

# Digital Supply Chain

*Fast, Accurate, Smart*

Mayo Clinic – Rochester, MN  
Erich Heneke – Director of Supply Chain

# Why are we here - agenda

- Mayo / Supply Chain Information
- The 'why'
- What is this 'digital stuff?' Defining it...
- Mayo's digital mission
- Examples throughout

This is a holistic Supply Chain strategy (not just payables)

# Mayo Clinic and Mayo Clinic Health System

- Charitable, not-for-profit, academic medical center
- In 2017, Mayo Clinic and Mayo Clinic Health System:
  - Ranked Best Hospital and #1 in more specialties than any other hospital in the nation\*
  - Realized \$12.0 billion in revenue (net and other sources)
  - Total personnel of 59,030 consisting of physicians, scientists, allied health staff, research associates, residents, fellows and students
  - Operated 22 hospitals in 5 states
  - Provided essential health care services to more than 1.3 million patients, from 50 states and 136 countries.

\* U.S. News and World Report, Mayo Clinic Rochester

# Mayo Clinic Supply Chain Facts

- 2017 Supplies & Purchased Services - \$3.4+ billion
  - Supplies - \$2.4B / Purchased Services - \$1.0B
  - Capital for 2017 - \$ 705M
- 605 FTEs; Operating plan of \$48.6M for 2018
- Technology
  - Infor, GHX, SAP/Business Objects, SAP/Concur, Pyxis, CIMS, SC Logic, Par Ex, Ecteon, Direct Commerce, Tecsys, Hyland, etc.
- Mayo Clinic is a member and service provider – **Captis, LLC.** – a regional aggregation supply network
- Gartner's Top 25 Supply Chains in Healthcare
  - 2017 – Ranked #2; 2015 – First healthcare provider to be ranked #1.
  - Recognized since 2009 and placed in the Top 5 each year since 2011.

True to the mission of Mayo Clinic  
the Digital Supply chain will be clinically integrated  
and delight its customers

# About the “Why?”

- Question: Does anyone in this room find healthcare affordable?
  - Costs are unsustainable in healthcare
  - New strategies are required to drive costs downward
- Question: Does your organization encourage/require you to drive out waste and drive out cost?
  - Most organizations are looking for strategies to lower costs and overhead

# A vision for the digital healthcare supply chain

- Americans spend \$10,600 annually on healthcare on an income of \$61,000
- 20-30% of healthcare expense is Supply Chain
- $\frac{1}{3}$  of supply chain expense is administrative (marketing, selling, distributing)

*Healthcare supply chain is highly fractured, therefore inefficient.*

# Key Supply Chain Trends (Outside of Healthcare)

- Demonstration of **demand-driven** leadership.
- **Sharing** of Best Practices as a way to raise the bar of everyone in supply chain.
- Massive shift in creating **digital** connections.
- **Lights-out** operations (robots and AI).
- Complete **visibility** to not only what is on the shelf but also people, process, things, and availability of alternatives (in real-time).
- **Agility, flexibility** and **speed** through modular systems, integration points and teams.





# Can digital help?

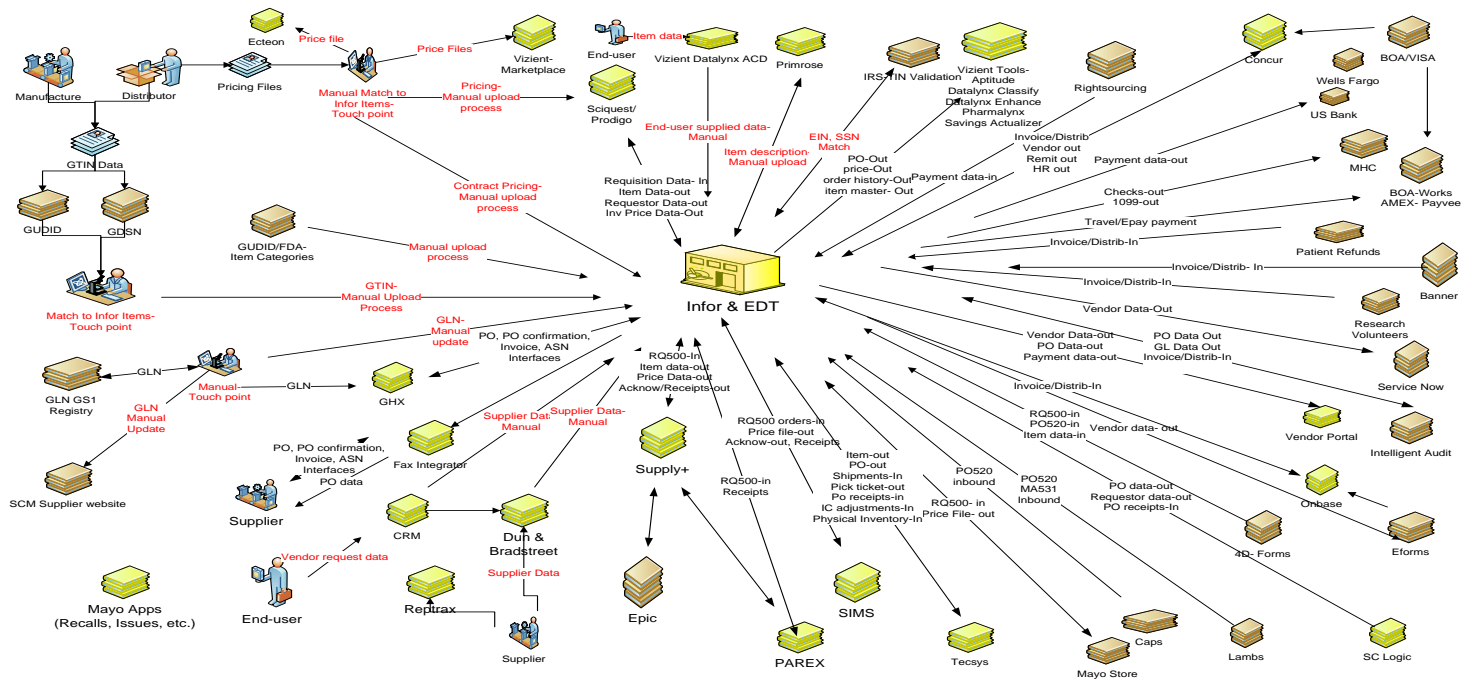
One of the biggest opportunities to improve efficiency and lower cost is 'Digital'

Digital includes computers, internet, big data, and software that enable automation of what otherwise would require continuous manual intervention

- It's the 'platform-approach'

Enterprise Resource Planning (ERP) is one example, but falls short since it is confined to specific sequences and cannot readily accommodate the power of machine learning and AI

The current IT strategy has centered on Convergence and the ERP as the central information management platform...



# Digital mission

In order to dramatically **lower cost** while **improving value**, each function of the supply chain will need to work together in a smarter manner.

The Digital Supply Chain (DSC) strategy is a plan to **optimize** years of convergence through an integrated information management platform that seamlessly **connects** and **coordinates** each process so that the entire system can be optimized.

Furthermore, it enables the delivery of the products, information and services needed to manage health delivery across the entire ecosystem at a **speed, reach** and **scale** that is characterized by a fully mature Shared Service.

# What is digital?

- A platform that provides new levels of productivity, scale, value and innovation through 'borderless' transactions driven by big data and AI
- Reduces repetitive or mundane tasks
- Increases staff opportunity for higher skilled roles

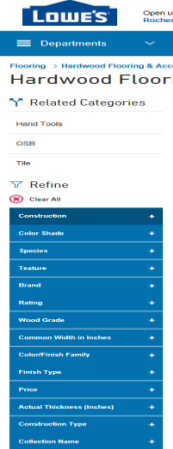
*Examples of Digital ... Google, Siri, Alexa, Kayak, Uber, Lyft*

# Digital Data Management Example

- Online shopping sites like Lowe's store hundreds of data attributes on the products they sell.
- How it works...

Manufacturer sends product attributes to Lowe's PIM

Attributes to online platform →



Consumer searches for flooring and compares options

Attribute	TimberTech	TimberTech	TimberTech
Item Number	44115	144447	44444
Model ID	44115	144447	44444
Material	TimberTech	TimberTech	TimberTech
Price	\$1.19	\$1.19	\$1.19
Retail Price	\$1.19	\$1.19	\$1.19
Actual Length (inches)	48	48	48
Actual Width (inches)	6	6	6
Actual Thickness (inches)	0.75	0.75	0.75
Material	TimberTech	TimberTech	TimberTech
Price	\$1.19	\$1.19	\$1.19
Retail Price	\$1.19	\$1.19	\$1.19

Consumer uses attribute data online to determine that Cali Bamboo flooring is the same as Americas Best Flooring but \$1 less per sq. ft.

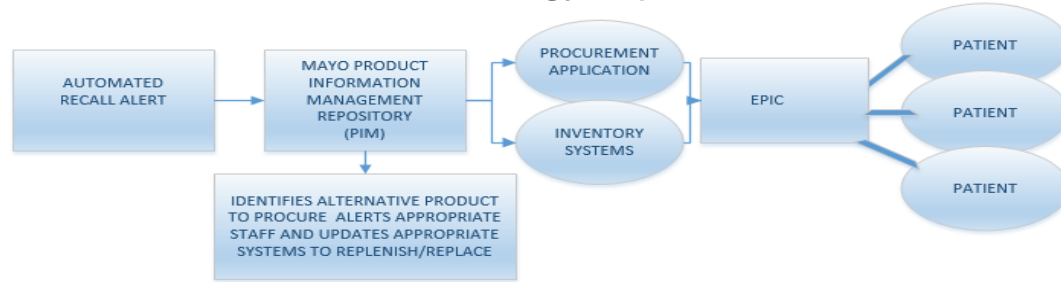
Consumer purchases Cali Bamboo Flooring



- Storage and use of unique product attributes allow consumers to make informed decisions about the products they are purchasing.
- Attributes storage gives shoppers the ability to do refined searches to quickly identify preferred product characteristics
- Product attribute visibility makes it easy to compare like products
- Attribute visibility allows consumer to look for replacement or substitute products

# Supply Chain Data Management Example

- **RECALL ALERT:** FDA issues Class I recall on key medical item
- Mayo Clinic prevents potential patient safety risk by implementing robust data management and automation technology to process Medical Device recalls.



- Mayo received an API call from the FDA alerting of a Class I recall.....Using RPA, they searched their PIM by utilizing product attributes to identify impacted products and kicked off an automated event to identify the purchases and location of impacted devices.
- When inventory was located, an alert appeared on inventory mgmt dashboards with instructions to remove the product, and utilized an automated 'event manager' to kick off a product return.
- The BOT also identifies the appropriate substitution utilizing cross-reference attributes in the PIM, and alerted appropriate SCM staff with instructions on replacing the recalled products.
- The EHR application was alerted with the recalled serial #'s tied to impacted patient cases, and kicked off appropriate automated notifications to the applicable procedural areas, and patient, if applicable.
- By collecting accurate product data, and utilizing automation and API tools, the recall process is **FAST, ACCURATE and EFFICIENT.**

# Digital is here ...

Mayo Clinic has embarked on the conceptualization of its next generation Information Management Platform to enable a truly “Digital” Supply Chain

This long-term vision will be agile and cross-functional

*The “smarter” Supply Chain is enabled through analytics and automation*

# Digital Transformation

Digitization ≠ Digital Transformation

## Digital Technologies

- Internet
- Mobile
- Embedded sensors
- Cloud
- Social Media
- Enterprise Platforms
- Public or open platforms
- Artificial intelligence/cognitive computing
- 3-D printing

## Digital Transformation

The use of digital **technologies** and the **data** they produce to

- **Connect** organizations, people, physical assets, processes, etc. in new ways
- **Build deeper customer relationships**
- **Rapidly innovate** products, services, business models
- **Build (digital) business strategy**



# Digital examples ...

Smart process automation can be used to ...

- Automate item add process
- Triage recall events
- Disseminate contract renewal bids
- Detect shifts in preference cards to proactively adjust inventory strategy

# Digital is good ...

Digital will make our jobs quicker, easier, smarter ...

- Real-time information
- Frustration-free analytics (hopefully)
- Automated processes
- Technology that empowers decision-making

*If only I had the right data, I could make the right decision*

# SCM apps should be modular and connected through a standardized API Management System...

- What is a API Management?
  - Application programming interface (API)
  - Runs real-time or close to it
  - Can be scaled and added to
- What benefits are gained through APIs?
  - Flexibility and highly customizable
  - Creation of end-to-end E2E Supply Chain processes
  - Upgrades/changes without costly and time-intensive upgrades (agility)

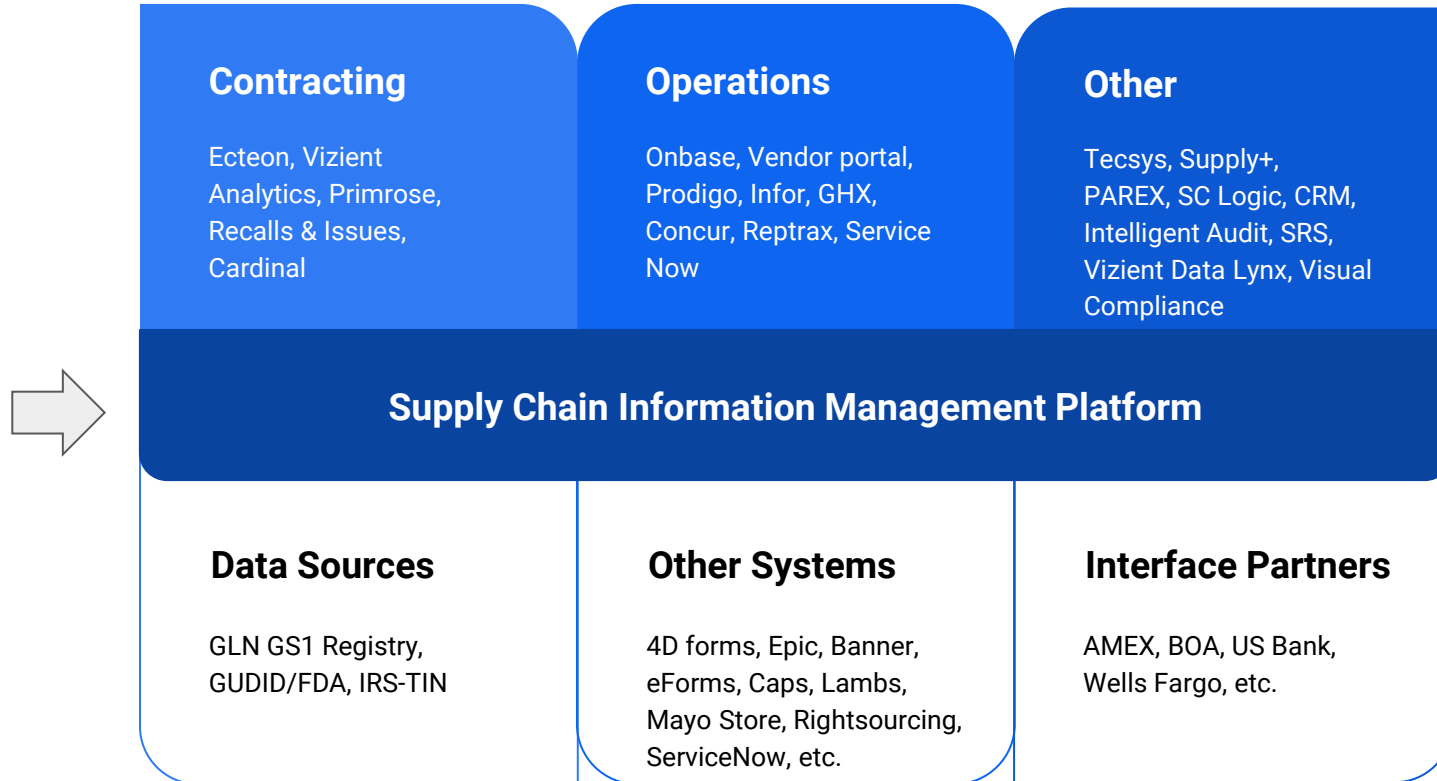
# What is the information management platform?

A centralized system for collecting, analyzing and acting on large sets of data originating from disparate sources. Its sole purpose is to ingest, enrich, harmonize and act on the vast amount of available information.

## Characteristics

- Non-linear
- Highly scalable, automated
- Enables simultaneous smart processes
- Empowers efficiency, insight, and innovation

# Digital lives in the middle ...



# Digital Functions ...

Digital uses the Information Management Platform to perform five primary functions ...

- Process Automation ... less repetition
- API Management ... less finagling
- Dynamic Analytics ... less obscurity
- Data Management ... more reliability
- Innovation Sandbox ... more experimentation

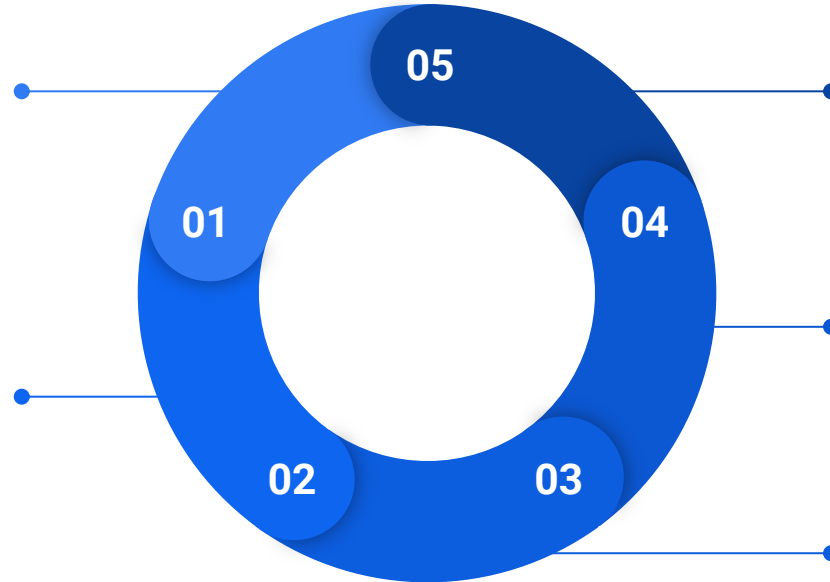
# Digital Functions ...

## Process Automation

Automates repetitive, logic-based tasks.

## Process Integration

Connects processes holistically



## Innovation Sandbox

Supports rapid development and testing of new ideas.

## Data Management

Understanding, cleansing, integrating, governing, mastering and monitoring data

## Dynamic Analytics

Flexible, real-time analytics that support business needs

# Process Automation

*Automates repetitive, logic-based tasks*

- Robotic Process Automation (RPA)
  - Automates repetitive, logic-based tasks, with little programming effort
- Business Process Automation (BPA)
  - Any combination of automation to maximize the value of the business's activities
- Intelligent Data Capture (IDC)
  - Software that 'reads' characters off an image of a page, creating a digital version of the data
- Cognitive Automation
  - A mix of decision-trees, machine learning, and algorithms that remembers users actions
- Physical Automation (Robotics)
  - Automation that mimics human actions with visible, tangible apparatus (e.g. Roomba vacuum)



# Process Automation

## Benefits

- Automate manual tasks
- Eliminate keying errors
- Speed up processes
- Link applications together
- Systematically enforce internal controls
- Ensure data integrity

*Allows SCM to automate back-office activities and maximize value*

# Process Integration

APIs establish digital connections for people, business processes and things. These interfaces enable modular functionality to accommodate new products, business models and innovations.

## Characteristics

- Real-time
- Standardized
- Enables adaptability and scalability

# Dynamic Analytics

Allows seamless access to just-in-time data across the technology landscape.  
Supports customer and business needs with reduced system constraints.

## Characteristics

- Flexible and agile
- Trusted and accurate
- Architected for growth
- Eliminates need to remodel data structures

*Empowers technology advancement, and provides metrics that matter*

# Data Management

Includes understanding, cleansing, integrating, governing, mastering and monitoring data as a strategic asset.

Supporting functions including “Data ...”

- Access
- Knowledge
- Preparation
- Quality
- Governance

*Delivering the right data to the right people at the right time.*

# Data Management - *benefits*

	Current State	Future State
Data Acquisition	Manual	Automated
Product Visibility	<30% of contracted products	100% of contracted products
Product Attribution	Limited; primarily ERP transactional	Robust; enhanced based on specific business needs
Process	Linear, manual	Automated
Data Integrity	Reactive	Continuous management
Speed to Market	Days or weeks	Hours







# Sandbox - *what is it?*

A place where you can play without consequences, and where you can destroy and rebuild your successive imperfect attempts at creating something.

## Characteristics

- Supports rapid development and testing of new ideas
- Enables 'idea recycling' (ecosystem of different combinations of ideas)
- Unleashes maximum innovation by removing technological barriers

*Keeps operations, products and services fresh without impacting production*

	Today	Future	Tools & Drivers
	Efficient	Intelligent	<ul style="list-style-type: none"> <li>• Big Data</li> <li>• Machine Learning</li> <li>• Artificial Intelligence</li> </ul>
	Control	Orchestration	<ul style="list-style-type: none"> <li>• Master Data Management</li> <li>• Data Quality</li> <li>• APIs</li> </ul>
	P2P	E2E	<ul style="list-style-type: none"> <li>• Demand-Driven Inventory</li> <li>• Smart Contracts</li> <li>• Blockchain</li> </ul>
	In-the-office	In-the-field	<ul style="list-style-type: none"> <li>• Mobile</li> <li>• Augmented Reality</li> <li>• Market Places</li> </ul>
	Workflow	Automation	<ul style="list-style-type: none"> <li>• IOT</li> <li>• Sensors</li> <li>• Data Bots</li> <li>• Autonomous Machines</li> </ul>
	Implementation	Innovation	<ul style="list-style-type: none"> <li>• Innovative Sandbox</li> <li>• Agile Development</li> <li>• Portfolio Management</li> </ul>

# Next Steps

Engage SCM, Mayo IT Architecture and others for strategy and guidance to pilot 1st Generation model

- Dynamic Analytics - Leverage newer memory tools to bypass static and expensive data marts. Create self-service tools.
- Master Data Management - Leverage MDM to manage data delivery, governance, and quality.
- API - Standardize and apply best practices
- Process Automation - Pilot using Automation Anywhere and perhaps MDM.

*At the conclusion of these pilots, a complete strategy could be delivered including potential projects, benefits/value, organizational impact, investment plan, etc.*



# How does this disrupt the payments space?

- Imagine a fully integrated purchase to pay process
  - Products are auto-ordered based off agile demand projections and on-hand inventory (via bot)
  - Communication is managed B2B through smart bot automation
    - Including backorders, recalls, and stockouts
  - Items are shipped by a supplier, which are tracked and traced electronically
  - Items are received automatically via scan at the loading dock, routed appropriately
  - Purchasing system → receiving system → payables systems integrated with 3-way match
  - Invoice is received electronically confirming 3-way match
  - Invoice paid electronically

# Process Automation Trends

1. RPA has become a dominant theme in back-office performance improvement
  - *‘Everything that can be automated will be automated’* - Though many RPA technologies are still relatively immature, it's estimated that robotic automation at large is already impacting up to 40% of back-office processes for businesses.
2. Massive proliferation of automation and artificial intelligence (AI) will continue
  - AI is expected to be better equipped than humans to write a high school essays by 2026, drive a truck by 2027, work in retail by 2031, write a best-selling book by 2049, and perform surgery by 2053. There is a 50 percent chance AI will outperform all human tasks in 45 years and automate all human jobs in 120 years.
3. “Chat” bots like Siri and Alexa extending into customer support and basic service management functions
  - In a survey by Oracle of chief marketing officers, chief strategy officers, senior marketers, and senior sales executives from France, the Netherlands, South Africa, and the UK, 80% of the respondents said they already used chatbots or planned to use them by 2020.
4. Cognitive technologies being piloted in healthcare to more quickly and accurately diagnose.
  - The healthcare artificial intelligence segment is projected to see a staggering 40 percent compound annual growth rate (CAGR) between 2017 and 2024, resulting in a \$10 billion market focused on medical imaging, diagnostics, personal AI assistants, drug discovery, and genomics.

# Supply Chain Process Automation Example

Mayo SCM utilizes smart automation technologies to automate item add process, dramatically improving data quality, speed to availability and end user satisfaction. How it works...

Template captures  
key elements



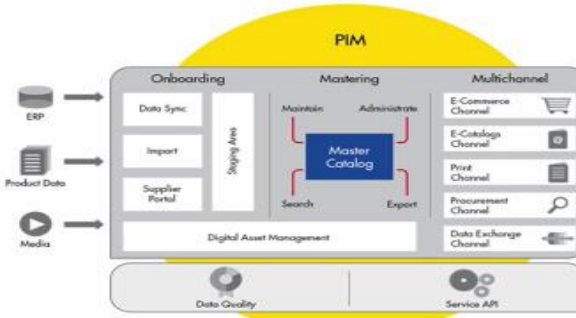
ITEM ADD REQUEST

**Instructions:** This form is to be used to submit any item add requests related. If your request references or includes a Purci get it processed.

## Requestor Information

LAN ID\* Name  
jmr06 Jennifer M Rahlf  
Work Location Work Phone Work Pager  
RO\_OW\_02\_57.6 (77)3-2165  
☒ Yes ☐ No Are you submitting this form as a delegate?\*

Calls to PIM



Completed data elements  
pushed to Lawson

- Smart form utilized as a template to gather necessary data elements for the item add from the requestor
- Business Process Automation (BPA) tool triggers a series of automated processes to gather relevant/required data elements via public and Mayo proprietary data sources - manual routing eliminated
- Augmented human intelligence is utilized to enhance data elements
- Completed data elements pushed to Lawson and auto-notification sent to requestor

# Roles

**Engineer** – Stand up Information Management Platform  
(enterprise Tableau server)

**Expert** – Manage and support Information Management Platform  
(identifies needs, provides training, develops standards, assists accelerators)

**Accelerator** – Generate content using Information Management Platform  
(e.g. uses Tableau to generate a back-order dashboard)

**Consumer** – Leverage content generated by Accelerator to deliver service  
(e.g. uses back order dashboard to address and prevent back orders)

# Roles (cont.)

**Admin Apps** – name of the IT group that support our systems

**Operations Systems** – SCM team supporting logistics systems  
(Par, Wave Mark, etc.)

**ASCI** – SCM team supporting source-to-settle systems (S2S)  
(ERP, Prodigio, etc.)

# The challenges...

- **Efficiency** – Because each function works independently more work is generated by the system than necessary.
- **Scale** – Often Healthcare IT solutions that are readily available are built to meet the needs of the mass market (small to medium sized Hospitals). As a result, enterprise functions such as mass configuration is unavailable.
- **Master Data**– With data being stored in multiple systems it is very difficult to have integrity across each system. Today the ERP is used as the source of truth but it does not have the functionality to work outside of the ERP.

# More challenges...

- **Agility** – Today the ERP system typically acts as the central information hub of the supply chain.
- **People Metrics** – While information is available for the supplies that move through our supply chain, data is lacking in regards to the people who are key actors in carrying out day to day activities.

# Q&A

*The “smarter” Supply Chain is enabled through analytics and automation*

*Erich Heneke*

*Supply Chain Director*

[Heneke.erich@mayo.edu](mailto:Heneke.erich@mayo.edu)