

**Building an Efficient Print Production Workflow through
Web-to-Print: A Case Study of Hemlock Printers**

by

Sandra Ofori-Dei

Bachelor of Arts, Kwame Nkrumah University of Science and Technology, 2013

Project Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Publishing

in the
Publishing Program
Faculty of Communication, Art and Technology

© Sandra Ofori-Dei 2016
SIMON FRASER UNIVERSITY
Spring 2016

This work is licensed under the Creative Commons Attribution-NonCommercial-
NoDerivatives 4.0 International (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Approval

Name: Sandra Ofori-Dei
Degree: Master of Publishing
Title: Building an Efficient Print Production Workflow through
Web-to-Print: A Case Study of Hemlock Printers.

John W. Maxwell

Senior Supervisor
Associate Professor and Director

Juan P. Alperin

Supervisor
Assistant Professor

Masih Ferdosian

Industry Supervisor
Team Lead, Web Development
Hemlock Printers

Date Approved:

March 30, 2016

Abstract

To respond to significant technological progress, the printing industry is gradually embracing a production system known as Web-to-Print, of which print providers can offer services to their clients through an automated online service. This report examines the use of web-to-print systems at Hemlock Printers, a Burnaby-based printing firm, as a case study. The report focuses on three different web-to-print systems at Hemlock and provides information on the company's reasons for adopting each system; the various components of each workflow; detailed description of each workflow; as well as their capabilities and limitations.

Dedication

This report is dedicated to my parents and my beloved aunt, Diana Appiah. The sacrifices you have made in my life have yielded the result of who I am today.

Acknowledgements

I wish to express my heartfelt gratitude to my academic supervisors: John Maxwell and Juan Alperin for their help and support throughout my studies and the completion of this report, not forgetting other faculty members in the Publishing program at Simon Fraser University.

My sincere thanks also goes to Richard Kouwenhoven, President and Chief Operating Officer, and the entire staff of Hemlock Printers for the opportunity offered me to have my internship with them, working with such great and lovely people. The experiences gained were enormous and has given me the exposure to the modern print world. My love and desire to remain in the industry has been stirred, due to the knowledge and experience acquired during my internship.

A special thanks to my industry supervisor, Masih Ferdosian (Team lead, Web Development - Hemlock Printers). I appreciate your readiness to help me each time I needed information on Hemlock's web-to-print systems. Your sacrifices and dedication toward your work is exceptional.

Finally, I would like to thank my family, friends and fellow MPubbers for their help in varied ways, not forgetting Dr. and Mrs. Osei-Kwame, Dr. and Mrs. Smith-Eseh, Pastor and Mrs. Ayedzi, and the entire membership of Liberty House of Worship. You have all been of great support in making my MPub dream a reality.

Table of Contents

Approval.....	ii
Abstract.....	iii
Dedication.....	iv
Acknowledgements.....	v
Table of Contents.....	vi
List of Tables.....	ix
List of Figures.....	x
Introduction.....	1
Chapter 1: Hemlock Printers.....	4
1.1 About Hemlock.....	4
1.2 Locations.....	4
1.3 Print Specialties.....	5
1.4 Mission Statement.....	5
1.5 Organizational Structure.....	6
1.6 Departments and their Functions.....	8
1.6.1 Estimating and Sales Support.....	8
1.6.2 Planning and Scheduling.....	8
1.6.3 Hemlock Express.....	8
1.6.4 Web Development.....	9
1.6.5 Manufacturing and Production.....	9
1.6.6 Warehouse and Fulfillment.....	9
1.6.7 Information System.....	9
1.6.8 Purchasing.....	10
1.6.1 Accounting.....	10
1.6.2 Sales and Marketing.....	10
Chapter 2: Web-To-Print.....	11
2.1 An Overview.....	11
2.2 Emergence.....	11
2.1 Adoption of Web-to-Print Solutions around the Globe.....	12

2.2 Advantages and Disadvantages of Web-to-Print.....	13
2.2.1 Advantages to Print Providers	13
2.2.2 Advantages to Clients	14
2.2.3 Disadvantages to Print Providers.....	15
2.2.4 Disadvantages to Clients	16
Chapter 3: The PrintStream Fulfillment (PSF) Web-to-Print System	17
3.1 Its Adoption.....	17
3.2 Components of PSF	17
3.2.1 The print management information system	18
3.2.2 The fulfillment and storefront management system.....	18
3.2.3 Software for creating templates for variable data printing.....	19
3.2.4 The prepress software	19
3.2.5 The digital file sharing system.....	19
3.2.6 The web application for creating job docketts	19
3.2.7 The web application for tracking order status.....	20
3.2.8 The shipping management software.....	20
3.3 The PrintStream Fulfillment Workflow.....	21
3.4 Capabilities	23
3.5 Limitations.....	24
Chapter 4: The Presswise Web-to-Print System	26
4.1 Its Adoption.....	26
4.2 About Presswise.....	26
4.3 The Presswise Workflow	27
4.4 Capabilities	29
4.5 Limitations.....	29
Chapter 5: Hemlock’s New Fulfillment and Web-To-Print System	31
5.1 Its Adoption.....	31
5.2 Components of the New Fulfillment and Web-to-Print System.....	31
5.2.1 The storefront management software (<i>uStore</i>)	32
5.2.2 The variable data printing software (<i>PersonalEffect Print</i>)	32
5.2.3 The fulfillment/warehousing software (<i>VeraCore</i>).....	33
5.2.4 The digital asset management software (<i>Portfolio</i>)	33

5.2.5 The online support ticketing system (<i>OSTicket</i>)	34
5.2.6 Database management server and programming language (<i>SQL/Lasso</i>)	34
5.3 Hemlock's New Fulfillment and Web-to-Print Workflow	35
5.3.1 Features of the New Fulfillment and Web-to-Print System	36
5.3.2 The ordering and production process	37
5.4 Capabilities	39
5.5 Limitations	40
Chapter 6: Summary, Recommendations and Conclusion	41
6.1 Summary	41
6.2 Recommendations	43
6.3 Conclusion	44
References	45
Appendix A: List of Acronyms & Abbreviations	48
Appendix B: Definition of terms	49

List of Tables

Table 1 Available Features in the various web-to-print systems at Hemlock.....	36
--	----

List of Figures

Figure 1.	The organizational structure of Hemlock Printers.	7
Figure 2	A diagram describing the PrintStream Fulfillment Workflow.	21
Figure 3	A diagram describing the Presswise Workflow.....	27
Figure 4	A diagram describing the New Fulfillment and Web-to-Print Workflow.....	35

Introduction

The increase in the use of internet has open several opportunities for corporate and individually-owned businesses, who mostly relate with their clients through the internet. The printing industry is no exception in this regard. This has created an opening for commercial printers to interact with their clients by providing them with online services that allow for job submission, job reviewing and artwork previewing, proofing and approving print proofs, and customizing templates such as business cards and brochures, as desired.

An online automated system for print production is one of the effective workflow systems used by several printing companies around the globe.¹ This is as a result of its productivity and efficiency in the area of job estimation, planning, printing, finishing, shipping, etc. Among these systems is web-to-print, designed to work through a networked website that is specially designed for clients. These unique websites allow clients to submit jobs, preview and review jobs, provide information for variable data printing, and receive notifications. The web-to-print systems in use at Hemlock are mainly for variable data printing, print on demand; and warehousing and order fulfillment purposes.

The objectives of this report are to;

1. Evaluate the various web-to-print systems at Hemlock and what informed their adoption.
2. Provide a description of the various components of each workflow.
3. Provide a description of how each workflow works.
4. Suggest recommendations for enhancing the efficiency and effectiveness of web-to-print at Hemlock.

¹ Fenton, Howie. *Web-to-print Adoption and Success*. In-plant Graphics. May 29, 2015. <http://www.inplantgraphics.com/article/web-print-adoption-success/> (accessed September 19, 2015)

The report is further divided into the following chapters:

Chapter One: *Hemlock Printers*: This chapter provides a brief background of Hemlock Printers. It also describes the company's organizational structure, highlighting the various departments and their functions.

Chapter Two: *Web-to-Print*: This chapter gives a description of web-to-print and what it entails. The first section provides a general overview and discusses its level of adoption in the printing industry around the globe. The second part discusses the system's capabilities and limitations to print providers and their clients.

Chapter Three: *The PrintStream Fulfillment Web-to-Print System*: Discussed in this chapter is Hemlock's first adopted web-to-print system. It describes the components of the workflow, as well as its capabilities and limitations.

Chapter Four: *The Presswise Web-to-Print System*: This chapter describes Hemlock's second adopted web-to-print system. It also provides a description of how the workflow works, and its capabilities and limitations.

Chapter Five: *Hemlock Fulfillment and Web-to-Print System*: This chapter gives a description of the newly adopted fulfillment and web-to-print system. It gives a description and functions of the various components of the workflow, and provides a detailed description of how the workflow works, as well as outlining the capabilities and limitations of the system.

Chapter Six: *Summary and Recommendations*: The final chapter of this work contains the conclusion and some recommendations that management of Hemlock could consider for future innovations. These recommendations, while specific to Hemlock, can serve anyone with an interest in the print industry.

Findings for this report were gathered through observation and hands-on experience gained from my four-month internship at Hemlock from April 20, 2015 to August 31, 2015. During this period, I worked as a team member of the Web development team,

where I assisted in managing the existing web-to-print sites, as well as the development of the new fulfillment and web-to-print system.

Chapter 1: Hemlock Printers

1.1 About Hemlock

Hemlock Printers is one of North America's leading printers. The company, whose main office is located in the city of Burnaby, British Columbia, Canada, has been in existence for over forty years. The company began in 1968 and is privately owned by the Kouwenhoven family.

Hemlock started with two traditional printing machines: an *AB Dick 360* and a *manual platen letterpress*, which were both produced in 1905. After seeing many orders, the company acquired extra printing machines to facilitate production.² Years after, the company progressively increased and won numerous contracts during the 1986 World Exposition on Transportation and Communication (Expo 1986), which was held in Vancouver. During that year, sales returns tripled, allowing the company to invest in more advanced equipment. With this acquisition and prospects, the company acquired its current main office at 7050 Buller Avenue, Burnaby.³

1.2 Locations

Up until the 1990s, Hemlock was solely a Canadian-based company. However, on seeing the opportunities for growth and expansion offered by the passing of the Free Trade Agreement (FTA) in 1988, the management of Hemlock decided to extend their services to the United States, opening up their first office in Seattle in 1993. This made Hemlock the first printer in Western Canada to penetrate into the US market. With several developments over the years, the company decided to expand its operations further, both locally and abroad. Currently, Hemlock has sales offices in Victoria, Seattle, and San Francisco, together with the main office, the graphic display office and warehouse, all in Burnaby, BC.

² Filomena Tamburri "Printer of the year", *Graphic Monthly*, October 2002, 1-9.

³ Ibid.

1.3 Print Specialties

Hemlock Printers offers a complete suite of printing services, ranging from traditional offset printing to digital printing, electronic prepress, binding, finishing, and all fulfillment and warehouse activities. Currently, the company's main plant uses solely Heidelberg branded printing machines for traditional printing jobs and HP indigo digital presses for the digital department. Hemlock offers services in all business areas, including advertising collateral, fine art printing, labels and packaging, publication, direct marketing, stationery, fulfillment services and corporate communication.⁴

1.4 Mission Statement

Integrity and Innovation in Print has been the company's hallmark since inception. It aims at producing print products to suit clients' preferences.⁵ To practice this, the company's mission is to:

"To provide the best value in printed products to a diversity of clients whose satisfaction with our quality of product, quality of service and integrity is our primary goal; to encourage all employees to learn and develop and to provide the opportunity to reach personal career objectives, in an environment that inspires team spirit, high achievement and continuous improvement; to be fair and equitable in our business practices with suppliers of materials and services; to build long term and mutually beneficial business relationships; to work towards continued financial well-being through care and responsibility for the security and benefit of all employees, shareholders and the community; and to be an outstanding company, honest and forthright in the conduct of our business."⁶

⁴ Hemlock Printers. "Services" http://www.hemlock.com/?_escaped_fragment_=/services#!/services (accessed September 14, 2015)

⁵ Hemlock Printers. "Company: Our Mission" http://www.hemlock.com/company/our_mission (accessed August 20, 2015)

⁶ Hemlock Printers. "Company: Our Mission" http://www.hemlock.com/company/our_mission (accessed August 20, 2015)

1.5 Organizational Structure

Hemlock Printers is made up of about 170 employees. These employees are guided by the leadership board and departmental heads. The leadership board comprises of the Chairman and Chief Executive Officer (CEO), President and Chief Operating Officer (COO), Senior Vice President (Manufacturing and Operations), Vice President (Sales & Marketing), Vice President (Prepress), Vice President (Finance), Director (Products and Service Development), and the Managing Partner of the company's branch in the US. The President and Chief Operating Officer (COO) acts as the head of all operations and reports to the Chairman and Chief Executive Officer (CEO) periodically.

Activities in Hemlock are divided into Operations, Manufacturing, Finance, and Sales. The Operations comprise of Estimating and Sales Support, Production Planning and Scheduling, Digital Print Services and Web Development. Manufacturing is made up of the Prepress Department, Production, Warehouse Fulfillment, IT and Purchasing. The Finance team includes Finance Controller, Credit and Collection team, Payroll & Benefits team, and Administration. The Sales team comprises of all sales representatives and the Marketing Department.

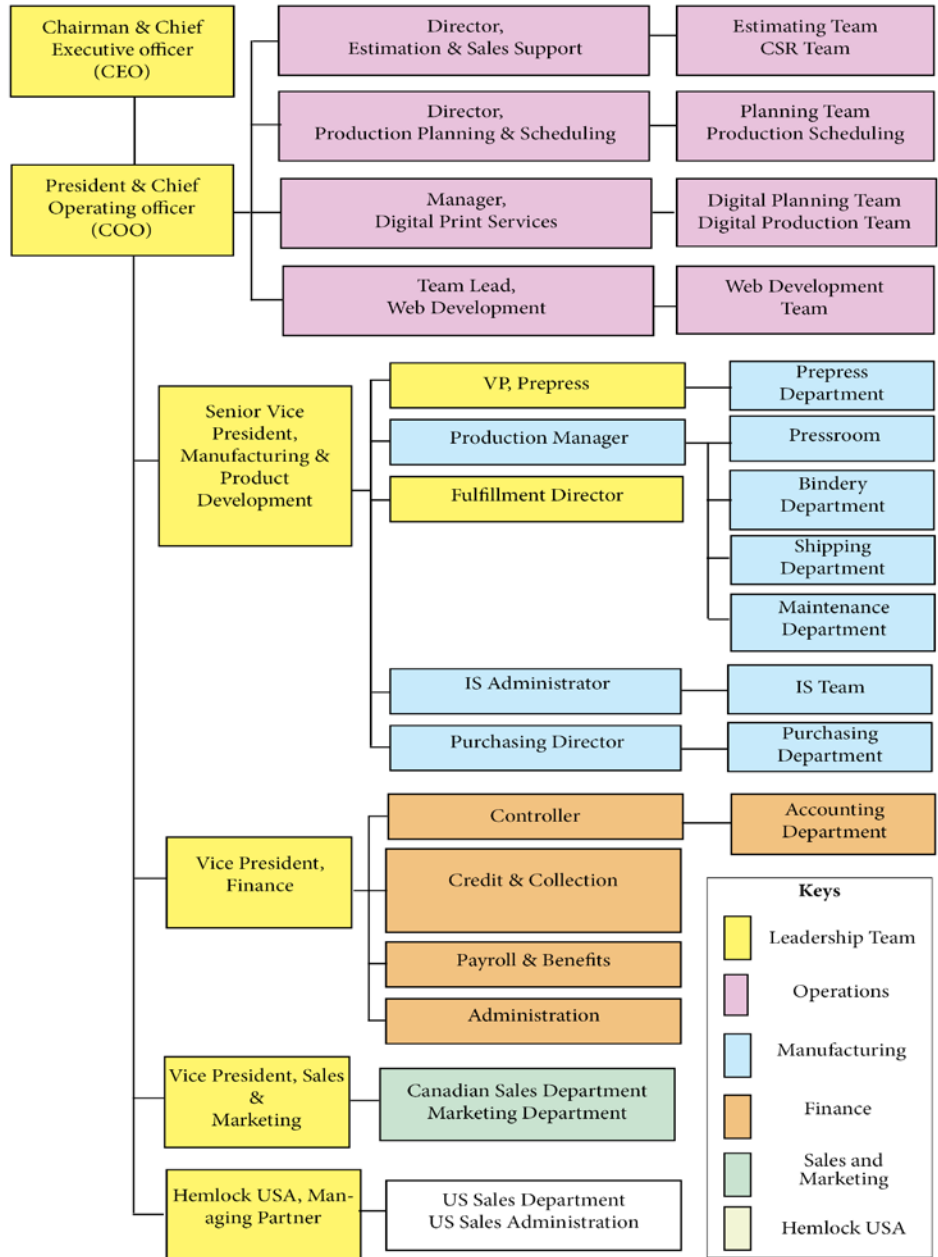


Figure 1. The organizational structure of Hemlock Printers.⁷

⁷ Constructed with information from Richard Kouwenhoven, President and Chief Operating Officer, Hemlock Printers, August 28, 2015.

1.6 Departments and their Functions

Hemlock has ten working departments, namely: Estimating and Sales Support; Planning and Scheduling; Hemlock Express; Web Development; Manufacturing and Production; Warehouse and Fulfillment; Information System; Purchasing; Accounting and; Sales and Marketing. Below is a description of the responsibilities of each department:

1.6.1 Estimating and Sales Support

The estimating department handles all digital and main plant estimating activities for all incoming orders. They are responsible for the maintenance of all estimating standards and developing estimating tools for a more efficient and effective print production estimation. The sales support team serves as a customer service team for clients.

1.6.2 Planning and Scheduling

The planning and scheduling department is made up of seven planners and one production scheduler. Production planners are responsible for all offset production planning activities, docket preparing, imposition, deciding production materials to use. They coordinate with sales representatives and customer service support team in planning jobs. They are also responsible for developing advanced strategies that simplify and streamline production. They also coordinate with the purchasing department in ordering for stock and other production materials. The production scheduler is responsible for scheduling turnaround times for incoming orders.

1.6.3 Hemlock Express

Hemlock Express, also known as Hemlock Digital handles print orders with a fast turnaround time, and are usually printed using digital printing machines and small traditional printing machines. Members of the department work with sales and the customer service team who receive orders in this regard.

1.6.4 Web Development

The web development team is responsible for developing and maintaining web-to-print workflows within the company. This department handles all web-to-print storefront development activities. This team manages and maintains the web-to-print sites created for clients.

1.6.5 Manufacturing and Production

The production team is mainly categorized into three departments, namely: prepress, press and postpress. The prepress department handles all the print-ready files clients send and prepares them for print. The press handles all large quantity printing fulfillments in the company. The postpress department handles all print finishing activities such as cutting, trimming, binding, packaging, etc.

1.6.6 Warehouse and Fulfillment

The warehouse and fulfillment department is a small unit within the company, which handles pick and pack orders from the various online portals. The warehouse department also manages the web-to-print warehouse software, and fulfills all warehoused orders from the various online storefronts.

1.6.7 Information System

The information system department is responsible for all workstations; computers and small printers. They manage all the telephone systems and some internal websites. They coordinate with the company's security provider in providing their services.

1.6.8 Purchasing

The purchasing department is responsible for all internal and external purchasing orders. They coordinate with all department heads and serve as a liaison between them and material suppliers.

1.6.1 Accounting

The department coordinates all financial transactions and employee benefits plans, which include employees' payrolls and benefits, account set-ups, billing and invoicing, cash, cheque and credit card payments.

1.6.2 Sales and Marketing

The sales and marketing department ensures a cordial relationship between the company and all of its existing and potential clients. The sales representatives serve as liaisons between clients and the company by serving all their needs through day-to-day interactions. The marketing team is responsible for managing the company's website and social media platforms such as Facebook and Twitter. The sales and marketing department is also responsible for reaching out to all prospective clients to patronize the services of printing with Hemlock.

Chapter 2: Web-To-Print

2.1 An Overview

With the increasing popularity of online transactions, there has emerged a means of operating printing businesses through designated websites. Web-to-print is simply defined as the process of managing printing business using websites. Web-to-print, which is sometimes referred to as Web2Print, remote publishing or print e-commerce, is the act of printing both variable and static printing products using specially-designed websites made for clients.⁸ Most of the printing companies that offer this service sometimes extend their services into e-commerce and online services such as hosting, website design, and cross media marketing. This has become an open market and an opportunity for printers and clients to exchange job files, review and preview print proofs, and accept or decline proofs depending on the available previews. This system is opened to the general public or specific clients depending on the business niche of the host company.

2.2 Emergence

The history of web-to-print can be traced back to the late 1990's and the early 2000's, where the growth of e-commerce created the avenue for clients to order products online. The scheme for this workflow had already been established years before this period, however.⁹ This allowed for easy file exchange and easy access to job proofs and previews. Printing shops then began to create websites to offer such services. The invention of online transactions between print shops and their clients began when the need arose for print shops and clients to find electronic means of exchanging digital files.

⁸ Wikipedia, The Free Encyclopedia. "Web to Print" Last modified June 09, 2015, <https://en.wikipedia.org/wiki/Web-to-print> (accessed June 10, 2015)

⁹ Ibid.

Prior to the advent of web-to-print systems, proofs were sent to clients in hard copy formats. There was the quest to find ways by which clients could preview proofs online (a way of making sure that the uploaded file is correct and ready for print). This led to a huge improvement in the printing business and later advanced to web-to-print, as seen today. Web-to-print created the avenue for clients to send digital proofs to print shops.¹⁰ This system has gradually moved from job submission portals to online ordering storefronts. Web-to-print has improved over the years and can now be described as a system for both print and non-print or warehousing and fulfillment ordering, variable data printing, and a platform where employees of clients could directly order for their company's branded materials such as stationeries, brochures, manual, etc.¹¹

2.1 Adoption of Web-to-Print Solutions around the Globe

The demand for a faster production turnaround time for print jobs and the need to find simplified ways of reaching out to clients, have stirred the interest of most print providers in adopting web-to-print solutions.

To obtain information on the penetration rate of web-to-print around the globe, Infotrends (a leading worldwide market research firm) conducted a research and reports in their finding that about 46% of print companies around the world have embraced and invested in some web-to-print solutions. From this research, it is anticipated that there will be an annual investment growth rate of 12.7% between 2011 and 2016.¹² To further give an industry analysis of web-to-print solutions, a research conducted by the Global Industry Analysts (publishers of worldwide market research), reveals in their report

¹⁰ Cholmondeley, Greg. "Print eCommerce Versus Web-to-Print" June 16, 2015. <http://www.piworld.com/post/print-ecommerce-versus-web-print/> (accessed September 17, 2015)

¹¹ Wikipedia, The Free Encyclopedia. "Web to Print" Last modified June 09, 2015, <https://en.wikipedia.org/wiki/Web-to-print> (accessed June 10, 2015)

¹² Fenton, Howie. *Web-to-print Adoption and Success*. In-plant Graphics. May 29, 2015. <http://www.inplantgraphics.com/article/web-print-adoption-success/> (accessed September 19, 2015)

“*Web to Print: A global strategic Business Report*”, that the global web-to-print market will reach \$869 million by 2017.¹³

Results from the above-mentioned studies provide insight on the responsiveness of print providers to web-to-print solutions and how the worldwide print market is increasingly taking advantage of the opportunities these solutions offer to their businesses.

Although companies are positively responding to these solutions, others are not satisfied with the capabilities of web-to-print because of: a) the system’s inability to fully understand client's requirements through online interactions; b) the difficulties in integrating several applications; c) the cost involved in purchasing and maintaining these solutions; and d) how to market these solutions to clients.

2.2 Advantages and Disadvantages of Web-to-Print

As a modern printing technology, web-to-print workflow has its own ups and downs. Below is an outline of the system’s capabilities and limitations for print providers and their clients:

2.2.1 Advantages to Print Providers

Additional print service solutions: Web-to-print offers print houses a wide range of print solutions, including variable data printing, creating storefronts and order dashboards, automated job estimating, invoicing and billing, etc. Although these solutions may be accessed through the integration of some software and web applications, it is useful when properly integrated.

Improved customer service: It helps print houses to assign online ordering platforms to their clients. With some types of web-to-print solutions, unique ordering storefronts are designed for clients based on their preferences. Through these sites,

¹³ Design ‘N’ Buy. “Growth accelerators for the global Web-to-Print market worth \$869 million by 2017”. April 28, 2014. <http://www.designnbuy.com/growth-accelerators-for-web-to-print-market> (accessed September 19, 2015)

certain added features, such as live online help and assistance is offered to enhance customer relationships.

Better communication: Through the integration of some communication solutions that triggers email notifications throughout the workflow, communication is made easy by automatically setting up email to notify clients and internal staff on major actions that take place within the workflow.

Marketing strategy: As a marketing tool, web-to-print storefronts allow print providers to display a complete list of print products, which is made available to the general public, especially to potential buyers who might be interested to order any of the products.

Increase in efficiency and productivity: To reduce the number of processes involved in print production, web-to-print automates processes such as job pricing/estimation and submission, thereby making it more cost effective.¹⁴ The automation of job pricing helps eliminate price negotiation which is of a great advantage to print providers.¹⁵

2.2.2 Advantages to Clients

Easy accessibility to print products: Web-to-print offers easy-to-use designed templates and ordering tools for customers. Specially designed websites for clients, which are a component of the system, provides a wide range of templates clients could choose from, or customize to suit their needs or preferences.

Easy accessibility of proofs: For variable data printing, clients have instant access to print proofs once a product is selected and customized. This saves clients the time of travelling to see hard proofs of products before they are finally printed.

¹⁴ B2c Print “The Pros and Cons of Web-to-Print -B2C Print”.
<http://www.b2cprint.com/the-pros-and-cons-of-web-to-print/> (accessed September 13, 2015)

¹⁵ Twyla J. Cummings and Bernice A. LeMaire: *Utilization of E-commerce by Commercial Printing Companies*. (Rochester-New York: Printing Industry Center at RIT, 2006), 5-6

Ability to track orders: Web-to-print websites help customers to monitor and track their orders online, giving them frequent updates on activities that take place within the workflow.

Receiving notifications on activities: Most web-to-print stores are designed to update clients on activities within the workflow. Activities that call for such notifications include when an order is placed, when it is in production, and when it is shipped and billed. This saves clients the time of sending emails and making calls to get updates on their orders.

Consistency in producing branded products: The online provided templates allow companies to use their brands and ensure uniformity in the product every employee prints. These company-branded products include stationeries such as business cards, letterhead, envelopes, among others.

2.2.3 Disadvantages to Print Providers

Software purchases and licensing: Most software used in building web-to-print workflows are expensive. This limits their accessibility to small and mid-sized print houses, and poses a disadvantage to print providers with a lower revenue stream that cannot afford the purchase of such software.¹⁶

Software integration: With the integration of different software and plug-ins used in the web-to-print workflow, the process can be complicated to use and very disappointing if any software or application within the workflow fails to work.¹⁷ The integration of these applications sometimes requires the services of experts in web development, and also comes with additional cost of maintenance.

¹⁶ Wikipedia, The Free Encyclopedia. "Web to Print" Last modified June 09, 2015.
<https://en.wikipedia.org/wiki/Web-to-print> (accessed June 10, 2015)

¹⁷ B2c Print "The Pros and Cons of Web-to-Print -B2C Print".
<http://www.b2cprint.com/the-pros-and-cons-of-web-to-print/> (accessed September 13, 2015)

Training: Web-to-print workflow systems also calls for some other cost on host companies, with regards to offering training for employees and clients on how to manage activities within the workflow. To gain knowledge from software providers, companies sometimes pay for employees to attend seminars and conferences organized by some web-to-print software providers.

2.2.4 Disadvantages to Clients

Complications in using storefronts: The web-to-print portal can be complicated to use and requires some training sessions to enable clients to order from their storefronts.

Inability to view hard proofs: Inasmuch as some clients would want to utilize modern-day online interactions in making sure their orders are being processed, others prefer to see hard proofs of their print jobs before they are printed. With the common (perceived or actual) notion of differences between online proofs and hard proofs in terms of colour management, some clients still prefer to have hard proofs before mass production is made.

Chapter 3: The PrintStream Fulfillment (PSF) Web-to-Print System

3.1 Its Adoption

The PrintStream Fulfillment (PSF) system, initiated in 2007, was the first adopted web-to-print and fulfillment system at Hemlock. This was a result of management's desire to have a faster and cheaper way of communicating with clients in the area of files submission, previewing and approving proofs, automated pricing and shipping system.

The reasons for adopting this system were to;

- a) Meet clients' demands through a fast and efficient way.
- b) Handle all internal and external communication and production activities through an automated workflow.
- c) Provide a system that automates and manages warehousing and order fulfillment activities.¹⁸

Before this system was initiated, the company had an online submission portal that only received incoming orders and request for job quotes. The PrintStream Fulfillment (PSF) system was launched as a storefront for one of the company's biggest clients, BC Hydro. This system helped with the print and warehousing needs of BC Hydro and was later extended to other clients of Hemlock.

3.2 Components of PSF

The PrintStream Fulfillment (PSF) system is designed to streamline the ordering and production activities which includes; submission of file, preparation of templates for variable data printing, online ordering, job planning, prepress, production, finishing, shipping, and billing. The workflow works with the integration of some software which

¹⁸ [Source: Personal communication with Masih Ferdosian, Team lead, Web Development – Hemlock Printers].

includes *PrintStream Fulfillment* (the fulfillment and storefront management system); uCreate (the software for developing templates for variable data printing); *PSI* (the company's print management information system); and *Prinergy* (the prepress software). The system also makes use of two important web applications which are *Job rocket* and *Job tracker*. A description of each component is provided below.

3.2.1 The print management information system

Print management information system is an automated system specially designed for organizing activities in the various departments within a print production workflow. The management system used in Hemlock is known as *PSI*. *PSI* is designed for commercial printers who use all forms of printing equipment and provides modules for print job estimation, job planning and managements, as well as inventory and purchases of print products.¹⁹

In this workflow, *PSI* has been integrated into the fulfillment and storefront management system which serves as the master data source for all products available on the storefront. *PSI* carries information on a product's pricing, production planning, print specifications, shipping, purchases, and inventory.

3.2.2 The fulfillment and storefront management system

The system that enables the workflow's ability to manage order fulfillment needs, as well as building a storefront for client is known as *PrintStream Fulfillment*. This software is designed to provide services such as pick and pack fulfillment, print on demand, material requirement planning (MRP), among others.²⁰ *PrintStream Fulfillment* works on integration with the company's management information system (*PSI*) and serves as a solution for creating ordering sites and managing product details and inventory count on

¹⁹ EFI. "EFI Customer Requests Highlight Next Release of PSI Management System" May 1, 2006. <http://ir.efi.com/releasedetail.cfm?ReleaseID=455906>. (accessed September 14, 2015)

²⁰ EFI. "EFI PrintStream Fulfillment – Overview". <http://www.efi.com/products/productivity-software/fulfillment/>. (accessed September 14, 2015)

each storefront. It also accepts and manages templates for variable data printing which is made available on the ordering site.

3.2.3 Software for creating templates for variable data printing

To create templates for variable data printing (VDP), a plug-in known as *uCreate* works with *Adobe Indesign*. With *uCreate*, the web developer applies certain rules to an artwork to determine the changes a client could make to any provided variable data template on the storefront. For instance, the business card templates provided on the storefront are encoded with certain rules that restrict clients' data inputs such as length or number of characters to enter in a field and the addition of certain characters such as comma, colon, semi-colon and hyphen in a given VDP template on a storefront.

3.2.4 The prepress software

Prinergy serves as the prepress workflow software that feeds on information from the management information system (*PSI*) and *PrintStream Fulfillment* to prepare submitted digital files for final print. Activities involved include controlling the appearance of colours in a graphic work, quality control management, imposition, proofing, and preparation of printing plates.

3.2.5 The digital file sharing system

ShareFile is the file sharing system used for receiving and storing digital files from clients. Files shared on this system are made to be sent to the prepress workflow for processing.

3.2.6 The web application for creating job docket

Job rocket is a web application that is setup to retrieve information from the company's management information system (*PSI*) to create job docket (a summary of print orders

which usually comes with a reference number that gives an identity to an order throughout the production process).

3.2.7 The web application for tracking order status

Job Tracker is also a web application that retrieves information from the company's management information system (*PSI*), to track the status of jobs throughout the production process. It also allows for the retrieval of order history and information.

3.2.8 The shipping management software

FedEx Ship manager serves as the software that automates the shipping process within the workflow, using the various shipping modes offered by FedEx. The integration of this software gives clients the access to select their shipping method in the process of entering their shipping details while placing an order.

3.3 The PrintStream Fulfillment Workflow

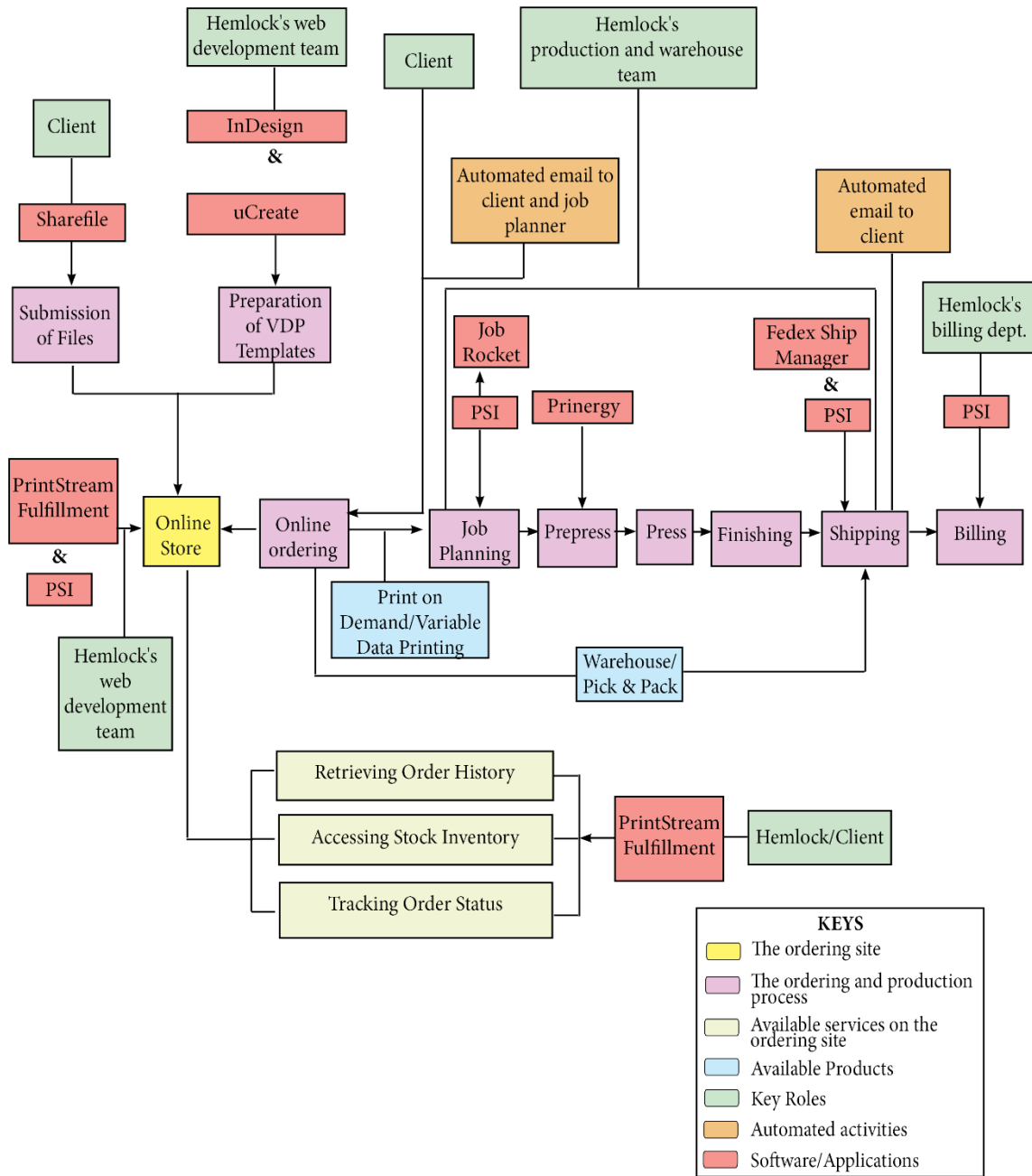


Figure 2 A diagram describing the PrintStream Fulfillment Workflow²¹.

²¹ Ofori-Dei, Sandra. A diagram describing the PrintStream Fulfillment workflow. February 28, 2016.

To initiate the workflow, the web-to-print coordinator of Hemlock creates a storefront for clients with an integration of *PrintStream Fulfillment* and *PSI* (the company's management information system). Once a client is registered onto a storefront, products of all types (warehoused and print on demand) are made available for ordering. The ordering and production process follows the procedure below:

Submission of print-ready files: Through the file sharing system (*Sharefile*), clients submit their digital files for printing and for creating templates for variable data printing.

Preparation of variable data templates and print-ready files: Once files for creating templates for variable data printing are received, templates are prepared using *Indesign* and *uCreate* which is then uploaded on the *PrintStream Fulfillment* ordering site. Print-ready files for other print on demand and warehouse orders are received and uploaded onto the system's digital asset folder that has been linked to the prepress system (*Prinergy*).

Log-In and product ordering: Each client is registered onto the *PrintStream Fulfillment* ordering site as a user. The client is then given access to the storefront to place orders, customize variable data templates, or select and order any print on demand or warehoused product.

Job processing and production: Once an order is placed, the ordering site has been programmed to send an order confirmation email to the client. The web-to-print coordinator and production planners also receive an incoming order notification via specially created inbox for incoming orders. For variable data printing and print on demand orders, the incoming order email sent directly to production planners comes with a PDF link of the print-ready file which is stored on the prepress software (*Prinergy*), for production. Notifications on all incoming warehoused orders are sent to a fulfillment inbox, managed by the warehouse department of Hemlock.

For the production of variable data printing and print on demand orders, job information is entered into the management information system (*PSI*) to generate a job

docket (the printing, finishing and shipping details of the job to be printed). Since the PrintStream Fulfillment site is linked to the management information system (*PSI*), information such as contact details, shipping information, quantity, are automatically transferred onto the system once an order is placed.

After a job docket is created, the job is imposed on the prepress system (*Prinergy*) to produce the final master plate for printing. For print on demand orders that need proof approvals, the planner sends a proof to the client for approval before the final imposition and master plate is generated. After an order for a printing plate is issued through *Prinergy*, a summary of the job details is printed and added to the docket for the printing department. The printed docket, shipping list and production summary from *Prinergy* are filed in an envelope. This envelope and its content becomes the instructional document for the various departments throughout the production process until the order is finally shipped.

Shipping: For warehouse/fulfillment orders, the warehouse department receives the order notification after an order is placed online. The ordered item is then picked, packed and shipped to the client. The system is set to automatically send notifications to clients on all shipped orders and orders that are ready for pick-up.

Billing: After shipping, the envelope that contains the printed docket, shipping list and production summary is sent to the accounting department for billing. All records for billing are retrieved from the management information system (*PSI*) using the job number the production planner created when planning the job.

3.4 Capabilities

Since the initiation of the PrintStream Fulfillment workflow, there are some outlined capabilities the system is known for. The capabilities include the following:

- a) The PrintStream Fulfillment (PSF) workflow provides a unique storefront that allows clients to place orders. Storefronts are specially designed and identified with the names of the various companies. Employees of such companies are given

- special usernames and passwords that allow them to log on to their site to place orders.
- b) It allows a medium for variable data printing. The storefronts provide a platform where clients can customize and order imprint items such as business cards, letterheads, envelopes, etc.
 - c) The workflow offers clients the ability to track their order history, cancel orders or re-order a product.
 - d) With the PSF workflow, clients have access to preview their print proof before an order is finally placed. This eliminates that frequent use of file transferring software in sending job proofs.
 - e) The workflow also provides warehouse and fulfillment services alongside print on demand and variable data printing services.

3.5 Limitations

Despite the above mentioned capabilities of the workflow, it has some limitations that cannot be overlooked. These limitations include the following:

- a) The PrintStream Fulfillment (PSF) site workflow is operated as a central server for all users. This makes it very slow when several other printing and fulfillment companies are on the server.
- b) Files from all companies using PSF are hosted in the central server which is managed only in the US. Some clients have expressed concerns about having their print-ready files stored in a centrally managed server.
- c) The storefront management system does not support multi languages. It currently supports English only.
- d) The workflow is unable to automate payments in the product ordering process. Payments are made after jobs are printed and shipped.
- e) In this system, there are restrictions on the *uCreate* (the software for developing templates for variable data printing) plug-in used for creating rules for variable data printing. This is mainly because the system uses an older version of *uCreate* which will be described later in this report.

- f) The PSF system does not allow custom programming of storefronts for clients, (i.e. creating company-branded websites for clients).

Chapter 4: The Presswise Web-to-Print System

4.1 Its Adoption

To eliminate the use of several applications and repetitive tasks in the print production workflow, the digital department of Hemlock subsequently adopted the Presswise web-to-print system in 2011. This system was not introduced to eliminate the use of the initial web-to-print, PrintStream fulfillment (PSF), but to provide a unique workflow for orders that are grouped and printed on the same press sheet; and to improve the production process by automating activities such as imposition and preflighting. This is used hand in hand with the PSF system. The major reasons for this adoption were to reduce printing cost and paper waste; and to increase productivity.²² The Presswise workflow is used in manufacturing products such as business cards, square cards, note cards, post cards, and rack cards.

4.2 About Presswise

Presswise is a web-to-print workflow solution that automates and provides a single browser based print management system.²³ The system automates all activities such as placing orders, tracking orders, sending and receiving email notifications, generating job quotes, imposition and colour management; all within the workflow. Although a standalone software, it easily integrates with shipping management systems such as Fedex and United Parcel Services (UPS), to give clients shipping options to choose from when placing their orders.

Presswise provides services, such as unlimited customer web-to-print storefronts, print estimating, mail processing, instant bar-coded job tickets, digital workflow automation,

²² [Source: Personal communication with Masih Ferdosian, Team lead, Web Development – Hemlock Printers].

²³ Presswise. “About Presswise” <http://www.presswise.com/about/> (accessed June 17, 2015)

shipping and fulfillments, and integrated print management information system. The system is also built to easily integrate with third party systems.²⁴

4.3 The Presswise Workflow

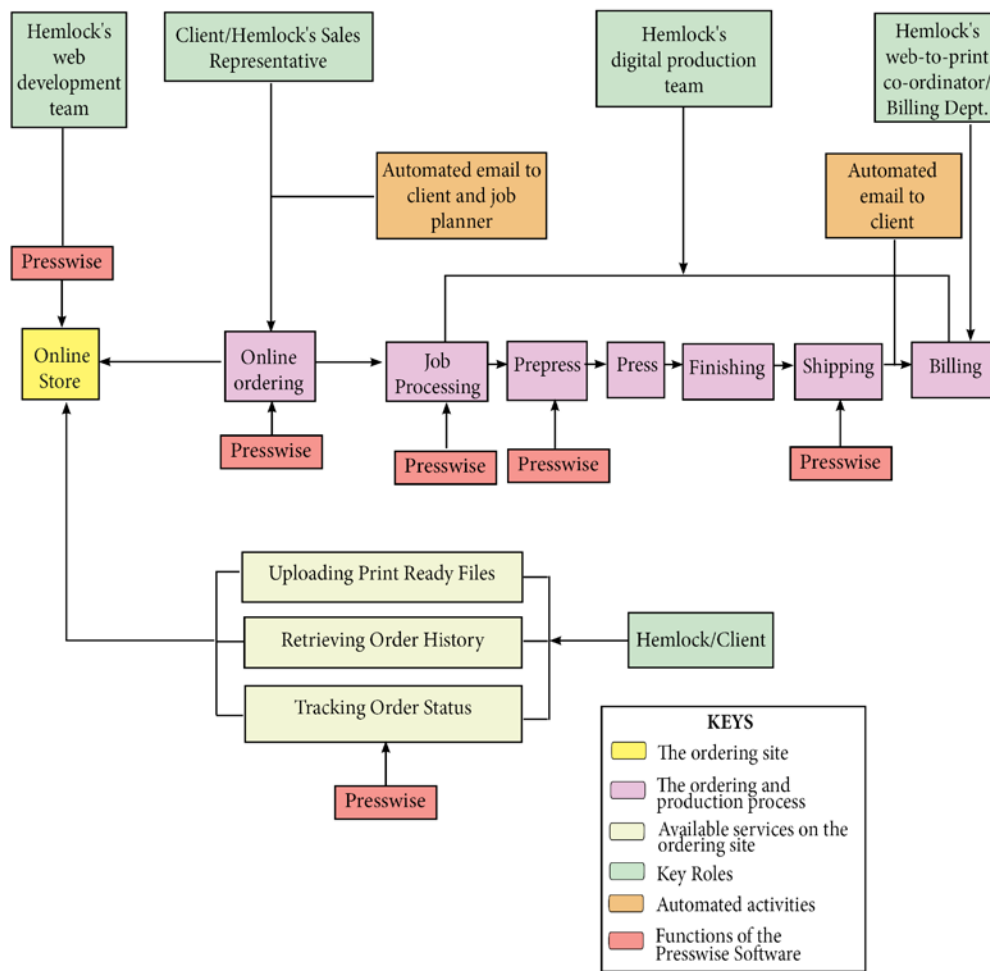


Figure 3 A diagram describing the Presswise Workflow²⁵.

²⁴ PressWise. "About PressWise" <http://www.presswise.com/about/> (accessed June 17, 2015)

²⁵ Ofori-Dei, Sandra. *A diagram describing the Presswise workflow*. February 28, 2016.

A description of the Presswise workflow in Hemlock is provided in the steps below:

Development of the site: To begin the process, the web-to-print coordinator creates an order site for the client on the Presswise system. This serves as an ordering site for the client. In developing the ordering site, it is preset with project sizes, prices and quantities, to give the client several options to choose from.

Ordering and processing: Orders on Presswise are either placed by clients or their sales representative at Hemlock on their behalf. The selected product from the store automatically retrieves the product's description and specifications for imposition, printing and finishing. Once an order is placed, the job planner receives a notification and processes the job for production.

Submission of print-ready files: Presswise allows clients to upload their digital files when placing orders. Clients who prefer to work through their sales representatives send their files to them to upload on their behalf. There are also variable data templates on the various stores that allow clients to customize and order items such as business cards, postcards, rack cards, etc. Unlike the PrintStream Fulfillment system that uses *Indesign* and *uCreate* in preparing variable data templates, templates in Presswise are developed on the presswise system using XML-based languages.

Production: After the digital file is uploaded onto the presswise system, the system automatically preflights and imposes it on the final press sheet size that has already been preset in the system, and afterwards sends it to print. Jobs that are sent to press are lined up in the press queue on presswise, which provides updates on whether a job has been printed or not. After printing, the finishing department executes their duties before the order is finally made ready for shipping.

Shipping: The finished job is shipped to clients, using the shipping address they provided and the shipping method they selected when placing the order. Through the system's existing shipping integration, the system sends an email notification to the client once an order is marked as shipped on the Presswise system.

Invoicing and billing: After the order is shipped, the web-to-print coordinator forwards records of the shipped order to the billing department for billing.

4.4 Capabilities

Specific capabilities of the Presswise system include the following:

- a) Because Presswise does not use any additional application in its operations, it is seen as time and cost effective. Printers who use Presswise tend to save money that would have been used in purchasing multiple applications, as well as integrating and maintaining these applications.
- b) The Presswise server could be cloud or self-hosted. This gives companies the option to work from a cloud server, which is managed by Presswise, or privately manage their system on a self-hosted server.
- c) Presswise also handles all maintenance activities on a cloud-hosted server. This saves companies the cost of maintaining their system.
- d) The system allows clients to upload digital files without sending them through another file sharing system.
- e) Within the workflow, the system automatically imposes print-ready files and makes it ready for final printing.
- f) Presswise is browser-based and can therefore be instantly accessed anywhere and at anytime.
- g) Presswise also allows the export of databases and reports within the workflow.
- h) This system also allows the retrieval of order history, as well as giving clients the opportunity to re-order these past orders.

The above mentioned capabilities of this workflow show how the usage of Presswise is, as compared to the PrintStream Fulfillment site workflow, seen as superior. This informed Hemlock's decision to adopt Presswise as their second web-to-print solution, purposely for small sized stationeries.

4.5 Limitations

Despite Presswise's capabilities described above, the system has some limitations that cannot be over-looked. The limitations include the following:

- a) The shipping integration in Presswise supports all FedEx and United Parcel Service (UPS) shipping methods except FedEx freight. This is due to the

unavailability of a web application in Presswise that enables the integration of FedEx into the Presswise system. This challenge does not give clients an option of choosing FedEx freight as a shipping option when they are making heavyweight orders.

- b) Presswise do not provide warehouse and fulfillment management solutions, as offered in the PrintStream Fulfillment workflow.

Chapter 5: Hemlock’s New Fulfillment and Web-To-Print System

5.1 Its Adoption

To fulfill one of the company’s goals of meeting customers’ demands, the management of Hemlock Printers brainstormed, investigated and decided to invest in purchasing some software to build a workflow that would satisfy the numerous demands of their clients, such as allowing credit card payments within a workflow, ordering manufactured on demand products, creating a custom-made website and an online storefront, among others.²⁶ These features are not available in the PrintStream Fulfillment (PSF) or the Presswise system. This additional system was therefore implemented not to completely eliminate the use of the two existing systems, but to provide the above-mentioned features which were not available in the PSF and Presswise systems.

Again, this workflow was launched in February 2016 as a print ordering and fulfillment management system for one of the company’s biggest clients, BC Hydro.

5.2 Components of the New Fulfillment and Web-to-Print System

The new fulfillment and web-to-print workflow integrates same or upgraded versions of some previously described software and applications in the PrintStream Fulfillment and Presswise system. These include: the variable data printing software (*PersonalEffect Print – uCreate, uProduce, and uPlan*), the online store management software (*uStore*), the prepress software (*Prinergy*), the prepress and web-to-print software (*Presswise*), and the company’s print management information system (*PSI*). The newly added software includes the warehouse/fulfillment management software (*VeraCore*), the digital files management software (*Portfolio*), and online support desk software

²⁶ [Source: Personal communication with Masih Ferdosian (Team lead, Web Development – Hemlock Printers)].

(*OSTicket*). *Structured Query Language (SQL)* and *Lasso* are the database management server and programming language respectively. Apart from the management information system (PSI), *Presswise*, *Prinergy* and *Sharefile*, the functions of which, as described in previous chapters, have not changed in the new fulfillment and web-to-print workflow, all other software and applications are described in the next section.

5.2.1 The storefront management software (*uStore*)

uStore is a web-to-print solution provided by Xmpie (a Xerox company that helps print providers, creative agencies, and corporate marketing departments to set up web portals that allows clients to order and customize all their products).²⁷ With *uStore*, web portals are built using web-to-print applications without involving the expertise of special programmers. *uStore* allows companies to build storefronts that are specifically designed for clients based on the preferences of clients. *uStore* is multi language and currently supports English, French, German, Spanish, Dutch, Japanese, and Portuguese.

5.2.2 The variable data printing software (*PersonalEffect Print*)

Variable data printing (VDP) is a form of printing whereby the information such as text, graphic and images may vary from one output to the other, without a pause/break in the printing process.²⁸ With variable data printing, the system feeds on information from databases that contain the varied information. For instance, a VDP system could be automated to print fifty business cards with different names, using the same template.

To provide a platform that allows clients to customize and order VDP products such as business cards, envelopes, letterheads, the new workflow incorporates a variable data printing software known as *PersonalEffect Print*, provided by Xmpie (a Xerox company). *PersonalEffect* is a variable data printing (VDP) solution that provides tools used in creating and managing a large volume of dynamic document templates and allows

²⁷ Xmpie. “uStore”. <http://www.xmpie.com/ustore> (accessed October 03, 2015)

²⁸ Wikipedia, The Free Encyclopedia. “Variable data printing”. Last modified September 29, 2015 https://en.wikipedia.org/wiki/Variable_data_printing (accessed October 03, 2015)

customers to produce a high volume of variable data outputs.²⁹ PersonalEffect Print includes certain components such as *uCreate Print*, *uPlan*, and *uProduce*. **uCreate** is the plug-in for setting up variable data templates in indesign. **uPlan** enables users to create rules and data source plans for each field in the variable data document. **uProduce** is the server used for managing templates and the print-ready files for variable data printing.

5.2.3 The fulfillment/warehousing software (*VeraCore*)

The VeraCore fulfillment solution, provided by VeraCore Software Solutions Inc., is built to offer a solution that combines order management systems and a warehouse management system in providing online portals/storefronts.³⁰ In the new workflow, the VeraCore fulfillment solution is used as the warehousing management software. This solution has been integrated into the workflow to work with the company's print management information software (*PSI*) and the storefront management software (*uStore*) to receive and fulfill warehousing orders and to help in keeping a proper inventory of warehoused products.

5.2.4 The digital asset management software (*Portfolio*)

Portfolio is a digital asset management software that centralizes access to file libraries through a common medium accessible to some respective file owners.³¹ Through *Portfolio*, a company can share digital files with internal staff and clients, who might want to add, remove or replace any print-ready file in the system. In this workflow, *portfolio* serves as the library for all digital files received from clients.

²⁹ Xmpie. "PersonalEffect Print". <http://www.xmpie.com/personaleffect-print> (accessed October 03, 2015)

³⁰ VeraCore. "Fulfillment Software Solutions". <http://www.veracore.com/solutions/fulfillment-solution> (accessed October 02, 2015)

³¹ Extensis. "Portfolio" <http://www.extensis.com/digital-asset-management/portfolio/> (accessed October 15, 2015)

5.2.5 The online support ticketing system (*OSTicket*)

OSTicket is an open source ticketing system that directs all inquiries made through emails, web-forms and phone calls into an easy and multi-user, web-based customer support desk.³² The integration of the system into the new workflow enables Hemlock to provide a live online support/help desk for clients. Request from clients are automatically directed to the customer support desk via email notifications.

5.2.6 Database management server and programming language (*SQL/Lasso*)

In integrating the above mentioned software, the workflow incorporates a language and a tool that help in managing the various databases, and developing the ordering websites for clients. In this workflow, *Structured Query Language (SQL)* is the database management server, while *lasso* serves as the programming language tool.

Structured Query Language (SQL) is a programming language designed for managing databases within a networked server. SQL supports the spread of databases on several computers within a server.³³ It therefore allows users of a local network to access the same database concurrently. In the workflow, SQL holds the database of all the integrated software and serves as a data source for custom programming with Lasso. Lasso is an application and server management tool for developing internet operations and effective programming languages.³⁴ In this workflow, Lasso serves as the server site language, which retrieves all of its information from the database management software (SQL). The custom-made ordering site is design with HTML and CSS.

³² osTicket. "Support Ticket System" . <http://osticket.com/> (accessed October 15, 2015)

³³ Wikipedia, the free encyclopedia. "SQL" Last Modified October 14, 2015 <https://en.wikipedia.org/wiki/SQL> (accessed October 15, 2015)

³⁴ Wikipedia, the free encyclopedia. "Lasso (programming language)" Last Modified September 20, 2015 [https://en.wikipedia.org/wiki/Lasso_\(programming_language\)](https://en.wikipedia.org/wiki/Lasso_(programming_language)) (accessed October 15, 2015)

5.3 Hemlock's New Fulfillment and Web-to-Print Workflow

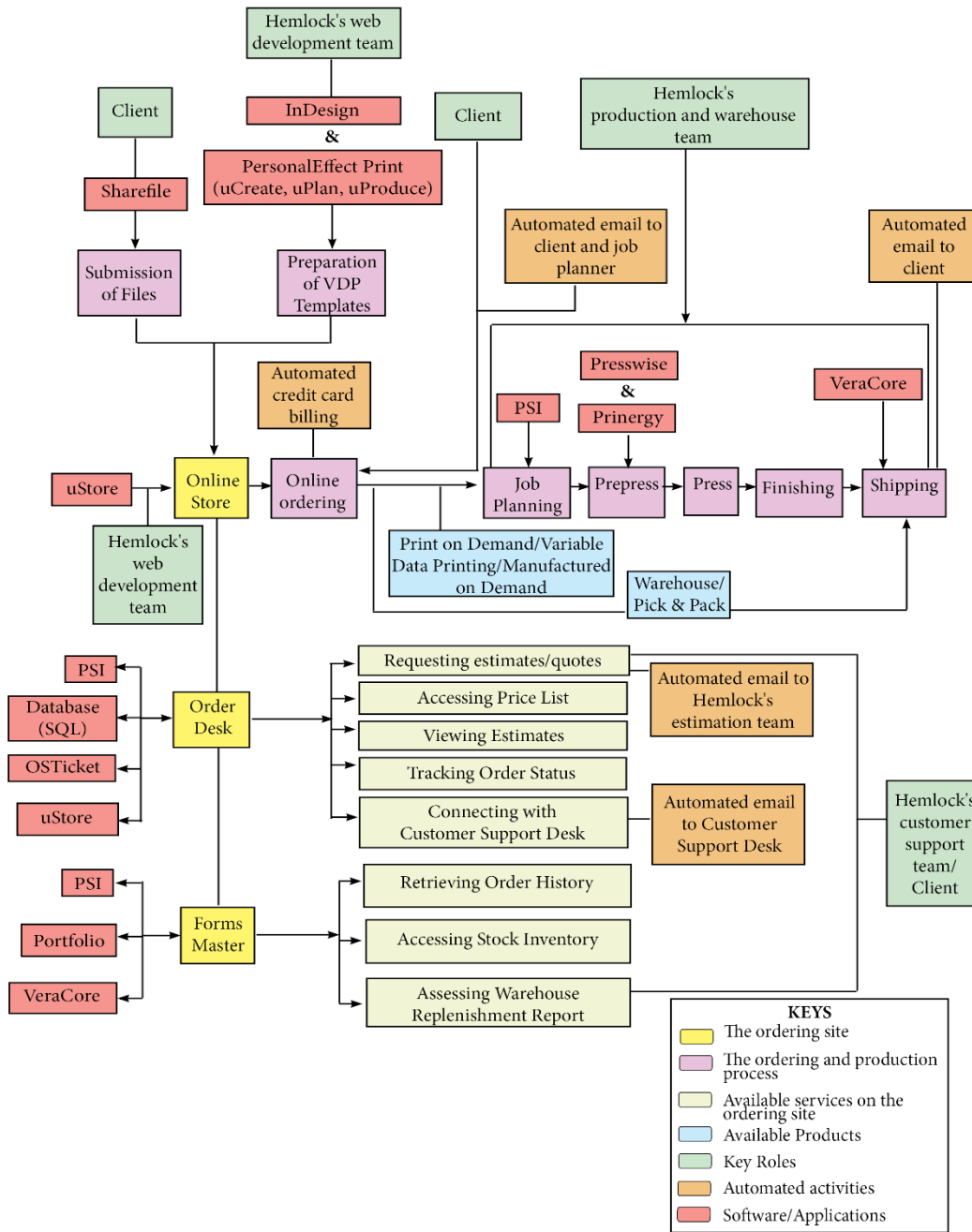


Figure 4 A diagram describing the New Fulfillment and Web-to-Print Workflow.³⁵

³⁵ Ofori-Dei, Sandra. *A diagram describing the New Fulfillment and Web-to-Print Workflow*. February 28, 2016.

5.3.1 Features of the New Fulfillment and Web-to-Print System

As mentioned earlier, the new fulfillment workflow has certain features that are either available or not available on the PSF or Presswise system. The table below shows the available features in the three systems.

Table 1 Available Features in the various web-to-print systems at Hemlock³⁶

Feature	PrintStream Fulfillment (PSF)	Presswise	Hemlock's New Fulfillment and Web-to-Print
Inventory management site	✗	✗	✓
Manufactured on demand (MOD) production	✗	✗	✓
Multi language storefront management system	✗	✗	✓
WYSIWYG editor for VDP templates when placing an order	✗	✗	✓
Online estimate request	✗	✓	✓
Online help desk	✗	✗	✓
Print on demand (POD) production	✓	✓	✓
Tracking order history	✓	✓	✓
Variable data printing	✓	✓	✓
Warehouse/fulfillment	✓	✗	✓

✓	Available
✗	Not Available

³⁶ Ofori-Dei, Sandra. *Available features in the various web-to-print systems at Hemlock*. January 21, 2016.

To give clients access to the features of the new fulfillment and web-to-print workflow, the new ordering site is designed to have three main sections namely; the online store, the order desk and the forms manager. Details of each section and the tools involved are provided below:

The online store: This part of the ordering site is the storefront that makes available all products to clients. The online store is programmed with an integration of the storefront management software (*uStore*) and the fulfillment management solution (*VeraCore*).

The order desk: This part of the ordering site is specially designed for tracking jobs, requesting estimates and quotes, accessing price list, and connecting with the customer support desk. The order desk is built with an integration of the company's management information system (*PSI*), the database management server (*Structure Query Language, SQL*), the online support desk tool (*OSTicket*), and the storefront management software (*uStore*).

The forms manager: This is the inventory and product management tool on the ordering site. It is created for clients and the web development team at Hemlock. This section of the ordering site is designed with an integration of the management information system (*PSI*), digital files management software (*Portfolio*), and the fulfillment/warehouse management software (*VeraCore*).

5.3.2 The ordering and production process

Hemlock's new fulfillment and web-to-print workflow is designed for producing all printing orders, including print on demands, variable data printing; as well as warehousing and fulfillment orders. Summary of the workflow is described below:

Submission and preparation of print-ready files: Before a product is added to the store, all print-ready files are received from clients through *Sharefile*. With the prepress system (*Prinergy*), all these files are prepared to meet the specifications of Hemlock print files. This step is skipped for old files that are already in the server of the

prepress system. The digital files management software (*Portfolio*) serves as a carrier for all these files and is made accessible to specific staff and clients.

Submission and preparation of variable data files: For variable data products, files are prepared using *Indesign* with the plug-in for designing templates for variable data printing (*uCreate*). After a client submits a file for variable data printing, the web-to-print coordinator then prepares the template and uploads it on the storefront management system (*uStore*).

Placing orders: To place an order, the client opens the online store page from a browser; selects the product and choice; customizes or uploads new files; and places the order. Once an order is placed, a confirmation email and an order notification email are sent to the client and the fulfillment inbox in Hemlock respectively. These notifications are created with custom triggers from the APIs of the warehouse management system (*VeraCore*) and the storefront management system (*uStore*).

Preparation of print-ready files for production: Print-ready files for all print on demand (POD) and manufactured on demand (MOD) orders are pulled from *Prinergy* (the prepress system) for preflighting and imposition. Jobs that are printed using traditional printing machines are sent to a folder in the prepress system, which sends it to the plate maker to produce printing plates once a production planner issues a command.

Production: These files are then sent to press for final print. Press operators are notified of incoming plates and print-ready jobs in their job queues.

Shipping: After production, all orders are shipped using the shipping method the client opted for when placing the order. Orders of warehoused products are directly picked, packed and shipped to the client once the warehouse department receives a notification through the warehouse management system (*VeraCore*). Once an order is marked as shipped in *VeraCore*, a shipping confirmation email is sent to the client.

Billing and payment: The payment method in this workflow is credit card payment. Every user registers with a credit card number which is charged as soon as an order is

placed. The storefront management system (*uStore*) also offers an option for the standard invoice billing.

5.4 Capabilities

The new fulfillment and web-to-print workflow, as compared to the two previously discussed workflows, provides services that are either not allowed or allowed in limited services for the PSF and Presswise workflow. These new and improved services include:

Ordering manufactured on demand products: With the new fulfillment and web-to-print workflow, clients are allowed to order custom products. Print-ready files for these items are uploaded and ordered directly on the client's sites without sending the files through email or the file sharing system (*Sharefile*).

Live help from website: This workflow provides a live online support desk that allows clients to communicate directly with Hemlock's customer service team.

Retrieving order database: This system allows clients to search order database of past printed products to retrieve details such as print specifications, order dates and delivery dates.

Requesting estimates and quotes: With this system, clients are able to submit their estimate request for approval before placing an order.

Credit card payments: The new fulfillment and web-to-print workflow allows for credit card payment by clients who prefer that payment option. The system is set to automatically charge clients before they can complete the ordering process.

Multi language storefront: Apart from English, the storefront management system (*uStore*) supports other languages, such as French, German, Spanish, Dutch, Japanese and Portuguese. The storefront can therefore be set to any of the above-mentioned languages, as desired by clients.

Design editing: The plug-in for creating and managing VDP templates in this workflow provides clients with a WYSIWYG (What You See Is What You Get) editing tool that enables editing whiles customizing their templates for variable data printing.

5.5 Limitations

Inasmuch as the new workflow seems to be more advantageous, some software and applications in use have certain limitations that cannot go unnoticed. These limitations include:

Integration with Hemlock's management information system: One limitation of this workflow is the difficulty of integrating the company's management information system (*PSI*) into the storefront management system (*uStore*). Unlike the PrintStream Fulfillment system that easily integrates and retrieves data from the management information system, product details are manually entered into the new storefront management system.

Integration of software and applications: Because this workflow works with the integration of several software and web applications, it demands a lot of technical knowhow in building the websites and the workflow as a whole. Failure or breakdown of any of the software could distort a portion or the entire workflow. Also, the integration of these software on the same server lessens the performance of the various applications, which slows down the workflow.

Maintaining the various software: Since most of the software used in the new workflow are self-hosted, the cost of maintaining these types of software becomes the burden of Hemlock, unlike cloud-hosted software that is mostly maintained by the software provider.

Chapter 6: Summary, Recommendations and Conclusion

6.1 Summary

Web-to-print, which has been described as the practice of managing printing business through websites, is gradually gaining traction in the printing industry due to the flexibility it gives to print providers in their services to clients. There is no doubt that even though web-to-print has not yet been embraced by all print providers, it has the potential of becoming a worldwide solution for print providers in providing the day-to-day demands of their clients. This report examined how the system is being utilized at Hemlock Printers and how it is intended to meet the company's goals of; providing easily accessible ordering platforms for clients, providing a more efficient way of receiving orders, and giving constant notifications on actions that take place within the workflow.

The report provided a detailed description of three different web-to-print systems and how each of them has affected the production process at Hemlock. It also provided a description of the various components and their uses in the workflow, reasons for their adoption, as well as their capabilities and limitations.

The PrintStream Fulfillment (PSF) system, which began in 2007, was described as the first web-to-print system in Hemlock. It works with integration with the company's management information system (*PSI*), which serves as the data source within the workflow. PrintStream Fulfillment is a centralized web-to-print and fulfillment solution that provides services to all companies through a centralized server. This workflow allows clients to place and track orders, and retrieve order history. The web development team at Hemlock found the PrintStream Fulfillment workflow useful but failed in giving them the ability to own and customize order storefronts, accept automatic credit card payment, develop multi language sites and create multi currency payments mode for clients.

After many considerations on how to increase efficiency in the company's express department, the Presswise system was introduced in 2011. Presswise is a standalone web-to-print solution that has in-built software integration for preflighting, imposition, building templates for variable data printing, billing and shipping. The Presswise workflow eliminates the manual process of planning a job and tends to automatically prepare jobs for print. In Hemlock, this system is used by the digital department to produce smaller-sized stationeries, such as business cards, postcards and rack cards.

The New Fulfillment and Web-to-Print system which was launched in February 2016, works with a custom-based website which functions as a result of the integration of some already existing and new software and applications such as the storefront management software (*uStore*); the software for developing variable data templates (*PersonalEffect Print*); the warehouse management solution (*VeraCore*); the company's print management information system (*PSI*); the prepress system (*Prinergy*); the web-to-print software for small-sized stationeries (*Presswise*); an online support desk tool (*OSTicket*); the file sharing system (*Sharefile*); and the digital files management software (*Portfolio*). Features of the custom-made ordering site are grouped into three: the online store, the order desk, and the forms manager. Each of these divisions has their functions, which allow clients to place orders, customize and edit templates for variable data printing, request quotes, retrieve order history, re-order items, upload manufactured on demand products, connect with the customer support desk, manage and retrieve inventory, and manage print-ready files.

The management of Hemlock chose these three systems because of their unique functionalities and how they will serve the company's daily operational needs. These features serve Hemlock's goal of providing an online system that allows them to easily interact with their clients throughout the ordering and production process; and to increase productivity by providing systems that automate certain activities within the production workflow. Despite the usefulness of each system, using them concurrently has its own complexities which have been very challenging to the company. These complications include; multitasking staff to work with three different systems, training staff on new systems, and convincing clients to migrate from one system to another.

Also, purchasing and maintaining the various software require higher operating costs as compared to running a regular printing business. This is an indication of how web-to-print systems can be expensive to run and maintain, which is an impediment for small to medium sized print providers with a lower revenue stream who cannot afford the purchase and maintenance of web-to-print solutions.

6.2 Recommendations

As stated earlier in this report, the management of Hemlock has a goal to gradually strengthen their communication with clients throughout the production process, as well as enhancing the production process within the company. To fully achieve these goals by adding to the already existing web-to-print solutions, the following recommendations could be considered for future initiatives:

Off-Internet communication within the workflow: From the description of the three workflows, one thing that was found consistent is the use of emails in notifying clients of their orders received, orders shipped, payments received, among others. To widen the channels through which such notifications are sent to clients, the company could consider setting up notifications such as automated voicemails and messages to the cell phones of clients who may be out of reach of internet access.

Extension of the workflow: To take advantage of some other uses of web-to-print portals such as e-commerce and cross-media marketing, the management of Hemlock could extend the workflow by working as a third-party contractor for such companies. For marketing, the various storefronts designed for clients could also serve as e-commerce platforms to market products that are produced and are to be sold to the general public. In setting up such stores, detailed description such as the materials used in production, types of binding and finishing; and samples of products could be provided on the ordering sites which would be made accessible to the general public. This could be a great marketing tool for clients and a source of revenue to Hemlock for managing such e-commerce sites.

Maintenance of software: As discussed earlier in this report, one disadvantage of a web-to-print system is its failure to function well if there is a breakdown in any of the software integrated into the system. To avoid such occurrences within the workflow, the management of Hemlock could consider periodic maintenance for each software. Maintenance here refers to updating and upgrading the software and applications, as well as attending to some notifications on the systems that needs to be fixed promptly.

Training sessions for clients: Training for clients in the three systems is mostly through instructional manuals and training videos that are made available on the ordering sites. To offer a more interactive training session for clients, the company could consider organizing periodical webinars and/or face-to-face training sessions for clients. This could provide a more in-depth and practical education on new systems, as well as old but updated systems.

6.3 Conclusion

This report has examined three web-to-print workflows being used at Hemlock Printers, and has clearly demonstrated how productive and efficient each workflow is to the company. Just as the Presswise system was initiated to provide certain solutions the PrintStream Fulfillment (PSF) system could not provide, so was the new fulfillment and web-to-print system initiated to offer some new and upgraded solutions that were not allowed in the PrintStream Fulfillment (PSF) and Presswise systems. This shows how the management of Hemlock is consciously making efforts to improve their production workflow, in order to serve the changing needs of their clients.

Print providers should equally take steps and adopt other initiatives in building ways that would facilitate the processes involved in meeting the numerous production and operational needs of their clients. In this technological world, new developments and innovations should be embraced to enhance productivity.

References

B2c Print “The Pros and Cons of Web-to-Print -B2C Print”.

<http://www.b2cprint.com/the-pros-and-cons-of-web-to-print/> (accessed September 13, 2015)

Cholmondeley. Greg. “*Print eCommerce Versus Web-to-Print*” June 16, 2015.

<http://www.piworld.com/post/print-ecommerce-versus-web-print/> (accessed September 17, 2015)

Design ‘N’ Buy. “Growth accelerators for the global Web-to-Print market worth \$869 million by 2017”. April 28, 2014 <http://www.designnbuy.com/growth-accelerators-for-web-to-print-market> (accessed September 19, 2015)

EFI. “EFI Customer Requests Highlight Next Release of PSI Management System” May 1, 2006. <http://ir.efi.com/releasedetail.cfm?ReleaseID=455906>. (accessed September 14, 2015)

EFI . “EFI PrintStream Fulfillment – Overview”.

<http://www.efi.com/products/productivity-software/fulfillment/>. (accessed September 14, 2015)

FedEx. “FedEx Ship Manager™ Software”.

http://www.fedex.com/ca_english/business/tools/shipsoftware/ (accessed October 13, 2015)

Fenton, Howie. *Web-to-print Adoption and Success*. In-plant Graphics. May 29, 2015.

<http://www.inplantgraphics.com/article/web-print-adoption-success/> (accessed September 19, 2015)

Hemlock Printers. “Services”

http://www.hemlock.com/?_escaped_fragment_=/services#!/services (accessed September 14, 2015)

Kodak. "Kodak Prinergy Workflow - Graphic Communications".
http://graphics.kodak.com/CA/en/Product/printing_workflow/Workflow_Management/Prinergy/Prinergy_Connect/default.htm (accessed September 17, 2015)

Ofori-Dei, Sandra. *A diagram describing the New Fulfillment and Web-to-Print Workflow*. February 28, 2016.

Ofori-Dei, Sandra. *A diagram describing the PrintStream Fulfillment workflow*. February 28, 2016.

Ofori-Dei, Sandra. *A diagram describing the Presswise workflow*. February 28, 2016.

Ofori-Dei, Sandra. *Available Features in the various web-to-print systems at Hemlock*. January 21, 2016.

OsTicket. "Support Ticket System" . <http://osticket.com/> (accessed October 15, 2015)

Presswise. "About Presswise" <http://www.presswise.com/about/> (accessed June 17, 2015)

Twyla J. Cummings and Bernice A. LeMaire: *Utilization of E-commerce by Commercial Printing Companies*. (Rochester-New York: Printing Industry Center at RIT, 2006), 5-6

VeraCore. "Fulfillment Software Solutions".
<http://www.veracore.com/solutions/fulfillment-solution> (accessed October 02, 2015)

Wikipedia, The free encyclopedia. "Lasso (programming language)" Last Modified September 20, 2015 [https://en.wikipedia.org/wiki/Lasso_\(programming_language\)](https://en.wikipedia.org/wiki/Lasso_(programming_language)) (accessed October 15, 2015)

Wikipedia, The Free Encyclopedia. "Prinergy" Last modified August 28, 2015,
<https://en.wikipedia.org/wiki/Prinergy> (accessed September 16, 2016)

Wikipedia, The Free Encyclopedia. "ShareFile". Last modified September 10, 2015
<https://en.wikipedia.org/wiki/ShareFile> (accessed October 15, 2015)

Wikipedia, The free encyclopedia. "SQL" Last Modified October 14, 2015
<https://en.wikipedia.org/wiki/SQL> (accessed October 15, 2015)

Wikipedia, The Free Encyclopedia. "Variable data printing". Last modified September 29, 2015
https://en.wikipedia.org/wiki/Variable_data_printing (accessed October 03, 2015)

Wikipedia, The Free Encyclopedia. "Web to Print" Last modified June 09, 2015,
<https://en.wikipedia.org/wiki/Web-to-print> (accessed June 10, 2015)

Xmpie. "PersonalEffect Print". <http://www.xmpie.com/personaleffect-print> (accessed October 03, 2015)

Xmpie. "uStore". <http://www.xmpie.com/ustore> (accessed October 03, 2015)

Xmpie "Variable Data Printing (VDP)". <http://www.xmpie.com/vdp> (accessed October 03, 2015)

Appendix A: List of Acronyms & Abbreviations

API: Application Program Interface

B2B: Business-to-Business

CEO: Chief Executive Officer

COO: Chief Operating Officer

CRM: Customer Relationship Management

CSR: Customer Service Representative

MOD: Manufactured on Demand

MRP: Material Requirements Planning

POD: Print on Demand

PSF: PrintStream Fulfillment

SQL: Structured Query Language

UPC: Universal Product Code

UPS: United Parcel Service

VDP: Variable Data Printing

WYSIWYG: What You See Is What You Get

Appendix B: Definition of terms

Colour Management: The process of controlling the appearance of colours in a graphic work to ensure a uniform representation on all media.

E-commerce: The process of doing business transactions through certain computer networks.

Fulfillment: The process of offering warehousing, distribution and shipping services for clients.

Gang runs: Grouping and printing same or different jobs with similar size and features on one printing sheet, to reduce the cost of printing and paper waste.

Imposition: The process of arranging how a digital file will appear on a printing sheet, in order to reduce paper waste and to ensure that a right sequence is obtained after a multi-page document is print, folded, gathered, and bound.

Job docket: A summary of print orders which usually comes with a reference number that gives an identity to the order throughout the production process.

Job proof: The final verification with clients to ensure that a print-ready file is ready for mass production.

Manufactured on Demand (MOD): A web-to-print system that allows clients to upload their files when placing orders from their ordering sites.

Material Requirement Planning: A planning and inventory control system used in managing production processes.

Pick and Pack: The process of pulling, packaging and shipping products that have already been printed and stored in the warehouse, to clients as requested/ordered.

Pick and Pack products: All printed products that are stored in the warehouse as requested by clients, and are supplied to clients when orders are placed.

Preflighting: A process of verifying if a digital file sent by a client, meets the specifications of a file that qualifies for final printing.

Prepress: Activities that occur between digital file submission and final printing, in a print production workflow.

Print on Demand: A form of printing service where orders are printed only when an order is placed. These are mostly printed in small quantities and are printed using digital and small traditional printing machines.

Print Management Information System (MIS): An automated system specially designed with tools that help in organizing activities in the various departments within a print production workflow.

Print-Ready File: A digital file submitted by a client when placing an order, which fits the print provider's specifications for producing a high quality output.

Platemaking: The process of producing a thin metal, plastic, rubber or paper that serves as an image carrier for traditional printing machines.

Printing Plate: A thin metal, plastic, rubber or paper that serves as an image carrier for traditional printing machines.

Quality Control Management: The process of setting procedures to ensure that services offered meet the expectations of clients.

Source file: A digital file submitted by a client when placing an order.

Storefront: The web-to-print online store where printing and warehousing orders are placed.

Variable Data Printing: A form of printing where information such as text, graphic and images may vary from one output to the other, without a pause/break in the printing process.

Web-to-Print: The act of offering printing services using specially designed websites.