

# Supply Chain Digital Transformation Opportunities for Publishers

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# Table of contents

|  |    |
|--|----|
| Supply Chain Digital Transformation Opportunities for Publishers ..... | 4  |
| Proceeding with Supply Chain Digital Transformation .....              | 6  |
| Assess your inventory and supply chain current state .....             | 8  |
| The Tri-brid approach to inventory management .....                    | 9  |
| Auto-replenishment is the second Tri-brid supply chain strategy. ....  | 11 |
| Print-to-order (PTO) is the third Tri-brid supply chain strategy. .... | 12 |
| Closed ecosystems and viable first generation PTO supply chains .....  | 13 |
| What is an optimal next generation PTO supply chain? .....             | 14 |
| Conclusions and next steps .....                                       | 15 |
| About The Author: Tim Cooper .....                                     | 16 |

# Abstract

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Do publishers have the necessary strategies to leverage the opportunities of supply chain digital transformation? Publishers and distributors with significant inventory investments should. The call to action is clear: Supply chain leaders are embracing digital transformation. While the long path to analytics maturity maybe daunting, publishers can take immediate and significant steps to improve supply chain performance. The most important first step is to move away from a traditional monolithic supply chain construct and adopt a new approach, including next generation print-to-order (PTO) enabled technologies as exemplified by HP's Piazza.

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# Supply Chain Digital Transformation Opportunities for Publishers

In their November 2017 "Supply Chain Digital Transformation Study," The Hackett Group reports that "94% of organizations say digital transformation will fundamentally change supply chains; only 44% have a strategy for getting there."<sup>1</sup> The same study found that a majority of supply chain leaders have urgency for getting advanced supply chain analytics implemented and contributing to their operations. "66% of supply chain leaders say advanced supply chain analytics are critically important to their supply chain operations in the next two to three years."<sup>2</sup> Analytics is one of the most crucial drivers of digital change. Another important enabler is the cloud. This paper will show HP's Piazza as an example of how data sharing via the cloud fosters analytics that empower collaboration between publishers and printers, accelerating supply chain digital transformation.

The top issues that supply chain leaders seek to address with analytics include: optimizing inventory levels to balance working capital investment with service levels, improving forecast accuracy, understanding demand patterns, improving product tracking traceability, and optimizing production and sourcing to reduce total landed costs. All are publishing relevant use cases. See figure 1 below for how the use cases were evaluated from high to low in importance and level of adoption.

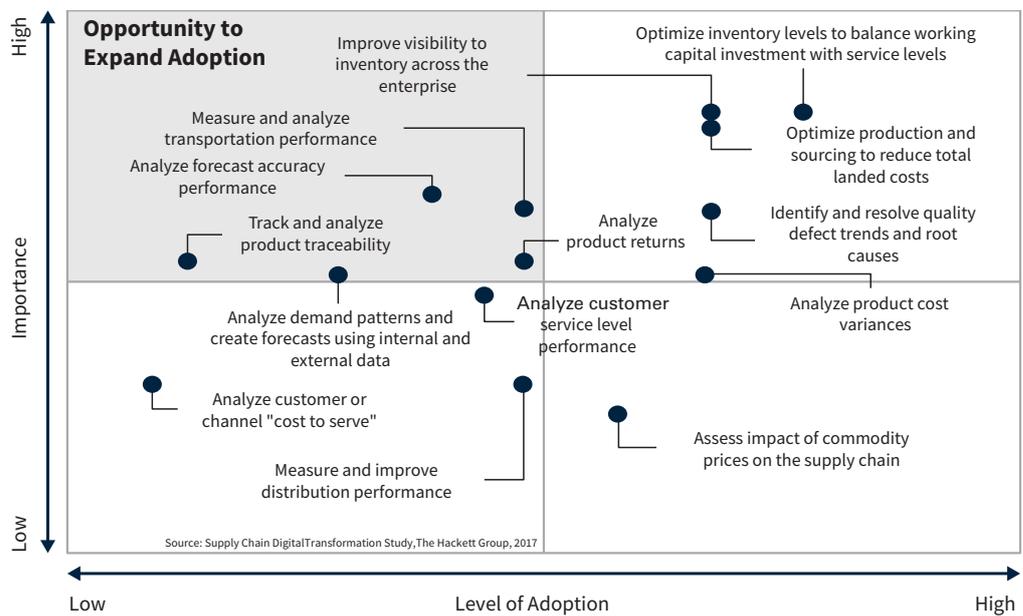


Figure 1: Supply chain analytics use cases: adoption vs. importance ratings<sup>3</sup>

Source: Supply Chain Digital Transformation Study, The Hackett Group, 2017

<sup>1</sup>Supply Chain Digital Transformation Study, The Hackett Group, 2017

<sup>2</sup>Ibid

<sup>3</sup>Ibid

Do publishers have strategies to leverage this supply chain digital transformation? If publishing is reflective of the results in the study, then more than half of publishers don't. Yet the needs for print book inventory and supply chain improvement strategies are greater than ever. Publishers report suffering from a range of supply chain related problems. Average fill rates are typically no higher than 85%, meaning 15% of sales are missed or delayed (if backordered). Even worse, many publishers can't or don't measure their service levels.

The industry is rife with tales of excessive inventory levels. Many major publishers are holding more than three hundred days of stock on hand. The Consulting Garage finds that the publishers they've studied achieve an average of one inventory turn per year, and the results show a turn range of 0.2 (five years on hand) to 2.5 (less than five months on hand). Excess inventories are compounded by return rates of 40% or more in certain publishing sectors.

All the while, the print book world is under continued pressure to improve financial performance. This need to improve is driving publishers in many sectors and countries to rethink the significant cost factors in their business models. In addition, emerging competitive and customer factors are highlighting the need for innovation. Among the highest priority areas impacted are the effective management of global distribution and global manufacturing, direct fulfillment to the consumer, reducing or eliminating warehouse costs and footprints, consolidating and securing source files, customization, and personalization.

In Trade and other market segments, ecommerce giants occupy a large (and still growing) share of sales. In Higher Education, customization is driving growth, with uniqueness per title down to the classroom level. K-12 Education is experiencing similar demands for more digital and custom material. STM Publishing reflects the result of similar trends. For all segments, initial orders are smaller, reducing traditional print economies of scale. For many types of books, what were once long offset print runs are being replaced by shorter digital runs. Publishers report that the digital print share of their production spend has risen from a negligible amount to 30% or more in the last ten years.

With decreasing initial order quantities comes increasing forecast uncertainty. Changing demand patterns require publishers to collect and dissect more data at all levels to accurately forecast future sales. Knowing the markets and the general lifecycle patterns of titles is no longer enough to manage effectively. All of these challenges are exacerbated in a strategic environment where traditional economies of scale are shrinking.

Mergers and acquisitions, ecommerce, global distribution and direct fulfillment are requiring the reengineering of many publishers' processes at a fundamental level. They have reached the intersection of business innovation and technology innovation where digital transformation is located. To be transformative, publishers need to adopt more advanced digital technologies as well as change the way they deliver books to customers.

Mark Peacock, principal and Global IT Transformation practice leader of The Hackett Group told [CIO.com](#), "it's how you're taking digital technologies and, as a company, really fundamentally changing the way you're delivering products and services. It's about applying technology innovation to come up with new business models, which really drive new revenue above the line, and new ways to deliver products and services."<sup>4</sup>

Certainly one of the most significant factors publishers need to transform is how they manage inventory. In the twentieth century, publishers could (and did) pretend that almost every book printed would eventually sell. This naïve assumption led to chronic excess inventory and financial underperformance for many titles. Now we know better. To move into the future, understanding the real costs of inventory should be a financial literacy requirement for all publishing executives.

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<sup>4</sup> Change Management For Digital Transformations, CIO.com, 2017

How many publishers clearly understand their total cost of inventory, either on an aggregate annual basis or on an individual saleable unit level? Instead, publishers have traditionally focused on unit cost (aka printed cost per unit). Traditional offset print economics, combined with publishers' legacy accounting practices, amortize the fixed cost of press set-up across a print run. As the print run increases, the cost per unit decreases. To compound the problem, many executives work with title profit and loss models that assume the sale of all units printed. Long disguised by accounting with various reserves for returns and obsolescence (40% of sales for some book types), total inventory costs have, for too long, been higher than commonly perceived. Figure 2 shows the full carrying costs: not just the unit print costs, but the cost of capital, service, risk, and storage are included in a TCO calculation. How many publishers have a clear, transparent calculation for TCO that is included everywhere a unit cost is used? TCO is just one example of a widely understood supply chain concept that publishers have been slow to adopt. See my previous white paper, "A Rebalanced Approach to Print and Digital" for more information. <https://tinyurl.com/y8euodn7>

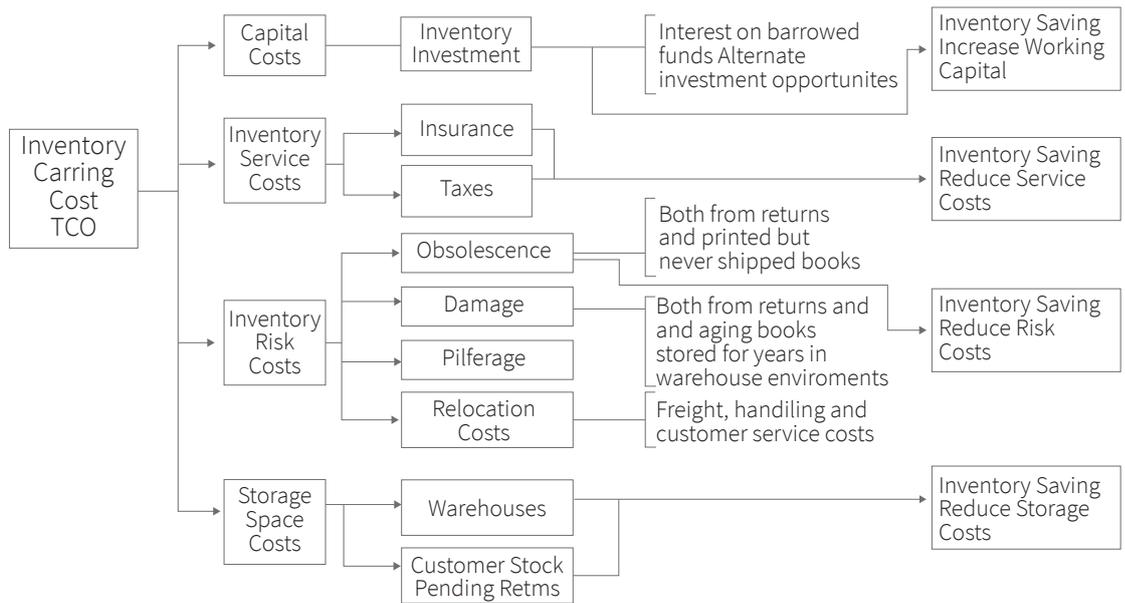


Figure 2: Inventory Carrying Costs (TCO)<sup>5</sup>

# Proceeding with Supply Chain Digital Transformation

Using advanced supply chain analytics, the most critically important tool for digital transformation, is an ongoing effort that requires organizations to understand their starting point. To better define what your starting point is, the Hackett Group has defined four stages of maturity for companies in their supply chain analytics maturity model. The Hackett Group reports that most companies operate in stage 1 and stage 2, with only the most advanced organizations placing in stage 3. See the chart below.

<sup>5</sup>Lean Six Sigma Logistics, Goldsby & Martichenko, page 2

Publishers are also likely operating in the initial stages of the model. In stage 1, data is manually analyzed in a spreadsheet program, and that data is descriptive (historical), such as sales figures or prior costs. Many publishers use Excel, for example, to analyze data gleaned from their sales and financial systems. Larger publishers have data warehouses that combine file extracts from multiple systems or inputs. Descriptive analytics answer the question “what happened?” These measure performance by translating events and activities into data points in order to drive fact-based analysis.

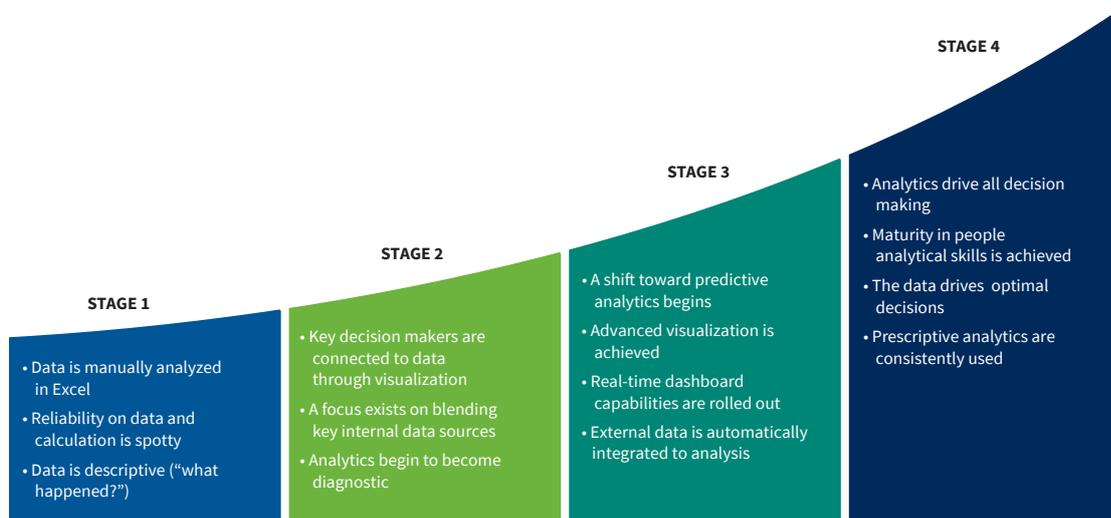


Figure 3: Supply Chain Analytics Maturity Model: The Hackett Group, 2017 <sup>6</sup>

The next step in stage 2 is to understand “why did it happen?” Diagnostic analytics attempt to identify the root cause of problems by combining and analyzing multiple data sources. Understanding why is the second stage of the model, and correlates with our experience with savvy publishers dating back into the 1990s. Descriptive and diagnostic analytics are also called rear-view analytics. These analytics use historical data to find out what and why.

The most advanced companies are shifting toward forward-looking analytics. Stage 3, predictive analytics, read past and present signals to predict future events and risks. This stage answers the question “what will happen?” Stage 4 prescriptive analytics focus on making optimal decisions and answering “how can we do it better?” The analytics look to solve trade-offs and find options that maximize profit and operational goals. Certainly every publisher wants to have these capabilities in their future toolkit.

The Hackett Group goes on to point out that “the organizations in the early stages of the maturity model (stages 1 and 2) may interpret having a visualization tool or an advanced statistical analytics suite as having analytics. However, there is an ecosystem of required technologies that needs to be assembled underneath the visualization tool to perform as a comprehensive end-to-end analytics solution.”<sup>7</sup> The technical complexity and cost in resources, money, and time of achieving a more mature stage may prevent most publishers from achieving advanced stage, forward-looking analytics in the near future. Given this reality, how should publishers proceed?

<sup>6</sup>Supply Chain Digital Transformation Study, The Hackett Group, 2017

<sup>7</sup>Supply Chain Digital Transformation Study, The Hackett Group, 2017

# Assess your inventory and supply chain current state

Any analytics or systems won't perform miracles if you don't understand the important factors that drive performance. Strategy precedes system. If publishers lack relevant supply chain strategies and policies, they lack organizational alignment and jeopardize their chance for sustainable improvement. Any size publisher that owns their own inventory decisions should have an explicit supply chain strategy that recognizes trade-offs and explains how to execute to achieve key business objectives.

For example, if you are targeting inventory reduction, how much do you need to reduce, and do you need to reduce service levels (fill rates) to customers as well? If not, what improvements will you make to current processes to achieve the desired reductions? As far as trade-offs, would you renegotiate with suppliers for a consistent and reliable lead time for reprints in lieu of an incremental unit cost reduction? Will you use TCO to overrule unit-cost based decisions that increase inventory? Will you streamline print quantity decisions and measure the result of each printing? Do you require an explicit sales forecast (x units over y time) for each title, then measure the results after the timeframe passes? All of these questions assume that a publisher has consistent processes in place and is able to navigate with solid rear-view analytics and metrics.

To help publishers assess their baseline current state and make explicit what may have been traditionally implicit, The Consulting Garage developed a survey called the Inventory Audit and Analysis or IA&A. It contains twenty publishing specific inventory and supply chain factors and their descriptions in the form of questions to answer. After this "game" of twenty questions is answered, publishers will have a clear understanding of their starting point. Below are the first ten questions. The full list is available at <http://consultinggarage.com/for-publishers>

| #  | IA&A Factor                          | Factor Descriptions   |
|----|--------------------------------------|---|
| 1  | Inventory Position                   | Is there visibility and integrity of inventory levels across the enterprise?    |
| 2  | Inventory Turns Analysis             | What are the inventory turns and days on hand? What is the trend?               |
| 3  | Sales level and stratification       | Is there an ABC and Pareto analysis of title sales performance?                 |
| 4  | Seasonality of Titles                | Is there a heavier selling season or holiday seasonality that is material?      |
| 5  | 1st print process                    | What is the internal and external lead time? Consistent measured process?       |
| 6  | Reprint process                      | What is the internal and external lead time? Consistent measured process?       |
| 7  | Forecasting methodology              | What data and methods are used and what accuracy metrics?                       |
| 8  | Print Quantity decision making       | Who makes the decision and is their performance tracked with metrics?           |
| 9  | Service Level Target                 | Are there implicit or explicit fill rate goals set and measured? Who sets them? |
| 10 | Supply chain (supplier to publisher) | Are standards set and measured for lead times, quality and performance.         |

Figure 4: Inventory Audit & Analysis: Tim Cooper/The Consulting Garage 2015

Publishers who don't have sufficient answers for many of these questions are at a disadvantage in moving forward. They may require additional inventory and supply chain exploration to address deficits and correct their systems and processes. Those that are able to answer most if not all questions still may not have their future plans crystallized. But there is a way for any publisher to get on the right path while transitioning toward the future.

In an interview, the CEO of supply chain specialist JDA Software said "One monolithic supply chain is not going to work anymore. Monolithic supply chains are dead. So you have to adapt to your market . . . the monolithic way of approaching it belongs to yesterday. It slows down the velocity of how you can respond."<sup>8</sup> Monolithic supply chains are uniform and rigid. Everything is handled as "one size fits all." Any publisher can diversify their supply chain approach to make their processes more agile and responsive. Many have already done so in response to the needs of their markets.

<sup>8</sup> JDA Software partners with MIT to develop predictive supply chains, Internet of Business, March 1, 2018

# The Tri-brid™ approach to inventory management

The Tri-brid<sup>9</sup> approach to inventory management is polyolithic, not monolithic. It is a strategy that uses three unique supply chains to manage distinct segments of inventory. This strategy aims to better optimize the total inventory and enable immediate tangible benefits. The first is the traditional segment, the second is auto-replenishment, and the third is print-to-order (PTO).

The segments are determined by the yearly unit sales of existing titles or the forecasts for new titles. The range of the segments reflects the estimated offset breakeven point, or the amount of forecast uncertainty and service risk inherent in a title's history and forecast. The sales ranges shown below are estimates and may vary for type of publisher and product mix. The data is from a publisher with 1,170 total titles that had sales of at least one copy during the prior year. 30% of titles had sales of 1,000 copies or more, 34% from 100 to 999 copies, and 36% from 1 to 99.

| Tri-brid Segments               | % of Total Titles | % of Total Sales | % of Total Inventory |
|---------------------------------|-------------------|------------------|----------------------|
| Traditional--sales over 1,000   | 30%               | 87%              | 42%                  |
| Auto-replenishment-- 100 to 999 | 34%               | 13%              | 27%                  |
| Print To Order— from 1 to 99    | 36%               | Less than 1%     | 21%                  |

## Tri-brid Segmentation By Annual Sales

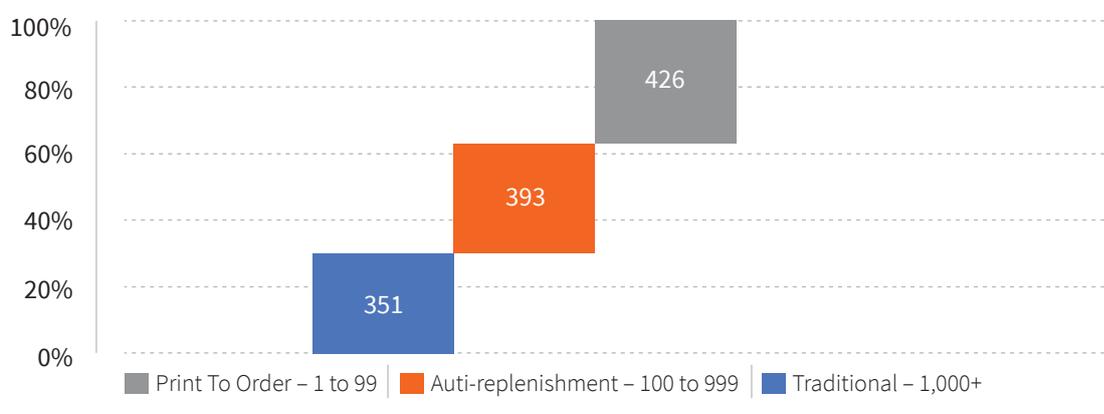


Figure 5: Tri-brid inventory segmentation/  
The Consulting Garage:  
Tim Cooper 2018

Traditional is the first Tri-brid supply chain strategy. It's used for the inventory segment that consists of the top tier of bestselling titles. For our example publisher, the top 30% of titles account for 87% of sales and 42% of inventory. In this case, the number of titles is three hundred fifty-one. Because of the high concentration of sales, it's clear that optimizing inventory levels to balance working capital investment with service levels is critical for this segment. Because the service level data is not available for this publisher, we don't know how well they currently do this. We will discuss the inventory investment concentrated in the other segments later.

<sup>9</sup>Ibid

There are seven main attributes for the traditional publishing supply chain. They are listed below in figure six.

| Traditional supply chain attributes |  |
|-------------------------------------|--|
| 1                                   | Print, then sell model.  |
| 2                                   | Books printed then shipped to publisher's warehouse for order fulfillment and distribution.            |
| 3                                   | Print quantities determined through a forecasting methodology.   |
| 4                                   | Offset printing in long runs.  |
| 5                                   | Production specifications determine the materials, trim size, binding and paper.                       |
| 6                                   | Components may be sourced separately and shipped to bindery.   |
| 7                                   | Turnaround time for printing varies from days to months depending on provider location and agreements. |

Figure 6: Traditional supply chain attribute table/Tim Cooper/The Consulting Garage 2018

In the traditional supply chain, books are printed first and then sold. They are shipped from the printer to the publisher's warehouse for storage, subsequent order fulfillment, and distribution. Print quantities are determined using an implicit or explicit forecast in a prescribed decision-making process. Conventional offset print providers are used as the quantities are typically higher than digital breakevens. The publisher (production or editorial department) determines the specifications of each title, including the materials, trim size, binding and paper, which can vary widely. Components (jackets, covers, etc.) may be sourced separately from specialty suppliers and shipped to the bindery. Reprints can take from several days to several months to arrive, based on the printer's turnaround and location.

Managing inventory for the traditional supply chain involves using and optimizing four primary factors: inventory level, forecasts, lead time, and safety stock. Inventory level is dynamic data that changes as transactions occur. Orders, receipts, and all variety of inventory adjustments all impact inventory levels. The integrity (accuracy) and visibility of inventory levels are key, along with understanding the update cycle. Forecasts reflect the prediction of future sales. As such, their accuracy can vary widely depending on the data sources, the techniques used, and the forecast time horizon. Titles without sales history are typically more difficult to forecast. Forecast accuracy is the metric used to evaluate how close forecasts are to actual sales.

Lead time is the total time required to complete the full replenishment cycle. Publishers have internal lead times (from perceived need to purchase order generation) and external lead times (from purchase order to warehouse receipt). Lead time accuracy measures actual lead times against a standard lead time expectation to document the amount and range of variability. Safety stock is the buffer inventory carried to compensate for forecast inaccuracy and lead time variation.

The need for safety stock reflects a service goal that can range up to 100%, or an intention to carry the inventory needed to always remain in an "in-stock" position. If we measure forecast accuracy and lead time accuracy, we can establish a buffer that will absorb the risk of stock outs. Simultaneously we also increase the risk of excess inventory. This is the traditional supply chain conundrum.

Given all these basics, how do we flesh out the traditional supply chain approach? First, adopt and use an inventory policy. Inventory policies capture the ground rules, methods, and decision rights used in inventory management. The table below shows the major components of a traditional inventory policy. Answers may vary per publisher.

| Traditional Supply Chain Inventory Policy | Description                            | Examples   |
|---|--|--|
| 1 Forecasting Methodology                 | How and what rules and tools?          | Modeling like titles, algorithms, reorder points |
| 2 Service Level Goal                      | Fill rate or availability % up to 100% | 85% fill rate goal                               |
| 3 Print Quantity Parameters               | How do we choose quantities?           | 1/4 year forecast to 1 year, volume related      |
| 4 Cost Parameters                         | Minimum profitability /transaction?    | Find sweet spot in cost curve/TCO model          |
| 5 Suppliers and Sourcing                  | Which suppliers and performance goals? | Supply contracts, cost, quality, SLAs            |
| 6 Process Timelines and Alignment         | Duration, sequence, and compliance     | 1st print & reprints, internal & external SLAs   |
| 7 Excess Inventory Reduction Program      | How and how frequently?                | Remainder and destroy after annual cycle count   |

Figure 7: Traditional Supply Chain Inventory Policy Table/Tim Cooper/The Consulting Garage

Many publishers are investing in or already have transaction data warehouses that provide cleaner information for traditional replenishment analysis. These systems enable analytics by customer, author, format, subject, etc. Modeling data yield tools for forecasting sales of new titles based on the past performance of similar titles. With timely and targeted data collection and analysis, publishers can use these tools to better adapt production to demand closer to printing, re-route stock rather than print more inventory, anticipate and pre-empt out

of stocks, and troubleshoot logistical problems and delays. These are rear-view analytics within the range of stage 1 and 2 companies. Existing analytic capabilities should be leveraged toward answering the supply chain questions of what happened and why.

The Hackett Group notes that 56% of supply chain leaders see critical importance in using analytics to optimize production and sourcing to reduce total costs, and 53% in optimizing inventory levels to balance working capital investments with service levels. It is critically important that publishers intensify their efforts to better use their current stage analytic maturity toward optimizing inventory and supply chain performance, and aggressively target progress toward the next stage of their analytics evolution.

## Auto-replenishment is the second Tri-brid™ supply chain strategy.

The second supply chain strategy in the Tri-brid<sup>10</sup> is auto-replenishment (AR). The titles included are those where the annual sales volume is low, from one hundred to nine hundred ninety-nine in our example (see figure 5), and sales are unpredictable. For our example publisher, this constituted 34% of the titles, 13% of sales, and 27% of inventory. AR supply chain titles are enabled by digital print technology.

In the AR supply chain, titles are reordered using a carton quantity or similar operationally efficient constant. These titles may be held in a fixed location within a flow bin or in a specific warehouse aisle. AR titles are flagged for reorder when a minimum stock threshold is reached. Then the system algorithm automatically reorders the title in a preset quantity. The maximum amount of inventory carried is planned to minimize the distribution footprint of the title. For example, if an automatic replenishment title has a carton qty of 24, a print order for 24 is triggered when on-hand inventory is depleted down to a specific minimum of x, down to 0. This is also referred to as “micro-inventory.”

This concept (also known as Kanban) was originally developed as part of the Deming/Toyota system to ensure adequate and timely inventory on the assembly line. Too little inventory of any part meant the line had to slow or stop until the part was restocked. Too much inventory would not fit in the work space provided, also slowing down the assembly line. The stock rate of use of each part had to be balanced with the storage capacity and how frequently replenishment could be planned.

The warehousing and fulfillment for AR typically involves VMI (vendor-managed inventory). In this case, the printer is responsible for printing and storing the inventory at levels within the prescribed range. The printer may ship the titles back to the publisher for future order fulfillment, or drop-ship directly to the customer. Printing, warehousing, and fulfillment costs, as well as the associated lead times and parameters, are negotiated in advance as service level agreements (SLA) and monitored on a regular basis.

### Auto-replenishment (AR) supply chain attributes

1. Print then sell model.
2. Printed books stored in bin location at printer or publisher’s warehouse.
3. A formulaic and fixed reorder quantity is applied within a range of predetermined constraints.
4. Digital printing used for carton quantities or short runs.
5. Materials, trim size, and paper are within printer specified parameters.
6. Components produced on site by printer.
7. SLA compliance monitoring and regular parameter reviews are required.

Figure 8: AR supply chain attributes table/  
Tim Cooper/The Consulting Garage

<sup>10</sup> Ibid

The operational benefits of the AR supply chain are critical. Titles can be readily modeled to find the total warehouse capacity required to hold the maximum inventory of each title. Outsourcing to a VMI model can free up significant warehouse capacity. Costs and order quantities are agreed upon in advance and don't require the publisher's intervention on a transactional level. The publisher and printer can align around a joint understanding of the parameters. The attributes of AR describe the inventory policy, so the table below is largely redundant: The policy is explicit.

| Auto-replenishment inventory policy |                           | Description                                     | Example                                 |
|-------------------------------------|---------------------------|---|---|
| 1                                   | Forecasting Methodology   | Use sales and reorder levels to trigger restock | Order a carton when inventory goes to 0 |
| 2                                   | Service Level Goal        | Set based on reorder level and lead time        | 80% service level goal                  |
| 3                                   | Print Quantity Parameters | Defined parameters—automatic                    | System/3rd party                        |
| 4                                   | Cost Parameters           | TCO model breakeven                             | predetermined                           |
| 5                                   | Suppliers and Sourcing    | Process, price and SLA pre-determined           | Standard cost and 5 day lead time       |

**Figure 9:**  
Auto-replenishment  
inventory policy

As we move toward the future, the carton itself may trigger AR with a smart tag. In some current retail strategies, IoT (internet of things) based systems with smart appliances signal replenishment as the tagged items are removed (or sold). In a wired house, for example, if you empty a carton of milk in the morning, your refrigerator will place a milk order with Amazon Fresh, which will deliver to your door later that day. The AR supply chain may be a temporary one on the way to an even more automated solution.

## Print-to-order (PTO) is the third Tri-brid supply chain strategy.

The third and most potentially transformative supply chain strategy is print-to-order (PTO). It is simply described as print to order, direct to consumer. To do this requires an integrated, end-to-end supply chain solution that connects the content from publishers to a printer that can produce the book at the point of need, in the quantity needed and in the quality desired for use, then ship directly to the end user. This supply chain is zero- inventory, just-in-time book printing and delivery.

Some in the industry use the term print-on-demand (POD) interchangeably with PTO. It's understandable that the terms generate confusion. Both are enabled by digitally automated print manufacturing that provides a book of one capability. But POD includes short run printing for replenishing warehouse inventories, which PTO does not. Some publishers have leveraged POD short runs, particularly in color, to reduce their inventory for low-volume titles such as teacher's editions or custom textbooks. But those titles are still stored in a warehouse. Most POD providers are not PTO providers. PTO is POD plus fulfillment for each ship-to order received.

In our example in Figure 5, 36% of the titles represent only 1% of sales but 21% of the publisher's total inventory. By using the PTO supply chain strategy this publisher could sustainably reduce their inventory by 21% without losing any sales. If they were to eliminate on-hand inventories, that would free up one-fifth of their current storage space. A one-time write down of current excess inventory would yield recurring significant financial and operational benefits. No inventory would be replaced. Figure 7 shows the attributes of a PTO supply chain.

### PTO supply chain attributes

1. Sell, then print
2. Zero inventory stored
3. Books printed to order
4. Flat unit cost
5. Materials, trim size and paper are within printer standards
6. Components produced on site by printer
7. Turnaround in 12-24 hours to meet SLA

**Figure 7:** PTO supply  
chain attributes table/  
Tim Cooper/The  
Consulting Garage

# Closed ecosystems and viable first generation PTO supply chains

For more than twenty years, book publishers have had access to groundbreaking PTO with industry pioneers Lightning Source. They created a workable business model and continue to deliver on the promise and the volumes possible with PTO. Amazon also provides PTO services for many publishers. What makes these programs so valuable for publishers is that the corporate ecosystems in which they are situated generate a tremendous volume of demand, whether from booksellers through Ingram Books, or from consumers through [Amazon.com](https://www.amazon.com).

These represent the first generation of PTO supply chains, filling orders placed by booksellers or consumers in a closed ecosystem for titles designated by publishers. The providers take and fulfill orders for qualified titles, and then send monthly payments to publishers (subtracting their charges from the selling price of each transaction). They've built the infrastructure to archive print-ready files in a proprietary repository hosted on their own servers. They control the quality of the files and the print output, and prescribe standard materials, trim sizes, and bindings that fit their equipment portfolio. Such providers have offered scanning and other file conversion programs to increase their repository's title count by creating files for books that may have existed only in film or older file formats. Publishers are sometimes provided access to these hosted repositories.

But publishers don't have transparency on who ordered each title and how quickly the order was printed and fulfilled. Even more importantly, operating within these ecosystems cedes the order and fulfillment historical data to the ecosystem owner, not to the publisher. Many consumers and booksellers may continue to prefer dealing with their intermediaries of choice, whether on a retail or wholesale level which means publishers will likely continue to interact with closed PTO ecosystems, including Amazon, Lightning Source or others.

While these first generation POD/PTO order programs are viable for publishers, they are not optimal. No single PTO provider can cover the full range of a multi-channel or global publisher's future needs in a closed ecosystem. Even with multiple providers, within closed ecosystems there are gaps in coverage and capability. A publisher sells into many channels and needs the flexibility to maximize their sales of any title, even those designated for PTO. Publishers want to take and fulfill direct orders for titles marked for PTO.

As we move forward, publishers should strive to create their own PTO supply chain to enable a strategic advantage with benefits beyond owning the order and fulfillment historical data: as a source for advanced analytics. Accumulating all of the possible data about who bought which titles has enormous future value in a big data, advanced analytics world.

Building this more transparent ecosystem of technology may be beyond the capacity and financial resources of many publishers. Their priority investments are directed toward content acquisition. Some larger or more advanced publishers may have pieces of the puzzle, but few have the programming resources to fully assemble it. Luckily, cloud-based applications and software as a service from third-party developers promise to bring PTO capabilities within the reach of many publishers soon.

# What is an optimal next generation PTO supply chain?

Optimal next generation PTO is a cloud-based ecosystem of technologies that are assembled and integrated for a comprehensive and scalable solution. The technologies include a cloud-based content repository housing print-ready files, checked by quality control, and accessible to any print supplier granted access rights. Robust and transparent order management is part of the ecosystem, with security and track-and-trace fulfillment at the parcel level. When combined with the power of the repository, high transaction order management empowers effective global distribution.

Let's use HP's Piazza for Publishing as an example of a newly available optimal PTO supply chain enabler. It is a set of interlocking cloud-based services for publishers and printers that enable secure, integrated, automated, end-to-end workflow. Piazza's ingestion engine will pre-flight content for digital print optimization. This includes both cover files and book blocks. The publisher assigns metadata by title, including bibliographic information, a quality profile, and production metadata such as ink density, paper, trim, and finishing. Then the optimized content is stored in a cloud-based repository. The repository is secure, searchable, and scalable, and provides the ability to group titles with a catalog management function.

Piazza's order management works through an interface from the publisher's enterprise resource planning (ERP) system or order management system. It provides a single point of integration with printers, delivering on the promise of a true standard for electronic data interchange (EDI). It allows publishers to choose between multiple qualified printers (that are compatible) and enables a distributed manufacturing model to print at the closest point of need. SLA management is a publisher-to-printer specific setting, and real-time reporting of orders and delivery tracking is available on a featured publisher dashboard. The dashboard also tracks SLA performance and volume by printer, as well as book title performance by sales volume and region.

When Piazza is fully implemented, publishers will have an optimal PTO supply chain. The framework and workflow requirements for implementing this transition will require investments from both publishers and printers. Publishers must provide their title content and metadata to populate the repository. Titles designated for the PTO supply chain must conform to digital-friendly standard trim sizes, bindings, and paper choices. Publishers must also complete the application program interface (API) for Piazza to receive orders and customer delivery instructions, and provide delivery confirmation updates.

While implementation and transitions are typically painful, the promised benefits are transformational. The repository is an accessible content distribution platform in the cloud, scalable and secure. With it, publishers can maintain version control, enable customized content if required, and enable multimedia distribution and presentation. Additionally, publishers will not be locked into one supplier for any service. In a PTO-themed survey of various industry groups done in December 2017 by The Consulting Garage, eighty-seven percent of respondents already used a PTO provider, but sixty-five percent were not fully committed to that provider.

All publishers have experienced the quality issues that can arise when transitioning a title to a new printing process, particularly offset color titles to digital. In the PTO repository, the print-ready files can be accessed by multiple providers if necessary, but with standard profiles for consistent, repeatable quality and color. Continued development of digital quality standards comparable to offset international code council (ICC) profiles would ensure that the same title is printed with the same quality across multiple presses and multiple geographies.

Figure 8 below recaps the contrasting general attributes of viable PTO supply chains versus optimal PTO supply chains. HP's Piazza, combined the right set of providers, will enable publishers to create an optimal PTO supply chain.

Figure 8: Viable versus Optimal PTO attribute table/Tim Cooper/The Consulting Garage

| Viable PTO Attributes                                  | Optimal PTO Attributes  |
|--|---|
| Orders originate from provider's ecosystem             | Orders originate from publisher's ecosystem                     |
| Content resides in the provider's repository           | Content resides in publisher's repository                       |
| The file is controlled by the provider                 | The file is controlled by the publisher                         |
| Print quality is determined by the provider            | Quality standards embedded in publisher's metadata              |
| Order fulfillment data is opaque for the publisher.    | Order fulfillment data is transparent and displayed for review. |
| Limited global distribution within corporate ecosystem | PTO is a global distribution and fulfillment platform.          |
| Single provider platform only.                         | Standard platform for a portfolio of qualified providers        |

## Conclusions and next steps

The call to action for publishers is clear. Supply chain leaders are embracing digital transformation. While the long path to analytics maturity is daunting, publishers can take immediate and significant steps to improve supply chain performance. The most important is to move away from your traditional monolithic supply chain construct and adopt a Tri-brid strategy.

To succeed in the transition, publishers need to first assess their supply chain's current state. They must improve their traditional supply chain. Pages four through six provide ideas and examples that publishers can build on. Expert advice and experienced guidance is available through The Consulting Garage and other industry specialists.

To implement AR and PTO, publishers need to find strong provider partners who will assist in the transitions and cooperatively develop the SLAs and execute the programs. Publishers should also have control of their title metadata, including production specifications and file locations. Any publisher who has moved titles to different printers, or has attempted to retrieve print-ready files has experienced some hurdles and delays.

Also, converting titles from offset to digital can be a challenge, particularly if the full publishing organization is not aligned with the strategy. Changing paper, bulk, or trim size on a title may be difficult, and some titles will not be able to be printed digitally. Tools for financial analysis are required to understand the breakeven points between offset costs and digital. The TCO of offset quantities must be included in the analysis, or digital will not appear to be an attractive choice. As shown previously, to implement Tri-brid supply chains, all title sales must be analyzed and titles grouped into the appropriate segment. Optimal PTO, as represented by Piazza, requires additional resources as noted on page nine.

This is a challenging set of action steps for publishers, but the results promise to significantly improve business results, and lead to the next stages of analytic and supply chain maturity.

# About The Author: Tim Cooper

With a publishing background ranging from bookstore to boardroom, Tim Cooper is a globally-recognized supply chain expert who's worked with publishing and printing companies in the US, Canada, UK, Australia, China, and the Philippines. From Trade to Education, from STM to Specialty, Tim's worked with major segments of publishing from a hands-on operating perspective. Tim's experience includes making thousands of print quantity decisions, from huge quantities of best sellers to short run digital quantities of long tail backlist.

To manage this work, he designed an inventory management process and system that had major positive financial impact. Over a multi-year period, his publishers' inventory decreased by 50% while sales doubled. During that time, customer fill rates were higher than goal and out of stocks were limited to a maximum of 2% of the active title database in any given week. Not coincidentally, during the same period the publishing company went from perpetual loss to consistent profitability.

Tim's background in publishing strategy and operations includes projects pioneering the use of digital printing for Trade and K-12 Education books, as well as years of Global Supply Chain and Vendor (Printer) sourcing experience for publishers. He's spoken at printing events around the globe, and offers strategic perspectives that integrate the economics of digital versus offset, total cost of ownership (TCO) and 21st supply chain evolution.

Tim is the founder and principal of the Consulting Garage, now in its tenth year. Tim's vision of The Consulting Garage as a no-nonsense, no frills, highly focused, practical, hands-on consulting service grew from his own experiences (both positive and negative) in dealing with consultants over the years. Having worked with all consulting types, from the corporate megaliths to the boutique specialists, Tim has taken the best approaches and distilled them into the simple essence of listen, learn, and lead. Highly skilled in collaborative management with a focus on strategic planning, Tim is a leader with a successful history of improving day-to-day operations as well as directing enterprise-level initiatives.

In addition to his extensive work experience, Tim has a Master of Arts in Organizational Management, and a BA in Philosophy. He has attended great programs on business strategy and supply chain management at Harvard Business School, MIT/Sloan School of Management, Saint Louis University/ John Cook School of Business, and the University of Texas at Austin. Tim also reads widely to keep current on the most interesting and impactful business and technology developments.

