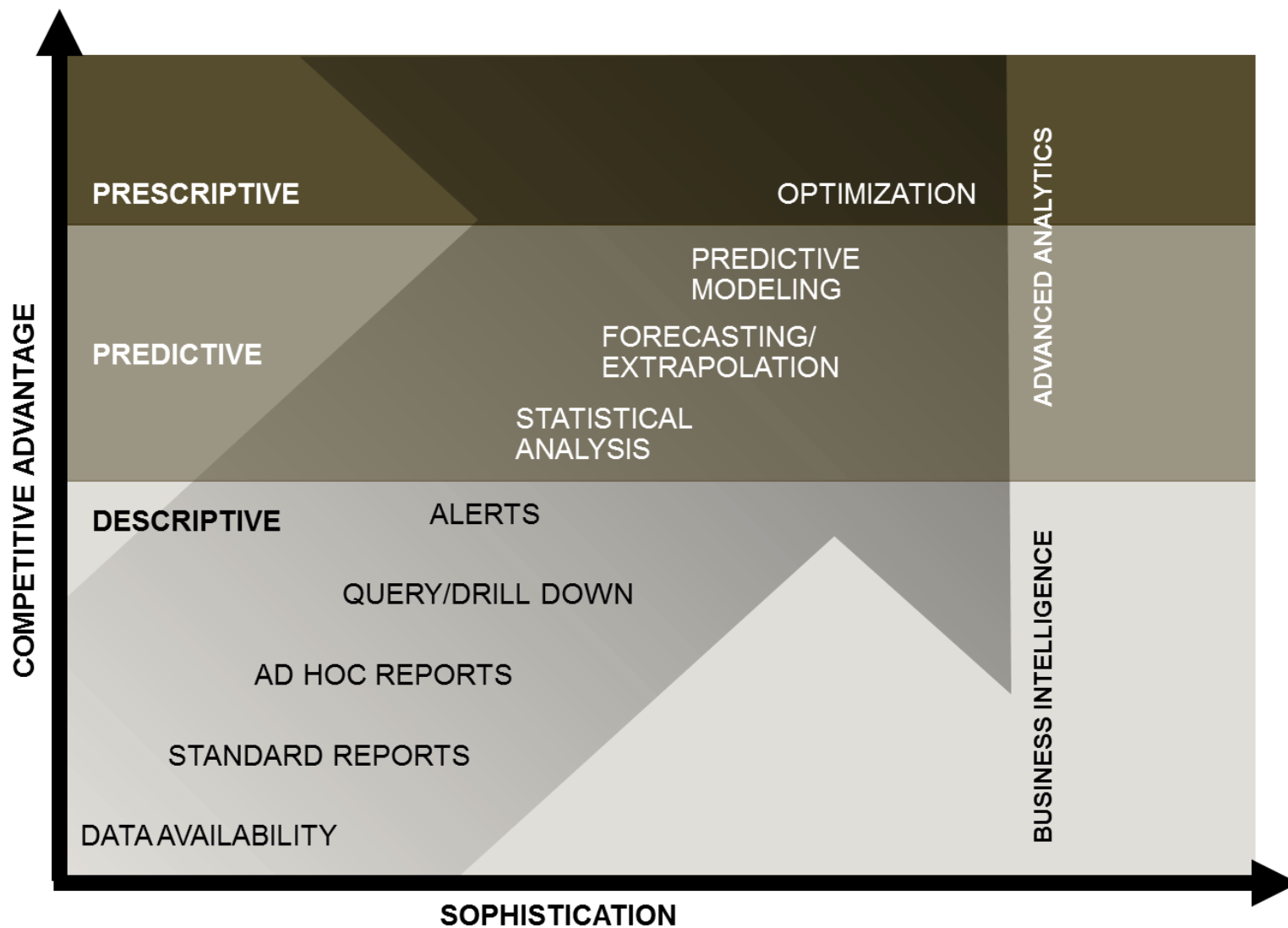
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Real-time asset monitoring & Predictive maintenance and repair

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Predictive/Prescriptive Analytics – Jobsite Optimization

Field Observations + Predictive Models + What If Analysis = Actionable Information
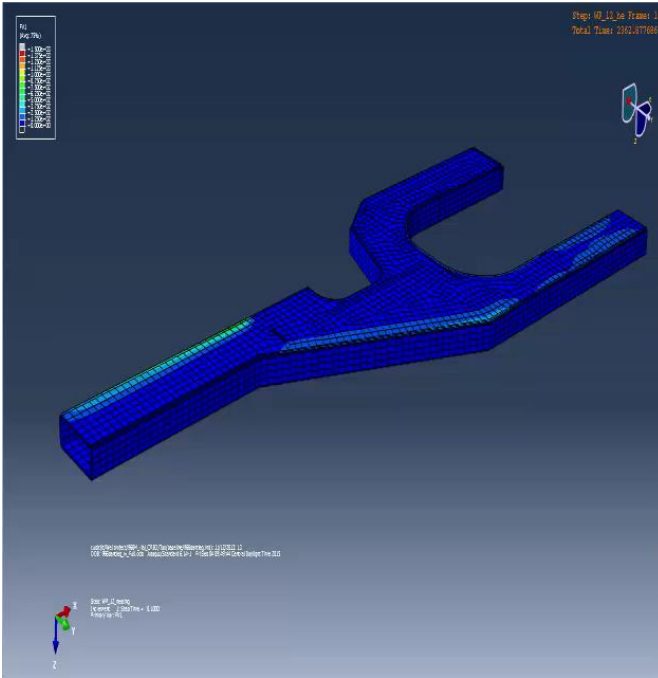
Prescriptive Analytics – Product Optimization
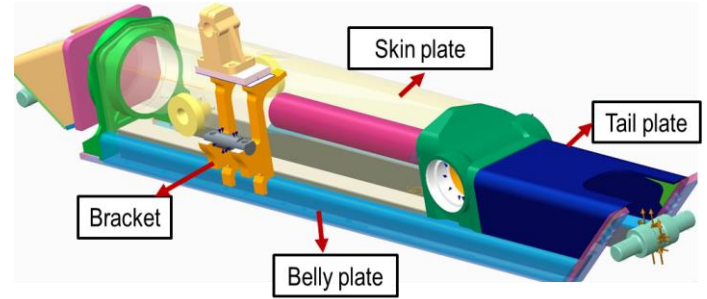
Integrate, Automate and Optimize

- Use existing tools (performance & cost)

- Standardize and automate process - Python

- Explore/Optimize – Dakota & Python
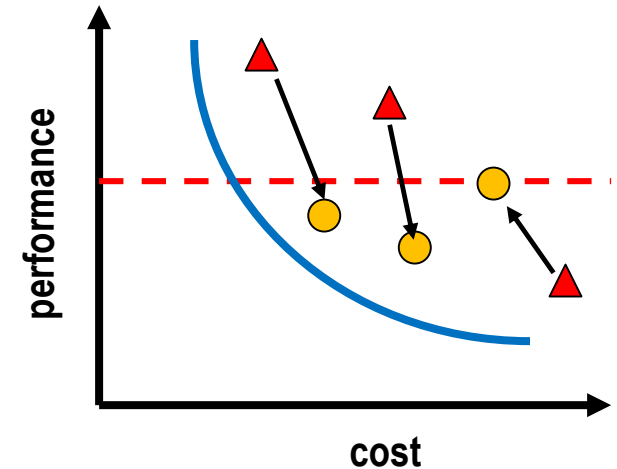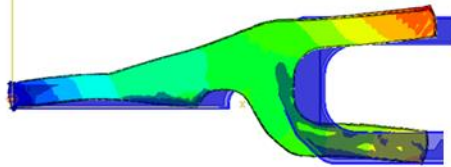
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Prescriptive Analytics – Process Optimization

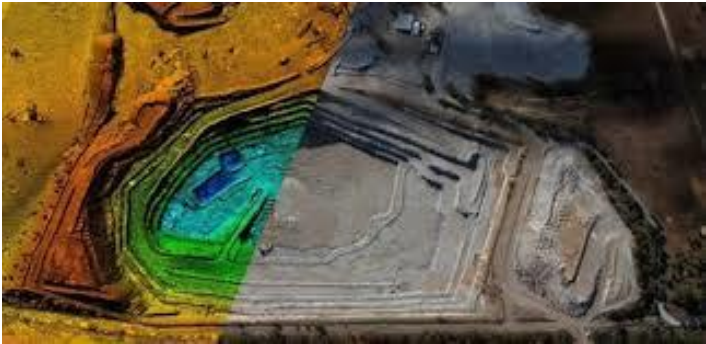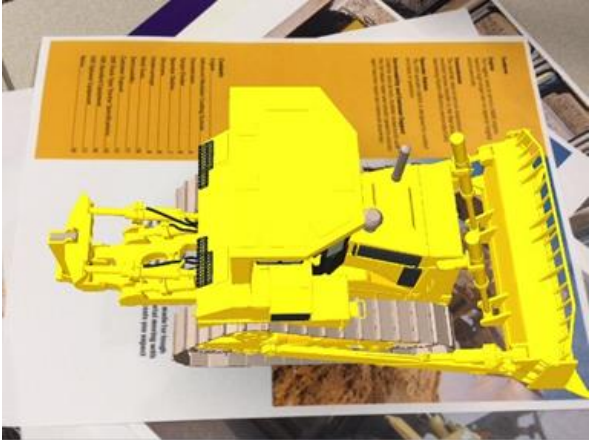1 rollover: 1-2-3-4-5-6-7-8//9-10-11-12-13-14-15-16
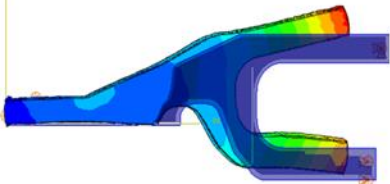
3 rollovers: 15-10-9//1-3-2//11-16-12-13-14//5-8-7-6-4

8 product models, 5 global facilities

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Computer Vision, Augmented and Virtual Reality

QUESTIONS?

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