



WAREHOUSE CAPACITY **ECONOMICS AND TRENDS**



On-Demand Warehousing

For years, firms have driven their supply chains to be stable, predictable structures. Yet, increasing demands to be more responsive now challenge that approach. Organizations deal everyday with seasonal swings, return issues, opening new markets and rolling out new products. Being responsive means addressing the dynamics that cause inventory variability. Those solutions must be scalable, secure, compliment existing structures and deliver cost efficiencies. Nowhere is this more evident than in the warehouse. These increased demands are driving the growing practice of On-Demand Warehousing.

On-Demand Warehousing is a spot market companion to the existing “long market” built on warehouse leases and/or property ownership. It is analogous to adding outsourced warehouse labor to an existing team in order to better meet variable demand by matching the capacity deployed to the capacity needed.

A story about Joe.

Joe works for a wholesaler with retail customers located all over the country. He is responsible for managing the warehouse network that supports the North American market. His company is growing rapidly and is trying to maintain a distribution infrastructure that can grow with the increasing demand. Yet, as Joe looks at a potentially record-setting holiday shopping season, he realizes that he has two problems. The first is that despite building a large warehouse network, he is going to need more space for seasonal holiday inventory in some of his firm's fastest growing markets. Second, in other markets that are not growing as quickly, he has a lot of empty

space on his hands already. He will have even more after the holidays—at least until the next major shopping season swings around. Some of these peaks and valleys are expected and in his forecast. Others will be surprises and create havoc. Joe clearly realizes that managing seasonal inventory peaks and valleys across multiple locations while growing quickly and trying to watch the bottom line will be challenging. Building more warehouses is not an option. Subleases that match the desired duration and location are hard to find. His third party logistics partner is not ideal for solving 2-3 month space problems in multiple markets. Any of this sound familiar?

75%

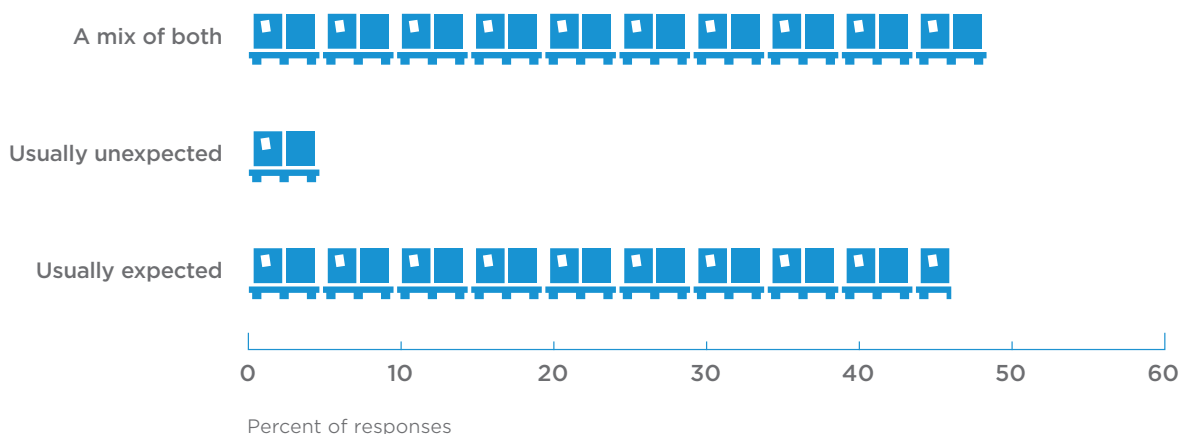
Of respondents reported significant inventory fluctuations throughout the year.

Warehouse Capacity is fixed. Inventory levels vary.

Joe's story is quite common. Most businesses experience inventory fluctuations while coping with changing demand throughout the year. To understand this phenomenon more clearly, FLEXE conducted a survey of supply chain professionals across multiple industries. We found that Joe's story is reflective of much of the industry. Plus, there is a lot more to the story.

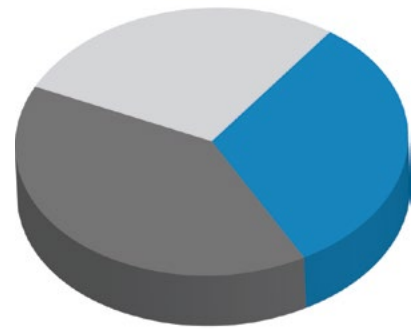
Out of 158 respondents, more than 75% reported significant inventory fluctuations throughout the year. This is likely due to the fact that warehouse capacity is typically fixed while inventory levels vary. These peaks and valleys are often expected, but 48% of respondents reported having both expected and unexpected fluctuations.

Are your inventory fluctuations expected or unexpected?



So, is the problem too much inventory or too little? Too much space or too little? The answer to both of those questions is “yes”. Of the respondents that reported significant inventory fluctuations, roughly 30% said inventory exceeds capacity regularly and just a bit fewer than that stated capacity exceeds inventory regularly. But the majority of respondents—more than 40%—said that capacity fluctuates between having too much and not having enough due to large swings in the amount of inventory held. This means that 75% of respondents report situations where inventory significantly exceeds capacity at some point during the year, and 70% report situations where capacity significantly exceeds inventory.

When it fluctuates, how does your inventory relate to capacity?



30% - Inventory exceeds capacity
30% - Capacity exceeds inventory
40% - Both happen during year

75% of respondents report situations where inventory significantly exceeds capacity at some point during the year, and 70% report situations where capacity significantly exceeds inventory.

What is driving these fluctuations?



SEASONALITY



PRODUCT PROMOTIONS



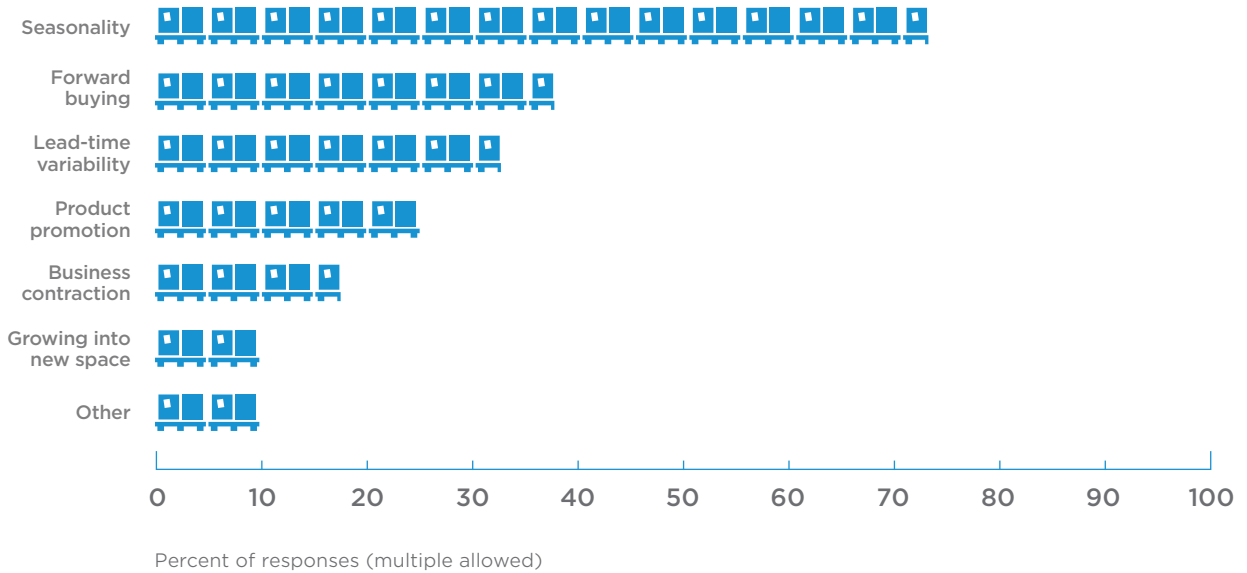
BULK BUYING



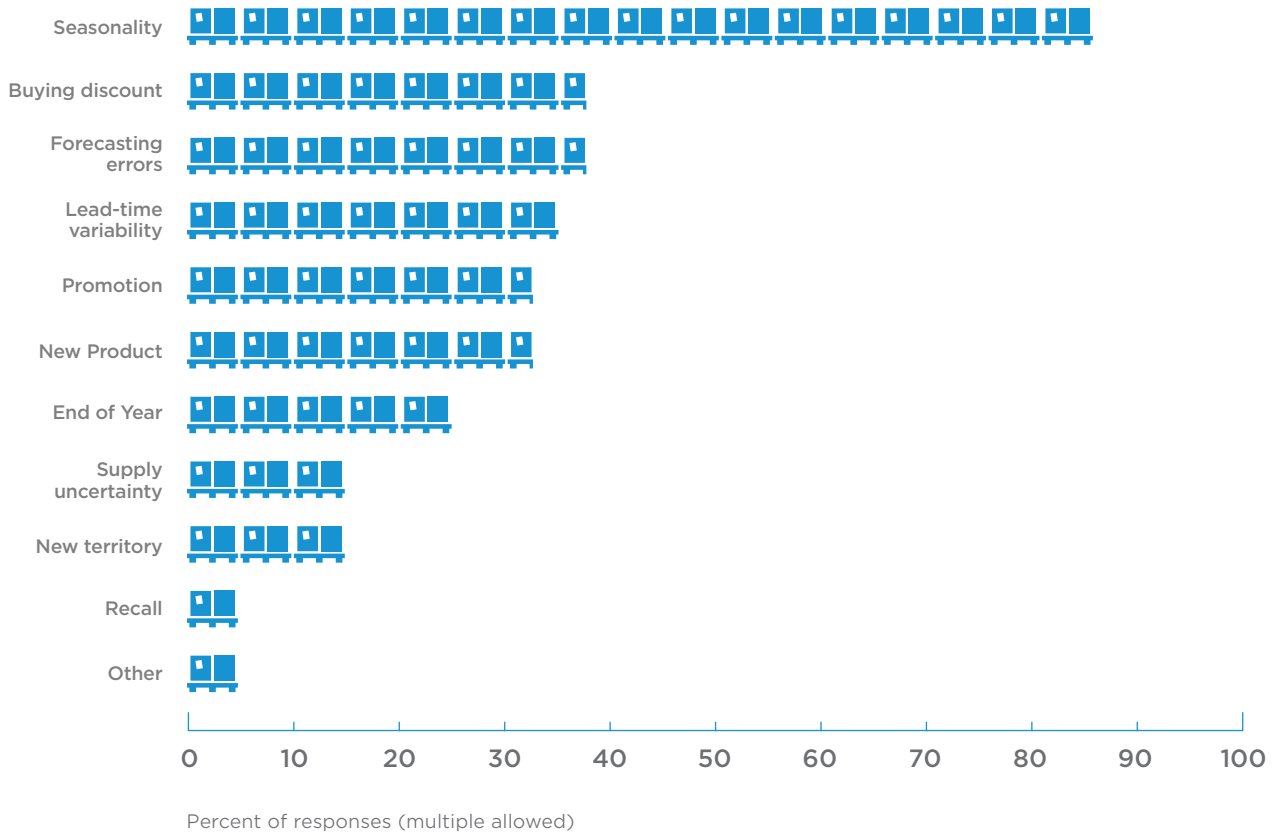
LEAD-TIME VARIABILITY

The answer is that fluctuations are due to a wide variety of issues. Some might result from macro trends affecting the industry such as shorter product life cycles or demand for same/next-day shipping. When the respondents were asked directly, their top triggers for inventory fluctuations resemble Joe’s situation above. In fact, seasonality was mentioned by about 80% of respondents as an inventory fluctuation key driver. Other top drivers included product promotions, bulk/forward buying and lead-time variability. Interestingly, fewer than 10% of supply chain professionals polled view these drivers of inventory fluctuations decreasing over time. So, the problem is relatively common and the outlook suggests more, not less, of it in the future.

Drivers of Excess Space



Drivers of Excess Inventory



70%

Of warehouse managers with excess capacity do not have a solution when they have more space than inventory—they simply accept it as a cost of doing business.

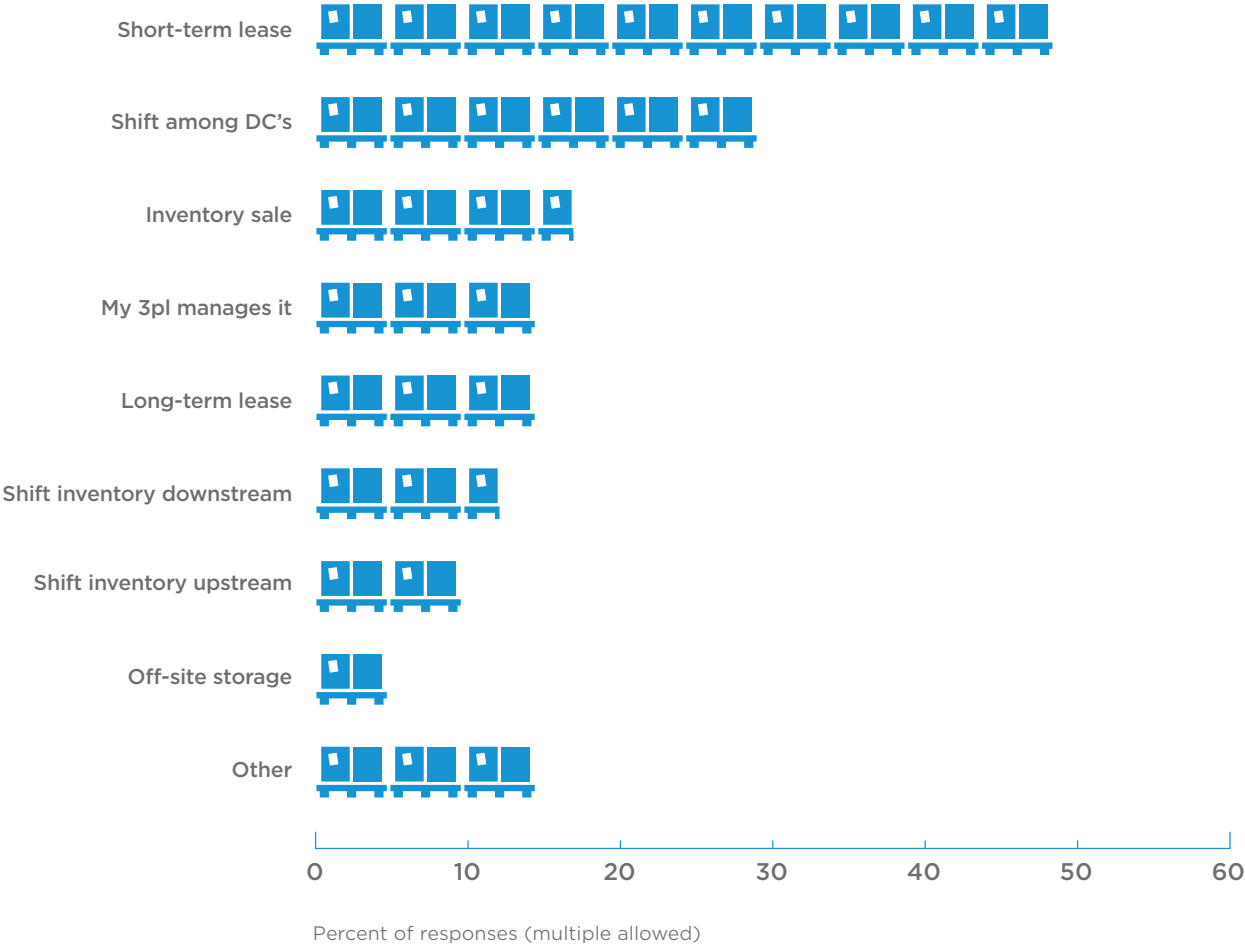
Moving past the causes to the solutions.

While it may not be a surprise that capacity and inventory fluctuate for a variety of reasons, it is surprising that relatively few solutions are employed to address these challenges. Nearly 70% of those that acknowledged capacity exceeds inventory at periods during the year accept the empty space as sunk costs. That means most warehouse managers with excess capacity do not have a solution when they have more space than inventory – they simply accept it as a cost of doing business. In fact, only 12% reported subleasing their excess space. This is likely due to the administrative overhead associated with subleasing, particularly when these pockets of excess space occur multiple times per year (just over 50% of those surveyed reported these peaks happen three times per year or more).

So, if there are few good solutions for those with extra space, what about those with not enough? Here the answer is a bit more robust. For those in situations where inventory exceeds current capacity, there are clearly a number of options. This is for obvious reasons: The inventory is coming no matter what, so a place must be found to store it. There is no “non-option” equivalent to accepting excess space as a sunk cost.

The following represents the kinds of solutions used to secure additional warehouse space during times when inventory exceeds capacity.

Excess Inventory Solutions



Clearly, leasing short- or long-term space has been the most common under-capacity solution, with a smaller percentage of respondents shifting inventory among and across other space within their distribution network or supply chain. Although there are other solutions employed, ranging from long-term leases to 3PL solutions, those are less common.

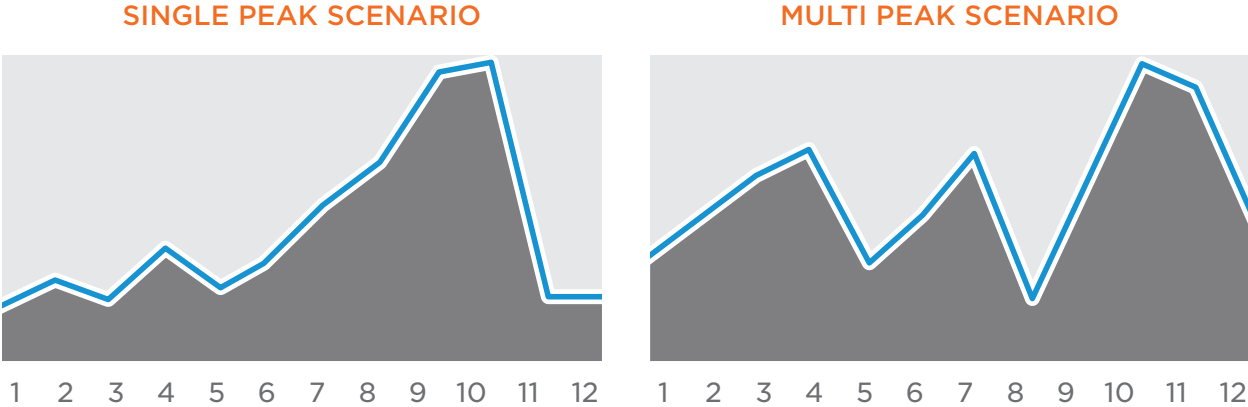
The economic impact of under and over capacity.

The warehouse capacity survey helps to define the nature of static space and dynamic inventory levels. The data confirms many expectations, such as seasonality causing a large percentage of inventory fluctuations. At the same time, the study also uncovers a few challenging issues: Companies generally accept sunk costs when warehouses are underutilized and 3PLs play a relatively small role in helping to solve short-term warehousing needs.

What the survey does not yet address is the economic impact of these inventory fluctuations. How can we measure the value of sunk costs? How can we measure the expense of seeking and committing to short and long-term leases? Are there methods to mitigate both sides of the equation for those organizations reporting that they are both over-capacity and under-capacity at points throughout the year?

The search for these answers led to the development of a Dynamic Capacity Modeling exercise. Based upon the survey results, forecasted capacity needs will often both exceed and dip below a firm's base capacity. In addition, some of these periods of over or under capacity can range for as short as one month to more than 6 months.

Two cases were developed: One for organizations that experience a single major peak within a calendar year and another for those that experience multiple peaks. These were based upon the survey results, which showed 1-2 peaks and 3-6 peaks per year as the most common patterns.



From these two starting places, three different solution models and their economic impact can be examined: 1] increasing base capacity to cover all peaks throughout the year, 2] employing short-term leases to add capacity for peaks and 3] using on-demand warehousing to address both under-capacity *and* over-capacity situations.

SINGLE PEAK SCENARIO

MULTI PEAK SCENARIO

MODEL 1:
MAXIMUM BASE CAPACITY



1 2 3 4 5 6 7 8 9 10 11 12

1 2 3 4 5 6 7 8 9 10 11 12

Owned warehouse space is secured to handle the highest levels of inventory throughout the year and over-capacity periods are simply accepted as sunk costs.

MODEL 2:
BASE CAPACITY + SUBLEASES



1 2 3 4 5 6 7 8 9 10 11 12

1 2 3 4 5 6 7 8 9 10 11 12

Owned warehouse space is enhanced with short-term subleases which help reduce costs but still result in some waste either due to inexact size or timing fit.

MODEL 3:
ON-DEMAND WAREHOUSING



1 2 3 4 5 6 7 8 9 10 11 12

1 2 3 4 5 6 7 8 9 10 11 12

Owned warehouse space is enhanced with additional on-demand space that specifically fits size and time requirements. In addition, additional capacity can also be filled with goods from other organizations to defray costs.

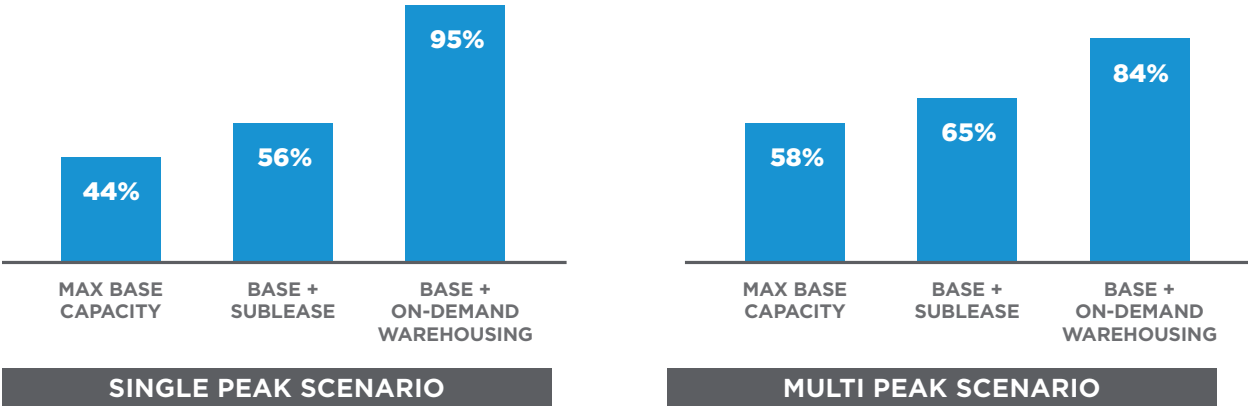
The three models present different sets of benefits and drawbacks. For example, the Max Capacity approach eliminates the need to secure additional space during peaks, but is clearly inefficient due to significant overcapacity across the board except during the very highest peak inventory period. The Sublease approach reduces much of that overcapacity in theory, but finding subleases that match exactly with peak durations can be difficult—and excess sublease duration results in the same kinds of sunk cost problems.

The case for On-Demand Warehousing.

So, if a Max Capacity strategy is inefficient, 3PLs can't often provide the right short-term solutions and a Sublease strategy can be difficult to execute – what is the ideal solution? Ideally it would first address the two core failings of the Max Capacity and Sublease models: First, it would provide additional capacity only when it is needed and not require minimums. Second, it would also provide an option for dealing with over-capacity issues so that a supply chain manager has some flexibility in setting a base capacity that is most efficient.

These conceptual models provide a degree of insight into efficiency, but the differences in the approaches become clearer when you begin to apply data.

Capacity Utilization



Model Assumptions:

- Base capacity & long-term lease rate: \$.50/sqft per month
- Short-term sublease rate: \$.58/sqft per month
- Labor + equipment costs = 30% of space cost
- Lease administration costs = 8% (broker commission of 5% plus other admin costs)
- On-Demand “buy” and “sell” rates based on actual FLEXE marketplace prices

Businesses with a single large seasonal peak should expect utilization rates to significantly vary between Max Capacity and On-Demand models. The reason for this follows a simple logic: Matching capacity more closely to actual inventory levels drives significantly higher utilization – upwards of nearly 100% improvement in a single peak scenario. Even in a multi-peak situation, On-Demand warehousing can drive utilization over 40% higher. As expected, these differences in utilization rates have a direct impact on warehousing costs as illustrated by the figures below.

Cost Comparison



Not only do total costs differ, so does the cost makeup across the three models. Specifically, the On-Demand approach is nearly 100% more efficient than a Max Capacity strategy in a single peak model and 26% more efficient in a multi peak model. Assuming you could even find a three-month sublease, the On-Demand model is still 38% and 14% more efficient within single and multi peak models respectively. Another phenomenon is that costs move from largely fixed in the Max Capacity model and semi-fixed in the Sublease model to variable in the On-Demand Warehousing model. As a result, the more dynamic the cost structure, the more flexibly the supply chain can “dial up or down” the amount of space it needs.

On-demand warehousing provides a solution for excess capacity as well as for excess inventory. Warehouses can make capacity that might only go unused for a short period of time, available to others that need it. Placing this warehouse space on the market, selling it within an On-Demand model, makes it possible to monetize what would otherwise result in wasted space. This approach to capacity utilization—storing other organization's goods, as well as your own—increases overall utilization and offsets costs well above any other methods available.

Considering a transition to a dynamic warehousing model.

If you are currently employing either a Sublease or Max capacity strategy there are a variety of questions to consider as you contemplate whether there might be a better approach:

1. What are the drivers of your inventory fluctuations? Do you anticipate that these will continue into the future?
2. Do you have a reliable, secure and economically attractive source of excess capacity for each of your upcoming forecasted inventory peaks?
3. How often have you had unexpected/unforecasted inventory peaks over the past two years that have required scrambling to find overflow warehouse capacity?
4. Have the subleases that you've executed to cover inventory peaks closely matched the time period necessary to cover these peaks?
5. What would the impact to your P&L be of removing or monetizing your excess warehouse capacity and the sunk costs it currently represents?
6. Is there an upcoming overflow need that could serve as a good pilot project to test an on-demand warehousing approach?

The future dynamics of warehousing.

This paper is a start for exploring the data and economics behind warehouse capacity and inventory issues. It has illustrated that these peaks and valleys present meaningful, financially challenging issues. It has also provided a potentially new way of tackling these challenges. On-Demand Warehousing provides a spot market solution for both sides of the equation. It doesn't replace owned facilities, 3PLs or even strategic subleases. But it does provide a specific, right-sized option when extra space is needed and an innovative way to monetize space when it is unused. Both of those flow to the bottom line and keep the flow of goods manageable, flexible and economical.

Opportunity for future study: While this paper focuses primarily on cost and efficiency benefits of On-Demand Warehousing, it is just the beginning. Revenue, growth and customer satisfaction likely benefit as well. For example, how can an On-Demand model drive growth by more flexibly enabling the deployment of inventory closer to customers? How can a more flexible approach to warehousing drive increased customer satisfaction? And for those organizations re-examining their warehouse network, how can the inclusion of On-Demand principles change the fundamental calculus used to determine the number, location and size of warehouses needed to achieve desired balance between market responsiveness and overall cost structure in the era of omnichannel sales and heightened consumer expectations?