ACKNOWLEDGEMENTS

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F R P E L Q H G   H ¬ R U W V   L Q Q R Y D W L R Q   D Q G   F R O O H F

CONTENTS

INNOVATOR STORIES AND INTERVIEWS

ArcelorMittal

INTRODUCTION

Advances in technology are having a profound impact on the manufacturing industry. The IoT, for example, will redefine human and machine interaction by adding connectivity to every kind of machine, from mobile devices to traditional appliances to wearable devices. Models like intelligent predictive maintenance, proactive replenishment, and inventory monitoring, along with pay-as-you-go, machine-to-machine (M2M) communications and the IoT will make manufacturers more efficient and profitable. The expected proliferation of IoT-connected devices alone will significantly enhance operations, enabling organizations to save $3 trillion through optimized logistics and next-generation digital supply chains.[4]

Likewise, AI, 3D printing, and robotics are upgrading the industry to digital. At a global level, manufacturers are embracing these new technologies to transform their business models and operations, improve customer engagement, and secure competitive advantage. According to recent predictions, by 2020, as they move closer to the "service economy," 65 percent of manufacturers will adopt digital manufacturing practices.[5]

Q. Which of the following best describes the state of digital transformation in your supply chain?
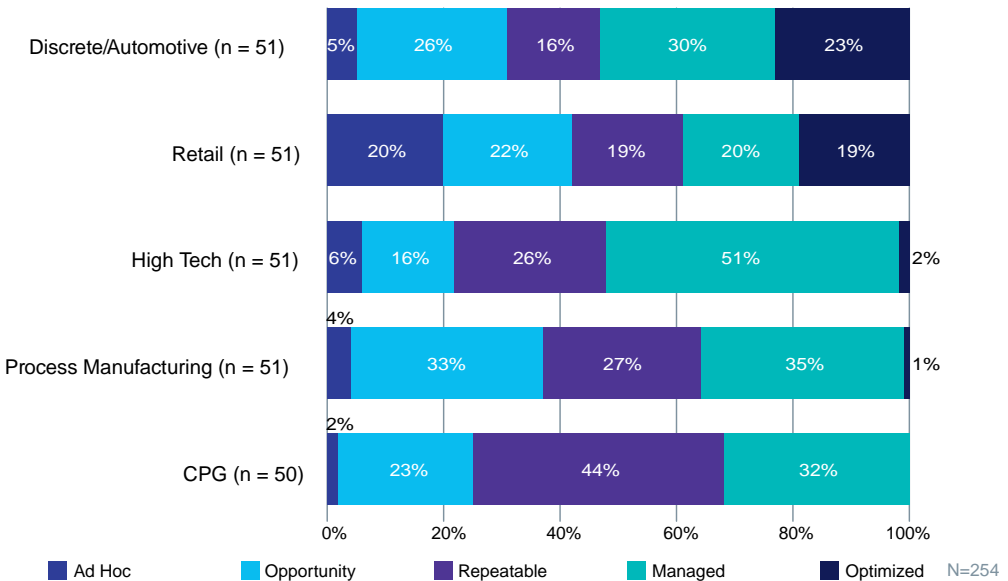
Stages of Digital Transformational Maturity in Manufacturing Industries[6]

Some sectors within the manufacturing industry are embracing the potential of digital faster than others. Organizations in discrete/automotive manufacturing and retail are leaders when it comes to optimizing their supply chain with digital technologies. High-tech is embracing the digitization of products, services, and customer experiences.

Both process manufacturing and Consumer Packaged Goods (CPG) are in the early stages of implementing digital technologies and practices to deliver innovative products and services. In general, discrete manufacturers are the most advanced, while those that produce expensive assets or equipment are lagging.[7]

The majority of manufacturing leaders realize the tremendous potential of digital solutions. According to IDC (see figure below), more than three quarters of manufacturing companies view digital transformation as more of an opportunity than a risk. Despite this recognition, only one in four are experiencing a Return On Investment (ROI) from implementing digital solutions.[8]

Is Digital Transformation a Risk or an Opportunity?

23%

77%
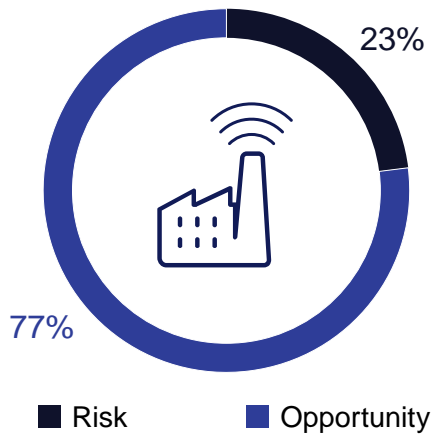
■ Risk   ■ Opportunity

Digital Transformation is a Top Business Priority for Manufacturers[9]

With opportunity comes risk. As disruptive technologies introduce new formats and growing volumes of information, expectations around security, IT infrastructure, and regulatory compliance are rising. Manufacturers require a proven digital information management platform to balance disruptive innovation with security and regulatory compliance.

EIM Powers the Intelligent and Connected Enterprise

During this digital revolution, the capacity to generate and collect information is greater than it has been at any time in human history. As the extremes of automation, connectivity, and computing power converge, the need to manage new types of information is critical. Deriving meaningful insight from this information will be the next major transformative activity for manufacturers.

Information lies at the heart of transformational change. To compete in the digital world, manufacturers will be required to manage and analyze their vast stores of information at each stage in the manufacturing process. Information is delivered across business processes, from product design to manufacturing, logistics and distribution, asset management, and sales and aftermarket support, as part of a larger system of ecosystem applications. Advanced Enterprise Information Management (EIM) and Business-to-Business (B2B) integration provides the digital platform that manufacturers need to transform their operations and organizations into the smart factories of the future.

As the basis of a transformational digital strategy, EIM helps manufacturers consolidate information internally across silos and applications and digitize processes, from end to end. Operations are more easily coordinated and streamlined throughout an ecosystem with digital consumers at its hub. At every stage in a product's lifecycle, operations can be automated and analyzed for deeper insights to improve efficiencies, output, and engagement with customers, partners, and suppliers. Empowered with intelligence and connectivity, manufacturers are better able to compete with agility, adapt to market changes, and respond to opportunities for growth.

Digital transformation can only happen when all nodes in the network are connected. For many manufacturers, transforming their supply chain is a strategic goal. More than 24 percent of organizations in the industry believe that the role of digital transformation is to revolutionize the supply chain.[10] While the approach typically takes a tactical route focused on operational efficiencies, it is expanding to incorporate innovative product and service offerings and new business models.

Smart factories are digital businesses that excel at the production and global exchange of goods and services, and can efficiently manage the underlying volumes of cross-border data, communications, and commerce. They rely on tightly interconnected networks and ecosystems to achieve the levels of speed, accuracy, and visibility required for digital supply chain excellence. The ultimate vision of the smart factory is an intelligent enterprise—one that is fully automated, connected, and has the ability to respond and adapt its operations as information changes.

Transformative enterprise technologies like EIM, in combination with the IoT, managed services, and B2B integration, form a comprehensive, secure, and automated platform for the management and exchange of supply chain information. From engagement to digitized processes to governance and insight, EIM is the proven digital backbone for

Security

By 2020 there will be more than 7.6 billion connected things in the business sector, and the annual sales of such devices will exceed $1.4 trillion.[11] With more people connecting and more machines generating information, business will become increasingly digital. As they do, it will become essential for manufacturers to digitize their information-based processes in order to remain competitive. Across every industry, digital leaders consistently outperform their competitors.

In a digital world, with unprecedented opportunities to innovate and evolve, manufacturers will function as intelligent and connected enterprises. They will re-invent their operations to find new customers, markets, and materials. The outcomes will stretch beyond operational efficiencies—to software-driven services, interconnected ecosystems, deeper customer engagement, new revenue streams, and the potential to take collaboration between humans and machines to a whole new level in the global production of goods and services.

Mark J. Barrenechea
VICE CHAIR, CEO AND CTO
OPEN TEXT CORPORATION

Tom Jenkins
CHAIR
OPEN TEXT CORPORATION

C H A P T E R 1

Digital Disruption

p7KH H[SORVLRQ LQ GDWD DQG QHZ FRPSXWLQJ FDSDELOLW
DUHDV VXFK DV DUWL®FLDO LQWHOOLJHQFH DXWRPDWLRQ

The Fourth Industrial Revolution

In the future, car components will be upgradeable in the same way that software is. This will redefine the automobile's product lifecycle, adding opportunities to engage with consumers to upsell throughout the duration of a car's lifetime. To accommodate this, car manufacturers will establish new processes for product lifecycle management and software development capabilities.

The Impact of Digital Technologies

In the Fourth Industrial Revolution, the technologies that underpin fully integrated and digitized supply chain environments can be placed into three categories.

The first category includes fifth-generation (5G) mobile networks, IoT-related platforms, and other cloud-based network infrastructures. The second consists of the devices that connect to these networks (3D printers, advanced robotics, drones, and IoT devices). The final category describes technologies that help to manage, archive, and process all the information produced by these connected devices, such as analytics, AI, and

Deutchsprachige SAP Anwenderguppe

Deutchsprachige SAP Anwenderguppe (

conversion to happen, many things need
to come together, such as pervasive and
R P Q L S U H V H Q W   P R E L O H   W H F K Q R O R J L H V   L Q ® Q L W H O \
scalable infrastructures—like the Cloud,

The Business Value Path from Standardization to Digitization
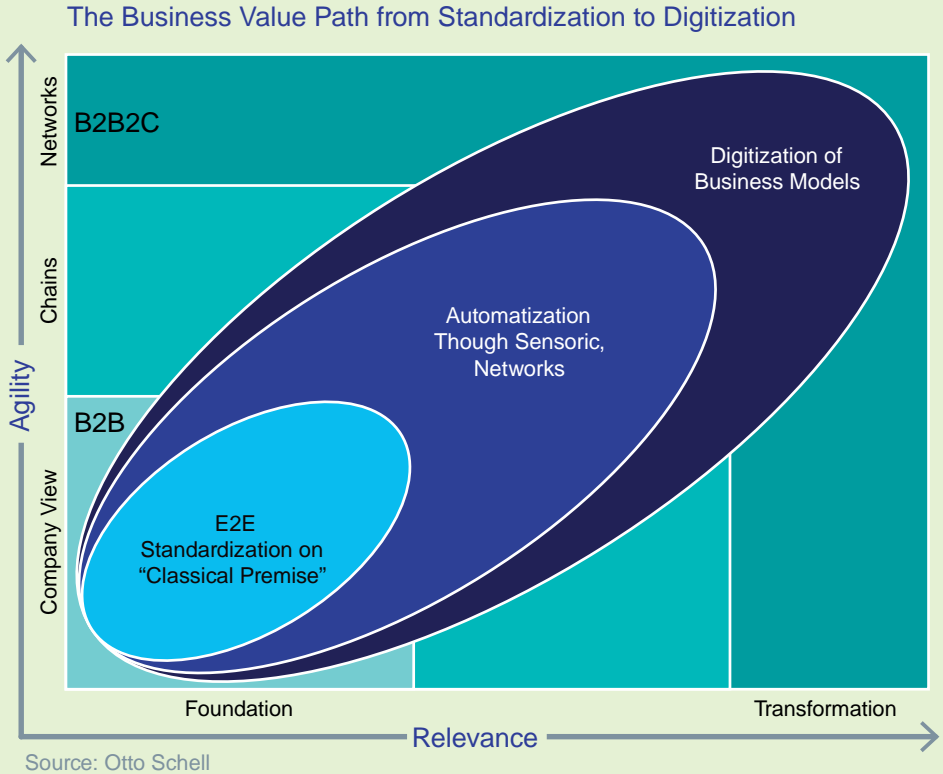

Source: Otto Schell

Figure 1.5: From Standardization to Digitization

Like the automated car, 3D printing is also a disruptive technology in most industries, not just automotive. The Aachen University of Technology in Germany recently developed a car where 75 percent of the materials were 3D printed. At the moment, the capabilities are rather basic, with a top speed of 60mph and a range of 80 miles. Even if it takes a sliver of market share away from traditional car manufacturers, that's money that they can no longer invest in research and development. Three-dimensional printing presents the opportunity for industries that currently outsource manufacturing work to other countries to bring much of that work back home.

our lives will be digitized. We will pay for products and services with software, our doctors will use software to operate on us, and we will get from one place to another using our mobile phones to access a service like Uber. Companies will connect software from machine to machine based on the Internet of Things (IoT). And the IoT will connect to everything. There are opportunities to monetize this, or even save consumers money. If someone goes on vacation, for example, they can program their electricity requirements accordingly and be reimbursed based on reduced consumption. This model can be applied to many industries and it will change how we live and work. That is the power of digital transformation.

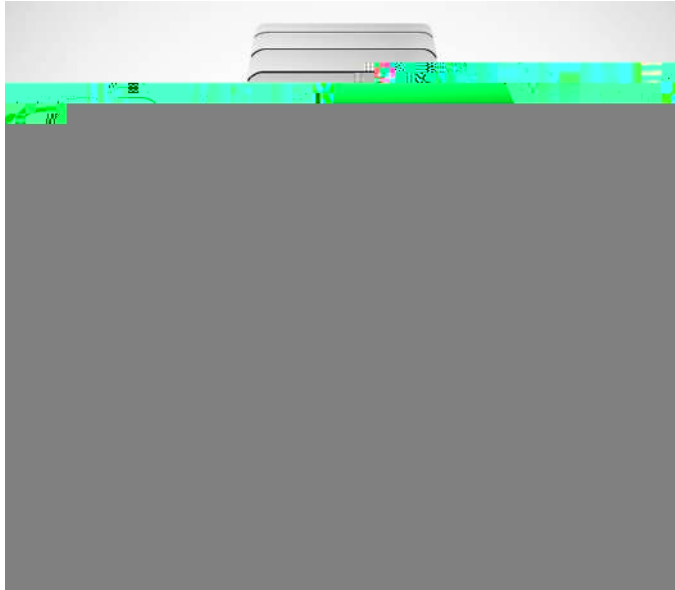6RRQ HYHU\WKLQJ ZH GR ZLOO EH LQ°XHQFHG RU directed by software. Every step of

Increased

Figure 1.9: Logistics Management Via a Smart Watch

Smart glasses enable people to receive information or alerts while remaining hands-on with their work. Volkswagen deployed smart glasses in one of their factories, giving

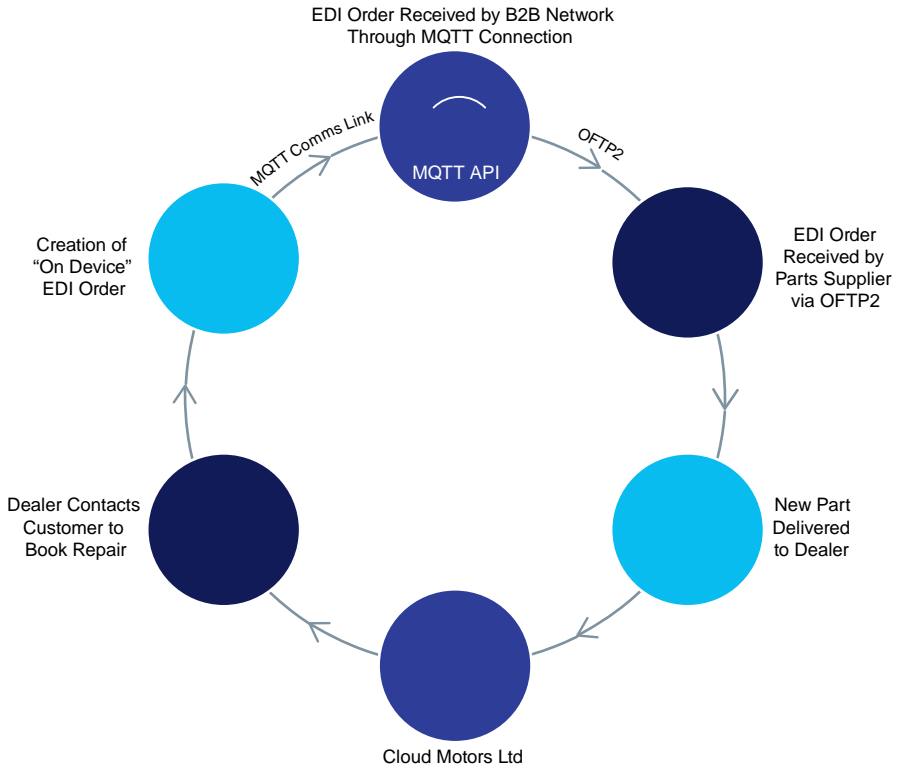Figure 1.10: Car Production Using Holographic Images

Just as smart devices will help to mobilize B2B platforms, augmented reality (AR) and virtual reality (VR) will transform tomorrow's B2B and supply chain environments. Technicians can perform maintenance using AR/VR with AI image recognition, following instructions and guidelines for repair. A holographic computer built into a headset, for example, is being used to provide collaborative review processes, not only at the design stage of a new product but also across retail distribution networks where advanced features can be demonstrated to potential buye2eg.6(y)1 ca..3r99p6(u).9(t a)-11 TJ(he)-1ereio A

One of the key drivers for robotics research is to develop more intelligent robots that can not only think for themselves, but also sense their surroundings in a more accurate manner. Another leading

The Industrial IoT

If there is one disruptive technology that is getting the most interest from the industrial manufacturing sector, it is the IoT. The IoT, or the Industrial Internet, or the

EDI Order Received by B2B Network
Through MQTT Connection

MQTT API

MQTT Comms Link

OFTP2

Creation of
"On Device"
EDI Order

EDI Order
Received by
Parts Supplier
via OFTP2

Dealer Contacts
Customer to
Book Repair

New Part
Delivered
to Dealer

Cloud Motors Ltd

Thales

Thales Group is a French multinational company that designs and builds electrical systems and provides services for the aerospace, defense, transportation and security markets. From the bottom of the oceans to the depths of space and cyberspace, Thales helps customers think smarter and act faster—mastering ever greater complexity and every decisive moment along the way. Thales has more than 64,000 employees and operations in 56 countries worldwide.
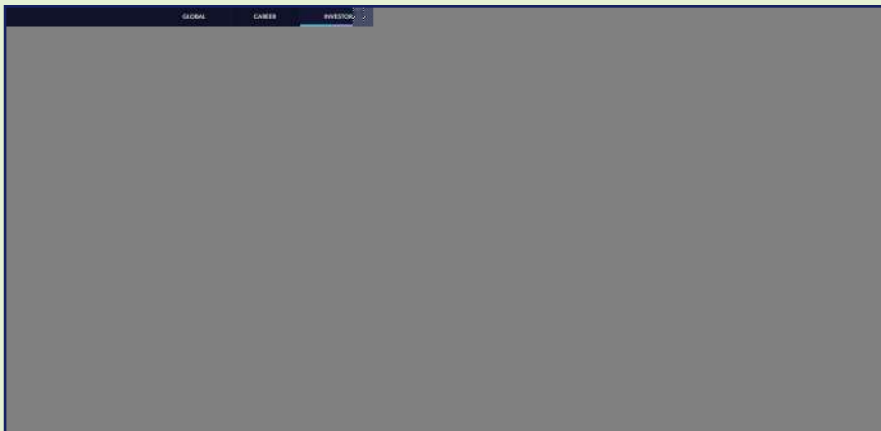

Figure 1.14: Thales

What follows are excerpts from an interview with Lahcène Massoum, Group Enterprise Architect at Thales.

"Thales is a key player in keeping the
public safe and secure, guarding vital
infrastructure and protecting the national
security interests of countries around the
e h16.6. OTJ T*28(c)-12.6((e)-14.8(c)1-237(e)12.61(r)-1.9((r)-.6(t)-3(, G)-21.4(w)-16.7(s a)-16.3(se)-145(k

W K D W   L V   X Q G H U X W L O L] H G   : H o Y H   L G H Q W L ® H G   W K L V
as an opportunity. We want to tap into this
information to transform organizational
behavior and become a more data-
driven company.

Two years ago, the company started
thinking about how we could disrupt the
market and digitize our organization. In our
quest to become data-driven, we acquired
Gauvus, a real-time, big data analytics
company, to help us mine, analyze, and
derive value from our information. We hope
to combine real-time analytics capabilities
with our existing products and services to
deliver additional value to our customers.
For instance, if we can analyze the Health
and Usage Monitoring Systems (HUMS)
data of a customer's airplane in real time,
we can provide them with value-added
services, such as predictive maintenance.
We could also analyze the data collected
W R   K H O S   X V   G H V L J Q   P R U H   H ± F L H Q W   S U R G X F W V
and services for our customers. These
capabilities would prove to be especially
E H Q H ® F L D O   W R   R X U   D H U R V S D F H   F X V W R P H U V
where sending a technician out to service a
piece of equipment, like a satellite in space,
for example, isn't always a viable option.

Digital gives us the agility to innovate.
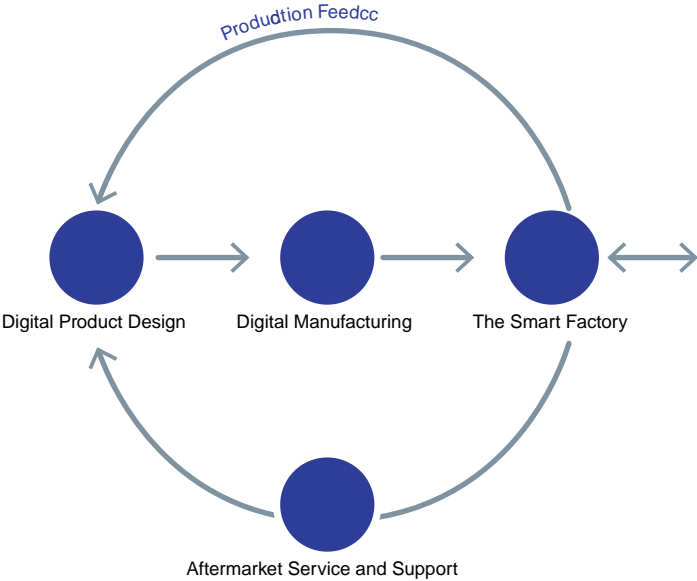7 K D W o V   Z K \   L W   L V   R Q H   R I   W K H   ® Y H   S L O O D U V   R I
our transformation program. ECOsystem,
R X U   (± F L H Q F \   D Q G   & D S D F L W \   2 U L H Q W H G
solution for aviation, is a great example

A Platform for Smart Factories

The IoT will lead to an exponential growth in data flowing across the extended enterprise and companies will have to acquire personnel with the necessary data analysis experience to be able to process this information. These employees will design robust algorithms for processing IoT-related information and then translate what happens in the physical world into a format that can be managed in the digital world.

With all the devices "talking" across the

Produdtion Feedcc

Digital Product Design

Digital Manufacturing

The Smart Factory

Aftermarket Service and Support

With its combination of smart sensors, wireless communication, and big data analytics, the Industrial

iTAC Software AG
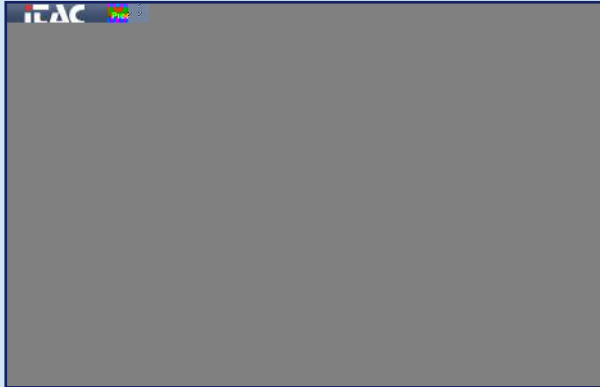
Using analytics to
enable smart factories
in the digital world

Figure 1.16 : iTAC Software AG

Since its founding in 1998, iTAC Software AG (Internet Technologies and Consulting) has been specializing in providing internet technologies for the manufacturing industry. The manufacturer of standard software and products for cross-company IT applications is an industry leading system and solution provider of Manufacturing Execution Systems (MES) for the entire supply chain. Implementing the Internet of Things and Services has been the focus of the company's strategic direction right from the beginning. Its philosophy is connecting people, data, and systems.

To offer its customers the greatest possible transparency and decision-making capability for production control, and to meet growing demands related to the Internet of Things (IoT), iTAC wanted to integrate Business Intelligence (BI) and analytics software into iTACMES. Suite. Doing so would support customer demands for manufacturing intelligence, quality control, and traceabilit   t   g.08 Tw 0 -1.3(g)0ition co iabp-16.3(i)-19.3(d)-20.2(c,

MANUFACTURING AS A DIGITAL BUSINESS
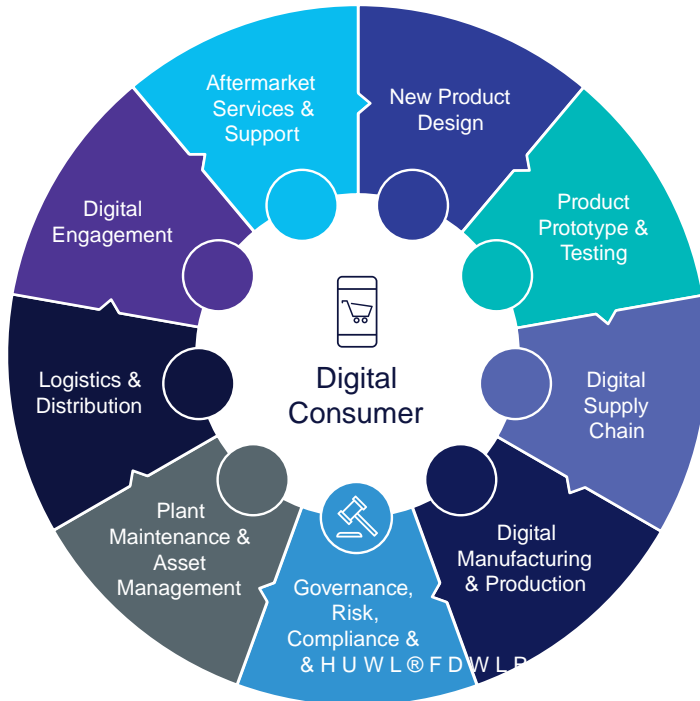
Manufacturing as a Digital Business

ρ0DQXIDFWXUHUV DUH JRLQJ WR IDFH UHDOO\ ®HUFH FRPSH
VKDUH DYDLODEOH DQG WKHUH ZLOƠ FHUWDLQO\ EH ZLQQHU

While the disruptive technologies discussed in Chapter 1 are enablers for digitization, true transformation involves much more than adopting new technologies. Along with upfront investments to modernize and consolidate enterprise systems, new business models, process support, and the requisite skills (in understanding massive data pools and the workings of cognitive or AI systems, for example) are essential for transformational success. To succeed in the digital world, manufacturing organizations will be required to evolve from traditional, stand-alone entities with linear value chains (illustrated in the previous figure) into digital manufacturing businesses that support a digital supply chain and function in the context of a larger manufacturing ecosystem (as shown in Figure 2.2).

The Digital Manufacturing Ecosystem

As part of a global ecosystem, manufacturers are better equipped to transition from mass producing "dumb" products for consumers to delivering customized, "smart" products and service-based offerings.

An extended digital manufacturing ecosystem is composed of three layers: the external trading partner community (shown in purple), the internal enterprise community (represented in blue), and the Internet of Things (IoT) layer (highlighted in teal).
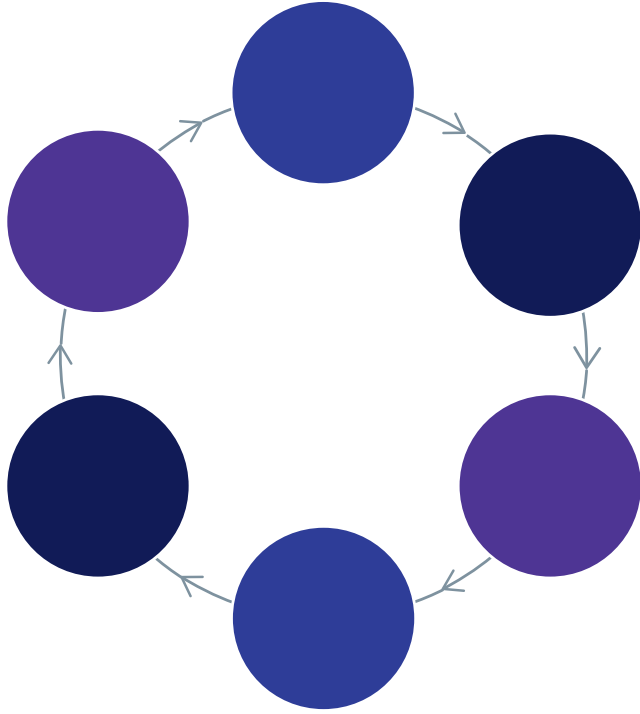
As impressive as these examples are, the manufacturing industry is still in the early stages of adopting disruptive digital technologies. As manufacturers digitally mature, they will be better able to innovate at scale and expand their ecosystem. To get to this point however, manufacturers will need to integrate digital technology into every facet of the business. As shown in the following figure, this level of digital transformation will yield sought-after outcomes such as differentiated customer experience and optimized manufacturing processes.
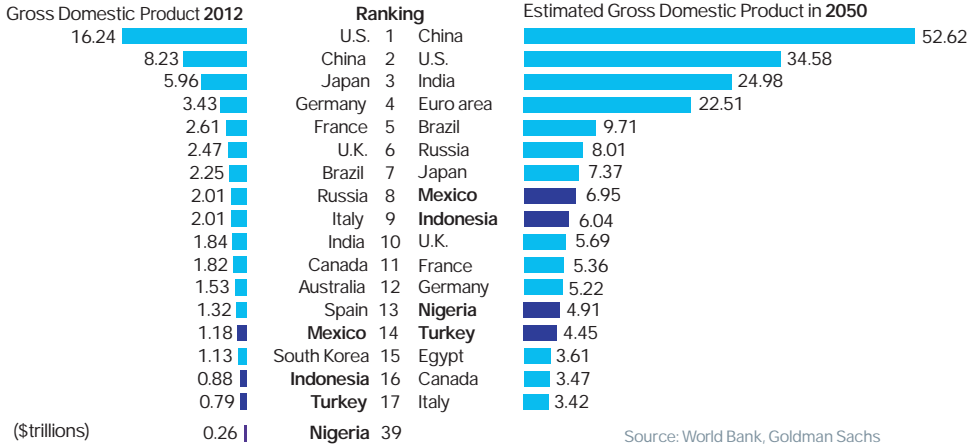
Gross Domestic Product **2012**	Ranking			Estimated Gross Domestic Product in **2050**
16.24	U.S.	1	China	52.62
8.23	China	2	U.S.	34.58
5.96	Japan	3	India	24.98
3.43	Germany	4	Euro area	22.51
2.61	France	5	Brazil	9.71
2.47	U.K.	6	Russia	8.01
2.25	Brazil	7	Japan	7.37
2.01	Russia	8	**Mexico**	6.95
2.01	Italy	9	**Indonesia**	6.04
1.84	India	10	U.K.	5.69
1.82	Canada	11	France	5.36
1.53	Australia	12	Germany	5.22
1.32	Spain	13	**Nigeria**	4.91
1.18	**Mexico**	14	**Turkey**	4.45
1.13	South Korea	15	Egypt	3.61
0.88	**Indonesia**	16	Canada	3.47
0.79	**Turkey**	17	Italy	3.42
($trillions) 0.26	**Nigeria**	39		Source: World Bank, Goldman Sachs

Figure 2.7: Rise of the MINTs[8]

Over the past few years, Mexico has established itself as a key automotive manufacturing hub, with automakers investing a record $3.62 billion in the first half of 2017 alone.[9] Meanwhile, Indonesia has the potential to become a powerful player in high-tech over the next decade, which is why it has invested significantly in upgrading its mobile infrastructure to deliver high-speed connectivity across the country.[10] The investment has paid off. Companies looking to avoid the increasingly expensive Chinese labor market are already investing heavily in Indonesia. Other MINT countries are working to upgrade their utilities and telecommunications infrastructures to encourage business development. If Nigeria were to improve its utilities infrastructure, for example, it is estimated the country could double the size of its economy in approximately six years.[11]

Moving manufacturing operations overseas and offshoring product development to countries with young, skilled, and affordable labor can help lower production costs. A presence in the global market creates opportunities for growth outside of the domestic market, which can lead to economies of scale. At the same time, disruptive technologies are reducing the dependency on cheap, outsourced labor, which diminishes the need to offshore. As disruptive technologies mature and globalization becomes more commonplace, time will tell if automation will render outsourcing obsolete.

Regulatory Pressure and Compliance

As the figure below illustrates, manufacturers must comply with numerous regulations concerning the safety of products, the health and safety of employees, environmental impact, data protection, export controls, anti-corruption, IT safety and security, fair competition, and employment law.[12] To further complicate things most regulations vary by region, and the emergence of new materials, production methods, technologies, political motives, and even scientific research can cause them to change.

Emerging technologies are impacting the regulatory landscape. New regulations will need to be created to adequately govern and protect everyone, from manufacturers to consumers. The increased adoption of drones, 3D printing, autonomous cars, and robots will be a catalyst for a host of new regulations. In response to the rapid adoption of drones, for example, the U.S. Federal Aviation Administration (FAA) has implemented conditions for use by

Consolidation and Modernization

Lear Corporation

Lear Corporation was founded in Detroit in 1917 as American Metal Products. More than a century later, Lear is one of the world's leading suppliers of automotive seating systems and electrical distribution systems, ranking 154th on the Fortune 500. Its world-class products are designed, engineered, and manufactured by a diverse team of approximately 150,000 employees located in 37 countries. Serving every major automaker in the world, Lear's content can be found on more than 400 vehicle nameplates.

Figure 2.10: Lear Corporation

What follows are excerpts from an interview with Don Guibord, IT Manager, EDI at Lear Corporation.

Lear is made up of two [Power] and Seating. We are one of only four suppliers with the global capacity to deliver complete automotive electrical distribution systems for traditional electrical architectures, as well as emerging high-power and hybrid systems. We are also one of the world's only fully integrated manufacturers of the entire seat. With sales exceeding $18 billion, we are one of the leading tier-one suppliers of automotive seating systems and electrical distribution systems in the industry.

As an industry leader, we have a global business network of over 3,000 unique suppliers and more than 7,500 suppliers that we exchange information with on a regular basis. That's a large supply chain, and exchanging information along it from end to end is challenging. As the IT Manager for Electronic Data Interchange (EDI), it's my job to make sure that all the systems, processes, and contracts are in place to facilitate the seamless exchange of documents that communicate needs and orders from business to business, or more

V S H F L ® F D O O \ L Q R X U F D V H   E H W Z H H Q / H D U D Q G
our partners who are major automakers
around the world.

2 X U N H \ G L ¬ H U H Q W L D W R U L V W K D W Z H P D Q X I D F W X U H
and ship our seating products in sequence.
In other words, the order in which we build

the quicker they will evolve. It's Moore's law in action, and this is forcing automotive companies to transform to keep pace with, or ideally, outpace the competition. Beyond adopting technologies to digitize the enterprise, they're hiring engineers and acquiring software companies and Intellectual Property (IP) to fuel innovation.

Autonomous-driving cars are already being tested on the road. I think it's just a matter of time, a few years really, before they become commonplace. Cars will be designed to

Typical global manufacturers run on

Digital Consumers

The rapid adoption of digital technologies has created the digital consumer—customers who expect much more from manufacturers than simply products. They want digitally enabled services from any place at any time via the channel of their choice. What used to differentiate the enterprise—economies of scale, distribution strength, and brand—have faded in importance. In their place, manufacturers are developing deeper, direct relationships with customers that exceed a one-time buying experience, giving them access to the potential lifetime value of loyal customers.

As powerful technologies become more widely available, they will change the industry forever. For example,

C H A P T E R   2

While PaaS offerings deliver added convenience and control for consumers, they can complicate things considerably for manufacturers. Where in the past the middleman— an appliance salesman at a department store, for example—owned the customer relationship; with the new PaaS model, the manufacturer does. Based on this new relationship, manufacturers can sell value-added services to increase customer stickiness. But this new direct-to-consumer relationship also presents a new set of challenges. In addition to modernizing IT infrastructure to support digital service platforms, manufacturing organizations must also update their operations and culture

operations, we found that regardless, the
RQO\ ZD\ IDUPHUV FRXOG Rdli bih onH RW D OH/QH $ VLJQ
DQG SUR®WDEO\ LQ WKH Famuul bf Gowd mRlR"dareV/reluduel. First
was to work with very big middlemen. and foremost, though, our goal was to try

7KHVH ELJ PLGGOHPHQ WDN.HGLdto.HHnILW.IRUPV WR KHOS WKHVH IDUPHUV RU S
Sometimes they are a large processor or their customers and markets—to build their
distributor that provides the infrastructure business—and the system we introduced is
needed to move food around. When we a very sustainable one.
looked at the local food suppliers, it was
obvious to us that the current model The big driver for us was increased sales,
appealed to about one percent of the large
producers and manufacturers that could
sell into a large distributor and service them
very well. But it wasn't a good model for the
other 99 percent of family farms, butchers,
wholesalers, or vineyards.

So, we spoke to as many farmers as we
FRXOGtDURXQG WR EH VSHFL®F :H VDW
at their kitchen tables and their challenges
surfaced very quickly. They wanted to get
their products to market while retaining
control of their sales, marketing, and
brand, but this was hard to do. They could
move their products to market, but based
on the current model, it was through a
massive distributor or processor, and
they would have to give up 25 percent of
their margin, as well as control over their
brand, and become disconnected from
their customers.

What we did was disintermediate the
middleman, which has happened in every
LQGXVWU\ :H ®JXUHG RXW WKDW WKH IRRG
industry needed an infrastructure to enable
this 99 percent of small and medium food
suppliers to get their products to market in
the best way possible.

For us, the sustainability and the
transparency were just a byproduct of
building a good system that worked for
a range of people. Based on the average
order for a food product travelling 4,500 km,
ZH FRXOG ®JXUH RXW SHU SRXQG RI SURGXFW
how much distance could be saved every

time an order was processed through a new
relationship built on RW D OH/QH $ VLJQ
amount of food miles are reduced. First

of an industry and more about a holistic
view of an industry and making it better for
everyone involved.

We've got customers in four provinces
 D Q G   W Z R   V W D W H V   Q R Z   % & $ O E H U W D   2 Q W D U L R
and Nova Scotia in Canada, and Maine and
Massachusetts in the U.S. Now that we have
built up a good presence, we're trying to
 W D U J H W   P R U H   V S H F L ® F   L Q I R U P D W L R Q   D E R X W   D
product. So, for example, we might examine
what the demand and supply for Ontario
potatoes is in the City of Guelph in July. And
 Z K D W o V   W K H   G L ¬ H U H Q F H   E H W Z H H Q   W K H   W Z R "   , Q
other words, is there an oversupply and
what impact does that have on the price?
Our software gives us a platform that we
can run analytics on to discover certain
metrics and insights into the industry.
This is a long-term play for us, deepening
understanding based on a critical mass of

Monetizing Data

Technologies like sensors, RFID tags, and IoT-connected devices are continually
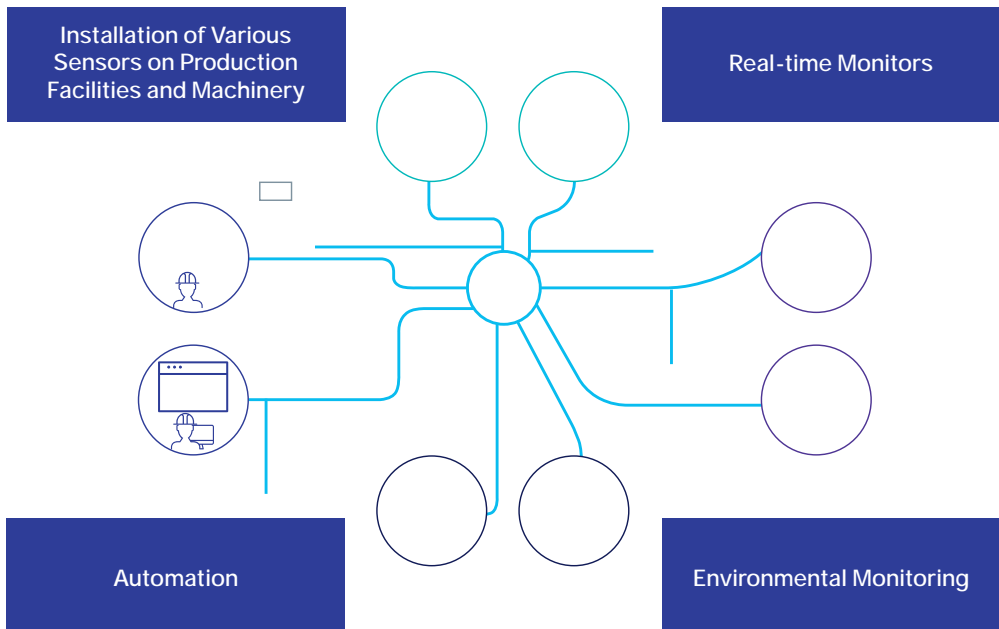
C H A P T E R 3

EIM and the Digital Thread

"'LJLWDO PDQXIDFWXULQJ WHFKQRORJLHV ZLOO WUDQVIRUP
YDOXH FKDLQ IURP UHVHDUFK DQG GHYHORSPHQW VXSSO\
PDUNHWLQJ VDOHV DQG VHUYLFHV 'LJLWDO FRQQHFWLYLW
ZRUNHUV FRQVXPHUV DQG SK\VLFDO LQGXVWULDO DVVHWV
FKDQJH WKH PDQXIDFWXULQJ ODQGVFDSH IRUHYHU q

How Much Data?

Manufacturing machinery produces a staggering amount of data. A Boeing 737 aircraft generates 333 gigabytes (GB) of data per minute per engine, so a flight from Los Angeles to New York generates approximately 200 terabytes (TB) of data. A drilling rig produces seven to eight TB of operational data a day. Self-driving cars produce one gigabyte (GB) of information a second. A smart factory might generate over one petabyte (PB) a day, which covers a range of information generated, relating to everything from production lines to processes to machinery to the environment.[3]

In general, manufacturing plants produce, consume, and exchange volumes of data every day. Connected automobiles, for example, are anticipated to generate more than one petabyte (PB) of operational data every day.[4] From sensors to machines to software systems, a general range of manufacturing information is illustrated in the figure below.

Installation of Various Sensors on Production Facilities and Machinery

Real-time Monitors

Automation

Environmental Monitoring

device level, data is created by motors, pumps, drivers, and robots. Sensor technology is making intelligent products more accessible and these are producing data at exponential rates. When sensors are combined with the IoT, they collect data from machines and equipment and send it to other enterprise systems. At the customer-facing level, Customer Relationship Management (CRM), and Digital Asset Management (DAM) systems house information that must be retained and archived for compliance purposes. All this data needs to be secure and accessible to maximize opportunity and minimize risk.

While manufacturing generates huge volumes of information, few companies are harnessing it. According to a recent survey, only 40 percent of U.S. manufacturers are collecting and using data generated by smart sensors to improve their manufacturing and operating processes. Many are in the early stages of using sensors to gain better

Connecting the Digital Thread—From Create to Consume

Manufacturing is complex, involving an array of design, engineering, production, distribution, and service activities. Comprehensive, end-to-end processes are essential for operational efficiency and product quality. This has led to extensive investments in business process reengineering programs and software applications like ERP, PLM, and Supply Chain Management (SCM).

While adopting these systems has resulted in many benefits, it has also reduced organizational agility because the flow of information is interrupted across disparate

Coca-Cola
Refrescos Bandeirantes
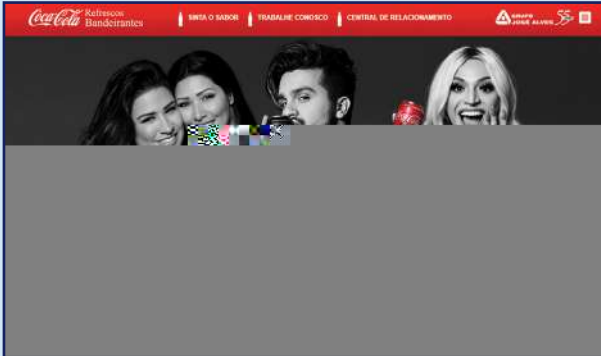
More reliable, global
B2B communications
and integration

Figure 3.4: Coca-Cola Refrescos Bandeirantes

Founded in 1987, Coca-Cola Refrescos Bandeirantes is responsible for the exclusive production, distribution, and sale of Coca-Cola products in Brazil. The company also resells brands such as Heineken and other beverages like teas, energy drinks, isotonic and chocolate milk. Coca-Cola Refrescos Bandeirantes is part of Grupo José Alves based in Goiânia and has more than 2,900 employees and another 5,200 indirect collaborators.

The company needed to improve its EDI processes with its retailers and decided to

Manufacturing processes are becoming more sophisticated, and the data inputs and outputs of manufacturing systems, sensors, and technologies will demand more robust information management. This is made more crucial as quality management programs and compliance require real-time monitoring, controls, and archiving. Enterprise Information Management protects and validates parts-related data, enabling each part to have an associated body of knowledge or digital twin.

EIM technologies are helping to ensure greater levels of integrity and traceability. In industries such as food and beverage, for example, regulations require companies to track and analyze products from create to consume. Even in the most traditional industries, manufacturers are burdened with making better use of their data to improve quality and efficiency. The automotive industry, for example, is constantly managing quality control with many of the major companies recalling millions of vehicles any given year. As explored in Chapter 6, information plays an important role in protecting manufacturers against the risks of non-compliance and litigation.

EIM is the platform that enables manufacturers to link together disparate systems. It connects the digital thread across processes, providing a structural backbone that comprises multiple facets, such as security, standards, interoperability, intellectual property and privacy, records management, and analytics. As digital information is used to support the documentation of a product from "cradle to grave," deploying an effective EIM platform is critical for any manufacturing operation. A comprehensive digital EIM platform unites typically siloed business systems, so that information can flow seamlessly throughout the entire product lifecycle. From engagement to insight, EIM enables digital communication and the exchange of data across the value chain. This end-to-end approach allows for competitive advantage and organizational agility as analytics can be applied to every process and throughout the supply chain, with partners, suppliers, and customers.

In the following interview, Columbia Sportswear emerges as a digital innovator, using digital systems and technologies to manage the lifecycle of their products—from data generated in design, prototyping and sampling stages to portfolio management—in a DAM system to extended

rock climbing, and swim wear), and of course, the largest, our Columbia brand of outdoor and active wear. So, we've really morphed into an umbrella for multiple brands. We're more a house of brands than a branded house.

Can you give us an idea of the sorts of
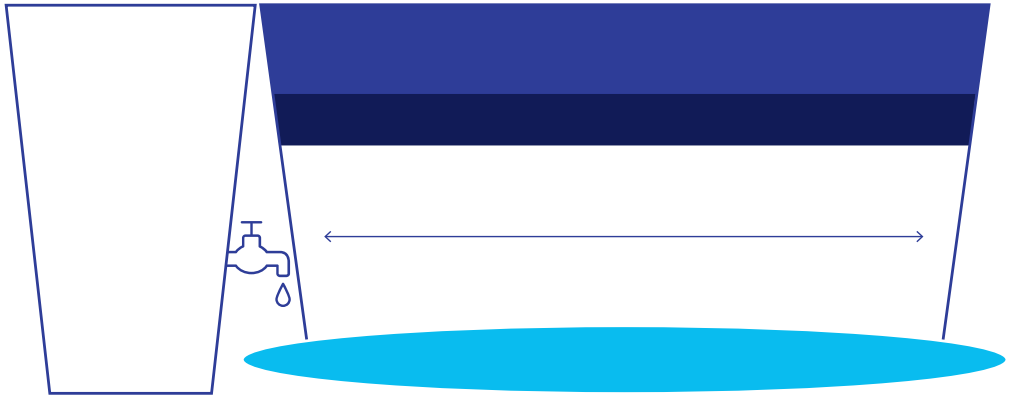
North Star BlueScope Steel
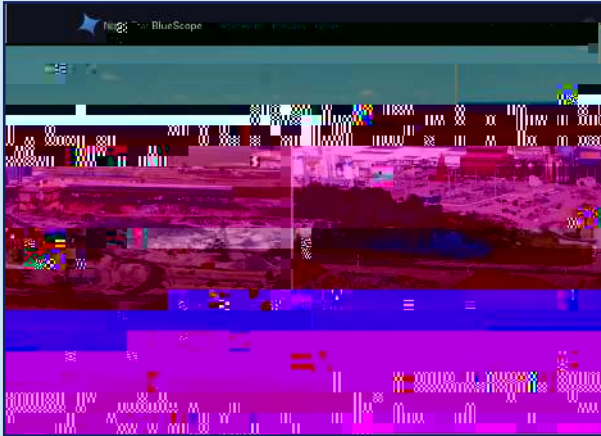
Steel band manufacturer makes costing clearer through analytics

Figure 3.9: North Star BlueScope Steel

A subsidiary of Australia-based BlueScope, North Star BlueScope Steel produces and supplies hot-rolled steel bands for coil processors, cold-rolled strip producers, pipe and tubers, original equipment manufacturers and steel service centers. Founded in 1997, the company is the largest scrap steel recycler in Ohio, recycling nearly 1.5 million tons of scrap steel every year.

North Star BlueScope Steel needed a more efficient tool to help it more accurately understand its costing data and workflow, so the company could use it to engage with customers, conduct market-based analysis, and build purchasing breakdowns. The technology would have to eliminate the manually intensive process and collect data automatically from a variety of sources—including databases and the company's electric arc furnaces (EAF)—allowing it to reallocate staff and save on resources, all while better meeting customers' needs.

The company opted for Big Data Analytics (BDA) to automatically access, blend, explore and analyze data. The solution allowsNorth Star BlueScope Steel to apply algorithms to extracted information to generate a final monthly report, reducing their reliance on manual work. Using BDA, the company can compare month-to-month data to analyze how events such as plant delays and bottlenecking might affect profitability. Embracing the IoT, the company hopes to integrate BDA into data points coming directly from its instruments, to analyze electricity consumption, weather patterns, material usage and steel prices for a better idea of future needs and sales potential.

Figure 3.11: The Digital Twin of a Wind Turbine

New product development depends upon design information that is accessible from anywhere at any time. This allows everyone within the connected manufacturing enterprise—whether internal to the company, outside suppliers, or third-party contract designers and manufacturers—to have access to information they can trust. This information must be securely archived to support the growing need for full traceability of every component in every product. Manufacturers are required to preserve design information for an extended period of time—often up to 10 or 20 years. As recent events have shown, products that fail or cause harm to a user can create incredibly expensive recall situations for manufacturers. A centralized archiving process for all design-related information can help companies resolve recall issues quickly and maintain consumer confidence. Governance, risk, and compliance initiatives introduced by governments around the world require secure information management and archiving.

EIM systems help meet the needs of product design and engineering by providing a consolidated view of all related information, including 3D CAD/CAM models, 3D visualization models, product bills of materials, testing reports, specifications, videos, renderings, and more. Extensive archive and version control are offered for each of these file types, helping to ensure compliance with regulations and QA requirements. Different groups and departments are able to access and share these documents and collaborate using mark-up capabilities from leading PLM solutions and other business applications. Finally, processes are streamlined as review and approvals can be automated for all design-related information. As with product design and engineering, information accuracy, security, and accessibility are paramount in plant maintenance and asset management.

In the following interview, Enterprise Content Management (ECM) is helping Multiconsult bring together digital and analog—uniting the two worlds of 3D modelling and documents—to keep projects on schedule and on budget, and its clients satisfied.

⚒ Plant Maintenance and Asset Management

Maintaining high availability of production assets has never been more important to manufacturers. The cost of facilities has skyrocketed and manufacturers need to maximize the use of every production line to achieve Return On Investment (ROI) goals. The shift to customized products and new manufacturing strategies like Lean and Just-in-Time (JIT) drastically reduce inventories and increase the importance of predictable production schedules.

The impact of any disruption can ripple through supply chains and undermine customer confidence. For example, JIT production environments across the automotive industry have two basic requirements: first, there must be a steady stream of parts delivered to a plant from outside suppliers and secondly, production equipment, assembly lines, and associated utilities supporting the facility must be highly available. If a key piece of robotic handling equipment suffers a failure or a back-up power generator fails to kick in during a power outage, these can have serious impacts on the production of parts, and more importantly, could negatively affect deliveries and customer satisfaction levels.

There is a direct relationship between asset availability and the quality of asset information. Studies have shown that the cost of poor asset information management can exceed 1.5 percent of a plant's revenues in some industries. This doesn't even consider the impact that poor maintenance could have on safety and environmental compliance.[19]

To ensure safe and reliable assets, today's factory-based maintenance teams need access to all digital information associated with machinery, as well as all utilities servicing the plant, such as electricity, gas, and water supplies. There is also a growing need to effectively manage the day-to-day relationships with all on-site contractors and indirect suppliers of spare parts used to repair plant equipment. Maintenance teams must also embrace a growing number of health- and safety-related compliance regulations. Advances in digital technologies, for example, the introduction of lightweight, ruggedized tablets that can remotely connect to centralized maintenance

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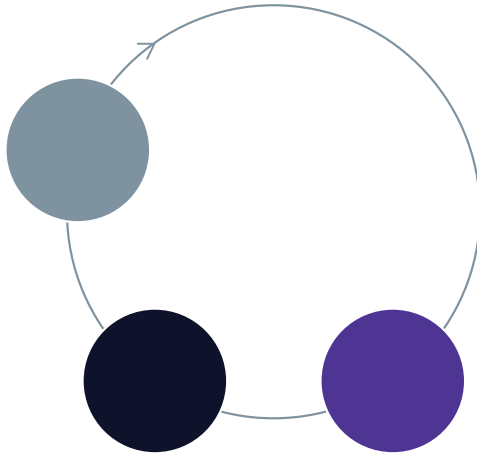
Standard applications like ERP, PLM, and SCM help manufacturers optimize individual business processes within finance, production, design, and distribution. But this is not enough for a successful, connected manufacturing enterprise. Today, manufacturing

With digitization, we have the challenge—
and the opportunity—to clean up our data
house. We want to do business with our
 F X V W R P H U V   P X F K   P R U H   F R V W   H ¬ H F W L Y H O \   D Q G
one way to do this is to implement a B2B
portal. We can't do that until we get our
house in order. This requires cleaning up
our master data and really understanding
how our business processes work. It's not
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it's unique to have this level of support from the CEO and the rest of the organization. IT is not going to be pulling them along, in fact, in some ways we have set a high level of expectation.

Cognitive technologies are being slated as the next big technology trend. We've put sensors into our manufacturing plants and

THE DIGITAL SUPPLY CHAIN
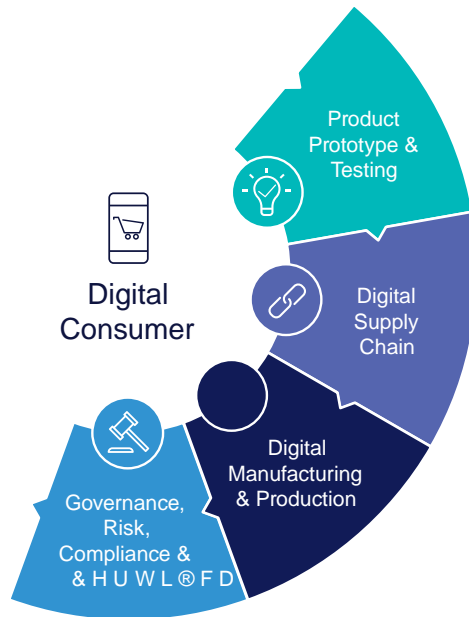
The Digital Supply Chain

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New digital technologies are allowing even the smallest supplier to work electronically with their customers. Cloud, mobile, big data, and the Internet of Things (IoT) are the cornerstones of today's efforts to digitally enable global supply chains. If manufacturers want to quickly build flexibility and scalability into their global operations, implementing a digital supply chain strategy is no longer an option—it is essential.

To effectively orchestrate today's outsourced and distributed digital supply chains, organizations must tightly coordinate the flow of goods, communications, and commerce across business partners. With the intricacy and frequency of business transactions, this involves a high degree of coordination, data synchronization, and automated transactions.

Transformational Challenges

Digital's potential for evolving the supply chain is enormous. The proliferation of IoT-connected devices, for example, will significantly alter operations, providing digital enterprises with the opportunity to make or save upwards of $3 trillion through optimized
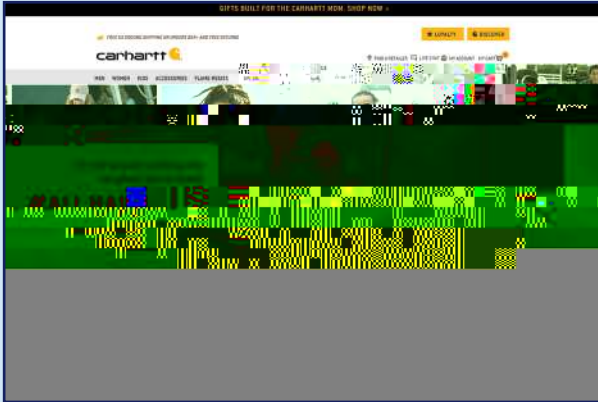
Carhartt

"When you increase speed to market, you're increasing your value-add to partners. We're onboarding a lot more partners every year, and we're onboarding them with ease. Our B2B platform, BizManager, makes us a heck of a lot more efficient and so we're bringing more value to the business as a result."

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ENTERPRISE INTEGRATION, CARHARTT

Weathering the challenges of time, competition, and fluctuating markets, Carhartt has expanded its business; however, the company's EDI was struggling to keep up. The ability to quickly and easily exchange information with suppliers, distributors, retailers, and other business partners is vital, and documents such as purchase orders, invoices, and advance ship notices are critical to the business. Their EDI process was not streamlined and they used multiple tools to support transactions, which didn't allow communications and direct connectivity with partners. As a result, the company experienced delays in the process and sometimes, delayed shipment dates.

Carhartt sought a comprehensive solution that would provide full EDI value-added network (VAN) services, including communication and mapping functionalities. After evaluating several solutions, 7(ea)-2.6(m)-1onapo5 p6.8(a2 TJ 0.8(a)-520.3(6)-20.3(I 6.8(a73 0 T

How Supply Chains are Embracing Digital Disruption

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Efficient supply chain performance ensures customer satisfaction and continued business success. Since the 1990s, lean has been the guiding principle for most manufacturers. Using lean practices, organizations have been able to eliminate excess waste from the supply chain. While lean may have dominated the past three decades, agile will be the way forward.

Today's CIOs must juggle modernizing IT infrastructures while managing complex B2B environments. Forty percent of companies cite competing IT projects (such as

A North American Specialty Pet Services and Solutions Retailer

What follows are excerpts from an interview with an e-commerce and supply chain director at a leading North American pet services and solutions retailer.
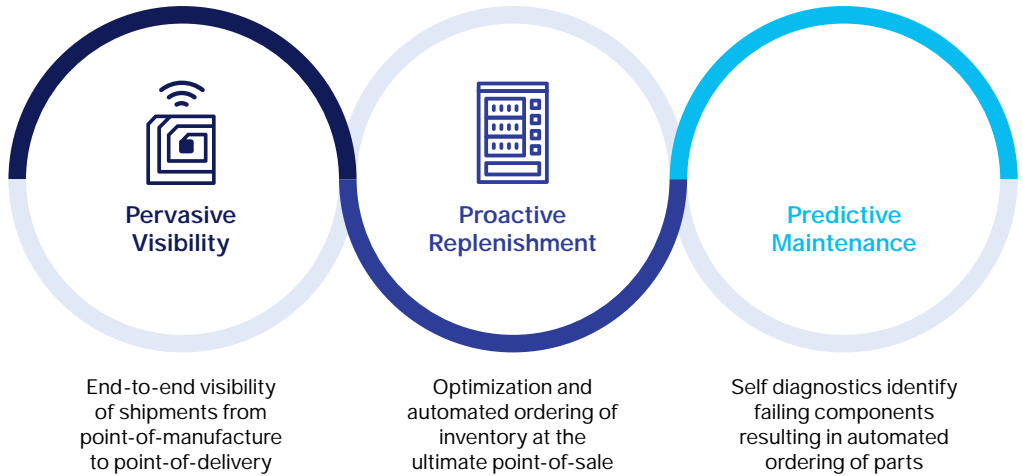
"I am responsible for supply chain and operations on the e-commerce side of the business. Our goal is to provide quality V H U Y L F H   W R   R X U   F X V W R P H U V   W K U R X J K   H ± F L H Q W e-commerce operations and a streamlined supply chain. Our supply chaiut6r a

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exchange information with these suppliers just as easily as we can with our larger retailers. In this way, digital is opening up new opportunities for both us and the

An IoT-Enabled Supply Chain

To illustrate how an IoT-enabled digital supply chain delivers value, let's examine three IoT-focused business processes: pervasive visibility, proactive replenishment, and predictive maintenance.

Pervasive Visibility

Proactive Replenishment

Predictive Maintenance

End-to-end visibility of shipments from point-of-manufacture to point-of-delivery

Optimization and automated ordering of inventory at the ultimate point-of-sale

Self diagnostics identify failing components resulting in automated ordering of parts

Bosch, for example, is using the IoT to support its virtual supply chain. The environment takes the output from various Radio Frequency Identifications (RFIDs) and other

DistributionNOW

DistributionNOW (NYSE:

"My role is to oversee DistributionNOW (DNOW) core technologies, including SAP technical teams, eBusiness (such as B2B electronic transaction systems), e-commerce, and all application development for branch locations and corporate functions.

Our current focus is on digital transformation and creating new opportunities, from market and revenue growth to operational excellence. We also bring cost-saving opportunities for both DNOW and DNOW's customers through innovation and process automation. One of our digital initiatives is to broaden our electronic connections rapidly and enable customers to more easily do business with us.

We partnered with a B2B integration and

make collaboration much easier if everyone
could access sensors, equipment, and
data remotely. User experience continues
to be challenging, though. Field workers
 F R X O G   Q R W   X V H   D   W R X F K S D G   H ¬ H F W L Y H O \   R Q   W K H
job—they use a pencil, and it doesn't matter
if they drop it or get it dirty—so we're still
 W U \ L Q J   W R   ® J X U H   R X W   D   V D I H   Z D \   W R digitize the
related processes.

Every procurement process could be
 X Q L T X H   ) R U   H [D P S O H   D   I X O O \   H ± F L H Q W   R Q O L Q H
 F D W D O R J   I R U   F H Q W U D O L] H G   E X \ H U V   L Q   D Q   R ± F H
would be the best way to place an order,
but not for contractors on drilling rigs. We
understand these challenges and design
our capabilities to solve unique problems.
Our ultimate goal is to enable our customers
to reduce cost and time. The faster anyone
can order, the faster our suppliers or
merchants can help them match their
 Z R U N O R D G   D Q G   W K H   P R U H   F R V W   H ± F L H Q W
they'll be.

Adopting what we see from Business-
to-Consumer (B2C), our objective is to
provide omni-channel experience to
mobilize everything—access to information,
catalogs, ordering, transactions, etc.
Business-to-Business (B2B) has a whole
other set of objectives. Our customers still
need

Reverse Logistics

While customer expectations like next-day, same-day, and even same-hour delivery are prompting manufacturers to make significant investments in logistics and distribution, reverse logistics (or returns) is often overlooked—despite being one of the most important aspects of a good supply chain strategy.

With more than half of global consumers preferring to buy online, digital has become the dominant retail channel. As digital sales surge, so too does the volumes of returns. At a staggering $642.6 billion annually, the value of returned goods worldwide would rank as the world's 21st largest economy.[17] Yet, only 33 percent of retailers have the infrastructure in place to deal with the increasing volume of returns.[18]

Traditional supply chains (even those implemented as recently as 10 years ago) that focus on the forward flow of products are not equipped to support the high volumes of returns that e-commerce generates today. As a result, supply chains that support the movement of a product from its point-of-consumption to the point-of-origin (referred to as reverse logistics) are rapidly becoming a business requirement—especially in retail, where returns can account for up to 10 percent of total sales.[19]

A digital supply chain provides the flexibility and end-to-end visibility to intelligently support reverse

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Envoi

Envoi was founded in August 2017, as a successor to the founders' first company Citius Solutions—a B2B logistics optimization company that serviced transportation companies, using routing and scheduling software that has been shown to improve operational efficiency by up to 32 percent.

pickup, but also on factors like construction, accidents, and road closures. The second way was to analyze the manpower required, or how many drivers should be assigned to a given shift.

Citius was founded based on the ΙQΗ±ΦΙΗΘΦΙΗϑ ΙΘ ΨΚΗ ΦΧ started out working to digitize the existing pen-and-paper system for the last mile— the sorting, routing, and pickups—which was a fairly disruptive move for the courier industry. We spoke to executives at multi-million-dollar trucking companies and discovered this manual system was costing them millions (in some cases, even hundreds of millions) of dollars. But they were hesitant to implement a new solution because the change required was of such a magnitude, it would take a lot of time ΔΘΓ Η¬ΡΟΥΨ ΨΡ ΡΟΟ ΡΧΨ pushback in the beginning, even from drivers and dispatchers. Our software, in a way, implied that they were not doing their ΜΡΘΫ Η±ΦΙΗΘΨΟΫ (ΫΗΘ ΨΚΡ to back up our claims, they were reluctant to adopt any kind of automated solution because their jobs were on the line. We ΖΗΥΗ ΨΥΫΙΘϑ ΨΡ ΙΘ°ΧΗΘΦΗ ΠΔΥΝΗΨ and it wasn't working. After trying to license the software to this market for about a year without much success, we realized we had to change our business model.

We decided to address the problem another way. We knew we were good at solving the ΟΔΦΨ ΠΙΟΗ ΦΡ ΙΘΦΨΗΔΓ ΡΙ Ρ¬ΗΥΙΘϑ ΙΨ ΨΡ ΦΡΧΥΙΗΥ or trucking companies, we brought the technology in-house so that we could serve ΨΚΗΙΥ ΦΟΙΗΘΨΦ ΠΡΥΗ ΓΙΥΗΦΨΟΫ ΔΘΓ Η±ΦΙΗΘΨΟΫ We shifted our business model, which meant that our former customers were now our competitors.

Based on the infrastructure of courier companies being ill-equipped to manage the ΟΔΦΨ ΠΙΟΗ Η¬ΗΦΨΙΫΗΟ ΖΗ ΙΡΟΟΡΖΗΓ ΨΚΗ demand online. People are becoming more accustomed to shopping online and have

come to expect same-day delivery. Globally, 41 percent of consumers demand same-day delivery, but only 14 percent of retailers Ρ¬ΗΥ ΙΨ &ΔΣΙΨΔΟΙ]ΙΘϑ ΡΘ ΨΚ Envoi was born.

That opportunity was based on providing ΦΗΥΫΙΦΗΦ ΡΧΨΦΙΓΗ ΡΙ ΨΚΗ ΨΫΣΙΦΔΟ operating hours (between 9 a.m. and 5 p.m.) that most ΦΡΧΥΙΗΥ ΦΡΠΣΔΘΙΗΦ Ρ¬ΗΥ 6Ρ on optimizing last-mile delivery after 5 p.m. Doing this allowed us to eliminate UPS and Canada Post as competitors. We also democratized the process of courier pickup and delivery by cutting out the middleman, essentially, we are enabling direct retail-to- consumer.

Like Uber, our employees are regular people with their own cars. When a bundle is ready to be picked up from a retailer and delivered ΨΡ ΨΚΗ Ρ ΖΔΫ ΠΔΥΝΗΨ ΨΡ Δ ΦΧΦΨΡΠΗΥ ΨΚΗΫ ΥΗΦΗΙΫ via an app. Our software does all the sorting and routing, and we deliver goods without requiring any overhead for trucks ΡΧΥ ΖΔΥΗΚΡΧΦΗΓ ΓΔΨΔ or warehouses. From here, we can easily update customers by text regarding when they can expect their package. Ins 2.927 0 T7(i)-14.8(

Information
Management

Content
Services

Analytics

Discovery

OpenText EIM Provides the Foundation for an IoT Platform

The Digital Supply Chain: A Strategic Imperative

C H A P T E R **5**

DIGITAL ENGAGEMENT

Digital Engagement

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Disruptive technologies are triggering the convergence of physical and digital worlds. In addition to mobile and social channels, IoT-related technologies like sensors, beacons, and wearable devices will add hundreds of ways for organizations to engage with their employees, partners, and customers. According to the above quote, in the future, only five percent of all customer interactions will require human contact.[2] Customer experience will expand to include augmented and virtual reality, holograms, digital wallets, virtual shopping assistants, digital mirrors, algorithmic retailing, 3D printing, and more. These technologies and channels will make the customer journey much more complex.

Today's fast-moving
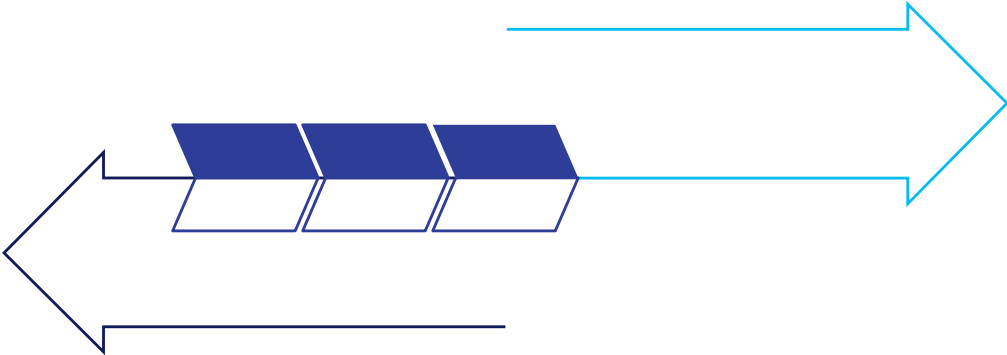
Digital product information can be created in a multitude of different software or cloud-based applications. Users across the extended enterprise may need to gain access to these files to view and mark up information, perhaps as part of a design review or product launch process. Ensuring that all digital assets associated with external websites and aftermarket services and support portals are managed effectively is equally as important as managing supply chain processes. Leveraging a centralized information management platform can help manage web-based digital assets and improve the customer experience.

The simplest application available on every desktop PC, laptop, or mobile device is the web browser—a common window into a digital information hub that helps drive consistency in terms of accessing, viewing and collaborating on product-related information. Using responsive design, organizations can manage a single site that caters to all device platforms, sizes, and resolutions. Consistently branded content creates a more satisfying end-user experience and enables organizations to positively impact the customer journey. This is illustrated in the following interview with the CIO of a leading energy drink producer.

Leading Energy Drink Company

What follows is an excerpt from an interview with the Chief Information Officer at a leading energy drink company.

p2XU SKLORVRSK\ LV WKDW ZHoUH D OLIHVW\OH ®UVW
and a product second. That's been our
guiding principle since our launch and it's
worked well for us. We've been on an upward
trajectory for growth, both in terms of sales
and content.

As we grew, our volumes of content grew,
DQG LW ZDV EHFRPLQJ KDUGHU WR ®QG DVVHWV
and repurpose this content in a timely
manner. When we partnered with a global
soft drink company and incorporated their
energy brands, we realized that to be able to
carry those brands forward and to continue
to manage ours, we would need to migrate
and manage our combined assets in a
Digital Asset Management (DAM) system.

We needed to come up with a solution to
better manage our collective assets—one
that included supporting historical content.

consistency. As we grow, one of the things
that's very important to us is to ensure
that proper logo treatment and the rules
of usage are maintained. The system
gives us consistency around the globe.
We can even automate brand usage and
guidelines. Our Legal teams on the IP side
and brand protection are thrilled that we're
implementing a solution and working on
strategies to engage them in the approval
process. As you can imagine, we sponsor a
lot of athletes and promote a lot of events.
If whatever we use comes out of the DAM
V\VWHP ZH FDQ EH FRQ®GHQW WKDW DOO WKH
checks and balances are in place and that
we're using those assets correctly.

Right now, the mobile user is our key
demographic. Our digital media group is
doing a lot of creative work in that space,
OLNH JDPL®FDWLRQ IRU H[DPSOH WR digitize the
customer journey. Our demographic doesn't
really sit at a PC to consume content, so
the mobile experience is hugely important.
We've got great traction there, but we're like
everybody else. We're moving as fast as we
can, and we've got a lot of great technology
in place, but every time you think you've
made it, a new disruptive technology
emerges. It's kind of like painting the Golden
*DWH %ULGJH E\ WKH WLPH \RX JHW WR RQH HQG
you have to start repainting the other. This is
just a reality for us.

Change doesn't come easily. People
get comfortable with what they know. In
order to ensure that implementation of
new technologies is successful, I have
to be more than just a CIO. I have to be a
sponsor, an advocate, and a cheerleader. It's
important to get out and communicate the
EHQH®WV WKDW WUDQVIRUPDWLRQ ZLOO KDYH RQ WKH
organization as a whole—not just the impact
it will have on the individual. I think when
people understand that adding a few steps
to a process on their end will save 50 steps
across the organization, and how saving 50
VWHSV ZLOO EHQH®W WKH RUJDQL]DWLRQ WKH\oUH
much more willing to embrace change."

Disruptive technologies like mobile and wearable technologies are revolutionizing the customer experience. Mobile functionality is combining with mobile payments

When analytics are applied to the data collected by disruptive technologies, organizations can transform business intelligence into actionable insights to deepen engagement. As shopping becomes more automated and AI-driven, customer loyalty and repeat purchases may be harder to secure. Algorithms will be able to comparatively (and objectively) shop online for the lowest prices available. Sensors in an appliance, for example, will locate replacement parts based on the best price and availability without consideration for brand loyalty. To differentiate themselves, manufacturers and retailers will need to apply analytics and AI in order to tap into consumer habits, behavior, and need—ultimately giving them the ability to create experiences that delight.

The following interview with Tata Consultancy Services Ltd. below examines how digital consumers are forcing organizations to deliver simplified, yet compelling experiences to meet their evolving and sophisticated expectations.

Combining Physical and Digital Worlds

As the digital revolution advances, customer centricity is eclipsing the decades-old, traditional product-centric approach to merchandising. Consumer behavior is evolving, and to stay competitive, manufacturers will be increasingly required to put the consumer at the center of all their operations—from design through to marketing, distribution, and support.

CIOs will be required to deploy a modernized technology foundation to bring together physical and digital experiences and create new value streams for competitive advantage. Although the physical store will remain at the center of multi-channel operations, top manufacturers and retailers will strategically blend physical and digital operations, creating an ambient, immersive user experience in what has been called the "digital mesh." Virtual Reality (VR), Augmented Reality (AR), wearables, the IoT, and sensor-rich devices will create connected rooms and spaces to enhance the shopping experience.

As consumers push the demand for a more digital sales experience, brick-and-mortar stores are closing their doors. In early 2017, over 8,600 physical store locations shut down in the U.S., including retailers Bebe, JCPenny (JCP), and Payless ShoeSource.[9] Macy's announced plans to close 68 stores at the expense of 10,000 jobs.[10] Hudson's Bay, owner of Saks Fifth Avenue and Lord & Taylor, plans to reduce its workforce by 2,000 jobs.[11] In the U.S. alone, physical store traffic and sales are declining in the wake of increasing competition from online sellers like Amazon and Zara.

Tata Consultancy Services Limited

Tata Consultancy Services (TCS) is an IT services, consulting and

architecture solutions. I also support our
presales and

Figure 5.7:

The retail model is being further disrupted by innovations like Moby Mart, an autonomous mobile supermarket that brings the shopping experience right to the consumer's front door. Developed by Wheelys Inc., a Swedish start-up company, Moby Mart is run entirely using AI and sensors, features a hologram cashier, and enables shoppers to scan items using mobile phones. This futuristic grocery store demonstrates just how seamless and convenient consumers expect the shopping experience to be.[17]

While the physical store will play its part in the omni-channel experience, making shopping convenient, real time, and relevant is the goal. Consumers today have ultimate control over the customer experience—what channels they use, how they pay, and how items are shipped. Manufacturers and consumer packaged goods companies that have adopted direct-to-consumer models offer their customers flexible options

Omni-channel Excellence Starts with the Supply Chain

Omni-channel retailing has been one of the main trends to impact retailers in recent years. The adoption of online mobile retail has changed the dynamics of consumer buying patterns and retail distribution. Retailers need to be able to source goods at competitive prices as well as ensure they are working with responsive suppliers that can meet consumer demand.

Rate importance of integrating e-commerce and in-store experiences as important/business critical

Connect customers' activities online with what they do in store
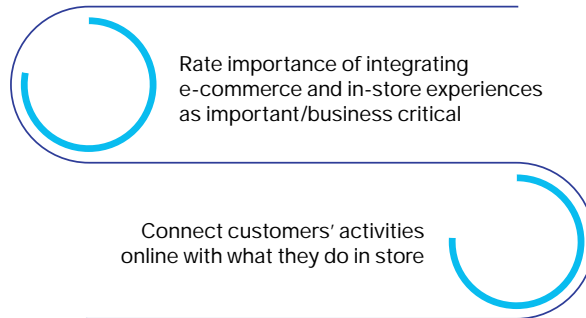
Figure 5.8: Integrating Operations is Critical to Achieving Omni-channel Excellence[18]

With a keen focus on optimizing customer experience, manufacturers are streamlining their siloed supply chain processes on top of B2B platforms to unite the factory with the showroom. Omni-channel excellence depends on more than just combining digital and physical channels. A digitized supply chain enables omni-channel execution, especially at the store level.

Superior omni-channel support requires 90 percent inventory accuracy.[19] If merchandise is out of stock, digital consumers can find availability and competitive pricing in just a few clicks. Many manufacturers and retailers are investing in technologies like sensors on shelves, automated inventory verification, cameras and video

Digitizing the Customer Journey

The customer journey describes the experience a customer has from initial desire through to fulfillment. All of the touchpoints encountered constitute the brand experience. Over the next five years, we will witness a "radical integration" of the customer journey across physical and digital environments.[25] It is already being impacted by the IoT, web technologies, and analytics.

In the digital world, companies that succeed will implement digital end-to-end strategies to create breakthrough customer experiences. The focus is on engaging the customer with relevant information, served up on the right channel, at the right time on their journey.

Customer journeys are based on data collected across various touchpoints—transactions, interactions, social media sites, devices, sensors, videos, and more. Analyzing this data leads to customer insights, and these can be tied back to actions that drive automated, internal processes and the delivery of content and services. This should all happen on the fly, in response to customer needs, to influence their buying decisions.

Every touchpoint provides the opportunity for an organization to engage. For ideal customer experiences, organizations need to engage customers at every stage of their purchasing journey because two-thirds of the decisions that customers make are formed based on their experiences.[26]

The figure below illustrates possible touchpoints on a customer journey for the purchase of a car. A prospect conducts research online before setting foot in the dealership—potentially watching a commercial on the dealer's site or reading car reviews that link to the manufacturer's website. This might be followed by a virtual road-test and finally, a trip to the showroom as a GPS system on their mobile device finds the closest location. Analytics along the journey help manufacturers and sellers determine car buyer preference and habits. As part of a larger, digital ecosystem, banks and insurance companies can be incorporated to provide pre-approved loans or insurance rates based on driving habits. Post-purchase, sensors might alert the driver when service is due. The entire journey should be orchestrated to capture preferences and facilitate a seamless experience. The value of the information collected at each touchpoint can be used to deepen the experience and provide insight.

CHAPTER 5
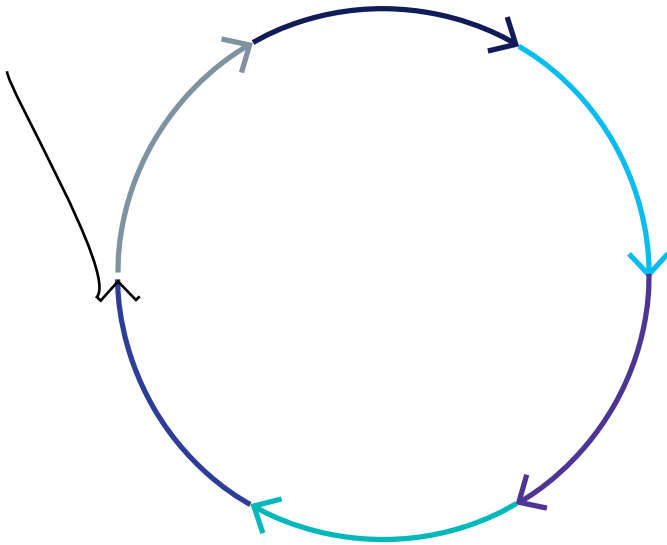
Advanced analytics can effectively comb through data using sophisticated quantitative methods, such as statistics, descriptive and predictive data mining, simulation, and optimization. The insights produced move beyond traditional Business Intelligence (BI) to analyze the data, glean insights, and recommend a course of action. Analytics brings together interactive data visualization, pattern matching, and machine learning. For example, a large U.S.-based retailer applied smart-pattern matching and machine learning to an inventory program to quickly identify a performance issue related to a new product. As a result, the company was able to avoid customer dissatisfaction and reduce returns. Based on their findings, the retailer cited a quality issue and returned the merchandise to the manufacturer.

The need to improve real-time business decision making will force retailers to acquire self-service and big data discovery capabilities. In fact, managing big data is recognized as being business critical by 73 percent of global retailers.[29] When asked where analytics would impact their strategic goals, they ranked market-based insights, customer segmentation, and centralizing their customer information as top initiatives.

In the digital world, a deeper understanding of the customer has become a strategic objective for organizations in the manufacturing, retail, and consumer packaged goods industries. Sophisticated analytics platforms can transform volumes of data into advanced intelligence that forms the basis of marketing strategies, new business models and revenue streams, and new product and serv.052 7lumes of

CHAPTER 5
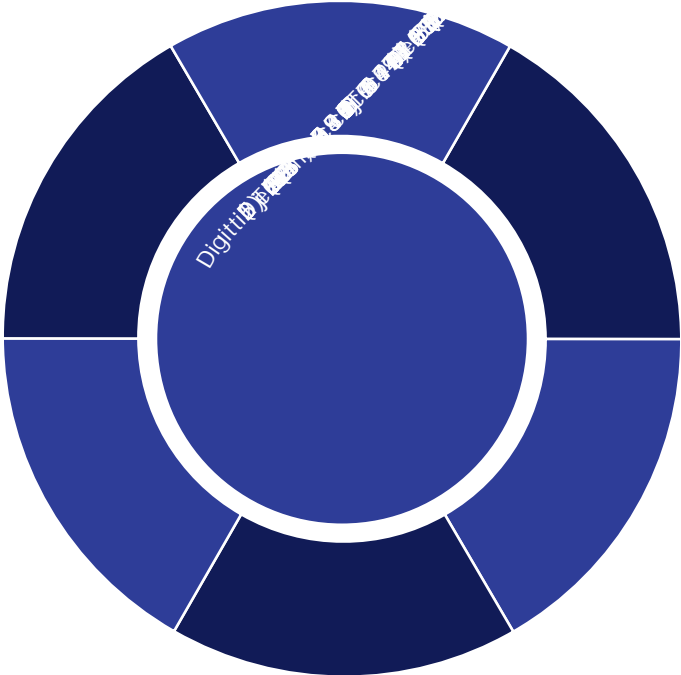
Figure 5.14: CEM Creates Value across the Customer Lifecycle

In the digital world, manufacturers and retailers have to work harder to engage and satisfy their distributors and consumers with an end-to-end digital strategy. They need to be able to extract value from their information, optimize and personalize the delivery of this information, and manage it securely. To transform and drive growth, organizations in the manufacturing and retail industries must deliver compelling experiences while adhering to established information governance policies and standards to guarantee security and privacy. The following chapter on Digital Governance, Risk, Compliance, and Certification describes how to achieve this in greater detail.

C H A P T E R 6

Digital Governance, Risk, Compliance and Certification

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R Q H V F D Q G D O D Z D \ I U R P D V D O D F L R X V K H D G O L Q H D Q G R Q H
O D Z V X L W W I W Nam—William Lytton, former EVP and General Counsel of Tyco International

Manufacturing organizations are operating in a new environment—one in which old-world challenges like systems integration and consolidation are colliding with the new-world challenges of globalization, digital disruption, and constantly evolving regulatory compliance requirements. In short, today's manufacturers must function in an environment that is inherently complex.

Globalization, for example, has exposed the growing intricacies of the extended enterprise

Along with globalization and other factors, manufacturers are undertaking significant digital transformation initiatives to automate processes in a bid to increase both productivity and the pace of innovation. These involve the integration of Information Technology (IT) with Operational Technology (OT) to facilitate the seamless exchange of business information, which can bridge security domains through direct connections with

A Complex and Evolving Landscape

To further complicate matters, compliance requirements in any of these key areas can change at any time. As such, manufacturing organizations must build agility and flexibility into their enterprise systems and processes to be able to quickly respond to sweeping changes. For example, the 2014 introduction of the Dodd-Frank Conflict Minerals Law impacted export controls requirements, making end-to-end supply chain transparency a necessity. In 2017, Sapin II (the French anti-corruption law addressing transparency, anti-corruption, and economic modernization), mandated companies to establish an anti-corruption program to identify and mitigate the risk of corruption.

Manufacturers must be resolute in their GRC practices. Once they have addressed the intricacies of Conflict Minerals reporting and Sapin II, new regulations like the General Data Protection Regulation (GDPR), and geo-political influences, such as Brexit pose a whole new set of business challenges.

The General Data Protection Regulation

p   S H U F H Q W   R I   F R P S D Q L H V   F R Q V L G H U   G D W D   V H F X U L W \
E H   W K H   P R V W   L P S R U W D Q W   F R P S R Q H Q W   R I   * ' 3 5   q

In 2016, the European Union (EU) introduced the General Data Protection Regulation (GDPR) to bring personal data protection into the digital age. While this new legislation imposes stringent requirements for how companies store and handle the personal data of European citizens, its legal reach isn't defined by geography, but by the use of the personal data of European residents—which means that the GDPR applies to any organization anywhere in the world. Compliance mandates will be far reaching and impact everything from how organizations obtain consent to how they use cookies on their website to the "right to be forgotten." The GDPR will essentially affect every part of an organization.

The ability to locate personal information is the first piece of the GDPR puzzle. Sophisticated file management solutions can help organizations find the proverbial needle in the haystack by searching, identifying, and reporting on personal information that is dispersed among many sources. This allows manufacturers to manage enterprise information based on value and risk, and apply retention and disposition policies as mandated by the GDPR and other compliance regulations.

Data minimization, or collecting the smallest amount of personal data for the shortest period of time and deleting it quickly after it has been used, is the second piece of the puzzle. The less data that manufacturers hold on to, the less data thanthtt-8.1(e)-16.7(c

The Chemours Company

The Chemours Company is a world leader in titanium technologies, fluoroproducts, and chemical solutions. The company is focused on its differentiated portfolio of premium products positioned to help its customers respond to developed and developing market needs. Chemours is a new company with over 200 years of history, created from DuPont's performance chemicals businesses.

Figure 6.5: The Chemours Company

What follows are excerpts from an interview with Robert Siegel, Solution Portfolio Manager at The Chemours Company.

"Chemours has a rich history that goes back over 200 years in an industry that is almost

in Europe, the Registration, Evaluation,
Authorization and Restriction of Chemicals
(REACH), that requires companies to share
information about a regulated chemical
throughout the entire industrial supply
chain, and to keep any information related to
a chemical a company manufactures for 10
years after its last manufacture, sale, or use.
Obviously, this too could be for many years.
6 R P H F R X Q W U L H V O L N H * H U P D Q \ K D Y H ® Q D Q F L D O
audit requirements for immediate access to
data by auditors, who will use our systems to
U H F U H D W H K R Z Z H F D P H X S Z L W K V S H F L ® F G D W D
Technology helps us digitize and manage
these information-based processes.

As a global leader in titanium technologies,
° X R U R S U R G X F W V D Q G F K H P L F D O V R O X W L R Q V
when Chemours manufactures chemical
components, our processes produce paper
W U D L O V W K D W V W H P I U R P V F L H Q W L ® F U H V H D U F K

extortionist hackers who demand money
to decrypt the data. Employee education
 L V   F U L W L F D O   W R   H ¬ H F W L Y H security, as well as
securing and monitoring our systems to
make sure breaches aren't happening.

We don't store or manage our highly
sensitive information in the Cloud. We
have a hybrid solution—partly in the Cloud
and partially on premises. We do put in a
number of access requirements if there
 L V   F R Q ® G H Q W L D O   G D W D   L Q   W K H Cloud—it's a
layered security approach. We can still use
our information to innovate and create new
products, but access is tightly controlled,
and we ensure that we protect our
information as it is generated.

True digital transformation is based
on addressing a business issue with
key business stakeholders, a desired
business outcome, and a vision of the
future state. IT can often operationalize
this vision and make it real, but the drive
for transformation needs to come from
management as strategic insight, with an
 H \ H   W R Z D U G V   L W V   E H Q H ® W V   , W o V   P R V W   H ¬ H F W L Y H
when the originator of a digitization project
is a business leader. And in the end, they
represent the users as well, so if they're
behind the project, adoption will be easier."

New business models like PaaS and disruptive technologies that create a direct connection between manufacturers and consumers are causing the line between products and services to blur. This presents manufacturing organizations with the opportunity to provide better aftermarket support for products and services. For

Compliance Officers don't need to be technology experts but they do need to know how to leverage GRC solutions to streamline associated processes. Critical steps include ensuring enterprise policy frameworks are up-to-date and that employees and partners understand and are trained on their compliance responsibilities. The CO strives to put airtight policies and controls in place to ensure that compliance, centralized policy management, discovery and holds, early case assessment, and defensible disposition of content are all working in harmony to reduce and prevent risk.

Information Security in Manufacturing

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In addition to redefining cybersecurity, emerging technologies coupled with new business models are causing the network perimeter to vanish. As illustrated in the figure above, the result is a paradigm shift where the focus is moving from a network-centric defense strategy (that protects data, apps, and users behind the firewall) to an identity and data-centric strategy (that protects data, apps, people, and connected things everywhere). As the number of endpoints in the extended enterprise ecosystem

Illovo Sugar Group

Illovo Sugar Group is Africa's biggest sugar producer and has extensive agricultural and manufacturing operations in six African countries. The group produces raw and refined sugar for local, regional African, European Union (EU), United States of America (USA) and world markets from sugarcane supplied by its own agricultural operations and independent outgrowers who supply cane to Illovo's factories. High-value products manufactured downstream of the sugar production process are sold internationally into niche markets. The group is a wholly-owned subsidiary of Associated British Foods plc (ABF), a diversified international food, ingredients, and retail group operating in 48 countries.
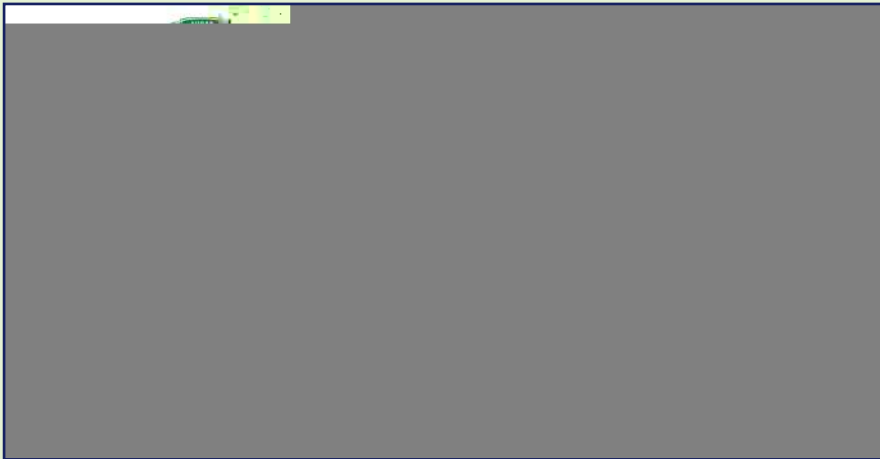
Figure 6.10: Illovo Sugar Group

What follows are excerpts from an interview with David Schaller, Group CIO, Illovo Sugar Group.

"Illovo Sugar Group is the largest sugar-from-cane manufacturing company in Africa, producing close to two million tons of sugar per year. We operate in six countries in Africa, including South Africa, Swaziland, Mozambique, Malawi, Zambia and Tanzania and in ®ve of the countries we are the planter and the miller. We've got quite a lot of vertical integration from land preparation through the entire agricultural cycle from harvesting and milling, packaging, sales and distribution, and marketing. At our peak, we employ about 35,000 people.

My advice to any executive who is
embarking on this journey of digitization
would be twofold. First of all, if it's not a
business project, don't bother doing it.
There really is no such thing as just an IT
project. As soon as something becomes an
IT project, the business disowns it or fails
 W R   H Q J D J H   , I   \ R X   F D Q o W   ® Q G   D Q   H Q W K X V L D V W L F
and committed business champion who is
going to own the project and its outcomes,
 W K H Q   P R Y H   R Q   X Q W L O   \ R X   ® Q G   R Q H $ Q G   W K H
second piece of advice I would give is to
understand where the value is in your value
chain. Start with your high-priority projects
and demonstrate the value to the business.
Once you get traction, then you gain
momentum. Then, more and more business
people will climb on board. It's not really
about the technology, it's about solving a
business problem."

For example, data sovereignty laws, such as those in Germany, France, and Russia, mandate that citizen data be stored within the country's physical borders and on physical servers. Growing regulatory and competitive pressures will require manufacturers to rethink and reprioritize security and governance strategies for enterprise information. These requirements will be driven by emerging global regulations (such as the GDPR), increasing amounts of Internet users and privacy-related issues, big data, and the IoT.

Tradition al Security

Designed for static devices behind traditional network protection

Cloud-ready Security
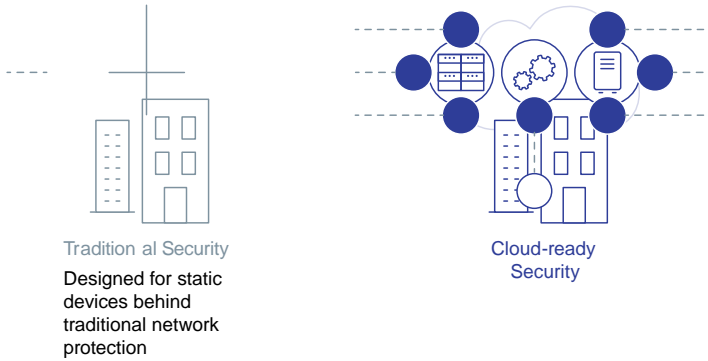
The Cloud can be very secure and very compliant if it is well managed. Developing a cloud strategy is an exercise in understanding an organization's business processes, workloads, security rules,

Davigel

Figure 6.13: Davigel

Davigel automates secure and regionally compliant e-invoicing for more than 65,000 global customers

| Capture | Classify | Manage | Discover | Archive |
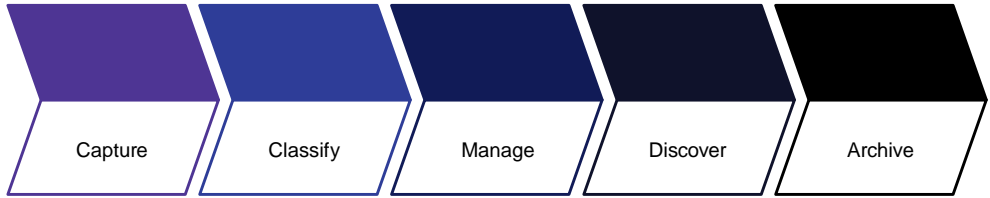
While most manufacturers recognize the need for improved technologies for better

CONNECTED ENTERPRISE

The goal for every modern manufacturing organization is to leverage their information
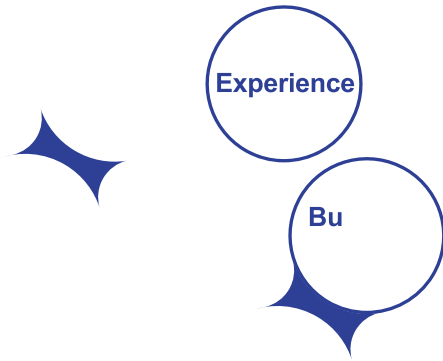
LANXESS

LANXESS is a leading specialty chemicals company with sales of €7.7 billion in 2016 and close to 20,000 employees in 25 countries. The company is currently represented at 75 production sites worldwide, including 24 in North America after the acquisition of Chemtura. The core business of LANXESS is the development, manufacturing, and marketing of chemical intermediates, additives, specialty chemicals, and plastics. Through ARLANXEO, the joint venture with Saudi Aramco, LANXESS is also a leading supplier of synthetic rubber. LANXESS is listed in the leading sustainability indices Dow Jones Sustainability Index (DJSI World) and FTSE4Good.
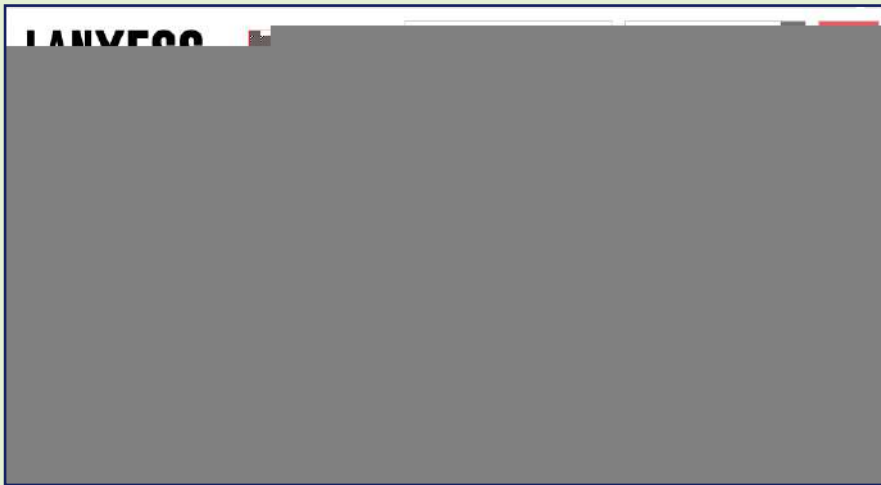
Figure 7.3: LANXESS

What follows are excerpts of an interview with Stefan Linke, Process Expert Documentum at LANXESS.

"I am responsible for Document Management at LANXESS and this involves the coordination and implementation of infrastructure projects, as well as business-driven projects. We work closel

Our aim is to explore opportunities for digitization where they make sense and to streamline processes internally to help reshape the transformation of the chemical industry as a whole. To this end, we are working on a global digitization strategy W K D W   L V   J H D U H G   W R   W K H   V S H F L ® F   U H T X L U H P H Q W V of the company, our customers, and our employees. Our understanding is that The Fourth Industrial Revolution, also called Industry 4.0, calls for independent and fresh access to business processes. At the moment, we are examining projects that we believe are good candidates for transformation, with a focus on the quick wins. Many of the projects impact other projects and schedules, so they have to be considered very carefully. Overall, the chemical industry is not an early adopter of digital business models or technologies, so we are in the early stages of digitization.

Process improvement is a centra(i)2> craenendf dur21.5(i)-14.5(g)-21.9(i)-14.7(t)-19.6(i)-11.5(z)-19

New Product Design

OpenText Content Suite enables manufacturers to manage content throughout its complete lifecycle, from capture to archiving or disposition. The solution delivers concurrent revision control and secure collaboration for all digital product design and engineering process information, including 3D CAD/CAM models, 3D printing files, 3D visualization models, 2D drawings, production information, product bill of materials, materials specifications, product specifications, videos, animations, renderings, and more.

As a complementary system, Content Suite integrates directly with industry-leading Project Lifecycle Management (PLM) solutions, enabling manufacturers to share,

Due to the volume and velocity of data, content solutions for manufacturing need to be massively scalable and capable of identifying and accessing data—structured and unstructured—from many sources both inside and outside the factory walls. By applying predictive algorithms to this information, manufacturers can generate accurate, forward-looking insights to help them make better decisions.

The OpenText Analytics Suite supports both product design and quality management processes when costs are high and the failure rate for new industrial products is more than 50 percent.[2] During a quality management process, for example, analytics can capture sensor-based information to increase production yield and throughput. Data on how many products are manufactured and at what cost and effort can feed into quality systems to quickly identify problem areas and predict issues in real-time, rather than using root cause analysis to learn what has historically gone wrong. When quality defects in production can cost as much as 30 percent of a manufacturer's revenue, analytics can help improve production while significantly reducing costs.[3]

OpenText Magellan, the flexible AI and analytics platform, combines open source machine learning with advanced analytics, enterprise-grade Business Intelligence (BI), and the capabilities to acquire, merge, manage, and analyze enterprise information. As drag-and-drop AI, Magellan cost-effectively gives manufacturers access to unparalleled insights by removing the limits of conforming data to a particular schema. Armed with tools like analytics and AI, manufacturers can more precisely address customer demands, predict factors that will impact business continuity, such as weather, and gain insights into product or asset performance.

Product Prototype and Testing

Creating prototypes is a highly practical phase in the manufacturing process, helping to test for design flaws, usability, and overall safety—each of which impacts the bottom line. As physical or digital renderings of a product, prototypes typically undergo rigorous operations and testing. Information gathered from a prototype, such as stress analysis reports, environmental test reports, or materials testing reports, can be used to make improvements to the actual product. Since different types of prototypes can be helpful at different stages of the product development cycle, managing the information associated with each prototype is critical to the overall success of the product.

As well as designing a product and building prototypes or samples, there is also the requirement to manage the complete portfolio of all digital assets related to a product. These assets can range from product specifications to images and videos of prototypes being used. OpenText capture technologies are used to preserve and manage content as the by-product of prototyping. As a required part of digitization, OpenText Capture Center uses the most advanced document and character recognition capabilities available to turn documents into machine-readable information.

information outside of the enterprise in a
secure and trusted way. We wrapped all
of this up with several onsite developers
who worked with them to create a
custom application to manage, monitor,
 D Q G   F R P P X Q L F D W H   W K H   H ¬ H F W L Y H Q H V V
of the processes to their stakeholders
and shareholders.

Enterprise information exists in many
formats that ultimately need to be captured
and transformed to be well understood,
governed, and leveraged to maximize value.
For the role it plays in critical business
processes, "Capture" does more than
the name suggests. Capture does collect
information, but more importantly, it
activates it. It brings information that resides
in a paper document to life so that it can be
used by multiple entities to meet a variety
of business objectives. Capture actually
collects, enables, and distributes the right
information to the right people in the most
 H ± F L H Q W   Z D \   S R V V L E O H

Capture helps organizations achieve better
 H ± F L H Q F \   D F F X U D F \   D Q G security. The
sharing of information needs to happen in
real time, not at 4 p.m. tomorrow, and so
this information needs to be digitized. The
information must also be shared securely
and in a way that is easy to consume.

Capture also plays a key role in integrating
structured data with unstructured
information. There are two steps involved.

Exchange technologies facilitate the efficient, secure, and compliant exchange of information across the enterprise and its business network, from faxes and cloud services to EDI and large Managed File Transfers (MFTs). These services generate massive amounts of data, including supplier information and procurement contracts. Through integration services, the OpenText™ Trading Grid™ and B2B Managed Services, the Business Network provides end-to-end visibility into supply chain operations for real-time decision making and the improved orchestration of operations.

The Business Network's cloud-based solutions help to onboard 100 percent of the trading partner community. Manufacturers can reduce operational costs and streamline supply chain processes with an outsourced approach to managing a B2B

All across the

When information is secure, it can be effectively routed through process applications to improve efficiency and performance. OpenText Process Suite offers solutions for flexible, agile business process automation and case management systems that enable employees, customers, and partners to collaborate, streamline operations and work more efficiently.

EIM enables end-to-end digitization, bringing together unstructured and structured information, business process automation, and a digitized supply chain on a single digital platform.

Manufacturing content needs to be governed throughout its complete lifecycle, from capture to disposition. OpenText Content Suite enables manufacturers to integrate critical content with business processes, to help ensure the security, integrity, and accessibility of manufacturing data. When an electronic investigation (audit or legal review) is initiated, systems have to be examined, information identified, and policies well understood and documented. When policies are centrally maintained, one central source can be easily understood, documented, and defended.

The expense and time associated with traditional legal or other information discovery is very high. Having a set of Discovery tools available to reduce time spent finding materials and improving the accuracy of data sets retrieved represents immediate savings for manufacturing organizations. By linking structured and unstructured information across multiple formats and sources—OpenText Discovery Suite lays the foundation for analyzing large volumes of information in real time with superior accuracy. Incorporating information and records management with solutions for archiving, email management, auto-classification, search, and eDiscovery helps manufacturers to reduce litigation, risk, and storage costs. At the same time, they benefit from improved compliance, security, user productivity, and time-savings in addressing the need to classify huge volumes of legacy content, email, and even, social media.

EIM gives manufacturers the confidence to apply governance across departments, content, application silos, and networks to align operations, meet certain standards, and achieve compliance.

Plant Maintenance and Asset Management

Today's manufacturers need to ensure their production facilities are available 24/7. Ensuring that production lines are operating smoothly, associated utility supplies are maintained correctly, and production stoppages are minimized can significantly reduce the operational costs and boost the profits of manufacturing operations.

For plant assets and equipment to be maintained effectively, it is important to have access to a single source of the truth for all digital information relating to the asset concerned. Careful management and archiving of digital information at the design and engineering phase of a new asset will help transform how the asset is maintained through its life. Many manufacturers of industrial factory equipment are starting to provide their customers with a full "digital model" of their products. For example, an industrial robot manufacturer can provide a full 3D model of a robotic arm, which allows maintenance engineers to become familiar with all aspects of the robot, even before it has been installed on a production line. Ensuring that maintenance teams have the correct versions of all digital information associated with the robot can help to minimize

EIM provides a complete 360-degree view of factory asset information, process, and performance data. Easy access to all plant-related information like maintenance procedures, assembly and disassembly videos, 3D plant design models, 3D CAD equipment animations, 2D equipment drawings, 2D utilities diagrams, and equipment test procedures helps maintenance teams minimize plant downtimes to avoid production stoppages. The quality and consistency of asset information and work instructions can be improved, and HSE risks minimized as more stringent compliance procedures are archived and more easily managed.

The application of analytics in plant asset management is transforming the process from one that has been reactive to one that can accurately predict future asset performance based on historical data. This helps to increase the uptime and efficiency of robot work cells, machining centres, assembly equipment, and utilities-related infrastructures.

Logistics and Distribution

OpenText EIM solutions enable secure collaboration between employees, partners, and customers, empowering them to add value to information to improve the transportation, warehousing, and packaging of products. By consolidating information in a secure repository, EIM gives manufacturers and their partner's rules-based access to information for secure collaboration. It also integrates with back-end manufacturing programs for streamlined logistics and distribution activities.

B2B integration is a set of technologies that facilitate the real-time, automated transfer of information, money, and goods and ((h)16((9.3(or4()16(v)-10.2(i)2.2(c)1.2(es)-7(,2.6(ac-3.3(r)11.2
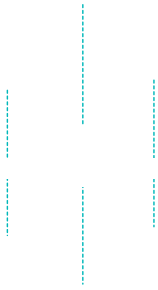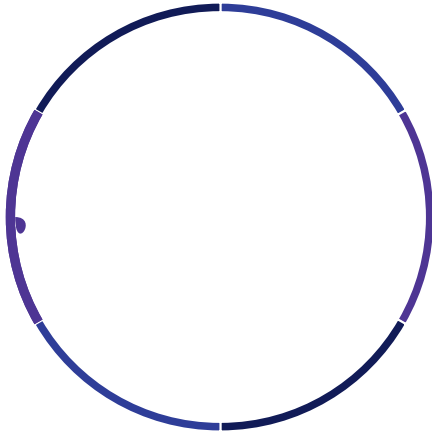
Aftermarket Services and Support

Many companies today are looking for ways to improve their aftermarket service and support processes, as this is a key way to help improve customer satisfaction. Ensuring that field service teams have access to a complete digital representation of a product or piece of equipment can significantly improve the uptime and ongoing maintenance of serviceable products.

Maintaining an accurate and up-to-date

STRATEGIES FOR CHANGE MANAGEMENT
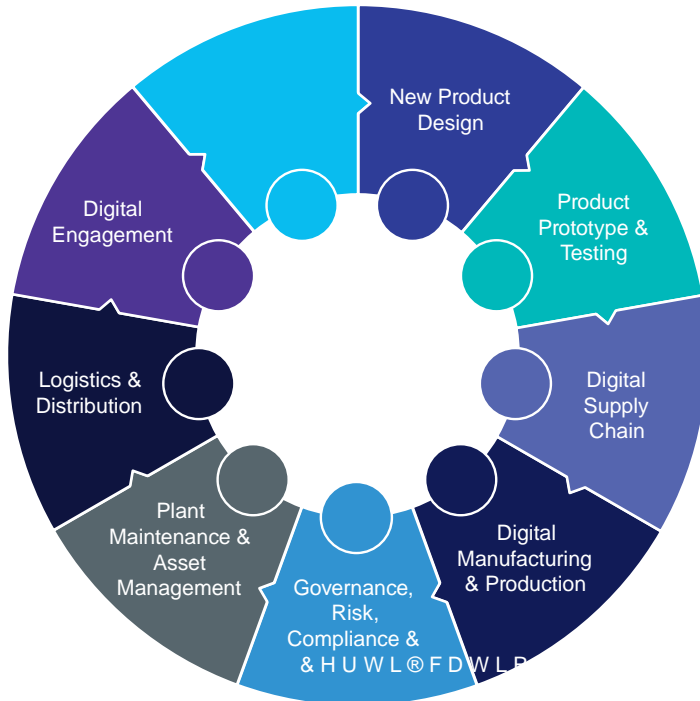
Strategies for Change Management

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F R P S D Q L H V W K D W P L V V H G W K H , Q W H H Q L O Q U W U , w Chief D J Q W a O R L Q J W R
2 – F H U R I GE and CEO of GE Digital

The world is changing at an incredible pace with new technologies causing upheavals in every industry. In the next few years, as many as one-third of all industry leaders will find themselves disrupted by a third-party platform competitor.[2] Despite this prediction,

Digital transformation in itself is not disruptive. Many digitization projects are implemented to improve performance or efficiency in the near future. The key is to identify the processes and organizational structures required for long-term success. Different scenarios can be created or explored to deepen understanding of a business problem. Business cases can then be created to drive short-term, measurable outcomes.

A business case should link business challenges to a strategic driver or business goal. Transformational business leaders need to establish a business case for digital transformation. Most projects do not move forward without a scrutinized business case. A business case should be based on existing processes, industry best-practices, and the positive impact an EIM solution can have on performance.

Most organizations have existing performance goals and objectives. These may be defined as Management by Objective (MBO) or as a Balanced Scorecard. Defining goals presents an opportunity to identify the processes that will directly influence objectives and demonstrate how improving the processes can improve overall business success. The ability to align process improvements directly to corporate objectives provides a clear and effective framework for illustrating business value and gaining executive sponsorship. C-level commitment is critical for any transformational project's success.

"Change management is a problem for everybody. We have customers
 D F U R V V   P X O W L S O H   K R U L] R Q W D O V   D Q G   Y H U W L F D O
requirements. Our approach is to provide digitization solutions to meet those
 F X V W R P H U V o   V S H F L ® F   U H T X L U H P H Q W V   : H   W U \   W R
early and often so that we have buy-in and they have a vested interest in the
success of the project that they're undertaking to automate their business
processes. To be successful, each software project needs a champion from
the business side. That person is responsible for implementing the change
that is required—the development and deployment issues of the application.
Without that person, the solution might as well be shelf-ware."

 õ 67(9(0$5.$11 9,&(35(6,'(17 2) &2817(532,17 &2168/7,1*

The operational goals of any business could not be achieved without strong leadership based on a coherent strategy. A strategy accounts for cultural shift and technology infrastructure challenges while supporting engagement across departments, partners,

Transformational Strategies

The manufacturer of the future will be holistic and expansive to include digital value chains and an extended ecosystem of customers, partners, and suppliers. IT infrastructure will be consolidated and processes streamlined to support superior omni-channel experiences and employee engagement. To implement transformational strategies, manufacturers should:

- Invest in emerging, digital technologies
- Integrate enterprise infrastructure (align IT/OT)
- Obsess about the customer
- Develop agile processes
- Expand the digital

Invest in Emerging, Digital Technologies

In the digital world, digital technologies will force organizations to explore new ways to engage with customers, create new products and services, and accelerate time-to-market. This moves beyond merely digitizing processes and, in many cases, will require radical shifts in core competencies, especially in IT. Strategic leaders will need to position their IT, support, and marketing organizations in relation to emerging digital technologies.

CIOs will lead their organizations on the digital transformation journey. They will have to meet the challenges of digital disruption by adopting key technologies for growth, especially around information management. CIOs will be forced to make investments as

Many manufacturing core processing systems were implemented pre-Internet and before mobile devices became ubiquitous. In the digital world, manufacturers will be transformed through the consolidation of technology onto platforms that allow for rapid application development of next-generation products, replacing development that moves at the speed of "zero-fault" tolerance. Continuous iteration, rapid feature enhancement, and short-term solutions will be developed as cheap, fast, and scalable pilots, replacing longer deployment cycles and the IT backlog that hinders the ability to capitalize on new opportunities.

Front-line and back-office employees will need to be empowered with the technologies to make their jobs easier and more efficient. This will entail monitoring advances in emerging technologies, along with the information required to operationalize the technology. As mobile, smart devices, and AI become standard, processes will have to evolve to support them. Technology will continue to force manufacturers to adopt new business models quickly and partner or outsource capabilities such as non-core business processes or system development and maintenance. One of the most important approaches the CIO can take is to align technology with business operations, or Information Technology (IT) with Operational Technology (OT).

Integrate Enterprise Infrastructure (Align IT/OT)

As the following figure illustrates, over a third of manufacturers have a "segregated" approach to ec

Manufacturers will need to think about how they integrate their B2B platform to back-

SAP

As a market leader in enterprise application software, SAP helps companies of all sizes and industries run better. From back office to boardroom, warehouse to storefront, desktop to mobile devices, SAP empowers people and organizations to work together more efficiently and use business insight more effectively to stay ahead of the competition. SAP applications and services enable more than 296,000

Z D Q W V   W R   E H   D E O H   W R   ®Q G   W K L V   L Q I R U P D W L R Q
and then manipulate it with a touch screen
for example, and that's the direction we're
moving in.

One of the key drivers of transformation is
meeting the needs of the digital consumer.
An SAP SlideShare called "99 Facts
About the Future of Business in the Digital
Economy," states that "By 2020, 50 percent
of digital transformation initiatives will fail
due to lack of an end-to-end customer
experience operating system." Systems
today are expected to support the customer
journey from end-to-end, and support
omni-channel G H O L Y H U \   I R U   D   P R U H   I X O ® O O L Q J
customer experience.

The retail landscape has shifted. Walmart,
who once dominated, is now under pressure
from Amazon—and this is all based on the
customer experience. Amazon can create
great customer experiences based on their
V H D U F K   F R P S R Q H Q W $ Q   H ¬ H F W L Y H   search is
E D V H G   R Q   W Z R   W K L Q J V   P H W D G D W D   D Q G   Y R O X P H
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To succeed, manufacturers and retailers must execute across physical and digital channels. As consumer shopping habits and technology continue to evolve, business models will have to keep pace, incorporating sensors, beacons, robots, and more. Putting customers at the center of all decisions will involve continuous collaboration

Tarkett
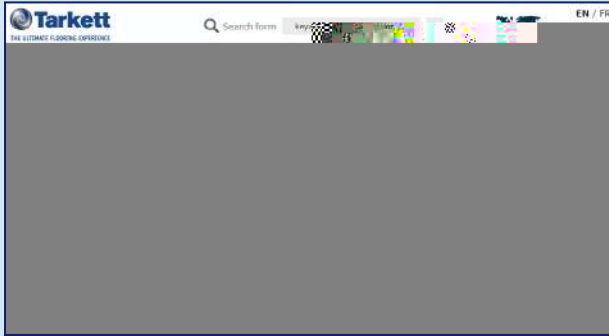
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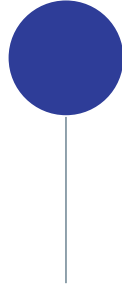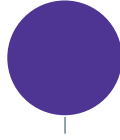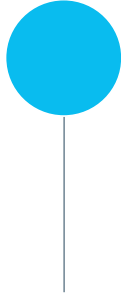
Figure 8.7: Bumble Bee Foods
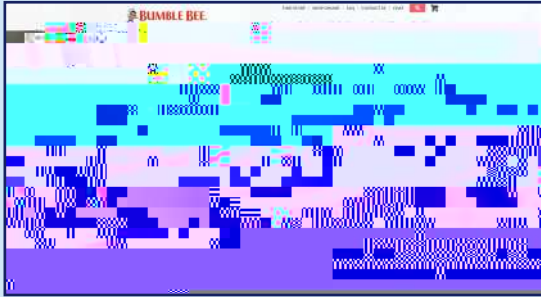
"We decreased invoice processing costs by over 50 percent, driven mainly by headcount redeployment, but also due to instituting a more automated process that reduces errors."

õ)55+ *2/'%(5* *(1(5$/
ACCOUNTING MANAGER, BUMBLE BEE FOODS

Bumble Bee Foods was founded by a handful of dedicated fishermen in 1899. Today, privately held and headquartered in the United States, Bumble Bee Foods, LLC is North America's largest branded shelf-stable seafood company, offering a full line of canned

Expand the Digital Ecosystem

Traditional manufacturing companies are focused on the efficient design, development, and delivery of physical goods. As more manufacturers shift from products to services and customer centricity, they will need to likewise shift their operations and processes to incorporate digital ecosystems. Supply chains will become supply networks.

We have already discussed how critical collaboration and innovation have become for digital manufacturers. Globalization has forced manufacturers to compete on many fronts. Software competence is becoming a key requirement. In the automotive industry, for example, the leading, global manufacturers will partner increasingly with new entrants like Apple and Google, as well as with specialized OEMs (especially for electric cars). This will lead to consolidation of the industry as manufacturers become part of a scalable, ecosystem in order to stay ahead of the disruption curve.

Partnership strategies will include outsourcing in the form of managed services for integration support. This is not just because manufacturers do not have the internal skills needed to understand and implement new technologies, but because the distraction of managing existing IT projects may preclude focusing on new and existing transformative business opportunities, such as the need for consolidating multiple IT systems or the need to move to the Cloud. Part of the transformation process involves knowing core competencies, where the business is in terms of digital transformation, and what can be outsourced.

In some ways, the technology barriers are the easy ones. Barriers such as lack of
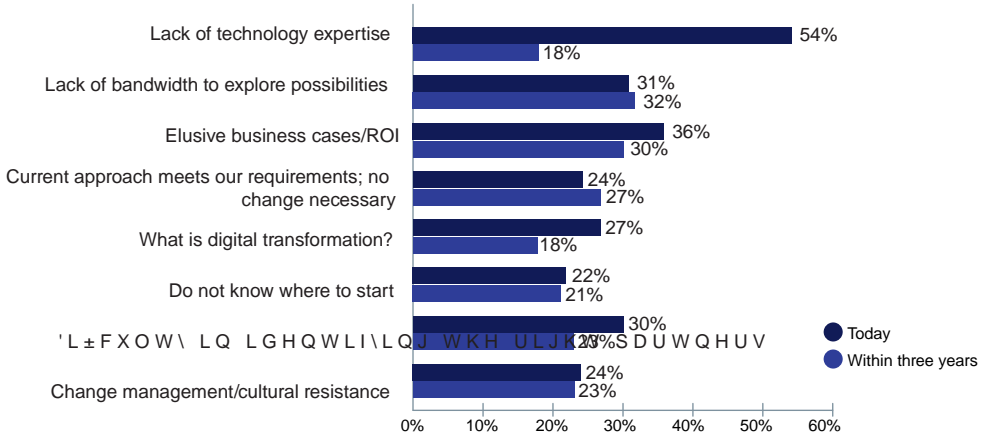
Figure 8.8: Barriers to Digitizing the Supply Chain [11]

Another effective way to improve capacity is to aggressively recruit and attract those w76e7e 7(i)4.7(r)3it6ruy is76e74.6(f s-23.39(k-24.3(g)-217e)-14.7(rl)-14.3(s)-14.8(ct-18.2

The impact of digital technologies on the workforce will be profound as entire industries become more entrenched in using disruptive technologies. Manufacturers should act now to prepare for the changes that digital will introduce, especially regarding the

Deloitte Consulting LLP

Deloitte Digital is an innovative leader in online and mobile strategy, design and development, offering world-class knowledge and resources from the leading global business and technology consultancy.
The company works with a wide range of iconic local and global organizations, helping them understand and profit from the online and mobile revolution. Their focus is on the areas of digital strategy, mobile, social/web, content management, and managed services—all underpinned by digital tech architecture, application implementation and development expertise.
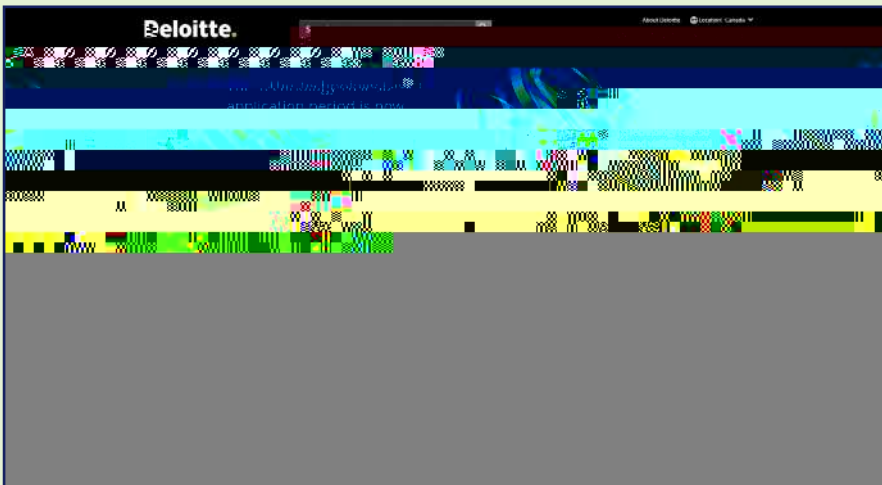
Figure 8.9: Deloitte Consulting LLP

What follows are excerpts from an interview with Michael Carlino, Principal at Deloitte Consulting LLP

"Deloitte as a brand consists of many entities. I'm in the group called Deloitte Digital and we're a part of Deloitte Consulting LLP. Basically, we deal with

Along with this shift, we've seen a change
in data. It's expanded beyond transactions
to include context. The value of information
lies in its context and the channels that we
can extract it from. So, the unstructured

RECOMMENDATION

When implementing a transformational strategy, a good first step is to take inventory of current enterprise information assets. This includes the following:

y Fragmentation - How many disconnected sources, flows, and archives do you have?

y Velocity - Which information processes need to be accelerated?

y Variety - What kind of information, media, documents, and discussions are you

1 Identify opportunities for transformation. Explore ways in which digital could disrupt the industry in the next decade. Review current and new business models. Where does the value lie for your company? Focus on core competencies and define how they can be transformed. Assess your current legacy systems and investments in information and process management/automation solutions.

2 Define an appropriate strategy based on goals and objectives. Clearly articulate your vision and strategy to ensure that your organization is committed to and aligned behind a common set of objectives. This means taking a stakeholder view early on to identify what's important company-wide. To know if you're on the right track, consider the following:

  y Organizational mission. What's the organization's long-term vision? What does it hope to achieve?

  y Objectives and goals. As with the mission, objectives also flow from the top of the organization down to the department level, and can take the form of financial goals (i.e., profits) or departmental goals (e.g., to achieve a certain level of market share). Objectives also help to shape the lower-level metrics and Key Performance Indicators (KPIs) that will become part of their measurable strategy.

  y Current activities. Current activities and programs should be reviewed in order to make decisions on how these activities will be measured.

  y Capabilities required: Technology, skills, mindsets, and partners. Consider how you will identify, recruit, and retain new talent.

3 Evaluate your business case. Determine costs. Outline benefits and risks to the business. Engage early in discussions on governance, security, risk, and liability. Consider current information-based processes and procedures. Measures should be chosen based on the processes already in place. Eventually it will become evident as to which top-level, operational, or strategic goals these measurement areas impact. Prioritize initiatives and assign KPIs that can be measured. Have a clear understanding of your capabilities and limitations.

4 Have a strong champion and dedicated team. During the initial stages of an implementation, most organizations have a champion included in the planning process, as well as the one or two individuals who act as the system's administrators. The champion provides knowledge of the organization's strategy management history and specifies the overall goals and vision of the transformation program moving forward. The system administrators typically take on the remaining responsibilities: coordinating various meetings with the departments for measure identification, building the actual database into the system, and organizing training. This central team manages all business processes that support the program as a whole.

5. Recognize that transformation is not solely a technological issue. Culture and organizational challenges will also need to be addressed.

6.

The Digital Call to Action

In the current complex, digital landscape, manufacturers that adopt new digital business models will be well positioned for success in the digital world. Given the transformational benefits of deploying a comprehensive EIM solution, future business leaders will make information management a top priority. As champions of a digital agenda, they will demonstrate how technology can facilitate change and investments in EIM technology, integrated B2B services, and automated processes will transform the industry.

ENDNOTES

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Mark J. Barrenechea joined OpenText as President and Chief Executive Officer in January 2012, and also serves as a member of the Board. In January 2016, Mark took on the role of Chief Technology Officer.

Mark oversees the strategic direction of the organization. Under his direction, the Company has grown both organically and through strategic acquisitions into a $2.3 billion technology company and has successfully transformed into an Enterprise Information Management leader.

Mark has received many accolades recognizing his leadership and innovation over the years including the 2011 Best Large Company CEO from the San Francisco Business Times and the 2015 Results-Oriented CEO of the year by the CEO World Awards.

In addition, Mark has authored several books including The Golden Age