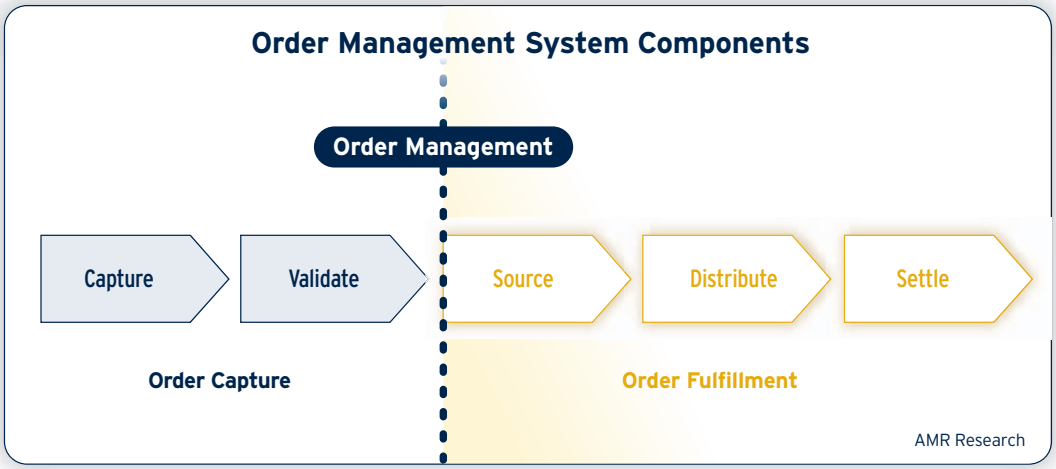
Adexa / *Order Fulfillment Solution White Paper*

Overview

Accurate and rapid order fulfillment is a key factor in today's business environment. Lack of it can cost customers, permanently. With the recent explosion in online B2B and B2C commerce, order cycle times have been slashed by eliminating communication barriers between trading partners. But that's just the tip of the iceberg of possible time and cost savings that the Internet adds to the equation. All participants in the order management and fulfillment process can benefit, and so does the customer. The fulfillment cycle can be instantly triggered by the demand cycle. Immediate, accurate delivery dates and alternatives can be dynamically generated, along with the most profitable supply chain and operations plans.

Today's customer penalizes firms more severely than ever for low service levels. So what choices do companies have? ERP systems can only calculate the order available time based on fixed lead times. Actual response times are determined by a myriad of other data points, so the ERP "answer" does not necessarily reflect reality. ERP systems are designed as single enterprise applications across an extended network. They are not able to aggregate data from disparate systems and manage order sourcing and tracking processes. Internet-based order management applications are helpful, but their role is communications and handling the order capture process. They lack the intelligent automation of collaboration between all trading partners, and intelligent (dynamic) order promising (Available-To-Promise and Capable-To-Promise).



Accurate, Profitable, Intelligent Response in Order Fulfillment

When can I have my order? Can you ship it tomorrow? Why can't you tell me now?

These are the typical questions asked by customers when they place an order. As we on the fulfillment side know, simple questions often have complex answers, but for customers, that's irrelevant. They want to know immediately…while they're speaking with you on the phone or placing their order online.

Historically, customer service has been a balancing act…a walk along the fine lines between excess inventories, labor costs and capacity allocations. Stepping too far in any direction can mean a tumble into the red. If you expedite an order it may have a negative impact on margins. What about other orders that are planned? Which are the most profitable orders? How much capacity is available? Is it more profitable to ship the order from a distribution center hundreds of miles away or to ship it directly from the factory? So many questions, so little time.

ERP systems use standard lead-times to answer these questions and we all hope for the best. If the quoted lead-time is too long, the customer may go somewhere else. If the quoted lead-time is missed, and the customer may never come back. If additional expenses, such as overtime and premium freight, are incurred to meet the date, profitability goes down, and if it keeps up, so might you.

The challenge, then, is to provide accurate and rapid promise dates, without incurring additional costs, and then meeting your commitments. This will generate return business and give you the ultimate marketing tool for generating new business, a customer reference. To meet the challenge, you need to understand your internal business processes and those of your supply chain partners.

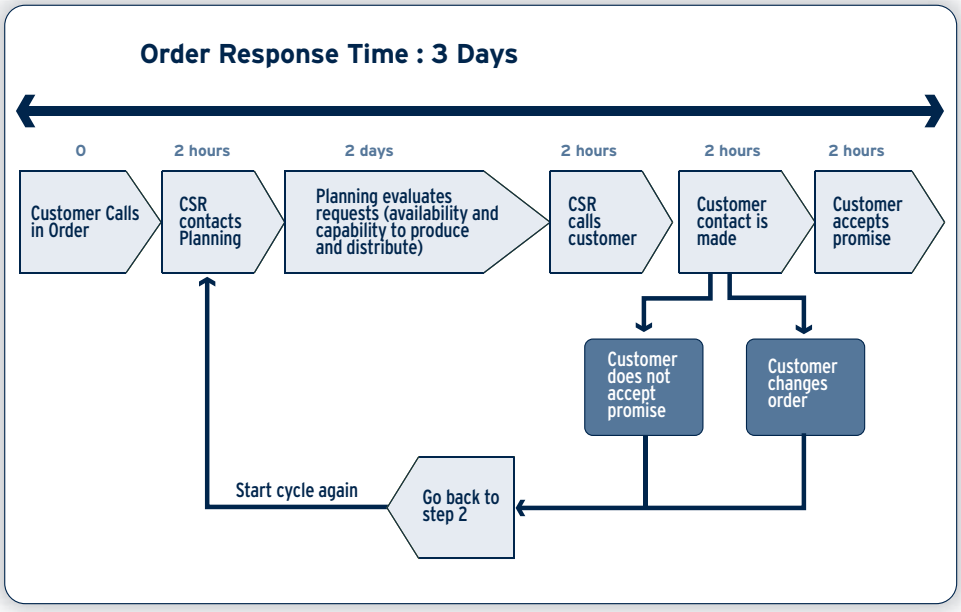


Figure 1

The Need for Speed

Here's a scenario that may sound painfully familiar. The clock starts ticking as soon as a customer calls in an order. A simple question is asked: When can I have it? The customer service representative attempts to contact the planning department, but the planner is in a meeting. Several hours may pass before the planner reacts to the request. If the order contains complex processes and multiple levels in the bill of material structure, it may take several days to evaluate the impact of inserting the order into the current schedule and come up with a date.

Once an answer is received from planning, the customer service representative attempts to contact the customer. When the customer is finally reached, they may either accept the promise date or reject it. The order may even be revised. If the promise date is rejected or the order is modified, the process will have to be repeated, taking up more of your time and that of the planner, and further frustrating the customer.

Companies can decrease the response time to seconds with an intelligent order fulfillment system that uses real data instead of fixed lead time assumptions, utilizes business rules to reflect the real business environment, and takes business objectives and material and capacity constraints into consideration in calculating the order available time.

Adexa's Order Fulfillment solution reconstructs this process in two pieces:

1. The work that the planning department did in the old process can be externalized into a one-time setup to precondition the enterprise for promising orders. This includes order-promising rules and objectives but not fixed assumptions, such as fixed lead-times.
2. Integrate the solution under the current order-promising process for optimized delivery dates in real-time.

If any 3PL companies are involved within the order fulfillment process (like warehousing, transportation, etc.), these trading partners need to also be included within the cycle as soon as the order is received so that the availability and capability of the third parties can also be considered in returning the available date to the customer.

A single multi line-item order requires the coordinated and synchronized efforts of multiple corporate divisions and business partners for effective fulfillment. Successful management of this extended community hinges on the ability to guide and direct business partners that do not owe allegiance to a single corporate structure. Adexa's Order Fulfillment solution aggregates real-time transaction data from within and outside the company's four walls. This automates collaboration and integration throughout the community, which means dramatic decreases in order cycle times.

Adexa's Order Fulfillment Solution

Imagine time and cost savings if sales, planning, manufacturing, distribution, suppliers and customers were all running from the same system, and could interactively work, in real-time, within a common collaborative environment. These different stakeholders would view data through a friendly web-browser interface, take necessary actions, and get instant, automatic alerts on issues that are critical to them.

Adexa's order fulfillment solution was developed with this vision in mind —a 100% Internet-based solution that enables multiple stakeholders to collaborate on the order fulfillment process in real-time within a common planning environment. The system continuously provides users with feedback, and personalized access to live supply chain data, to help them make more informed decisions.

With faster and more accurate order fulfillment through the Internet companies can reap huge benefits, including:

Shorter order cycle times – With Adexa's order-promising engine, order commitments can take less than a second. You will not need to check different systems, get approval from different departments, and then contact your customer. With Adexa's Order Fulfillment solution, the pre-built business rules will provide you the right answer based on allocation rules and business principles. Thanks to its open architecture, Adexa's Order Fulfillment solution will communicate with external systems and automatically send notifications to the related parties. These capabilities are the crucial factors to obtain large decreases in your Order Cycle Times.

Increased fulfillment accuracy – Adexa's order-promising engine does not use fixed lead-times to calculate availability dates. Instead, it takes all the supply chain constraints into consideration to return the actual availability time. Since Adexa provides the real and accurate results with very short order cycle times, your on-time deliveries will increase, which will improve the Customer Turnover. Its powerful rule-based ATP and CTP engine and flexible allocation rules increase the fulfillment accuracy.

Increased Order Fill Rates – Adexa's intelligent order-promising engine provides not only fast and accurate availability dates, but alternatives for different configurations, substitute/convertible products, locations, customer-to-customer group allocations, and up-selling options, as well. This will enable you to make more informed and profitable decisions to satisfy customer needs, which will result in increased order fill rates, decreased inventory holding, reduced short-term volatility in schedules and higher profits.

Increased Customer Satisfaction – Each trading partnership in the supply chain is critical to the success of the order fulfillment process. Adexa's open architecture and process workflow will facilitate and automate communication between multiple order management systems and collaboration between your suppliers, customers and other business partners. This will lower your operating costs (Indirect Labor/Expense – Sales and Planning), increase customer satisfaction, and more importantly reduce the lead-time (Order to Invoice Lead-time).

Lower Inventories – Adexa's Order Fulfillment solution supports a just-in-time manufacturing philosophy that allows you to incrementally lower inventory at various levels of the supply chain, while maintaining high service levels. Companies no longer have to maintain high inventories of finished goods to be able to provide fast order delivery. Order delivery times will be based on available material and resource capacities, and will represent the earliest possible delivery dates, which could be far sooner than the worst-case dates specified by fixed lead-times.

Fast, Intelligent and Accurate Order-promising

Adexa's Order Fulfillment solution provides a powerful order-promising engine that utilizes a real-time incremental planning solver to find the best response to a customer order. It takes all the constraints and business objectives into consideration. Instead of using the fixed lead-times in the calculation, it intelligently bases the solution on the real availabilities of the material and capacity within the supply chain. The solution is able to consume forecasts at any level of Bill of Material, and automatically generate and schedule the remaining downstream level work orders as necessary (taking the constraints into consideration). Moreover, according to the business needs, any allocation rule can be configured or easily modified to comply with the company's current business objectives and rules of order promising.
In case the returned response is not inline with the customer's needs, using an "alternative options list" feature, Adexa delivers the best available option to satisfy the customer's requirements and strengthen relationships.

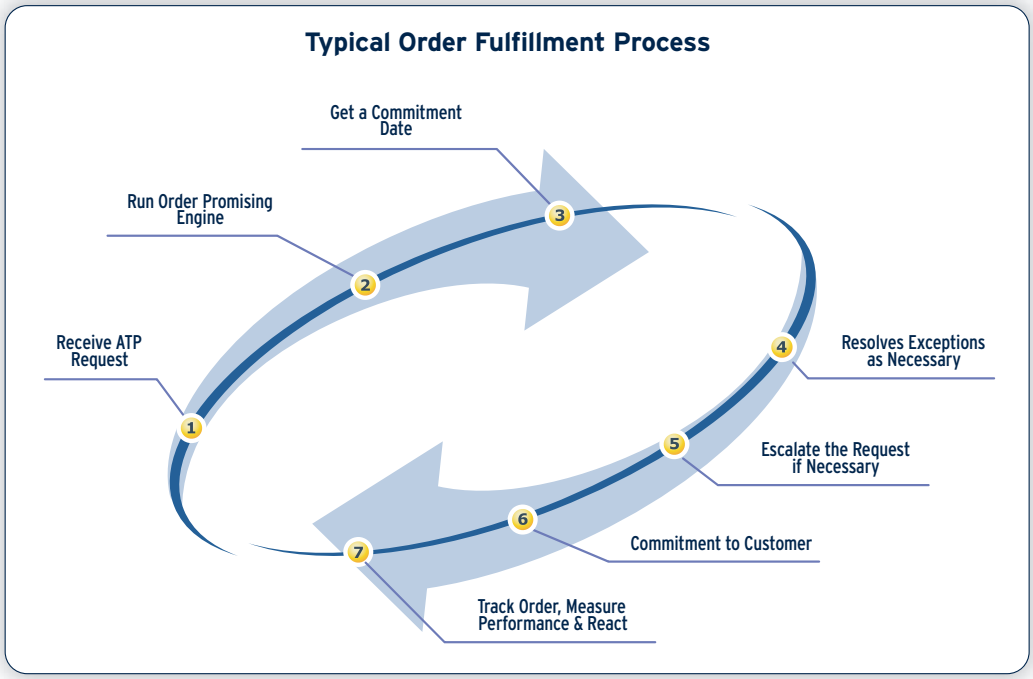
The order-promising engine is designed to return an availability date in real-time, so the response time is normally below one-second.

Closing the Loop between Trading Partners

Once a request for ATP is received in the system, the order-promising engine returns the availability date based on the current supply chain plan in real-time. And when the date is accepted and the actual order is placed, all related parties are notified and the plan is incrementally changed to reflect the new order. By shrinking information lead-times and reducing planning interactions, Adexa's Order Fulfillment solution helps enterprises to be more efficient and responsive in the overall order management process.
To ensure instant visibility into order status throughout the order lifecycle, the Order Fulfillment solution is seamlessly integrated with Adexa's Supply Chain Planning, Factory Planning and Scheduling and Supplier Management solutions through a single, shared data model.

The Order Fulfillment solution provides Internet visibility to all stakeholders into the journey of the order throughout the process and it automatically notifies the related parties in real-time if exceptions occur in the process.

Detailed Solution Description and The Algorithm



Step 1: *Receive ATP Request*

Salesperson / Customer Service Representative receives an ATP request from the customer, manually or through an order entry system (ERP/CRM/eCommerce Server).
He/she logs in to the system to enter the request. The system lets the salesperson/CSR enter the product and the configuration, enter multi-line items, if needed, and select the order-promising rule, if necessary (these rules are pre-configured and available to users according to the user roles and access rights).

Step 2: *Run Order-promising Engine*

After receiving the ATP request in the Adexa system, the order-promising engine runs. By taking the selected rule into consideration, the system consumes forecasts, utilizes finished goods inventory, utilizes planned supplies, and creates new production & purchases, accounting for material & capacity constraints, as necessary.

By configuring different "Rules" you can modify the behavior of the order-promising engine, according to business needs. This will help you handle the allocation management process according to the principles in your particular business.

In assemble-to-order strategies, the order-promising engine consumes make-to-stock item forecasts (at any level of Bill of Material), and automatically generates and schedules the assembly work orders (the remaining downstream level work orders as necessary) while taking all constraints into consideration.

Step 3: *Get Commitment Date*

The order-promising engine returns the best available solution in real-time as well as the options list for alternatives. The user is able to view the details of availability date, i.e. what supplies are used, what forecasts are consumed, in what quantities, for what customers/customer groups.

In case the returned availability date or the details are unsatisfactory, the user is provided with an options list, along with the original system-calculated availability date. The options list contains a number of other possible methods of satisfying the order, including substitutions, convertible configurations, up-sell configurations and other possible available items that belong to different regions/sales reps/customers/customer groups/etc. The system displays (in gray) but disables the possible available items that belong to different regions/sales reps/customers/customer groups/etc.

Step 4: *Resolve Exceptions as Necessary*

If the returned solution is not on time or the order-promising engine cannot find a solution under the selected rule, the salesperson/CSR can offer a partial shipment solution based on the detailed availability report provided by the system. As well, the salesperson/CSR has the option to pick item/s from the option list to resolve the problem.

Step 5: *Escalate the Request if Necessary*

From the option list, the salesperson/CSR can select an item that is disabled for him/her. In such a case, Adexa's order fulfillment solution will automatically escalate the issue to the related sales manager for approval.

Step 6: *Commitment to Customer*

When the salesperson/CSR receives the system notification about the sales manager's response, he/she contacts the customer on the accurate and precise commitment.
Step 7: Track Order, Measure Performance and React
Adexa's order fulfillment solution provides the capabilities to track order status, modify orders in progress, react to delivery alerts, measure performance KPIs and adjust planning parameters.

Business Benefits

Adexa's Order Fulfillment solution helps companies

- Ensure high quality of information
- Minimize number of user decisions
- Process large amounts of data
- Deliver superior customer service through fast, accurate, real-time order commitments
- Improve order fill rates, while minimizing inventory holdings, and reducing short-term volatility in plant schedules
- Provide real-time visibility of consolidated inventory and order information across an extended network
- Automate the order management process across corporate divisions and external partners, and
- Equip customers and trading partners with real-time alerts on the updates/imbalances/problems of the supply chain

With instant order commitments based on real capacity availability & material constraints, your order cycle time, customer service levels, order fill rate and fulfillment accuracy will rapidly improve.

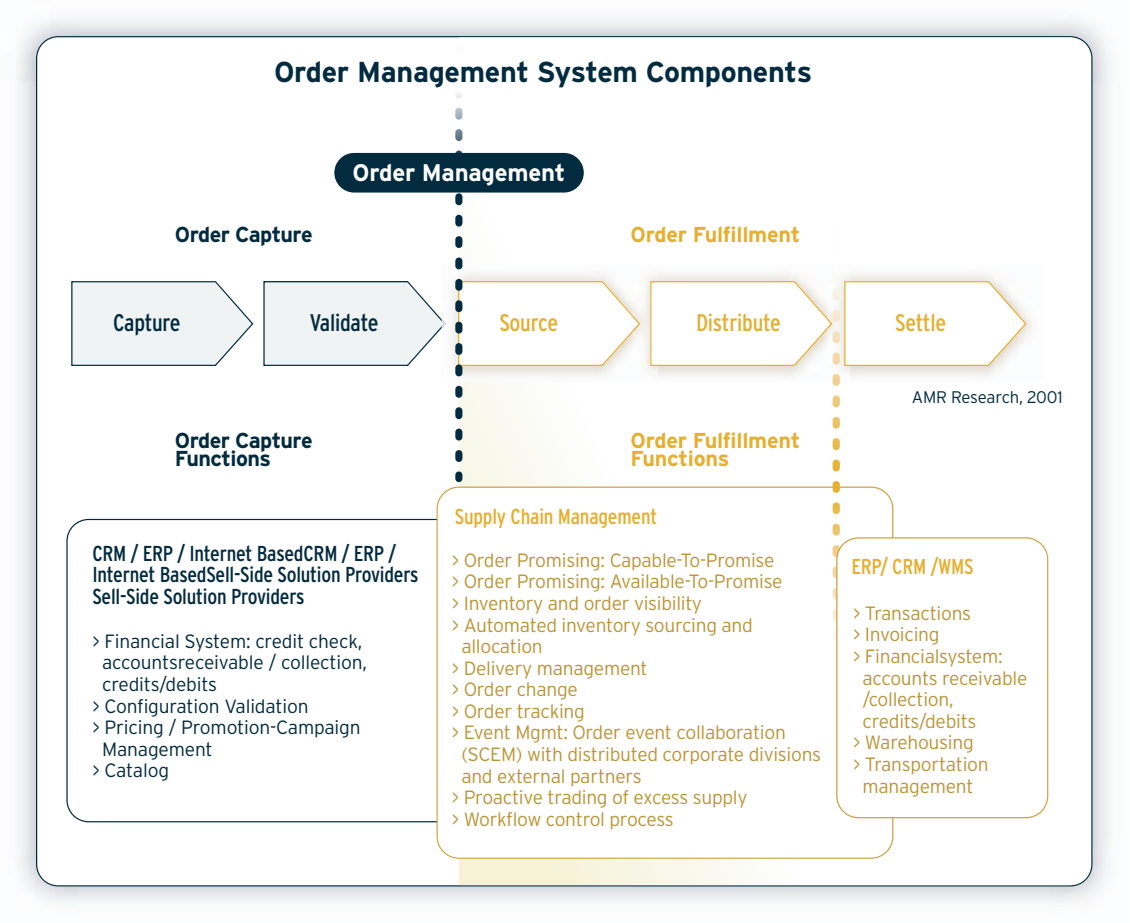
The flexibility to modify the order configurations even when the product is already in production will again help you increase levels of customer responsiveness and satisfaction.

Also, the potential to offer substitutes and up-sell configurations will reduce excess and obsolete inventory, and improve profit margins.

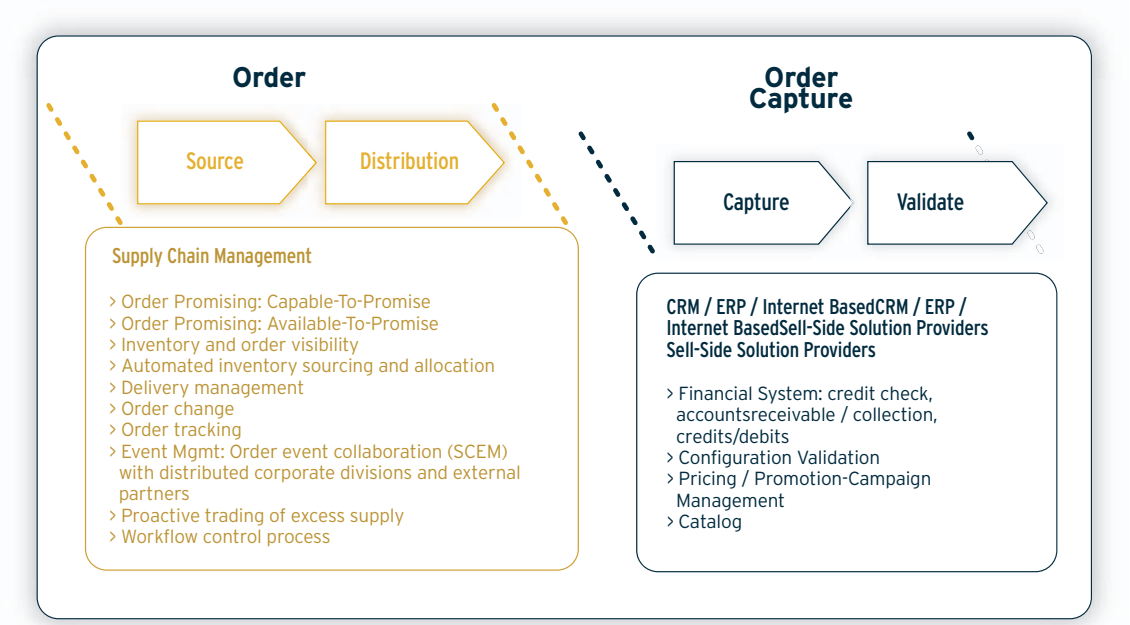
Technology

Technical Architecture

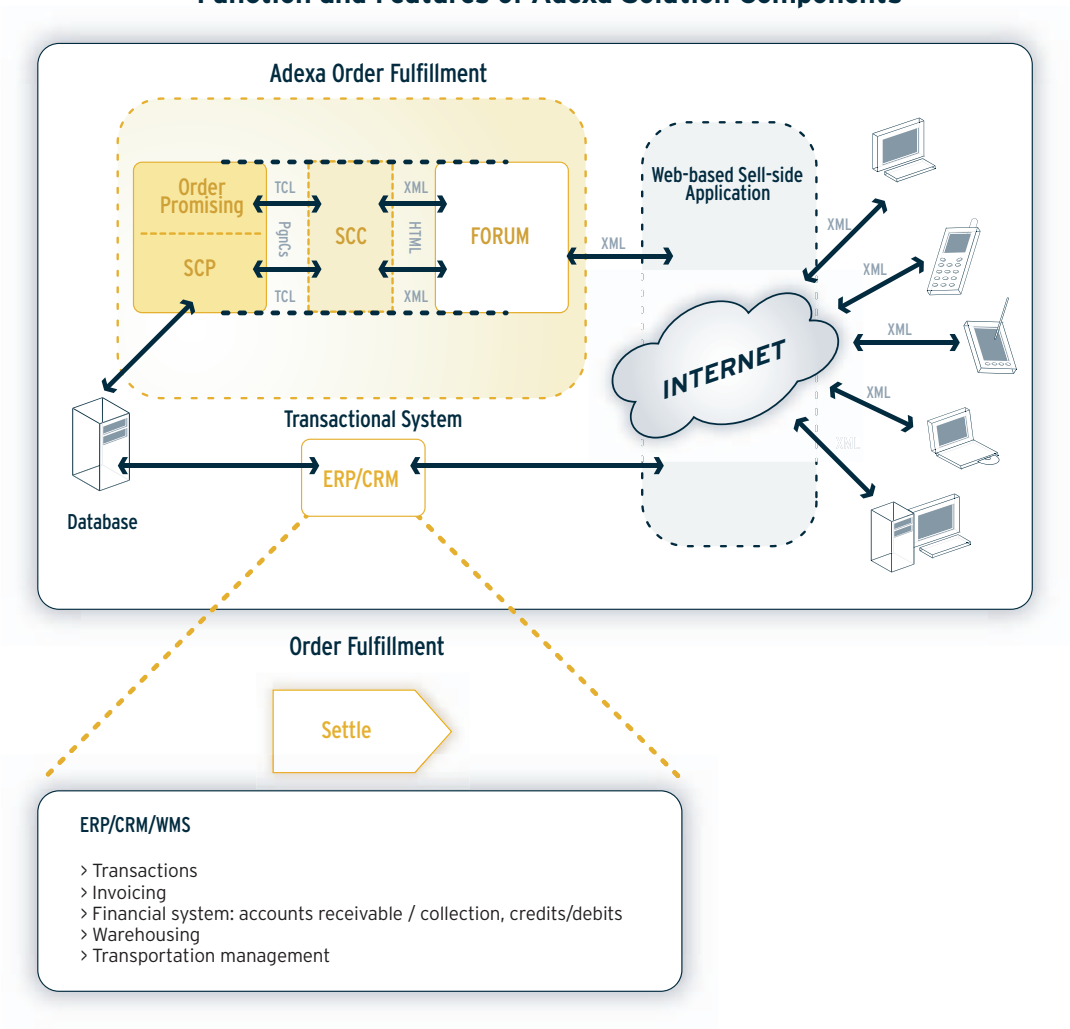
Order Management Process:

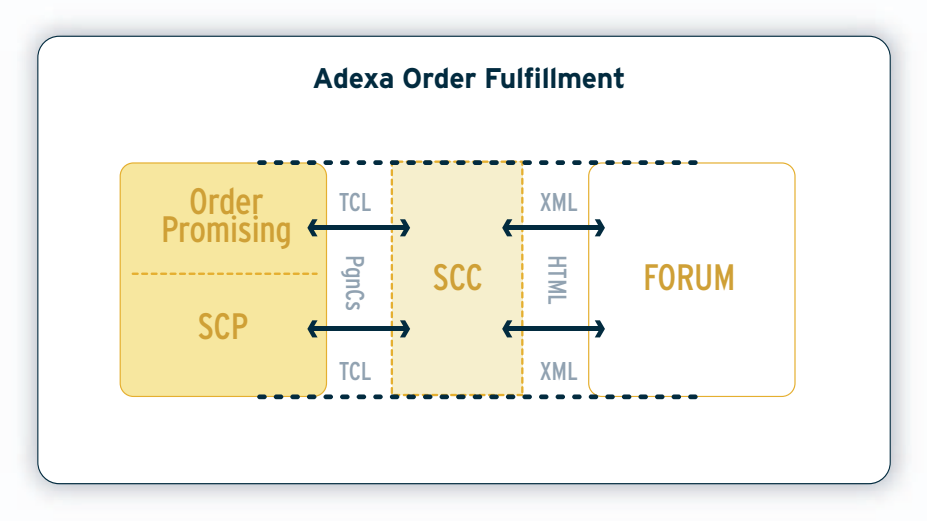


Architecture:



Function and Features of Adexa Solution Components





Order Promising Engine:

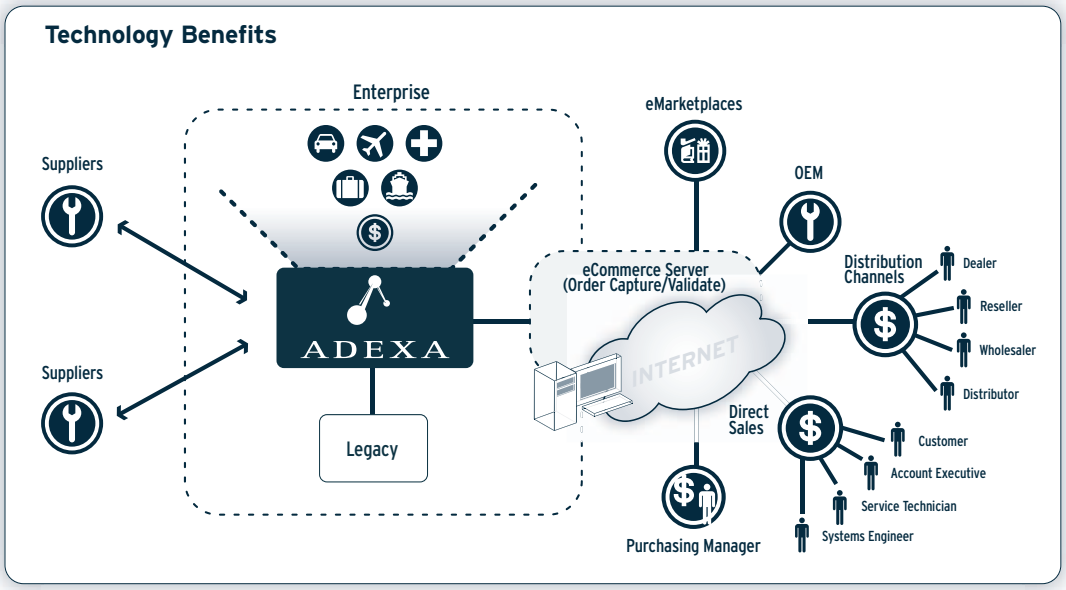
- ATP (Available-To-Promise)
  - Multi-level availability checking
  - Forecast consumption
- CTP (Capable-To-Promise)
  - Capacity and material constraints are taken into consideration
  - All other supply chain planning constrains are taken into consideration, e.g. work order sizing, CFI factors, demand period, etc.
- ATP options list
  - Multi-site, multi-material checking
  - Alternatives on different configurations, substitute products / upselling options, conversions, different locations, different customers
- Ability to define user-specific order promising rules to manage allocation management for both ATP and CTP
- Ability to include cost for Profitable-To-Promise (PTP)
- Visibility into consumption and supply connections
- Partial shipments

SCC (Supply Chain Controller):

- Workflow process control
- XML document exchange
- Integration with external systems

Forum:

- Event management
- Email notification
- Intelligent agents
- Web-based, multi-user, multi-threaded structure
- Flexible GUI
- Links to suppliers



The system is available 24x7 to remote users all over the world via the Internet. Adexa's order fulfillment solution utilizes the Internet to ensure "anytime, anywhere" access, ease of use, and simplicity of administration.

The solution provides users access to the consolidated data from distributed corporate divisions and external partners. Users can access the system anytime, anywhere –whether through a home PC or through a remote-access laptop – to interactively view and influence the order fulfillment process.

At the same time, the browser interface makes the system an easy-to-learn, intuitive experience for novice users. Since it has a similar look and feel and navigation of a standard Web browser, users can quickly become proficient with the application.

Since the application runs on a central web server, administration is greatly simplified. Administrators can quickly add new users to the order fulfillment process. And since it is a distributed application, new users could work in different departments within the same and different locations, or they could be suppliers, trading partners or customers.
Secure collaboration over the Internet through firewalls is maintained, since the solution provides stakeholders all over the world with access to sensitive business information. To enforce security, administrators are able to determine order fulfillment rule access and data privileges on a user-specific basis. For each user, administrators can associate one or more order fulfillment rules and data access privileges.

The intelligent order-promising engine supports constraint-based CTP calculations and forecast consumption from any level of the Bill of Material explosion, and arrives at actual delivery times instead of fixed lead-times.

At the core of the order fulfillment solution is a powerful automated monitoring and messaging network. It monitors the collaborative network and sends on-line alerts to appropriate partners when inconsistencies, supply/demand shortfalls or other user-defined exceptions are discovered in system data.

The open, single data model architecture of Adexa's Order Fulfillment solution enables companies to quickly maximize their existing technology investments.

The open architecture and workflow capability of Adexa's order fulfillment solution facilitates the integration with external systems. This is the crucial factor to maintain the automation of the process over the distributed networks/systems.

While Adexa's Order Fulfillment solution is already integrated with its own supply chain planning, plant planning and procurement management solutions, it can also easily be integrated with other advanced planning systems through its open architecture.

Adexa's Differentiators

› REAL WORLD – You can configure order-promising/allocation rules on an individual user basis. Adexa's Order Fulfillment solution uses detailed routings that represent the true environment, uses full Bill of Material explosion, and considers all material and capacity constraints and business objectives.

› REAL RESULTS – Adexa's order fulfillment solution provides accurate results. No fixed lead-time assumptions are used in ATP/CTP calculation. Adexa's Order Fulfillment solution utilizes Adexa's Industry leading core solver technology, calculates results accounting for recently entered orders, performs forecast consumption at multiple levels, generates new purchase and work orders as required taking the supply chain planning constraints into consideration, and provides visibility into consumption and supply connections.

› REAL-TIME – Adexa's Order Fulfillment solution is built from the ground up with one architecture and it delivers results in less than one-second. It is easily integrated with external systems through available APIs or standard ERP connectors, and Adexa's open architecture and workflow process supports the automated integration and collaboration.

An Efficient and Effective Order Fulfillment Solution

In today's cautious, accountable business environment, companies seek a proven, no risk, fast return, Internet-ready order fulfillment solution that allows them to save time and money.

Functionally and architecturally, Adexa's Order Fulfillment solution meets today's business imperatives. It provides multiple stakeholders – both players within the enterprise and supply chain partners and customers around the world – to view, share, analyze and influence the order fulfillment process at Internet speed. The real-time and accurate order-promising results and the collaborative environment, in which firms can synchronize the activities of different stakeholders, can make companies thrive.