



Beyond the organization with ERP Integration

ACMA4022- Supply Chain Informatics
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Session overviews

- Top extended ERP modules & applications
- ERP integration approaches
- Benefits & challenges of ERP integration
- Integrated features, benefits & challenges of ERP extensions
 - CRM (Customer Relationship Management)
 - SCM (Supply Chain Management)
 - Business Intelligence tool
 - E-Commerce platform
 - WMS (Warehouse management system)
 - TMS (Transport management system)

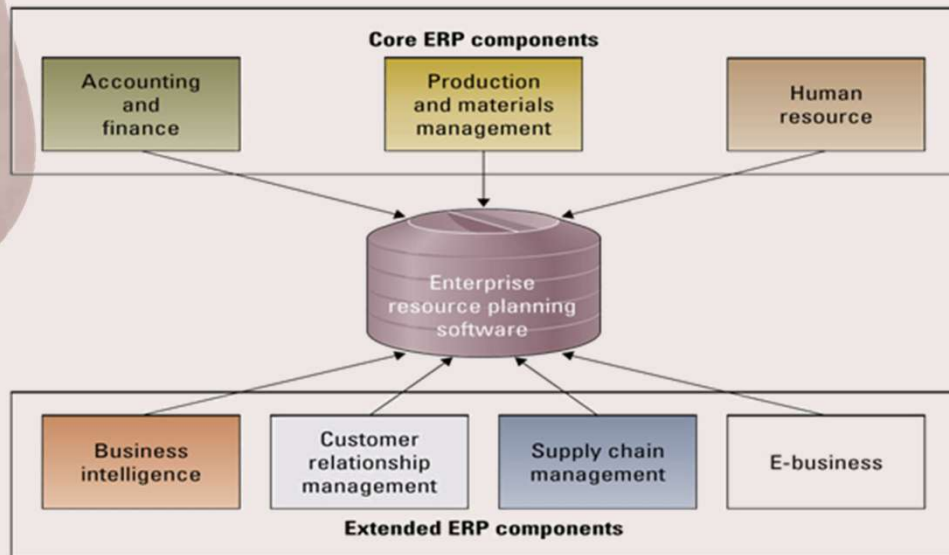


ERP Recaps



- **ERP (Enterprise Resource Planning) system** is the tool that include core processes within a company and having a single common database to use across functions.
- ERP features revolve around the **business processes**, core processes such as Production, Sales and distribution, Purchasing, Financial and Human resources.
- **ERP implementation is a project** required cautiously planning, developing, deployment and support from all parts of the company due to the complexity & lengthy implementation.
- ERP system can be extended beyond its organization by integrating with other system such as CRM, SCM, E-commerce platforms or Business Intelligence tools.

Extended ERP Modules



Customer Relationship Management - CRM module support all aspects of customer's relationship with the firm. It also provide integrated view of customer's behaviors & interactions data helping company's responsiveness to what customers really need.

Supply Chain Management - SCM module manage the information flow in every stages of a supply chain since the materials movements from suppliers, controlling of warehousing process to distribution process of finish goods the customers, including tracking external companies' handling of products, which deals with the coordination among various supply chain partners.

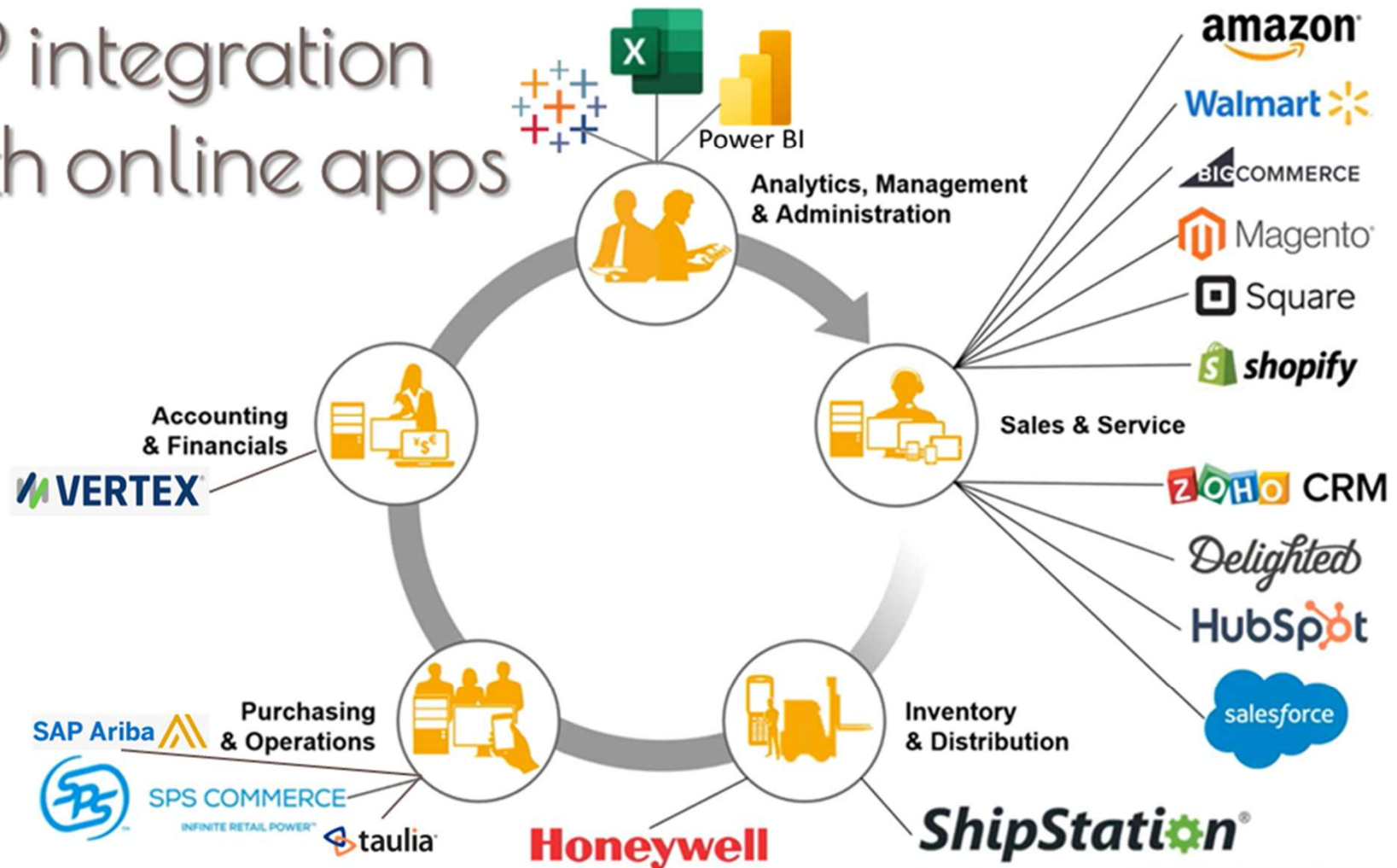
Business Intelligence – BI module collect information throughout the company, organize it and provide analytical tools into reports, dashboards or visualizations for assisting users to easily monitor KPIs, spot trends, get actionable insights and make informed business decisions in real time. Decision Support Systems (DSS) could also be integrated in this module.

E-Business – including the integration with E-logistics, E-procurement or E-Commerce tool. The module can simplify the online transactions, sharing information & allow traceability among business partners which can be accessed over internet.

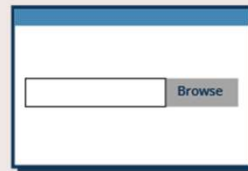
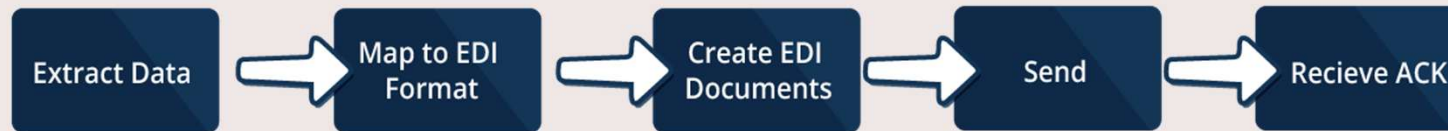
Top lists: extended ERP applications

Applications	Products/Vendors
CRM (Customer Relationship Management)	Salesforce, Infor CRM, Oracle CX, Microsoft Dynamics 365
HCM (Human Capital Management)	SAP Success Factors, Kronos, Oracle HCM Cloud, Ceridian
SCM (Supply Chain Management)	Oracle SCM, SAP SCM, Blue yonder, Logility
Business Intelligence & Analytics	Microsoft Power BI, Tableau, QlikView, SAS, Cognos
Sourcing & Procurement	SAP Ariba, Coupa, Workday, iValua, Bravo Solutions
WMS (Warehouse Management system)	Oracle WMS, Manhattan Associates, JDA, Fishbowl
TMS (Transport Management system)	Ship Station, Mercury
E-Commerce platforms	Amazon, Shopify, BigCommerce

ERP integration with online apps



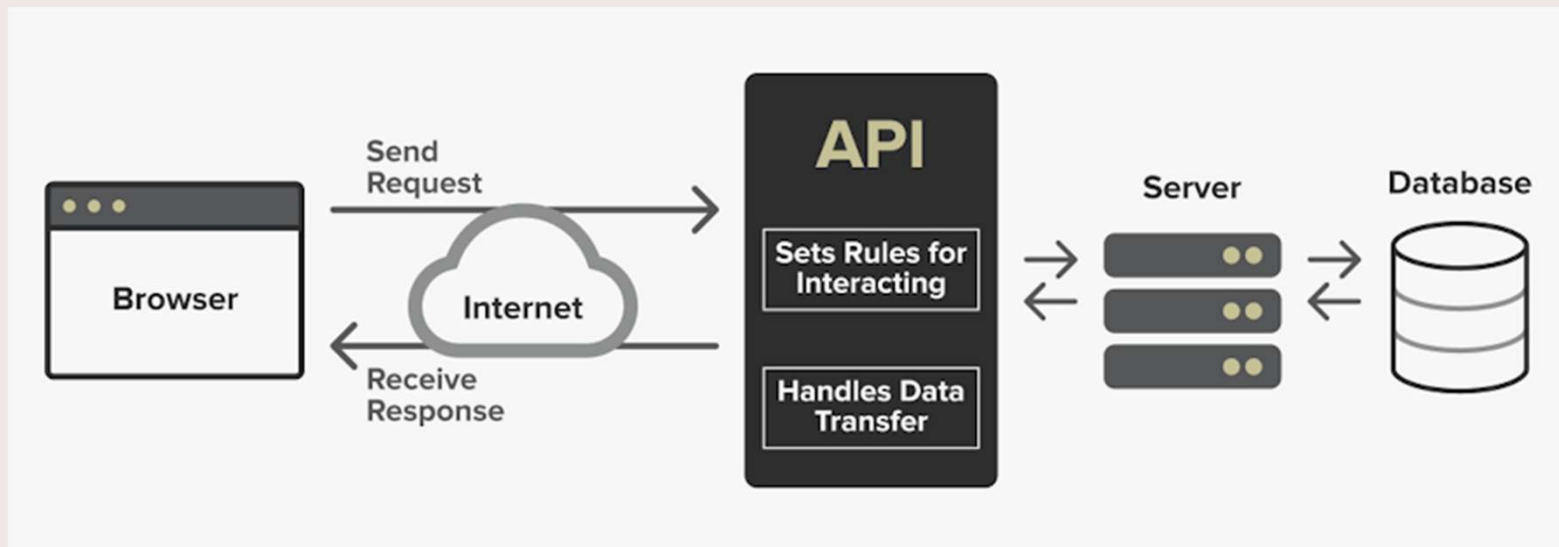
ERP integration approaches



EDI : Electronic Data Interchanging

- Automates information flow, without any human interaction reducing the cost associated with: Manual document management (overhead costs) and data entry error.
- Uses an intermediary layer, known as middleware, to facilitate communication between different systems.
- High reliance on the availability, scalability, and performance of middleware
- Compatibility with various communication protocols & EDI standards

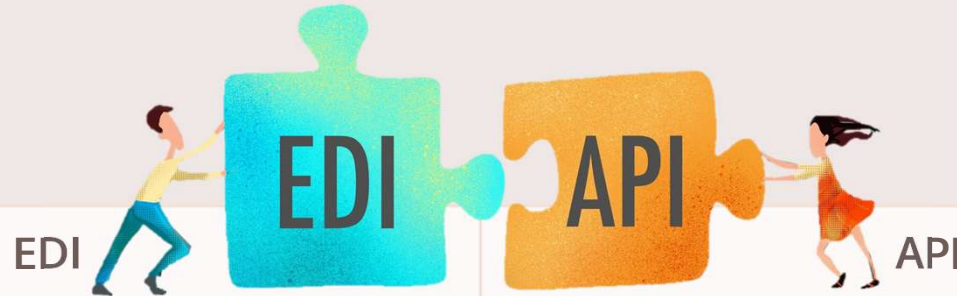
ERP integration approaches



API : Application Programming Interface

- Specific instructions software to help multi-applications communicate with each other.
- Enables real-time data exchange including data structures, routine specifications
- Customize to fit specific needs, leading to better alignment with unique operational requirements.
- Security measures should be in place to protect sensitive data vulnerabilities.

Differences between EDI and API



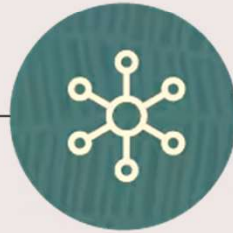
	EDI	API
Transfer concept	Established messaging standards files for <i>batch exchange</i> via secured network	<i>Real-time data exchange</i> by preset programming over the cloud using internet
Data size	Capable of handling mass data size	Not intended for mass data transmission
Standards	Standard protocols set with industry and region-specific options	Customizable, no established standards
Security	<i>Very secured</i> , only authorised users, Trusted solution to fulfill compliance regulations	<i>Less secured</i> due to via public internet. May not be suitable to adhere to compliance regulations
Ease of on-boarding	New partners, especially those who are pre-connected to provider's network, can be on-boarded easily and quickly	The data layer for API implementation needs to be built
Implementation	Easier to integrate with legacy systems. Need 3 rd providers for data files conversion.	Not compatible with legacy systems. Requires IT resources for develop & maintain.

ERP integration approaches



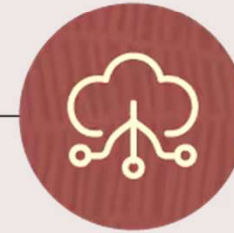
Point-to-Point

- For integration between two systems.
- Simple and fast.
- Highly customizable.
- Difficult to scale.
- Ideal for smaller, less complex organizations.



Enterprise Service Bus

- For integration between two or more systems.
- Customizable and scalable.
- Can be expensive and require more resources.
- Failure in one system affects all.



Integration Platform as a Service

- For integration between two or more systems.
- Easy to use, highly scalable, and affordable.
- Limited customizations.
- Potentially greater security risks.

Choosing the integration approach will depend on the specific circumstances & factors such as budgets, technical complexity and IT resources at hands.

Common ERP integration challenges

COMPATIBILITY ISSUES

Different applications may use different data formats or APIs, making it difficult to integrate data between them.



TECHNICAL COMPLEXITY

Integrating complex systems may require advanced technical knowledge and expertise.



SECURITY CONCERNS

Integrating multiple systems may increase the risk of data breaches or other security issues.



COST

Integrating multiple systems can be expensive, especially if you need to hire outside experts or purchase specialized software.



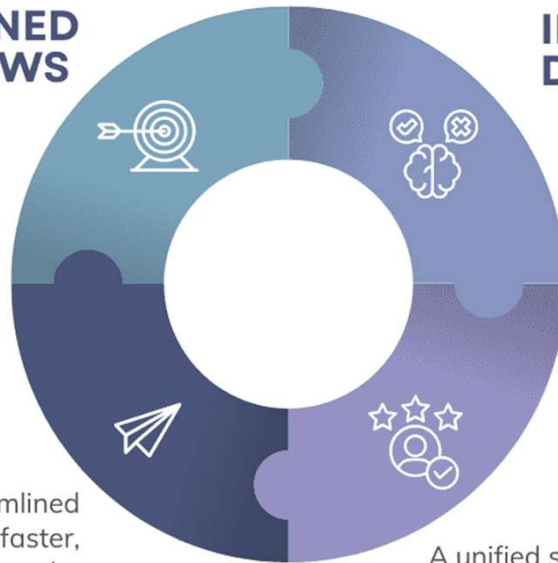
Benefits of integrating your ERP system

STREAMLINED WORKFLOWS

Integrating your ERP system with other applications can eliminate manual data entry and reduce the risk of errors and delays.

INCREASED EFFICIENCY

Automation and streamlined workflows can lead to faster, more efficient processes and a more productive workforce.



IMPROVED DECISION-MAKING

A unified business management solution provides a single source of truth for data, allowing for more accurate and informed decision-making.

BETTER CUSTOMER EXPERIENCE

A unified solution can improve customer service by providing employees with access to customer data across multiple systems.

CRM application

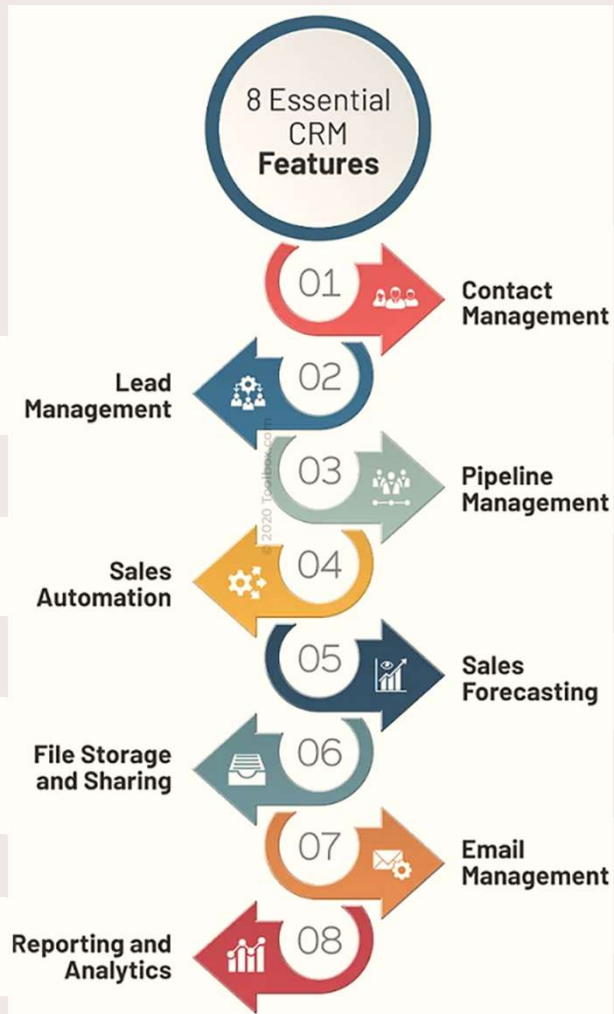
CRM system helps businesses manage relationships with customers, provide end-to-end customer care to increase sales from acquire new and retain existing customer, consolidate & maintain customer data, track customer interactions, and enhance sales ability.

Keep track & overview of leads potential customers with historical journeys.

Automation sales activities & related tasks, optimize cross-selling and up-selling

Real-time access and store to the common customer database shared by sales reps and related professionals

Visualised dashboard keep track of sales performance, market trends, targets



Capture and track relevant data about customers enable easy access up-to-date information

Keep track of current customers, leads and deals within accountable pipelines

Forecast future sales, visualise potentials, help focusing to push hot leads as priority

Provide sales reps with easy email tools, generate or reply mails right from the CRM software interface

CRM ↔ ERP Integration

An ERP system streamlines and integrates critical back-office functions, while **CRM** enables efficient customer information management, drives customer acquisition and retention and helps increase sales

By integrating **CRM** system with ERP system, you'll gain a holistic view of customers' needs and preferences, improve communication and collaboration throughout your organization from using single sources of customer information .

Possible Data Integrations Between Salesforce and ERP

Salesforce		ERP Data
Contacts	↔	Contacts
Prices	←	Prices
Products	←	Products
Opportunities	→	Orders
Orders	←	Orders
Accounts	↔	Customers
Sales History	←	Invoices & Credit Notes
Payments	←	Ledger Entries

Reasons to Integrate CRM and ERP

1. Consolidated Sales Process from different channels
2. Complete view of your customer to improve **relationship** with customers
3. Accessibility of important Information to improve responsiveness & **customer satisfaction**
4. Improved sales forecasting and visibility
5. Streamline & automate business process in marketing, sales and customer services.

▶ EXAMPLE : E-ENABLE SALESFORCE HCB/P

- ▶ Henkel customizes Salesforce CRM software & integrates information with their ERP system (SAP) to improve sales

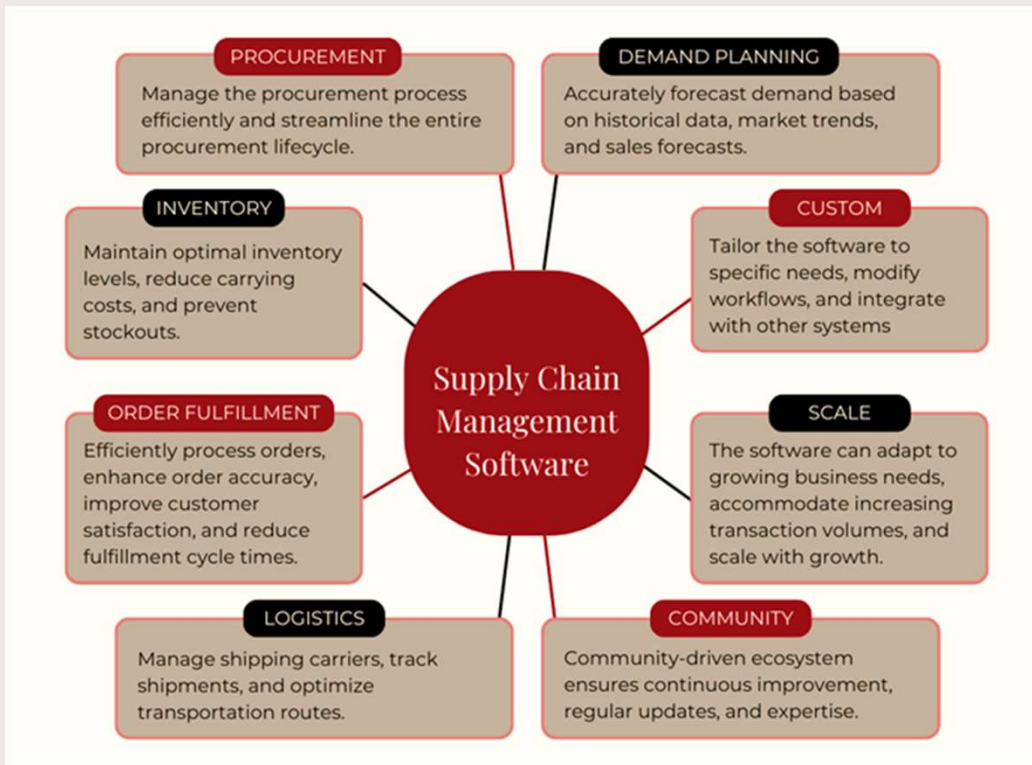
▶ Key touchpoints

- ▶ Building brand perception
- ▶ Sync master data of product & customer
- ▶ Real-time stock availability
- ▶ Accounts & pipeline management within app
- ▶ Automate order process
- ▶ Tracking orders real time
- ▶ Billing documents accessibility
- ▶ Enhance communications & reminders management.
- ▶ Allow performance visibility

SCM application

SCM software is a cross-functional interenterprise system that uses information technology to help support and manage the links between some of company's key processes and processes of the suppliers, customers, and logistic providers.

SCM may include features for planning and controlling any step in the manufacturing and distribution process, including tracking external partners' handling of raw materials, services and final products.



SCM enable company to monitor every stage of the supply chain process, from suppliers' price quotation to the moment the customer receives the product.

System can support alerts of any problems arise along the chain.

Some SCM also come with intelligence function to analyse problems and find the causes as well as provide suggestions for risks management.

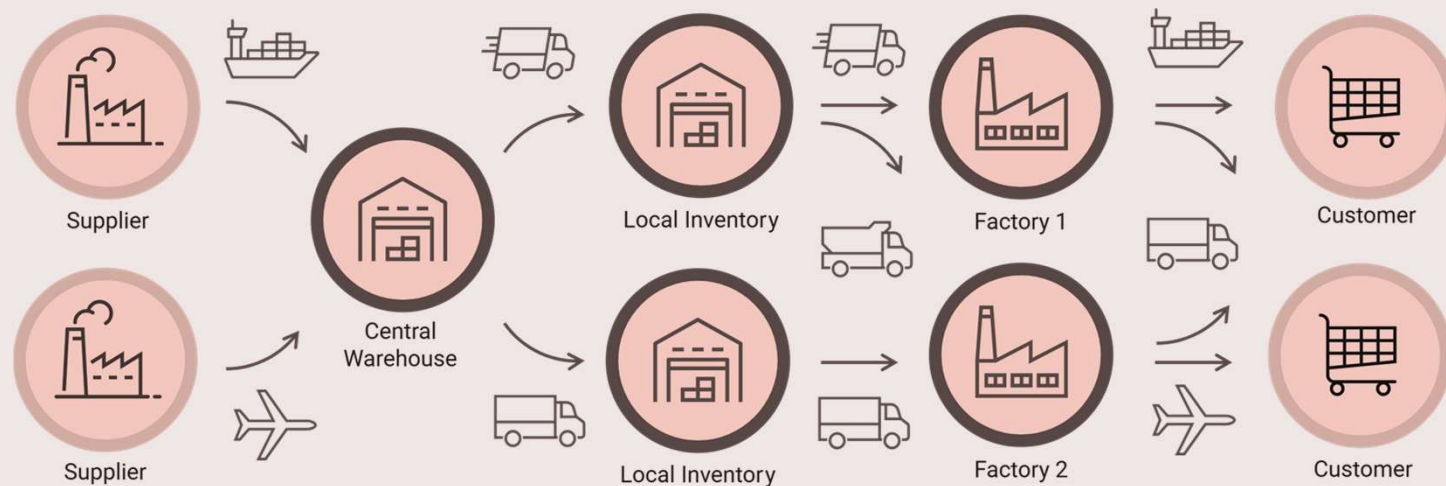
Visualizations of key measurements, such as fulfillment rates, order cycle times, and capacity utilization also available to support decision-making.

SCM ↔ ERP integration

The Strengths of SCM systems are collaborative, relationship-based software that helps businesses to track, manage, and optimize the flow of products beyond their company.

SCM-ERP integration coordinates the flow of information through all the supply chain process steps into a single source. Synchronize the information regarding P/O status, incoming shipments, stock transfer status, level of available stock at any point of supply chain network.

Information integrated SCM helps company to have holistic view of all supply chain status, enable communications & information sharing among SC partners, broader information can support data-driven decision-making. Cost for inventory holding and logistics operation lead time can be reduced from better managing throughout the supply chain.



SCM ↔ ERP integration

BENEFITS

- ✓ Transparency through the supply chain network.
- ✓ Enhanced Collaboration of supply chain partners.
- ✓ Build strategic relationship with suppliers
- ✓ Enable integrated information available for every supply chain members
- ✓ Effective Demand Forecasting allow lean Inventory level.
- ✓ Faster, more accurate and reliable order processing
- ✓ Reduce lead time & costs from procurement process to order fulfilment process
- ✓ Reverse logistics included enhance return management and credit notes

- ✗ Dependency on internal & external entities to update information
- ✗ Success depends on the cooperation and capabilities of external supply chain partners.
- ✗ Immature, incomplete or complexity to implement integration with existing multi-systems from all SC partners
- ✗ Risk of too much relying on software may lead to disruptions if any system fails.

CHALLENGES

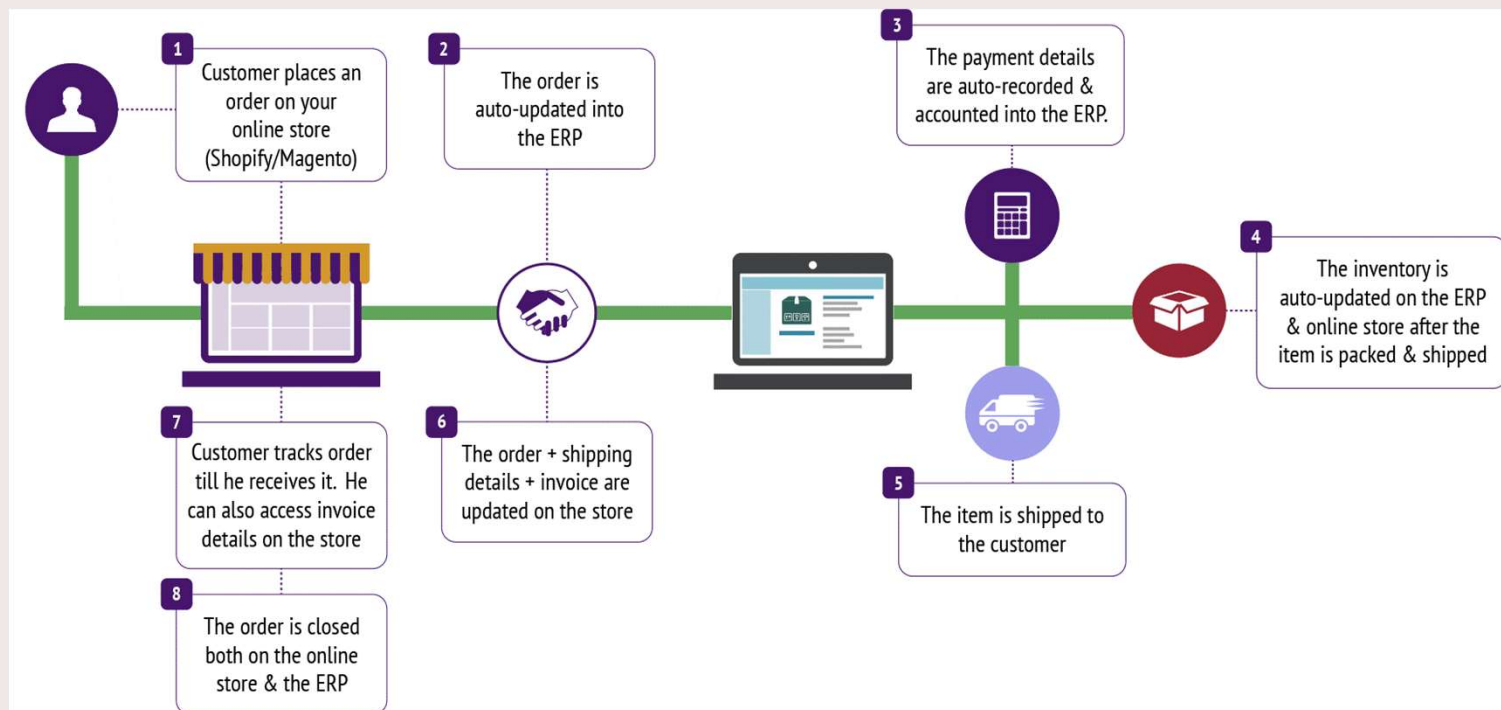
E-Commerce

- E-Commerce is any sort of business electronic transactions that involves with buying & selling, including pre-sales & post-sales activities.
- E-commerce can be conducted anywhere, anytime worldwide with internet, intranet or extranet networks.
- Most types of e-commerce are B2C, B2B which companies can have many solutions to set up online shops
 - Online storefront : company's own website, web store selling solely own products & services
 - Online Marketplace : 3rd party website created for multi-buyers/sellers to execute the commerce within the platform e.g. Amazon, Alibaba.

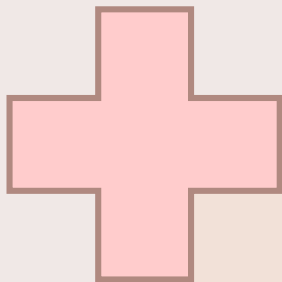


E-Commerce ↔ ERP Integration

- E-commerce site represent as organization's frontend with its backend refer to ERP system.
- Integrating ERP system to web storefront unify information such as inventory, sales order, and customer data automatically, enabling real-time insights and comprehensive control for the company over the online ecosystem.



E-Commerce ↔ ERP Integration



BENEFITS

- Automated Order Management
- Data consistency across platforms
- Real-Time Product Stock Levels
- Multiple Payment Options
- Allow shipment Tracking & Order Updates
- Easier scalability
- Better customer experience

CHALLENGES

- Integrate with unclear expectations
- Insufficient testing before go-live
- Insufficient training & support
- Management fails to consider long-term milestones



BI Tools ↔ ERP Integration

- ERP systems are important tools for the decision-making, and connecting ERP with BI can make both even more powerful by strengthening reporting, analysis, forecasting and performance.
- Integrating BI into the ERP system can improve ability to exploit the information stored in ERP database, allow customization of reports to support decision-making in different purposes.
- Features in BI such as predictive analytics or data mining allow deeper analysis of what-if scenarios enable users to have alternatives & project potential impacts with recommendations for required actions.



- By using information directly from ERP database enable BI to have interactive reports which automatically update data enable users to monitor process flows, performance or KPIs in real-time with customized views for specific requirements.

ERP-BI integration lets users consolidate big data into straightforward, actionable insights that can support even the decision-making in strategic-level to achieve competitive advantage.

BI ↔ ERP Integration



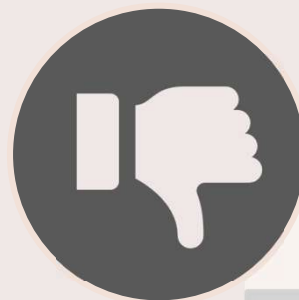
Data aggregation and analysis

Predictive capabilities

Real-time decisions

Comprehensive insights

Customization



ERP data preparation

Real-time data ingestion

Pre-built Analytics and Reporting

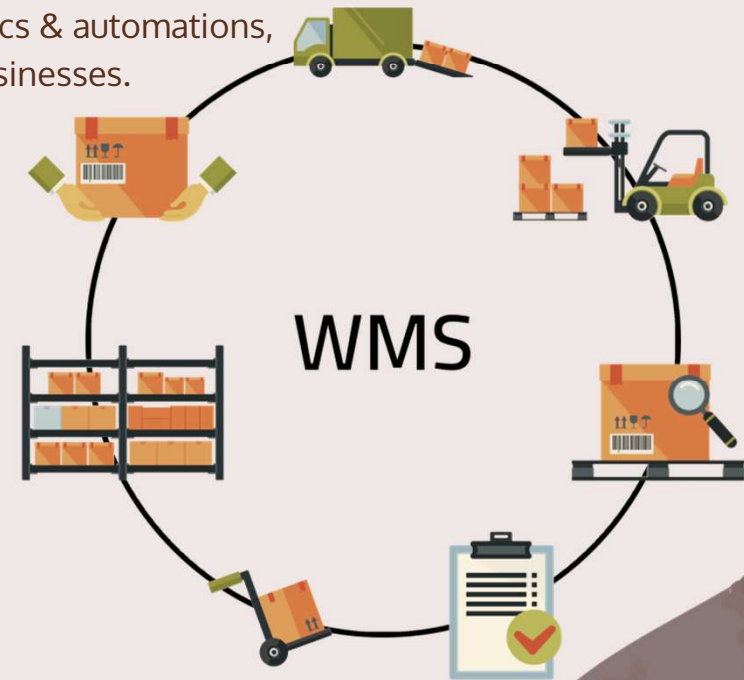
Maintainability and Extensibility

Verification of analysis results

Warehouse Management System

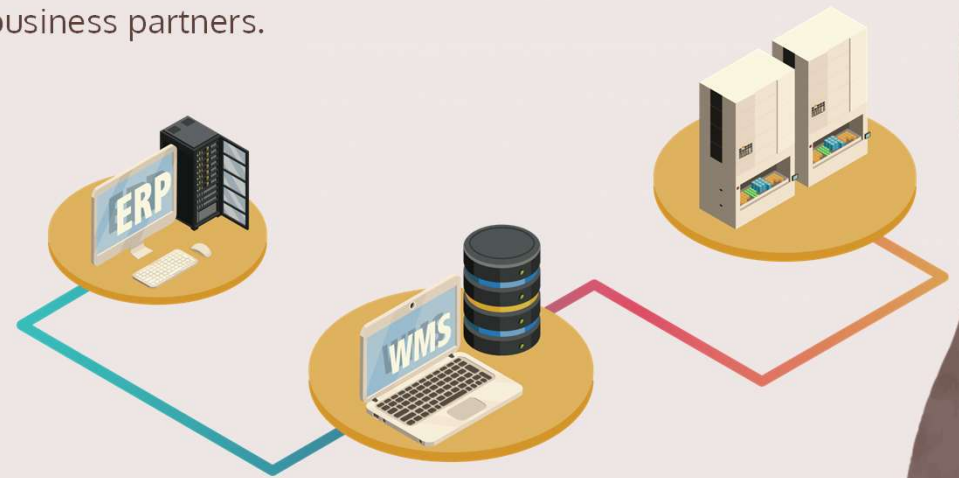
- Warehouse managing system (WMS) is a standalone solution for managing activities within warehouse, including MHE, labour, inventory, pick/packing and shipping.
- WMS can be set up as standalone system for the warehouse or use cloud-base software from 3rd party providers. It can also be included as features of SCM software or ERP system.
- Current trends & technologies included in WMS can range from using RFID to manage inventory, drones & robotics for physical stock movements, AI and IoT for analytics & automations, and cloud-base WMS for agility and affordability of small businesses.

- Key features for WMS including;
 - Inventory management & stock locator
 - Stock taking
 - Inbound receiving
 - Order and Fulfillment Management
 - Outbound picking & Packing
 - Outbound loading & Shipping
 - Labour management
 - Value-added Services
 - Analytics & reports



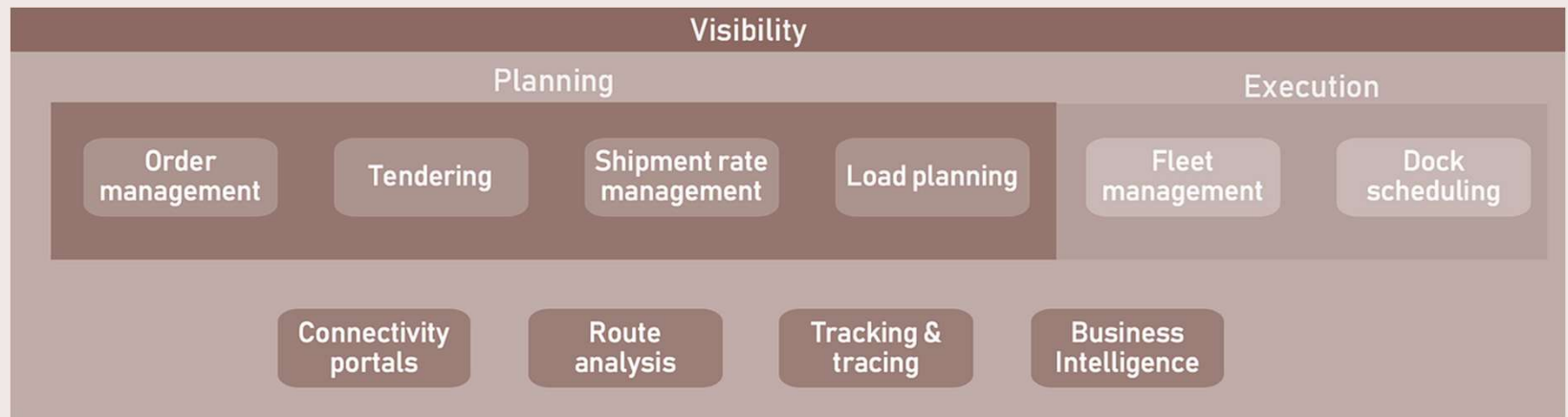
WMS ↔ ERP Integration

- WMS mostly applied to warehouse providers or 3PL/4PL companies which normally merge their WMS with other platforms to better exchange data between customers and business partners.
- Information flows between WMS and ERP related to;
 - Product master & Logistics profiles
(Batch no., UOM, Shelf life, MFG/EXP, DG/non-DG etc.)
 - Order data & shipping data
(Ship-to address, order list, special delivery requirements)
 - Goods receipt & goods issued information
 - Available stock & stock reservation list
- The traditional connection between the two system by EDI & rely on a middleware, batch transmission or manually transfer the data. This leads to increased complexity, costly data redundancies, and expensive interface development. Moreover, with two different sets of inventory data, it is almost impossible to get a single source of truth.
- The integration now increasingly use new cloud-base technology e.g. APIs or iPaaS to seamless data exchange and enable real-time communication between the two software. This results in streamlined operations, up-to-date inventory data, enhanced operational & tactical decision-making.



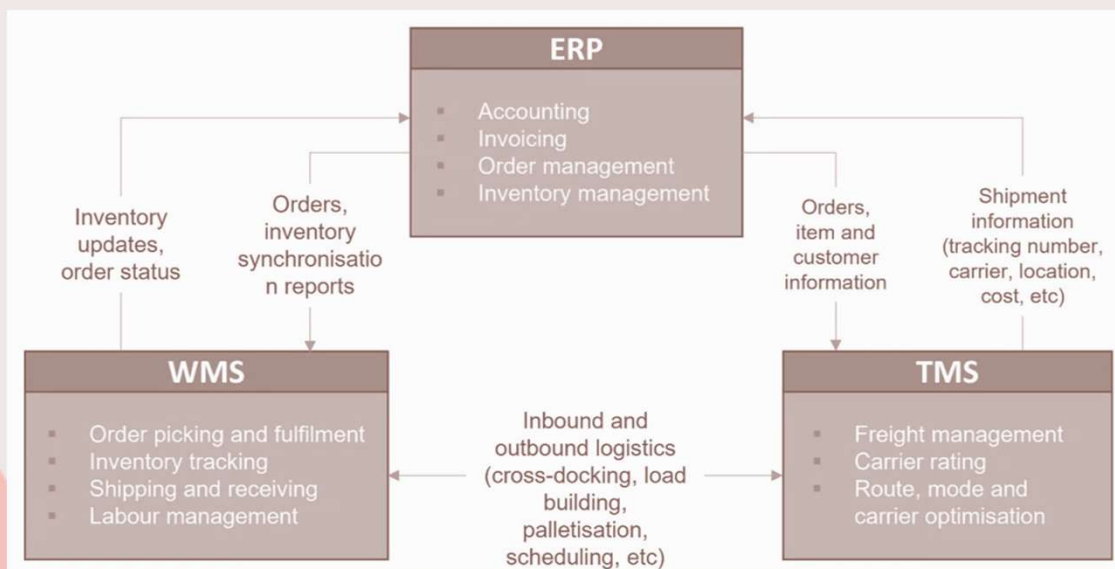
Transport Management System

- Transport managing system (TMS) is a software for managing activities associated with the movement of physical products by any or a combination of transportation modes.
- A TMS provides visibility into day-to-day transportation operations, streamline the shipping process since planning, execution and optimization to ensure timely delivery. Users can be all members of the supply chain network from manufacturers to shippers and 3PLs.
- TMS now can be offered with cloud-base software to support any types or any steps of supply chain logistics such as milk-run, last mile, cold chain, backhaul etc.
- Key features of TMS are shown below;



TMS ↔ ERP Integration

- The ERP functionality is rarely enough to cover all the aspects of transportation management especially when it related to freight management, fleet management & routing.
- For more advanced shipping optimization needs, companies opt to interface TMS software to better steer the consolidation of cargo and the routing to achieve the most cost-efficient transportation solution.
- A TMS is usually integrated with WMS & ERP software which enables single platform of information that are necessary for ***getting the right products to customers on time as efficiently as possible***. With this integration, businesses can optimize inventory levels, enhance demand forecasting, and efficiently manage transportation.



- Benefits of TMS integration including;
 - Enhanced operational efficiency
 - Streamlined data integration
 - Improve transport cost & financial control
 - Scalability and Flexibility
 - Enhanced Customer Satisfaction
- Further ERP-TMS integration;
 - E-commerce platforms
 - internet of things (IoT)
 - AI and machine learning (ML)

Thank You

