

Master thesis An Exploration of **Content-Driven Commerce** 

**MARK JOCHEMSEN Business Information Technology** Faculty of Electrical Engineering, Mathematics and Computer Science

hinttech

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# An Exploration of Content-Driven Commerce

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#### AUTHOR

Mark Jochemsen	
Programme	Business Information Technology,
	Faculty of Electrical Engineering,
	Mathematics and Computer Science
Student No.	0210358
E-mail	m.c.jochemsen@alumnus.utwente.nl

### **EXAMINATION COMMITTEE**

Maya Daneva, PhD		
Department E-mail	University of Twente, Computer Science m.daneva@utwente.nl	UNIVERSITY OF TWENTE.

Chintan Amrit, PhD		
Department	University of Twente, Industrial Engineering	UNIVERSITY OF TWENTE.
	and Business Information Systems	
E-mail	c.amrit@utwente.nl	

### SUPERVISORS HINTTECH

Rick Beemsterboer, B IT E-mail rick.beemsterboer@hinttech.com

Jan Willem van Wessel, MSc E-mail jw.van.wessel@hinttech.com





# Preface

This thesis is my final work as a graduate intern at HintTech and as a Master student at the University of Twente. Over the last seven months I have spent countless hours on indulging myself into the world of content and commerce integration. My days working on this study were characterised by reading literature, developing the integration layer, studying the market and collaborating closely with professionals in this particular field.

Throughout my entire educational journey I have been keen to take on extra challenges, especially if they involve getting on an airplane. When HintTech offered me this opportunity to be a driving factor in an internationally-oriented development project, my interest was immediately sparked. It has been a tremendously challenging and interesting experience, which I could not have successfully completed without the help of a number of people. I would like to express some words of thanks to them.

In an exploratory and practice-driven study such as this one, it is difficult at times to properly align practice and theory. I would like to thank my university supervisors, Maya Daneva and Chintan Amrit, for their counselling, their valuable insights and the freedom they gave me during this project. I have learned a lot from both of you. Second, I would like to thank my supervisors at HintTech, Rick Beemsterboer and Jan Willem van Wessel, for their guidance, support and feedback. I am also very grateful to Kittie Liem for her efforts in developing the integration layer.

Taking a central role in an inter-organizational development project can occasionally be challenging. At times, when I was running into issues, I was greatly supported by Ivo Bronsveld. I am very grateful for his uplifting advice and pragmatic approach to tackling problems.

The second part of this study was conducted in Vancouver, closely collaborating with the Elastic Path team, which has provided me with numerous valuable insights. This would not have been possible without the support of Bart Omlo and Peter Lukomskyj. Thank you both for trusting in my abilities and offering me this great opportunity. A big thank you is also due to Kalinda Bastaja. Not only for facilitating the research done in Vancouver, but also for making it an immensely enjoyable experience.

This study could not have been completed without the input from people who are experts in the field of Content-Driven Commerce. Therefore I would like to thank all the professionals at Elastic Path, Hippo CMS and HintTech for their time and effort.

Finally, my thanks to you, dear reader. Assuming you are reading this line last, you read at least one page of my thesis. Thank you.

Mark Jochemsen

### Summary

As a Digital Agency, HintTech works on the implementation and integration of multiple enterpriselevel web platforms. Key to HintTech is the integration between Web Content Management and ecommerce systems, known in the industry as Content-Driven Commerce. This has been identified by HintTech as an emerging concept and a potential market for growth. Since this is an emerging concept, little research has been done on the value and implementation of such integrated systems. In order to evaluate the content-driven commerce proposition, HintTech set out to better understand the domain by developing an artefact which integrates Web Content Management and e-commerce. Therefore, the following research question was formulated:

### • How to assess the content-driven commerce proposition?

To answer this research question, HintTech undertook the study presented in this Master project. This study starts with a preliminary literature review which describes existing theories on content management, e-commerce and system integration. Its goal was to gain an understanding of the state of the art in this domain. We found that content-driven commerce has received little attention in the academic field.

The researcher then closely collaborated with professionals at HintTech, Hippo CMS (a Web Content Management vendor) and Elastic Path (an e-commerce platform vendor) in order to develop a Proof of Concept for an integrated content and commerce system. Using a Design Science approach, the researcher identified a number of implementation challenges for building a content-driven commerce solution. By collaborating with industry experts at Elastic Path the researcher developed a Go-To-Market plan for the joint proposition and identified the key benefits of content-driven commerce - as they are perceived by organizations involved in the development of such systems.

These findings were validated by experts in two focus groups - one group discussed the design challenges of integrating content and commerce systems and the other the value businesses gain from implementing them. The focus group discussion revealed that integration of Web Content Management and e-commerce systems is concerned with a number of particular implementation challenges. The adoption of such an integrated system however, empowers e-vendors to improve their customer journey.

The final results of this study represent new knowledge about the domain of content-driven commerce. We describe eight technical challenges that system integrators deal with when developing such systems. Based on the researchers experience in the Design Science part of this study, and on the feedback from professionals in the focus groups, a number of suggestions are presented for overcoming these challenges. Finally, the study explicates the main drivers for content-driven commerce adoption and applies these to TAM2 and the IS success model. The validated challenges and opportunities provide organizations with a solid handle for assessing the Content-Driven Commerce proposition.

This study makes three industry-relevant contributions. (1) A Proof of Concept for the integration between Web Content Management and e-commerce systems; (2) A Go-To-Market plan for the Content-Driven Commerce proposition; (3) a contextually rich description of a real-life case in which systems integration took place, and a catalogue of benefits and challenges in integrating content and commerce systems.

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# List of abbreviations

A/B testing	Controlled test for evaluating user experience
API	Application Programming Interface
B2B	Business to Business
B2C	Business to Consumer
DSRM	Design Science Research Methodology
E-commerce	Electronic Commerce
GTM	Go To Market
GUI	Graphical User Interface
LAN	Local Area Network
POC	Proof of Concept
REST	Representational State Transfer
RPV	Revenue Per Visit
SOA	Service Oriented Architecture
TAM	Technology Acceptance Model
TAM2	Revised Technology Acceptance Model
TCO	Total Cost of Ownership
WCM	Web Content Management
WCMS	Web Content Management System

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### 1 Introduction

This chapter serves as an introduction to the scope of this study and discusses the research problem.

## 1.1 Background

The last decade witnessed an economical shift from production to knowledge. Rapid technological developments and the robust growth of E-Commerce drove a new paradigm for business: "Content is king!" [1]. Research has shown that e-commerce could benefit greatly from personalized content targeting, which is currently available in Web Content Management (WCM) solutions [2]. With the increased adoption of programming interfaces such as REST, fuelled by the emergence of Service Oriented Architecture, it is becoming much more feasible to integrate complex systems [3]. This change in the landscape provides an opportunity for integration of Content Management and e-commerce solutions.

# **1.2** Problem identification

In order to reach their customers, companies need to create cohesive customer experiences, but marketing and e-commerce groups often operate in silos with differing objectives. This leads them to purchase and operate independent solutions for brand content and transactions. The end result is a poorly integrated digital experience that confuses the customer and is difficult to manage [4]. Both software product developers and implementation parties notice a market demand for integrated WCM and e-commerce solutions. A convergence between e-commerce and WCM has also been mentioned by recent business intelligence reports by Forrester Research, Aberdeen Group and DCG[4][5][6]. We can speculate about the possible benefits of integrating commerce and content, but they are not thoroughly covered in literature. There is also little known about how to implement such a system. As a system implementer, HintTech is interested in the emergence of integrated e-commerce and WCM solutions and would like to get a better understanding of what the market looks like and what the technical possibilities are. Since Commerce and Content are historically covered by independent platforms, it is an interesting research opportunity to study the pros and cons of using these systems together.

# 1.3 Research objectives

As an implementation party for web technology, HintTech would like to expand its technology portfolio with e-commerce. In order to gain a better understanding of the benefits and steps required for integrating commerce and content, HintTech wants to produce a proof of concept for the integration of Elastic Path and Hippo CMS, an e-commerce solution and content management system respectively. Therefore, the goal of this research is:

# To develop an artefact which integrates WCM and e-commerce and review its business value.

The practical relevance of this study is the artefact itself: the Proof of Concept. This will allow HintTech to review this integrated solution and its practical feasibility. Moreover, it will allow HintTech to showcase the solution to potential clients, which will allow them to attract business leads. This could eventually lead to a commercial implementation of the artefact.

The scientific relevance of this study is the insight the academic field gets into the integration of WCM and e-commerce. In this study, we hope to get a better insight into the perceived benefits and technical possibilities for integrating e-commerce with WCM. Studying and participating in the development process allowed us to demonstrate and evaluate the developed artefact, which gives insight into its usability.

### **1.4 Research questions**

In order to study the opportunities of e-commerce and WCM integration, we formulate the following research questions:

### How to assess the content-driven commerce proposition?

- 1. What is the state of literature on content-driven commerce?
- 2. How can we integrate a WCM and e-commerce system?
- 3. What are the technical challenges for integrating content and commerce systems?
  - What are the architectural options?
  - How is data managed?
  - What are the design challenges?
- 4. How can we bring the developed system to market?
  - What is the business case for such a system?
- 5. What are the perceived benefits of an integrated content and commerce solution?
  - How do these benefits align with theory?

These sub-questions have been kept on a high-level on purpose. In an exploratory study such as this one, the researcher cannot always predict the direction of the outcomes. Therefore the research questions should guide the study without constraining it.

### 1.5 Case description

The study will be conducted in collaboration with HintTech BV. Together with Content Management vendor Hippo CMS and e-commerce vendor Elastic Path we conducted a case study and developed a proof of concept for the integration of e-commerce and content management [7]. HintTech, Elastic Path and Hippo CMS share the philosophy that rapid integration outweighs a complete solution portfolio. Studying their collaboration will provide this research with a unique opportunity to gain further insight into the extension of e-commerce through the marketing capabilities of WCM. Elastic Path's Cortex API, which allows the commerce system to easily integrate with other web systems, has been a formal product since the fall of 2013, which means it is about 6 months old at the time this study was started. The novelty of the system adds to the relevance of the research proposition.

### 1.6 HintTech

HintTech is an international provider of services related to content and marketing technology founded in 1997. They have more than 230 employees, located in offices in the United States, United Kingdom, Sweden, and Serbia and are headquartered in Delft, the Netherlands. HintTech works with technology of a large number of partners across the globe such as Adobe, SDL, IBM, SiteCore and Hippo. Their mission is to "help companies build connected brands and highly effective, relevant and influential cross-channel experiences that set new standards in user experience, deepen brand engagement and streamline the customer journey" [8]. Exploring new ways to create personalized commerce experiences clearly adds to this mission.

### 1.7 Hippo

Hippo CMS is an open source content management solution for enterprise level organizations. The company has been founded in 1999 and is of Dutch origin. They are headquartered in Amsterdam and have a North American office in Cambridge, Massachusetts. They currently employ more than 80 people of 20 nationalities. Their software comes in two versions: The community edition, which is free and the enterprise edition, for which clients pay an annual fee. The core software of both editions is the same, but the enterprise edition contains additional third party integrations and enterprise tooling. The community edition is available under the ASL 2.0 license. Their clients consist of large organizations such as Dolce & Gabbana, The University of Amsterdam, the Dutch government and the Dutch National Police. Hippo fits the goals of this study due to a number of reasons. (1) They are an existing HintTech partner and have expressed an interest into integrating with commerce tools; (2) There is an active community behind the software; (3) The software is open source and can be easily customised without restrictions; (4) The company of Dutch origin and is headquartered in Amsterdam, which will make communication with the researcher easier.

### 1.8 ElasticPath

ElasticPath is a privately held company headquartered in Vancouver, Canada. The company was founded in 2000 and currently employs more than 150 people. They provide an enterprise level e-commerce platform based on Java. Their e-commerce solution was originally developed with its own frontend. Since two years Elastic Path adopted a strategy of easy integration, which led it to develop a commerce API to expose its commerce functionality as a service. They have more than 200 clients worldwide, including Google, Symantex and Time inc. Elastic Path fits the goals of this study due to a number of reasons. (1) Elastic Path adopts a "headless commerce" strategy and heavily focusses integration with WCM systems; (2) Elastic Path's API makes it relatively easy to integrate with other web systems; (3) Elastic Path is built on the same technology stack as Hippo CMS.

# 2 Methodology

This chapter presents an overview of the Research Approach and the methodologies used in this study.

## 2.1 Research methodology

This study will be an exploratory research into the integration of WCM and e-commerce solutions. Our introduction covered the problem identification and practical motivation, which were derived from unstructured **interviews**. To gain further insight into the state of literature regarding our research problem, we will conduct a **literature study**. Based the problem definition and insight from literature, we will define the objectives for the solution. These objectives will describe how the designed solution will support the organizational problem. For this purpose we will take a **Design Science Approach** (DSRM) as described by Peffers et al [9]. We will develop a proof of concept for the integration of WCM and e-commerce, which will be the IT artefact. This artefact will be iteratively demonstrated and evaluated in order to compare its functioning with our solution objectives. Finally, we will set up two focus groups [10] to evaluate our findings for both the technical and business perspective.



Figure 1: Research Approach

Research question	Research method
What is the state of literature on the content-driven commerce proposition?	• Conducting a Systematic <b>literature review will</b> provide us an insight into the current state of literature in regards to content-driven commerce.
How can we integrate a WCMS and e- commerce system?	• Using a <b>Design Science</b> approach we will develop a Proof of Concept for the integration of WCMS and e-commerce.
What are the technical challenges for integrating content and commerce systems?	<ul> <li>Study the challenges of integrating web systems in a literature study.</li> <li>A Design Science approach will give us further insight into the challenges, design and process implications of an integrated solution.</li> <li>A focus group methodology will evaluate our technical findings by the critical reviews of experts.</li> </ul>
How can we bring the developed system to market?	• After developing the Proof of Concept we will extend the <b>Design Science</b> approach to develop a Go-To-Market plan for the joint proposition.
What are the perceived benefits of an integrated content and commerce solution?	<ul> <li>Informal Interviews with HintTech, HippoCMS and ElasticPath will give insight into the motives for integration from parties involved. These will be conducted during the design phase of this study.</li> <li>A focus group methodology will evaluate the business value we identified by the critical reviews of experts.</li> </ul>

The research methods for individual research questions are presented in the table below:

 Table 1: Research questions and corresponding methodologies

# 2.2 Design Science Methodology

In recent years, Design Science has been emerging as a valid IS research methodology, largely due to efforts of researchers such as Peffers et al. By developing a Design Science methodology for the field of Information Systems, they have made the case for its validity and value. Design science provides an excellent opportunity for creating closer ties between research and practical implications. It creates and evaluates IT artefacts intended to solve identified organizational problems, in our case the integration of WCMS and e-commerce. The design science methodology as described by Peffers et al. defines the following six activities:

- 1. Problem identification & motivation In this step the research problem is defined and the value of a solution is justified. The problem defined here will be used to develop an artefact which can affectively provide a solution.
- 2. Defining the objectives for a solution *This step rationally inferres the objectives for a solution from the problem specification.*
- 3. Design and development In this step the researcher defines the required functionality and architecture of the architecture, followed by a development phase in which the artefact is created.
- 4. Demonstration

*In this phase the artefact is demonstrated to solve an instance of the problem. In this step it is described how the artifact can solve the problem.* 

5. Evaluation

The results of the demonstration are evaluated against the original solution objectives. At the end of this activity, the researcher can decide to go back to activity #3 and improve upon the artefact.

6. Communication

The final phase resolves around bringing the previous phases together into a cohesive whole, and communicating them to researchers and other appropriate audiences. A common way to communicate the research results is through an empirical research paper, which is the case for this study.

### 2.3 The focus groups research method

Focus group research involves organised discussion with a selected group of individuals to gain information about their views and experiences of a topic [11]. Focus groups are a form of group interviewing but it is important to distinguish between the two. Group interviewing involves interviewing a number of people at the same time, the emphasis being on questions and responses between the researcher and participants.

In essence, the researcher provides the focus of the discussion, and the data come from the group interaction. This group interaction is a crucial feature of focus groups as it enables participants to ask questions of each other and allows them to reconsider their own understandings. Focus groups are useful at the exploratory stage of a study and can be used to check the validity of findings from other research methods. Focus groups also have certain benefits for participants. It allows them to be work collaboratively with researchers, learn from the discussion and be valued as experts. Furthermore, they can be a forum of change. Participants in our focus group may be able to use what they learn from group interaction for improving their work in the field of content driven commerce.

Although focus group research has many advantages, as with all research methods there are some limitations. By its nature focus group research is open ended and cannot be entirely predetermined as participants are allowed to talk to each other and ask questions. The researcher, or moderator, conversely, has less control over the data produced than in either quantitative studies or one-to-one interviewing.

With the advent of the Internet, online focus groups became a new vehicle for research [12]. Online focus groups can be conducted in two ways: synchronously and asynchronously. Synchronous focus groups are live sessions, where participants all take part at the same time as everyone else. In an asynchronous focus group, participants can read the comments by others and contribute to the discussion at any time. For this study we have chosen the asynchronous focus group approach, for the following reasons: (1) It is a cheap way to conduct research; (2) It has potential for a broad geographic scope; (3) It allows professionals with little time to contribute at any moment convenient to them; (4) It allows participants to write down well thought-out responses; (5) There is no need for annotating, which manages the workload and allows for more participants.

Focus group research consists six key steps [13]. These are:

- 1. Formulating the questions
- 2. Planning the focus group session
- 3. Selecting focus group participants
- 4. Executing the session
- 5. Analysing the data
- 6. Reporting the results

# 3 Definitions

This chapter presents a general description of this study's key domain.

### 3.1 Content management

Content management is an ambiguous term in the sense that it is used to describe different aspects across various disciplines [14]. Vincent and Lin [1] reviewed more than 100 definitions of "Content Management" and came up with the following comprehensive definition:

# "Content management is a set of business rules and editorial processes applied to content by people and organizations to align online publishing efforts with business objectives."

The benefit of this definition is that it puts content, people and organizations in the center of the equation, where they belong. Content Management is commonly used as a synonym for Web Content Management (WCM). This is a continuous series of iterative phases of creation and deployment within an organization, reflecting the continually changing and dynamic nature of the content that an organization will display [15].

One of the main reasons behind the need for more sophisticated content management systems on the web was the increased volume of web content. In 2003, various American industry analysts have calculated that content on a typical public corporate web-site grows at an 80% rate annually [16]. As the volume of digital data/content and the complexity of organizations increased, the efficiency of IT teams and systems declined [1]. The explosion of data volume and the continuing rapid growth of web-sites created tremendous challenges for CIOs. Some web-site publishers find that as more material gets pushed online, it actually diminishes the value of existing content. Infopark AG looked into the most common issues CIO's have with web content management [1]:

- 1. Keeping web content updated (44%)
- 2. Managing web content workflow (38%)
- 3. Creating new web content (22%)
- 4. Internal Content coordination (22%)

Companies started to address these problems by moving content into online databases and generating pages on-demand with the use of dynamic scripting languages. However, simply storing content online does not provide a solution for content production and publishing purposes. The ability to develop user-centered navigational and metadata schemes and enforce quality control for the "content contributors" became even more important. Software developers have moved to address this need and call their offerings content management systems. Like "Content Management" in general, a "Content Management System" is a somewhat ambiguous term. It is widely used to describe Web Content Management Systems and Enterprise Content Management Systems, but is not restricted to online solutions. To prevent confusion, we will use the term Web Content Management System (WCMS).

Nowadays there is an enormous variety of different solutions available. Vendors packages each have their own functionality but the following capabilities are essential in any WCMS [1]:

- Management of **contributor rights** should allow for different user roles so that participating staff can only undertake suitable and appropriate tasks.
- Content must be **authored or ingested** into the system and sometimes transformed into a consumable format, enabling corporate information to be actively managed.
- The **content repository** must be managed through version control, insuring integrity and authority of the core content.
- Content can be tagged with **metadata**, which allows it to be retrieved more easily and with less human intervention.
- **Workflow** mechanisms help assure consistency, quality, audibility and reliability of content and business processes.
- Content must be **localized** for multiethnic or multilingual audiences as well as authors, allowing enterprises to extend their content management across national boundaries.

Typical users of a WCMS will be non-technical, and require easy to use, standard interfaces [15]. Virtually all WCM systems comply with this need through a What You See Is What You Get (WYSIWYG) editor [17]. Due to the removal of the technical barrier, there is a diversification of content creators which may be spread across separate locations. To facilitate this large number of non-technical users, it is important to have a simple and accessible thin client. Today's market for WCMS consists mostly of systems with browser-based interfaces. These systems can be accessed through the browser and are thus platform-independent and won't require the user to install software packages. This allows the user to make changes to the content anytime, anywhere and on any device. Indeed, according to Merant [18], non-browser client software will prove to be a significant barrier to the use of the system.

Packaged CMS solutions attempt to provide an out-of-the box solution limiting the amount of customization needed. However, as we can see in the definition above, content management is closely related to business objectives. Since business objectives widely differ, there is no one-fits-all solution [17]. To meet these demands, WCM solutions offer an increasingly large number of functions. Husain stresses the need for these WCM functions to be specifically selected and not arbitrarily ordered following the motto "the system should be able to do anything" [17].

WCMS systems are getting increasingly sophisticated. Companies want to respond faster to market conditions and competitive pressures. And of course, end-users want information faster too. This has led to the adaption of a new term from the manufacturing world: "just-in-time" content. In a customer driven environment, responsive companies will provide the content their customers need, when and where they need it [19]. This change is driven by the

need for more specific content targeting and the availability of personalization techniques in Content Management solutions. Modern WCM systems allow marketers to become more independent in the authoring and updating processes. This provides greater flexibility and agility when crafting personalized experiences and individually tailored messages [20].

### 3.2 E-commerce

Commerce has been conducted for thousands of years. Traditionally, commerce involved bringing traders, buyers and sellers together in a physical marketplace. Today, many business transactions occur across a telecommunications network where buyers, sellers, and others involved in the business transaction may be anywhere in the world. The process of using the internet to facilitate business transactions is called electronic commerce or e-commerce. During the last decennia, e-commerce has moved from being seen as a new phenomenon to one of the preferred ways for consumers to buy products. In the new economy, the Internet has become a powerful and ubiquitous communication mechanism to facilitate the consummation and processing of business transactions. Napier et al. [21] point out that by implementing and using e-commerce, sellers can access narrow markets segments that are widely distributed while buyers can benefit by accessing global markets with larger product availability from a variety of sellers at reduced costs. However, e-commerce in no way guarantees success and companies are still subject to economic rules: Obviously, the long-term success or failure of companies is determined by their ability to generate positive net revenues [22]. Therefore, companies are continuously looking for new ways to increase their e-commerce sales. It costs more time and effort to acquire new customers than to retain existing ones. Customer retention is thus seen as a means to gaining competitive advantage. However, only about 1% of online visitors return to carry out repeated purchases [23]. E-commerce quarterly reports that fewer than 5 percent of Web site visitors actually make a purchase during a visit, and most of those who put something in their shopping cart eventually abandon it [24]. E-commerce may be a maturing concept, but there is still a lot of room for improvement in creating customer engagement.

In the production of consumer goods, technological developments have led to the adoption of mass customization. Technology allows companies to diversify their products in a cost effective way [25]. E-commerce does not help the company diversify its products, but it does allow them to provide the customer with more options [26]. Instead of tens of thousands of books in a superstore, consumers may choose among millions of books in an online store. Increasing choice has also increased the amount of information that consumers must process before they are able to select which items meet their needs. To address this information overload, e-commerce stores are applying mass customization principles to their presentation in the on-line store [27]. This means that they are increasingly looking for ways to customize their content in order to make it more relevant for the visitor. Indeed creating customer engagement through multi-channel experience tools is a rapidly emerging factor [28].

### 4 Theoretical background

This chapter present the theoretical background to the concepts used in this study. It provides an overview of the limitations of commerce systems, the potential for content and commerce integration and describes the technology that can be used to do so. The literature study is based on the work of Kitchenham [29], which provides a procedure for performing systematic reviews. Unless a literature review is thorough and fair, it provides little scientific value. In order to synthesize existing work in a fair manner, a systematic literature review is undertaken with a predefined strategy. For this study, a list of keywords was determined by the researcher which can be found in Appendix 1. These were used in a keyword search on Google Scholar and Scopus, using the scientific license provided by the University of Twente. Since scientific literature on content-driven commerce was scarce, it was complemented by the findings of business analysts such as Gartner and Forrester. The results of the literature study are presented in a concept-centric approach such as described by Webster & Watson [30].

### 4.1 The limits of existing e-commerce solutions

E-commerce solutions are made to support the consumer's transactions. They excel at handling the catalog, logistics, discounts, price management etc. However, they don't offer the multi-channel content targeting that is available in WCM systems. The following quote from the CEO of Amazon.com illustrates the need for mass customization or personalization in e-commerce:

### "If I have 3 million customers on the Web, I should have 3 million stores on the Web." —Jeff Bezos [26], CEO of Amazon.com

The e-commerce platform is often a static, online product catalog which lacks the personalization that is required to create a customer experience [26][28]. Personalization gives e-vendors the ability to provide products and services that are tailored to the individuals based on information about their preferences and behaviors [2][31]. However, without the proper technology, creating personalized experience is a huge undertaking and a significant investment [20].

### 4.2 E-commerce success models

To assess the success factors of a content-driven commerce solution we will apply the Technology Acceptance Model (TAM), as developed by Davis et al. [32] and extended by Venkatesh & Davis [33].

The original Technology Acceptance Model theorized that an individual's behavioral intention to use a system is determined by two beliefs: perceived usefulness, defined as the extent to which a person believes that using the system will enhance his or her job performance, and perceived ease of use, defined as the extent to which a person believes that using the system will be free of effort. Using TAM as a starting point, the extended Technology Acceptance Model (TAM2) incorporates additional theoretical constructs and their causal relationships [33]. The authors found that Relevance is an important factor for the perceived usefulness of a system.



### Figure 2: Original TAM2 model

An important observation to make here is that the TAM2 model is very generic. In order to dive deeper into the relation between content-driven commerce and e-commerce success, we will complement it with a second model: The IS Success model. In 1992, DeLone & McLean [34] developed a widely-used model consisting of six interrelated dimensions of information systems success. In 2003, the authors published an updated version of their model to be applicable to the e-commerce environment [22]. In 2008, this model was validated and further extended by Wang [35]:



Figure 3: DeLone and McLean's model for e-commerce systems success as extended by Wang

A major change made by Wang is the replacement of Perceived Usefulness by Perceived Value as it is perceived to be a more comprehensive measure in an e-commerce context. The reasoning behind this is that Perceived Usefulness only the captures the quality of the service, whereas Perceived Value is conceptualised as an assessment of the ratio between 'quality' and 'sacrifice'. This model shows how "User Satisfaction" and "Perceived Value" will increase net benefits in e-commerce environments. In turn, these factors are influenced by the "Information quality", "System quality" and "Service quality". In their description of the "Information quality" dimension, DeLone and McLean state that "web content should be personalized" and important factors for the "System quality" dimension are usability and adaptability [22]. We theorize that content personalization will have a positive impact on both the Information Quality and System Quality dimensions, and thus positively impact the net benefits. This study will provide us with further insights into the relations between content-driven commerce and both models.

### E-commerce systems success model and TAM

The validated e-commerce success model by Delone and McLean uses the same three classes of variables as TAM: Belief, attitude and behavior. TAM is focused on the expectations of net benefits from IS systems use. The e-commerce success model focusses on realized net benefits. In 2008, Wang evaluated the e-commerce success model and the ability to use it with TAM [35]. The author suggests replacing "Perceived usefulness" in TAM with "Perceived value", so that both models are more consistent with each other [35]. For this purpose we will use a slightly revised version of TAM2 in this study:





### 4.3 System integration

One of the enablers for integration of e-commerce systems and WCMS is the emergence of agile architectures and Service-Oriented Architecture (SOA) in particular. SOA is an architectural style whose goal is to achieve loose coupling among interacting software agents. This loose coupling is achieved by employing two architectural constraints [36]:

- 1. A small set of simple and ubiquitous interfaces to all participating software agents. Only generic semantics are encoded at the interfaces. The interfaces should be universally available for all providers and consumers.
- 2. Descriptive messages constrained by an extensible schema delivered through the interfaces. No, or only minimal, system behavior is prescribed by messages. A schema limits the vocabulary and structure of messages. An extensible schema allows new versions of services to be introduced without breaking existing services.

A large contributor to the field of agile architectures is Cloud Computing. The National Institute of Standards and Technology (NIST) defines cloud computing as follows: Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [37]. The core idea behind cloud computing is that it is much cheaper to leverage hardware and software as a service, paying as you go, rather than upgrading a data center. Naturally, this is an interesting concept for e-commerce solutions, which are concerned with large traffic spikes in holiday seasons and during campaigns. By hosting an e-commerce platform in the cloud, scalability and agility is guaranteed. Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the datacenters that provide those services. The services themselves have long been referred to as Software as a Service (SaaS) [38]. Open integration between e-commerce and CMS systems means that a CMS could potentially be loosely coupled with an e-commerce system which runs in the cloud, and is sourced on a SaaS basis, enabling a Service Oriented Architecture.

We can distinguish two main forms of services: Stateless Services and Stateful Services. In a stateless service each message that a consumer sends to a provider must contain all necessary information for the provider to process it. Because the state of the service is not stored, this constraint makes the service provider more scalable and reliable, as recovery from failure is relatively easy. Stateful services require both the consumer and the provider to share the same consumer-specific context, which is either included in or referenced by messages exchanged between the provider and the consumer. The drawback of this constraint is that it may reduce the overall scalability of the service provider because it may need to remember the shared context for each consumer. It also increases the coupling between a service provider and a consumer and makes switching service providers more difficult [36].

A web service is an instance of a SOA which communicates on internet based protocols, such as HTTP, FTP and SMTP. They are usually platform independent and loosely coupled [39]. There are two kinds of dominant web services: SOAP and REST. Both these services can be used in a stateless manner.

### 4.4 SOAP

The SOAP based web service architecture consists of three entities: service provider, service registry and service requester. The service provider is the network addressable entity which accepts and executes requests from the consumers. A service registry is a network-based directory which contains an index of available services. The service consumer is an application which requires a service. In order to access the service provider, the consumer consumer will find the service description from the service registry. Using the description, the consumer can communicate with the provider. This communication is based on XML contains call and response information.

### 4.5 **REST**

The commonly used REST stands for Representational state transfer. REST architecture is a client-server architecture in which the client sends a request to the server, after which the server builds up a response, which is then returned. These requests and responses are built around the representations of resources. The REST implementation differs from its SOAP counterpart in very fundamental ways. While SOAP adheres very closely to the RPC model, REST revolves around the concept of resources and focuses on using the inherent power of HTTP to retrieve representations of these resources in varying states [40]. Web services which follow the REST architecture are generally referred to as RESTful services. These RESTful web services use GET, PUT, POST and DELETE http methods to retrieve, create, update and delete resources. Since REST calls don't require XML formatting, and are not strong typed, they feature a smaller message size than comparable SOAP calls. REST is therefore know to have better performance than SOAP, because of its higher flexibility and lower overhead [39][40]. A 2008 study into the application of REST vs SOAP concludes: Use RESTful services for tactical, ad hoc integration over the web and to prefer SOAP in professional enterprise application integration scenarios with a longer lifespan[41].

The adoption of REST has triggered further development of design principles. Leonard Richardson, author of 'RESTful web APIs' [42], developed a stage gate model for restful maturity. His model describes four stages of maturity for a restful service, which has become an industry standard:

Maturity Level	Description
Level 0	Very basic RPC (Remote Procedure Call) system exchanging
	XML over HTTP. This basic for of REST is similar to SOAP.
Level 1	This level introduces the concept of Resources to the restful
	service. Instead of making all calls to a single endpoint, the
	request is made directly on the relevant resource. For example:
	All calls related to a shopping cart can be made on the 'cart'
	resource.
Level 2	Level 2 introduces the usage of all four HTTP verbs, which
	separates between safe and non-safe operations.
Level 3	The final level of REST introduces hypermedia controls. This
	means that for every response, a number of related nodes, and
	their respective URL's can be returned. Linking resources like
	this allows the client to explore the API and its resources from
	any number of entry points.

Table 2: Maturity levels of RESTful web services

### 4.6 Database integration

A third option for integrating two systems is full database integration. The technical project leader at HintTech identified this option to be hard to maintain as the interwoven database increases complexity. By merging or mediating both data sources, a two-way dependency is created in terms of data structure. That is: the integrated system will have certain expectation for the data structures of the individual applications. One of the major bottlenecks in setting up database-level data integration is the effort required to create the semantic mappings between the sources and the mediated data. The development and maintenance of such mappings requires database expertise and business knowledge [43]. Regarding data mediation, the basic problem comes from structural and semantics diversities of the schema to be merged [44].

### 4.7 Integrating the worlds of Content and Commerce

Many websites suffer from what business analysists call the "two site syndrome". This refers to segregated brand marketing and commerce sites that are poorly stitched together. This forces the user to jump between sections of the website during the exploration and buy phase. This friction is caused by the different functions of marketing and commerce roles within a company. Marketers focus on presenting romantic brand images and product presentations, while commerce is much more functional, dealing with logistics, revenue and conversions. As mentioned before, these roles are generally based on two different technology platforms: Marketing teams leveraging WCM and commerce teams working with the e-commerce system.

To close the gap between WCM and e-commerce, software developers have attempted to expand their services, creating an increasing overlap in functionality:

- Typical WCM systems such as WordPress, Joomla and Drupal have extended their capabilities by developing or supporting e-commerce modules. These modules serve as plugins which can be used to easily extend a WCM system with a web shop.
- E-commerce systems such as Magento and Shopify started offering basic content management capabilities. The purpose of these being to create a more immersive shopping experience.

For many customers, these extended products can be sufficient to their needs. For example, a local business running a website for their physical shop might want to have a simple web shop to sell products online as well. For such a case, a simple commerce plugin to an existing WCM solution might be sufficient. On the other hand, pure product vendors might find that the simple content management features found in e-commerce solutions are sufficient for their branding and marketing needs.

Content-driven commerce is mostly interesting for enterprise-level organizations which require sophisticated solutions for both content and commerce. Such organizations will need to acquire vendor packages for both WCM and e-commerce. On top of that, running both systems will increase implementations efforts. This means that content-driven commerce is a costly endeavour, which is not for everyone. In this study, we define content-driven commerce as follows: "The integration of content and commerce systems to drive business results".

The need for integration is driven by a need for consistency and contextualization. Digital experiences are increasingly offered over a diverse number of channels. In order to unify a brand image, marketers need to create consistent experiences across these various channels. By adapting these experiences based on demographic, behavioural and situational data, the marketer can create personalized, relevant experience, based on contextual data. When WCM and e-commerce run on a side-by-side implementation, companies need to duplicate contextualization strategies in what can be very different tools.

Content and commerce systems were originally developed to serve different functions. WCM supports non transactional experiences and content life cycles. These systems are built around unstructured marketing content such as pages and documents. In recent years, these systems have evolved into sophisticated tools that allow marketers to create, manage and measure targeted, personalized and interactive brand experiences [4]. E-commerce platforms support transactional interactions, merchandising and product management. The heart of the e-commerce platform is the product catalog, which is a structured list of the products that can be sold through digital channels. Tied to the product catalog are extensive merchandising tools that enable cross-sells, upsells and bundles. These solutions generally offer a basic front-end site, which exposes the commerce functionality through product grids, faceted navigation, a shopping cart and a checkout process [4].

We have compared eight industry standard e-commerce and WCM solutions in terms of functionality, the results of which can be found in Appendix 2. This has confirmed the hypotheses by Forrester that commerce and WCM systems are overlapping in terms of Personalization and multi-channel capabilities.

### 4.8 Implementation approaches

For those organizations that have the budget to invest in both WCM and e-commerce, an interesting challenge lies ahead: How should these solutions be integrated? Three approaches have been identified by Forrester [4], each with their own pros and cons:

### Side-by-side



The first option is to run separate WCM and e-commerce systems side-by-side. This way both content management and e-commerce are supported by a full-scale solution without concessions on functionality. However, this solution does not enable the web shop to take advantage of the WCM targeting capabilities. It also requires the developer to fake a truly

integrated system by using separate presentation layers, such as frames. This means that the two separate systems are glued together on the frontend, but actually run on different systems with their own request handling, which makes it challenging to track user behaviour, and requires a great deal of customization. Integration tasks are focussed primarily on the front-end, such as single sign on and sharing HTML and CSS templates.

ProsShort time-to-market; low cost; integration simplicityConsMultiple rendering engines and templates; Duplication of<br/>site experience tools; Difficult to integrate duplicate tools<br/>such as personalization, recommendations, targeting, search<br/>and navigation

### WCM-led



Another option is to run a WCM system on the front, utilizing the e-commerce platform as a service layer. Because this integration approach pushes the e-commerce solution to the back, its presentation layer is omitted. Faceted navigation, recommendations and personalization capabilities are also likely to come from the WCM system. In terms of effort, this is

by far the most complex of the three integration approaches. In order to manage and reduce complexity, some vendors have built out-of-the-box integration modules and reference integration architectures.

Pros	Integrated customer experience; Manage entire experience in							
	single	tool	set;	clean	separation	of	structured	and
	unstructured content							
Cons	High integration complexity and cost; Long time-to-market							
				-				

### **E-commerce led**



The third option is to run an e-commerce solution on the frontend and use the WCM platform as a content repository. This approach may be preferable for retailers with deep ties to their e-commerce tools. Using the backend tools of a WCM solution will allow them to utilize a structured workflow in the content management and rich media management processes. It

may however be difficult to justify this integration approach due to the large portion of the delivery software that is left on the shelf.

ProsIntegrated customer experience; clean separation of<br/>structured and unstructured contentConsWCM is "only" used as a content repository, making it hard<br/>to justify investment.

To better understand these options we conducted a number of interviews with developers and managers at tech firms. We have interviewed the following professionals:

- A Sales Consultant at HippoCMS
- A, Java developer at HintTech
- The CEO of HintTech
- The technical project leader at HintTech
- A pre-sales consultant at Elastic Path

The results of the interviews were as follows:

### 4.8.1.1 Flexibility and adaptability

The technical project leader at HintTech described how the development cycle at HintTech usually involves some combination of standard components and customization. In some cases organizations will adapt their processes based on a system, but it is much more likely that a system will need to be customized based on a client's existing processes. Since customization is costly in the use of man hours, flexibility is an important factor in the components used. This is confirmed by a sales consultant at Hippo CMS, who mentions the clients need to be able to quickly customize content in order to be flexible. From Elastic Path's point of view, the combination of WCMS and Ecommerce allows marketers to be a lot more flexible in both the products offerings as well as the presentation layers.

### 4.8.1.2 Omni-channel marketing and personalization

The CEO of HintTech, identified the need for centralized solutions. Companies operate over an increasing amount of channels, languages and locations, which they would like to centralize in order to keep control over their global marketing strategy. However, e-commerce implementations often act like a standalone black box, which means they do not easily integrate with marketing systems. A sales consultant at Hippo sees this increasing need for publishing over multiple channels at clients of Hippo. The HintTech CEO recognizes the importance of breaking down borders between traditional sales channels and creating an Omni-channel marketing strategy. Together, personalization and Omni-channel marketing are meant to create a more attractive brand experience. Elastic Path particularly supports this idea, as their Cortex API allows the e-commerce platform to be integrated into a wide array of channels and platforms such as Web, Mobile and even wearables such as Google Glass.

### 4.8.1.3 Best of breed solutions

E-commerce providers and WCMS developers are both looking to provide a more complete solution to their clients. In order to do this they have two basic options: Extending their functionality, or integrating with other systems. The technical project leader at HintTech identified the benefit of using "best of breed" solutions that go back to their core functionality and allow for easy integration with other systems. Instead of using large, inflexible monolithic systems, a system integrator can then simply pick the components that best fit to his needs and develop a flexible integration layer. A sales consultant at Hippo confirmed the need for a clear division between content and logistic services. By splitting marketing content from the logistics information, it is much easier to use it in a flexible manner. A pre-sales consultant at Elastic Path supported this idea in stating that Elastic Path has chosen to focus on core ecommerce functionality and integration rather than extending its own storefront. Because every website and digital experience is unique, large monolithic systems will require a lot of customization. Open integration between systems opens the door for developers to pick those vendor packages that best fit their needs. A 2013 WCM market overview by Forrester suggests companies to start out by framing their needs, and seek WCM product alignment accordingly [45]. This is made possible when system implementers can integrate CMS and commerce with relative ease. Customers will increasingly push for modular, utility-based contracts that allow them to assemble their own digital experience portfolio [46].

To conclude, we can identify a need for an integrated solution that:

- Has the full capabilities of a mature e-commerce system
- Offers the personalized content targeting capabilities of a WCM system
- Takes use of the WCM as the content-center for e-commerce activities

# 5 Solution design

This section presents a description of Hippo CMS and Elastic Path and a preliminary solution design.

# 5.1 System descriptions

In this study we will integrate **Hippo CMS** and **Elastic Path Core Commerce**, products by Hippo and Elastic Path respectively. This section describes both systems and their technology stacks.

### 5.1.1 Hippo CMS

Hippo CMS is a Content Management solution developed by Hippo B.V. Some of its strong features are its multi-channel management and personalized targeting capabilities. Forrester ranks Hippo CMS as an Aspirational Digital Experience Solution[45], a ranking reserved for WCMs which have basic personalization capabilities and can be acquired on a modest budget. Unlike many other CMS's, Hippo does not maintain content in a page oriented way. Instead, content is stored in a generic structured format, allowing it to be reused and enriched. This feature makes it relatively easy for the user to reuse a piece of content over multiple channels and devices. The core of the system is Hippo's repository, where all of the content is stored. The content is managed by the administrator through a web application called "Hippo CMS". The delivery tier of the system is an application called the "Hippo site" or simply "Web site". This application contains the Hippo Site Toolkit (HST), which is used to develop and configure the website.



### Figure 5: High level overview of Hippo CMS's architecture

Hippo CMS is fully built in Java. The systems architecture is very modular and is split into a number of separate components. The Hippo Delivery Tier is the top level components, which can push content over websites, mobile sites or other channels such as REST endpoints. Below the Delivery Tier, and at the core of the CMS, is the Repository tier. All content, metadata and
configuration is saved in this central component. Other than being a storage layer, the Repository is also responsible for the base CMS services such as meta-data and workflow driven content management, content searching, versioning, processing, scheduling, transformation and aggregation [47]. The Repository is based on Apache Jackrabbit, an open source content repository for the Java platform. The final tier is the Content Management tier. This component provides the user interface through which the CMS can be accessed. Using this interface, teams can collaborate on the creation and management of content. The architecture of the interface is based on the Apache Wicket Framework, which enables developers to introduce custom functionality for specific projects. These three tiers are important when deploying the CMS, as the application servers can be split into three corresponding functional groups: Delivery, Repository and Content Management.

For integration purposes, Hippo CMS features a REST interface which opens up the content to thirds party applications. This allows the developer to use a different delivery tier if required, which makes it possible to run Hippo CMS either in the "front" or in the "back" of an integrated solution.

## 5.1.2 Elastic Path

The figure below shows a high level overview of Elastic Path's architecture. The Core engine is the heart of the system and contains a number of libraries and classes as described in the "Core commerce" chapter below. The system is managed through a desktop application called the "Commerce manager". Finally there are two ways in which the commerce tools are exposed: The API (called Cortex) and Elastic Path's own storefront application.



Figure 6: High level overview of Elastic Path's architecture

#### **Elastic Path Core commerce**

The core engine is the heart of Elastic Path Commerce. It is a set of libraries that contain classes shared across the different components of the application. These classes are organized into the following categories, or layers: The **domain** layer, **service** layer and **data access** layer.

The domain layer contains an object model of the e-commerce domain. This object model consists of classes that model real-world entities such as customers and products. The behavior and relationships of these classes should be a reflection of the real-world entities. For example, customers have collections of addresses and products have references to price objects.

The service layer provides services to various consumers in the web layer as well as web service consumers. There are several types of services that serve different roles in the application. Persistence services provide the capability to save and retrieve domain objects. Domain services typically implement the logic for a use case that is inappropriate for encapsulation by any one domain object. For example, a service that performs a checkout will contain logic for the flow of the interaction between several domain objects. Integration services implement functionality that is invoked by domain services but considered outside the domain of an ecommerce application and typically integrate with other systems or technologies. System services handle various concerns that cut across many parts of the application.

The data access layer is responsible for saving and retrieving data from persistent storage. The majority of persistent data in Elastic Path is stored in the database but a small number of configuration files are persisted directly to the file system using XML and properties files.

#### **Cortex API**

In order to make its Core Commerce easily integrate with third party systems, Elastic Path developed an API layer called Cortex. The API is designed so Cortex API client developers can use any programming language to quickly create e-commerce applications and run them on any system. Corte is designed in a multi-layered application structure. Each layer has a specific set of responsibilities and each layer is loosely coupled to the other layers. The authentication layer is responsible for logging customers into the Cortex API and for restricting unauthorized customers from accessing protected resources. When valid, the HTTP Bridge determines the type of the incoming HTTP request and delegates it down to the kernel. The Kernel parses the URI to determine the resource being referenced and then delegates the request to the Resource Server to load the REST resource. Each resource controls a specific aspect of e-commerce functionality. For example, the profiles resource is responsible for the customer's details, such as first name, last name, and addresses. Finally, the integration layer forms an interface between the API and the Core Commerce Engine.

# 5.2 Towards an integrated solution

In section 4.8 we discussed three possible methods for integrating WCM and e-commerce. The simplest way is run the two systems side by side and have them share some of the style sheets on the front end. This allows you to use the capabilities of both systems while creating a somewhat consistent experience for the user. However, this will mean that both systems still use their own targeting, personalization and search capabilities which are hard to integrate. A second option is to bring the e-commerce product to the front and use the WCM as a content repository. This may help company enforce a content workflow, but it also means the entire set of presentation functionality from the WCM is not used, which makes investment difficult to justify. The third option is to bring the WCM to the front and use the e-commerce system as a service layer. This is the most costly and implementation heavy solution, but it is likely to be the cleanest and most extendable solution as well.

A number of software developers are shifting from a large solution portfolio to rapid integration. Instead of continuously adding system functionality, they believe in systems that go back to the basics and excel at their core functionality. They focus on open integration with other systems, instead of trying to be a one-fits-all solution. Elastic Path is such a solution. Their e-commerce system is fully built around the idea of integration. Elastic Path has its own presentation layer, but also features a very complete API, which makes its services available through REST interfaces. Due to the company's focus on open integration, Elastic Path provides a great solution for a WCM-led solution, as its commerce functionality can be relatively easily consumed as a service.

# 5.3 Solution objectives

The goal for the solution is to create a proof of concept which can be used to express the technical possibilities for integration and convey the potential of this solution to clients.

The proof of concept and its underlying architecture will help the parties involved in identifying challenges and opportunities for integration. It is not meant to be deployable in a customer environment as-is, but must show an effective commerce environment running within Hippo CMS, powered by Elastic Path. This provides all three parties involved with a solid base for future cooperation. It also has the benefit of standardizing similar implementations and serving as a best practice. In the case of a successful market adoption, the integration layer can be further developed and productised to serve as an out-of-the box setup. The Proof of Concept is developed with possible future goals in mind.

The following table shows how the solution goals are derived from HintTech's organizational goals:

Solution goal	Organizational requirement
Prove the viability of integrating Hippo CMS and Elastic Path	We need to gain an understanding of the challenges and required effort for integrating Hippo CMS and Elastic Path
Define the architectural approach for integrating both systems	The POC should provide a best practice guideline for future implementations
Determine the value of the joint proposition	The POC must serve as a means to communicate the potential of the solution to prospective clients
Develop the a Go-To-Market strategy for the joint proposition	The final stage of the development project should give the organization insight in how to proceed with the development and marketing of the joint proposition.

Table 3: Alignment of solution goals and organizational requirements

# 6 Design & development

This part describes the development of the Proof of Concept (POC) for the Hippo and Elastic Path integration and the corresponding Go-To-Market (GTM) plan. Both deliverables have been developed according to the Design Science methodology described by Peffers et al [9]. The steps for this methodology are shown in the figure below.



Figure 7: Design Science Research Methodology by Peffers et al

Our Design science research is conducted in three phases. The first two phases deal with the development and evaluation of the POC. The third phase is concerned with a technical review of the POC and the development of the GTM plan. Each phase represents a cycle from step two (Design objectives) until step 5 (Evaluation). The objectives for phase II and phase III are derived from the evaluation of the previous phase. The three phased have been named according to their objectives.

# 6.1 Phase I: Initial Design

This section describes the first design cycle, concerned with the initial POC design.

## 6.1.1 Objectives

The purpose of the first phase is to lay the groundwork for a workable integration between Hippo CMS and Elastic Path. The work needed for this purpose is twofold: Creating a technical **Proof of Concept**, and a general **description of the solution**. The Proof of concept will cover most of the basic functionality of an integrated e-commerce and CMS solution. In doing so, it will be the technical proof that an integration between Hippo CMS and Elastic Path is indeed possible. Challenges that arise during the design and development of the integration will allow us to determine whether the solution is feasible. The second goal is to create a general description of the solution, which can be used to inform sales teams and prospective clients. This allows us to probe the market and see if there is a demand for the solution we are designing.

The initial project team consisted of five members:

- The researcher
- A Software engineer at HintTech
- A technical project leader at HintTech
- A sales engineer at Hippo
- A system architect at Hippo

## 6.1.2 Design & development

During the design and development of the initial POC, a number of design challenges and principles came up. These are described below, categorised by topic.

## 6.1.2.1 CMS in the front, e-commerce in the back

The most high-level architectural decision to be made in the first phase was which system would be leading. More specifically: If both were to work as a single application, which system would be in the front (request handling, presentation) and which system would be in the back, approached as a service. Since Content Management systems are made for quick authoring and publishing new web content, they are dynamic in nature. This dynamism makes the WCM the perfect candidate for being at the front of the application, as their flexibility allows organizations to quickly adapt their web content to reflect their operations. However, as described by Forrester, a WCM-led approach also has the highest integration complexity and cost. As described in section 5.1.2, Elastic Path features a REST API called Cortex, which we will use to integrate commerce functionality into the CMS. By using standard libraries for our REST calls, we tried to minimize the integration effort.

## 6.1.2.2 Market / customer profiling

By discussing the market with the consulting and sales departments of all three firms involved, we were able to create a general profile of organizations for which the solution will be suitable. Those are organizations that want to utilize the unique aspects of both WCMS and e-commerce. In the case of Hippo and Elastic Path this is mostly the combination of the following:

- Flexibility in presentation layer, enabling marketers to quickly change the way content is presented to the user and create brand-specific user experiences.
- Flexibility in the product catalogue, allowing the creation of complex product bundles, promotions etc.

This makes the product interesting for B2C (Business to Consumer) clients with a strong focus on creating a brand. One example of a sector which combines a brand experience with complex product bundling is the telecommunications sector.

#### 6.1.3 Demonstration & evaluation

During development we were able to identify a number of issues and challenges, which were extended during a system review at the end of the first phase. This system review was conducted with two system architects from both HintTech and Hippo.

An early challenge the team identified was the spread of data around the **concept of a product**. This challenge was confirmed in an interview with HintTech's project leader. Products are the core of an integrated WCMS and e-commerce solution as they form the centre of e-commerce, as well as relate to much of the marketing content. This leads to a challenge when developing the data model. One of the benefits of using separate WCM and e-commerce systems is that there is a clear and clean separation of duties: The WCMS handles tasks related to marketing content such as document management, publishing, managing product photos and videos etc. On the other hand, the e-commerce system is responsible for handling the shopping cart, orders, inventory and other commerce-related tasks. Products, however, are a central concept in both these systems; they have descriptions and related media files, but also prices, shipping fees, availability and other logistic and financial data. We needed a data model that was clean and extendable and came up with the following solution:



Figure 8: Product data model

Figure 8 shows how the product data is divided between both systems. Commerce related data like the pricing information and availability is stored in the E-commerce system whereas content such as images and video are stored in the CMS. Both documents are then linked with the SKU ID (Stock Keeping Unit). The model was developed with two core principles in mind:

- Minimizing overlapping data
- No synchronization should be necessary

Another issue we identified was the future integration with external systems. E-commerce systems often depend on external systems such as Product Information Management (PIM), Customer Relationship Management (CRM) and Inventory Management to handle certain parts of the commerce process.

## **Dedicated environment**

During the initial development phase we used the standard developer instance of Elastic Path on their cloud platform. This is a shared system with limited options for configuration. The benefit of using this system was that we did not have to spend time on setting up our own instance of Elastic Path and Cortex, but could immediately start testing the REST calls made by our integration. Due to the shared nature of this environment we were limited in our capabilities to manipulate the system data. This meant we were unable to configure payment methods, and were limited to the demo product catalogue. In order to test and further develop the ordering and checkout process, a dedicated Elastic Path environment is required.

During the evaluation of the first phase, the team concluded that the Proof of Concept had succeeded in its goals. The system was able to perform a workflow from product selection to checkout using Hippo as the presentation layer. However, we recognised that the Proof of Concept at this stage was unfit to be used as a sales demo. The system required some minor clean-ups at the frontend, and a more appropriate data set. For this purpose we set up a dedicated Elastic Path environment in order to have more control over the product catalogue, bundles, payment methods etc.

During the technical review of the first phase we found a number of architectural issues with the current implementation. The purpose of integrating commerce and content is to utilize the backend of the CMS, which has strong marketing functionality, in order to configure and present commerce components. This means that the connection layer between the Commerce system and the CMS should be both accessible from the frontend and the backend. In the current implementation, the services layer which controls the API calls, was placed in the Site package in order to be able to present the commerce data, such as pricing and cart contents on the frontend. In the next iteration we needed to be able to access this same content from the Backend so all the commerce services will need to be moved to an external, shared common package allowing its functionality to be used in all parts of the CMS.

Another issue we identified was the fact that we directly mapped commerce data into corresponding objects in the CMS. Data in the REST level three API is highly nested, and while a direct mapping allows us to use data across both systems in a consistent manner, it is not a very flexible approach. If the hierarchy in the API is updated, this would force direct changes in the CMS as well. The ideal situation is to have the services layer translate the data from the API in to a more generalised commerce object. That way, changes in the API will only cause changes in the services layer, and not throughout the entire implementation. Being loosely integrated is an important design principle for this solutions, as both systems are sold ad developed independently which means changes in either system should have minimal impact on the integration as a whole.

## 6.2 Phase II: Further development

This section describes the second design cycle, concerned with improving the POC, based on the evaluation of the previous phase.

## 6.2.1 Objectives

The goal of the second phase is to turn the Proof of Concept into a usable sales demo. For this purpose we will do some minor technical clean-ups and change the data set which is currently used. In order to serve as a demo the system requires a more realistic product catalogue. In order to gain full control of the data which is used in the Elastic Path Commerce Manager, we will move away from the shared developer API and setup our own dedicated environment. In order to turn the POC into a working demo, we will review it with the sales team and discover if alterations need to be made. The demo will then be set up in collaboration with the marketing team at Hippo. This means we will set up the content and pages conform to their marketing strategy. The ultimate goal of this phase is to come up with a technical demo, which can be used to communicate the possibilities and benefits of this solution to prospective clients. Preferably, this demo will be packaged as a standalone environment, which makes it easy to set up for the sales team. The demo will be further complimented with a description of the architecture.

## 6.2.2 Design & development

During the further development of the POC, a number of design challenges and principles came up. These are described below, categorised by topic.

## 6.2.2.1 Backend integration

In the previous implementation we developed a connection between products in the commerce system and the CMS based on a product's SkuID. This means the SkuID is saved as a property for the product data node in Hippo. In order to improve the workflow we want to get rid of this error prone process of copying ID's over between both systems and will instead create a search tool that will automatically set these ID's for us. We developed an external product picker which allows us to search for products in the commerce system, directly from

the backend of the CMS, greatly improving the usability of the connector. This link picker forms a one-way connection from the CMS to commerce.

From the commerce end, there is currently no connection into the CMS. This means that the commerce backend does not allow us to manipulate or consume data from the CMS, which is something that should be considered for a future implementation. We want to have a clear distinction of what data is saved and managed where, and want to avoid any synchronization. Nevertheless, it would be useful to be able to see which products in the commerce products catalogue are shown on the frontend. The choice for a one-way versus a two-way integration is a consideration between usability and architectural simplicity.

## 6.2.2.2 Performance

Every bit of information retrieved from the commerce system through its API requires a call to be generated and a response to be consumed. This is a time-consuming process which is currently leading to some mild performance issues, and could lead to major performance issues in a full-scale implementation. We identified three ways to solve this issue:

- 1. Generate API calls asynchronously
- 2. Bundle API calls
- 3. Retrieve part of the information after page rendering with dynamic JavaScript

The ideal situation would be a combination of bundling calls and making them asynchronous. Since REST level 3 is stateless we can fire multiple calls at once without being concerned about the server's state. Retrieving parts of the information after rendering the page is basically a cover up of the performance issue and not a real solution. However, since this is by far the easiest option to fit into our current implementation of the services layer, this approach will be used for some of the API-intensive pages such as the products overview. In order to quickly improve perceived performance for demo purposes, pricing information here is loaded after the page has loaded. Obviously, the performance of the API is also influenced by server capacity and location. The current implementation is running on a cloud server located in Canada, whereas the demo is run on a system in the Netherlands. Having these two systems run locally or in close proximity will improve performance.

## 6.2.2.3 Local vs cloud

In order to quickly start testing the services layer, a shared cloud instance of the commerce platform was used for the initial phase. This way we could test our API calls and map the responses without having to worry about server setup. In order to build the initial proof of concept into a demo that can be used for externally communicating the potential of the solution, we need to have more control over the data in the commerce engine so we can set up our own demo catalogue. We identified two options for setting up this dedicated environment. The first option is to run a local instance of the commerce engine and API on the demo machine. This has the clear benefit of not requiring an internet connection in demo environments, and will decrease latency on API calls. However, this option will also require the commerce tools to be

installed and run on every demo machine. In order to reap the offline benefits, the commerce data will also need to be stored locally, creating a somewhat complex process of updating data sets in multiple environments when updates come out. The second option was to run the commerce environment in a cloud instance. This obviously has a negative impact on the latency of API calls and creates a dependency on an internet connection in order for the demo to work. Since most environments will have a connection available, and the development environment is not very performance sensitive, these will be minor for now. The cloud solution does not require us to do any complex setup processes and since data is managed in a single place, updates are instant. Since we are aiming for a loosely coupled integration, the goal is to make little to no customizations on both systems. This means we will not be making any customizations on the commerce API for now. As we are not building our own customised environment and the system is currently not very performance critical, we chose for the convenient setup of a cloud environment.

#### 6.2.2.4 Sales demo

The final goal for this phase was to turn the initial Proof of Concept into a Sales Demo which could be used for both internal and external communication of the solution. For this purpose the data set was updated in order to closely represent actual store data. The store was also set up with a lot of related content and personalization rules. Using the personalization engine of the CMS we were able to manipulate both the content and products shown to the user. Because the CMS has such a strong marketing toolset, this new version has a lot of freedom in the way commerce data is presented to the user. Since every piece of commerce data passes through the CMS we have full control over the way in which visitors interact with the system.

#### 6.2.3 Demonstration & evaluation

After collaborating closely with software engineers at both HintTech and Hippo CMS, the second version of the POC was demonstrated to system architects and solution engineers at Elastic Path. By including the technical experts from the commerce vendor we were enabled to have balanced technical review, which included the view of all three parties involved.

During the technical review, a number of issues with the current implementation became clear. One of the most important concerns is the agility of the system as a whole. During virtually any real-world implementation, parts of the application will have to be customized to fit the client's specific needs. It is important that changes in one of both systems have minimal impact on the application as a whole. Currently, the integration layer is built for some very specific scenarios. Certain actions in the Hippo Components make specific and direct calls to Cortex. This issue can be solved by adding an abstraction layer, such as a commerce API on the Hippo side. Another option is to use the Cortex Java SDK, which is currently still under development. Core aspects to be considered throughout the entire architecture are <u>configurability</u> and <u>extensibility</u>. This allows for new functionality to be "plugged in", using well defined end-points.



Figure 9: Possible integration layers between content and commerce systems

Generating API calls is another process that should be done dynamically. Currently, API calls in the service layer have a preconfigured zoom. This means that the same API call is used for getting the complete set of product data (price, availability, recommendations, add-to-cart, etc) as for simply getting a single property (price). By setting the zooms dynamically, we can retrieve only the data we need for a specific action. This will improve performance and make the implementation more flexible. Since the commerce API is stateless, we should also think about generating API calls in parallel.

Another concern related to performance is caching. Hippo content can be cached on a page level. However, we want to cache content on a document level. For example, on the product detail page the content repository is queried for two product documents that are related to the current one. Such related products should be cached. The complexity here lies in the fact that we DO want to cache the content coming from the CMS, but we do NOT want to cache the data coming from the commerce API, such as pricing.

Currently products must be added manually in both systems. This process is both timeconsuming and error-prone, which means the workflow should be improved. It was decided the commerce engine should be leading in terms of available products, since the commerce system already has existing integrations with Products Information Systems and other 3<sup>rd</sup> party tools. Like most commerce tools, Elastic Path features an XML data exporter. In order to automatically generate products documents in the CMS for corresponding products in the commerce system, a data import tool will need to be built. The issue of data import is also related to workflow. The implementation needs to be loosely coupled, and synchronization is something we want to avoid. This means that some steps need to be taken at the moment new product data is imported into the WCMS. A possible solution is adding the products in a draft state, and creating a trigger that notifies the marketer that an action is necessary. This likely depends on the context in which the system is implemented.

In Phase II we slightly touched the topic of integrated search. Searching in an integrated WCM and commerce system is a challenge because the data is saved in multiple locations. For example, the title and description of a product may be saved in the WCM system, whereas the pricing and size (relevant for shipping) of the products may be saved in the commerce system. A possible way to solve this is to use an external search engine, or adapt the data model based on searching requirements. Integrated search has been determined out of scope for the Proof of Concept level product we have. However, it is an important piece of functionality for most commerce environments and certainly a technical challenge.

The final technical challenge we identified is related to relevance; an important, but overlapping piece of functionality of WCM and commerce systems. Most WCM systems feature a relevance engine which can be utilised to personalize content on the user's behaviour and context variables. Commerce tools, on the other hand, feature extensive tools for recommendations, upsells and cross sells. On the administration side of the online commerce platform, marketers need a single interface to create a unified user experience. That is, they should be able to define and test personalization rules from a single view. Moreover, combining separate content and commerce personalization tools can create unpredictable behaviour.

Summarized, we have identified the following technical challenges, based on our development process and review:

- 1. System architecture
- 2. Implementation effort
- 3. System performance
- 4. System agility
- 5. Using WCM relevance for commerce
- 6. Joint data model
- 7. Integrated search capabilities
- 8. Developing a workflow for the joined system

## 6.3 Phase III: Go-To-Market Plan

This section describes the third design cycle, concerned with developing the Go-To-Market plan for the joint proposition.

## 6.3.1 Objectives

In the third phase we laid off development tasks and focused on reviewing where we are now and planning accordingly. The majority of input in previous phases came from the WCMS vendor (Hippo) and the system implementer (HintTech). In order to get a balanced view, and receive feedback from the commerce perspective, this part of the study was conducted at the office of the e-commerce vendor (Elastic Path) in Vancouver, BC. The goal for this third phase is to conduct a functional review of the proof of concept and determine the value proposition. Based on the value proposition, a Go-To-Market plan will then be developed. Whereas the two previous phases mostly focused on the development of a content-driven commerce solution, this phase will give us insight into the commercial aspects of such a solution.

## 6.3.2 Design & development

In the third phase we developed a go-to-market plan for the joined proposition, which identifies the added value of integrating a commerce system such as Elastic Path with a bestof-breed WCM such as Hippo CMS. For this purpose the researcher worked with the Elastic Path team in Vancouver for a period of five weeks. Whereas HintTech and Hippo CMS were mostly concerned with developing a technical solution for WCM and commerce integration, Elastic Path already has a strong focus on integrating commerce with external systems. Their main development target in 2014 is to build an integration between their own commerce tools and Adobe Experience Manager, which is an enterprise-level WCM. As a researcher, this gave me the opportunity to interview different actors within their organization and identify which market factors and demands drove their focus on content and commerce. First we will discuss the value of adopting a joined content and commerce strategy for businesses in general. Second, we will discuss the value of these integration for software vendors such as Hippo CMS and Elastic Path, by describing their motives for investing in this integration layer.

Enterprise commerce tools generally come with basic content management functionality. However, modern-day WCM systems do much more than just managing content. They serve as sophisticated marketing platforms which are specifically built for the creation of customer experiences. Content management functionality available in commerce systems is generally very basic. Historically, these systems are built around highly transactional processes, such as the facilitation of the ordering process and managing inventory. As the web matured, consumers started to expect more from their online shopping experiences, creating a need for online sellers to have more control over the way in which their content is managed and presented to the customer. This increased need for content management functionality in a commerce environment drove commerce vendors to develop basic content management functionality for their commerce tools. However, as these are not their main point of expertise, and very much developed as an "extra" feature, the functionality of such content management

tools is sub-par compared to dedicated content management systems. This is especially the case for advanced content management features such as multiple-channel management, authoring workflow and personalization tools.

#### Multi-channel

Multiple channel management allows companies to effectively manage which content is published over what channel. As consumers are starting to buy more products using mobile devices, the domain of commerce needs to adapt to this new customer behaviour. Commerce systems are slow to adapt to this new demand, as it is not in their area of expertise. Integrating with WCM allows the commerce vendor to benefit from its existing multi-channel management tools.

#### Workflow

Drafting, altering and publishing content are all typical use cases for any WCM system. Therefore these systems generally include a very sophisticated toolset for the content management workflow. This workflow can then be configured based on the organisational processes and needs of the marketers in charge of content. Elastic Path recognises that its clients would like to provide their customers with rich product information, news and promotions. A WCM in front of their commerce tools gives marketers the authoring workflow they need. In the case content and commerce systems are not integrated, both systems will use their own presentation layer and backend tools. Going back and forth between the 'commerce' and 'marketing' site has a high risk of creating a disconnected user experience. Managing all content from a single interface, using a single workflow, allows marketers to create consistent user experiences.

#### Personalization

The final WCM feature that most commerce tools lack is advanced personalization. Virtually all commerce systems will have some basic personalization functionality, such as product recommendations or discounted offers based on cart contents. WCM's such as Hippo CMS have an extensive relevance engine which allows the website to serve personalized content to visitors based on their behaviour and context. Strong targeting creates a relevant user experience which is reasoned to drive higher conversion rates. Logically, e-vendors want to offer their customers those products they are most likely to buy. Since content and commerce are an emerging principle, the impact of personalization on conversion rates will be an interesting topic for future research. If proven, the impact of relevant user experiences on the profits of commerce systems would give additional weight to the content and commerce proposition.

#### Non-functional benefits of content-driven commerce

Above, we discussed a number of common WCM features which are seen as a valuable asset to a commerce environment. Elastic Path also distinguishes a strong strategic benefit of adopting an integrated content and commerce strategy. Their reasoning is that the underlying business processes that drive content and commerce are moving at different paces. Content will need to reflect rapid changes in the business processes, whereas the more logistics oriented commerce system will move at a much slower pace. This view of technology moving at different paces in heavily influenced by the Pace-Layered Application Strategy developed by Gartner [48]. This approach looks at a company's application portfolio in three layers, each evolving at different paces: Systems of Record, Systems of Differentiation and Systems of Innovation. The layer with the slowest rate of change is the System of Record. These are established applications which support core transaction processing and are common to most organizations. The Systems of Differentiation are applications that enable unique company processes or industry-specific capabilities. These have a medium life cycle of one to three years and are frequently adapted to accommodate changing business practices. The applications which evolve the fastest are the Systems of Innovation. These are application with a short life cycle of zero to 12 months and are built on an ad hoc basis to address new business opportunities.



Figure 10: Gartner's Pace-layered model [48]

A 2011 publication by Gartner describes how this model can applied to the domain of ecommerce [49]. It shows that most of the WCM capabilities such as website management, Personalization and Multi-channel support are typical systems of innovation. These need to be able to rapidly adapt to changing business processes, customer needs and customer behaviour. Most of the typical commerce functions such as catalogue management, shopping cart and billing are systems of differentiation. Elastic Path adapts this strategy and sees WCM systems as Systems of Innovation, whereas they see e-commerce software as Systems of Differentiation. In a 2014 yearly prediction, Forrester Research undescribed the difficulty for technical teams to keep up with frantic pace of the digital world: "While digital customer experience teams embrace new digital channels and increased customer expectations, technology teams supporting them struggle to keep pace, and those experiences are often disjointed [46]. " Because of its different pace of change, commerce systems are not able to keep up with the rapidly changing demands of marketers. Their needs are much better suited by an agile WCM system, which allows them to rapidly draft, preview and publish new content. Elastic Path therefore has therefore adopted a strategy of "headless commerce". They have done away with their own content management capabilities and presentation layer. It is their philosophy that marketing tools should be built into the rapidly changing domain of Content Management. As an e-commerce provider they focus on building commerce tool within their own pace layer, which can then be consumed by a more agile WCM.

## 6.3.3 Demonstration & evaluation

During the final phase of developing the GTM plan at the Elastic Path office in Vancouver, the plan was reviewed with a professional at Elastic Path. After the review it was shared among all three companies. The final version of the GTM plan can be found in Appendix 3.

During the review phase we found that we had a solid value proposition for content-driven commerce. To further evaluate these finding, a focus group will be conducted on both the technical and commercial aspects of content-driven commerce. The development of the GTM plan will serve as a solid basis for setting up the focus group questions. Finally, we identified a number of challenges for moving the project further. These were concerned with the organizational strategy of the three companies involved, and not related to the content-driven commerce proposition. As this sensitive data is not directly related to this study, we will not further elaborate on these challenges.

# 6.4 Results

This section presents the results of the three phases of DSRM research we conducted. Each of the phases represents a cycle from setting development goals to evaluating the results (Step 2 to 5 in Peffers's DSRM model). This part of the study produced two deliverables: (1) A proof of concept for the integration of Hippo CMS and Elastic Path; (2) a GTM plan for the joint proposition. In this section we will present the system architecture of the Proof of Concept, give a functional overview of the system and present our findings from the development of the GTM plan.

The DSRM results presented in this section provide an answer to a number of our research questions, as shown in the table below.

Research question	DSRM result
2. How can we integrate a WCMS	The developed POC and corresponding architectural
and e-commerce system?	overview directly answer this question.
	An architectural and functional overview of the POC is
	presented in sections 6.4.1 and 6.4.2 respectively.
3. What are the technical challenges	During the development of the Proof of Concept we
for integrating content and commerce	identified a number of technical challenges. These will
systems?	need to be validated through the use of focus groups.
	The technical challenges we identified are summarized in section
	6.4.3.
4. How can we bring the developed system to market?	The developed GTM plan directly answers this question.
	Please see Appendix 3 for the developed GTM plan.
5. What are the perceived benefits of	During the development of the GTM plan we identified a
solution?	commerce strategy. These will need to be validated
Solution	through the use of focus groups.
	<i>The benefits we identified are summarized in section 6.4.4.</i>

Table 4: Research questions and corresponding DSRM results

#### 6.4.1 System Architecture

The diagram below represents the system architecture after the second phase. Both the Hippo Site and Hippo CMS applications are integrated with Elastic Path's tools through the Cortex API. The integration from the Hippo Site application into Cortex, consumes all commerce data that is presented on the website. The API features a number of different entrance points, or resources, which are consumed by the Site application. The Hippo CMS application, which serves as a backend system, has a very straightforward connection into Cortex which allows it to query the commerce system for products. This way, product data in the CMS can be directly linked to commerce data from within Hippo CMS.



#### Figure 11: Architectural overview of the integrated system

Through reviewing our implementation with system architects, we found there is a number of architectural concerns with the current implementation. First of all, there is a very direct link between the different components of the Hippo site and the Cortex API. An abstraction layer would make sure we can reuse commerce-specific components in the WCM for multiple commerce systems. Moreover, an abstraction layer could provide the system as a whole with a higher level of flexibility. Another concern is the obvious split of data. One part of the data lives in Elastic Path, the other one in Hippo's repository, which creates a challenge for integrated search functionality. In order to deal with this issue an integrated search tool could be implemented. Both these issues have been identified as long-term challenges, and do need to be tackled at this point in time.



Figure 12: Architectural overview of the preferred situation

#### 6.4.2 Functional system overview

This section presents a short functional description of the developed POC. A simple demo store was set up using Hippo CMS. The e-commerce functionality is delivered by Elastic Path's commerce API. Digital movies were used as demo content for the web store. The frontend consists of five simple pages: Home, Reviews, Products, Login and Cart. The "home" page contains a configurable banner slider and a number of configurable movie trailers. The "reviews" page contains a number of review articles which are managed in the CMS and are used to demonstrate the content management capabilities of the integrated system. The "products overview" page shows a list of all the movies sold. These can be filtered by their characteristics and the prices listed are retrieved from Elastic Path. Clicking a listed product will show additional information about the product and allows the visitor to add the product to the cart. The cart contents can be viewed on the "cart" page. From here the used can proceed to checkout. The management of the content and personalization rules is done from within the CMS. Pricing, promotions and product availability are managed from Elastic Path's Commerce Manager Tool. Next, a number of screenshots is presented to illustrate the basic system functionality.

#### Frontend

These screenshots give an impression of the frontend functionality of the POC as accessible to website visitors. The first screenshot shows the "home" page of the POC. The second screenshot shows an overview of the products. The third screenshot shows an individual product page.



#### Figure 13: "Home" page of the POC



#### Figure 14: "Products overview" page of the POC



Figure 15: "Individual product" page for the movie "se7en" in the POC

#### Backend

These screenshots give an impression of the backend functionality of the POC as accessible to website administrators. The first screenshot shows the backend system of Hippo CMS being used to manage the stored content for the movie "se7en". Note that this screenshot does not contain any pricing information. The pricing information is managed by Elastic Path's Commerce Manager Tool. The second screenshot shows how Hippo CMS can create visitor personas based on browsing behaviour, and use that information to adapt content. This particular screenshot shows how the banner image on the "home" page can be adapter based on the visitor's persona. The last screenshot shows Elastic Path's Commerce Manager tool, which is used to manage pricing information for products.

Name	State	Live	Related External Documents
Avengers (2012)	$\bigotimes$	1 uue	co.7on
Avatar (2009)	$\bigotimes$	Se/en	seZen
Die Hard (1988)	$\bigotimes$		seven
📄 Se7en (1995)	$\bigotimes$		
Casablanca (1942)	$\bigotimes$		IMDB rating
The godfather (1972)	$\oslash$	Description	8.7
Transformers (2007)	$\bigotimes$	Two detectives, a rookie and a veteran, hunt a serial killer who uses	·/
Twilight (2008)	$\bigotimes$	the seven deadly sins as his modus operandi.	Tags
Alien (1979)	$\bigotimes$		Crime
12 angry men (1957)	$\oslash$		Mustani
Back to the future (1985)	$\bigotimes$	Director	Wystery
Finding Nemo (2003)	$\oslash$	David Fincher	Thriller
			Vimeo URL
		Starring	41629177
		Morgan Freeman	()
		Brad Pitt	
		Kevin Spacey	
		Duration	
		127	
		Images	

Figure 16: Hippo CMS backend configuration for the movie "se7en"

slider	×	Select Persona X
Default New Configuration	When the visitor   Please add a persona, a characteristic, or a combination   Add persona Add characteristic	Family Man
+ Add targeting config	use the following configuration: Hide	Horror Fan
	Display Options First Slide * glider-1 × Q Second Slide glider-2 × Q Third Slide Q Save Cancel	OK Cancel

Figure 17: Hippo's channel manager being used to add a personalization rule to the home page slider

File Change Sets Catalog Management Prefere	ences Activity Help										
86 5 88 0 82 2 3	elect Change Set 👻	<b>9</b> 1									
Gatalog Catalog 🖪 Advance 🗖 🗖	Product Listing										- E
Q G B B I I B B B B B B B		9	Create Product	Create Bur	ndle 🔞 Delete Pro	oduct   🖓 Includ	e Product	C Ecclude Product	11 4 Page	of1 🖗	N Results 1 - 3 of 3
243	Product Code	Product Nan	e Produ	ict Type	Brand	Default Catego	Active				
Geometrix Outdoors	Gajamara	Cajamara	geom	etrix	Geometrixx	biking	Yes				
i equipment	Sparrow	Sparrow	geom	etrio	Geometrixx	biking	Yes				
Cal biting Cal biting Cal running	🍕 Tacna	Tacna	geom	etrioWit	Geometrix	biking	Yes				
ial sking ial sunglasses ial surfing ial swimming	Torn (Camer 2)										
📴 men	Summary Language: English +										
seasonal	Overview										
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Figure 18: Elastic Path's Commerce Manager Tool

## 6.4.3 Technical challenges for integrating content and commerce systems

During the development of the GTM plan we have distinguished the following challenges of adopting a content and commerce strategy:

- 1. System architecture.
- 2. Implementation effort.
- 3. System performance.
- 4. System agility.
- 5. Using WCM relevance for commerce.
- 6. Joint data model.
- 7. Integrated search capabilities.
- 8. Developing a workflow for the joined system.

For a thorough description of these eight challenges, please see Phase II of Part VI. A focus group methodology will be used to validate these challenges.

## 6.4.4 Benefits derived from developing the GTM plan

During the development of the GTM plan we have distinguished the following benefits of adopting a content and commerce strategy:

- 1. Utilising the **multi-channel** capabilities of WCM for the commerce domain.
- 2. Utilising the **authoring workflow** of WCM for the commerce domain.
- 3. Utilising the **personalization** capabilities of WCM for the commerce domain.
- 4. Adopt **pace layering** in order to support the rapidly changing aspects of e-commerce. by a system which is agile enough to do so.

For a thorough description of these four benefits, please see Phase III of Part VI. A focus group methodology will be used to validate these benefits.

## 6.5 Discussion

The DSRM has served to help us answer four of our research questions, creating two deliverables. The discussion has been split in to two parts, according to the two deliverables: Proof of Concept and Go-To-Market Plan. Both deliverables are of strong organizational importance. In academic terms, most value was derived from the knowledge gained while developing each deliverable, rather than the deliverable in itself. In the next phase our findings will be validated by the use of focus groups, after which they will be subject to a thorough discussion in the final part of this thesis.

## 6.5.1 Proof of Concept

The proof of concept has been developed during the first two phases of the DSRM study. It was first built as a simple integration layer, and later extended to serve as a demo for the joint proposition. This is an important deliverable for HintTech and one of the main goals of this study. By creating the POC, we have proven the technical feasibility of developing such an integration and have been able to derive a number of technical challenges concerned with such a development project. By developing the POC we can answer the following two research questions:

- 2. How can we integrate a WCMS and e-commerce system?
- 3. What are the technical challenges for integrating content and commerce systems?

To answer question 2, we presented the POC and its architectural description. In itself, the POC is a specific integration between Hippo CMS and Elastic Path. The deliverable itself is therefore mostly relevant to practice. The process of designing and developing the POC however, was used to answer question 3. The knowledge gained during the development of the artefact has more scientific worth than the artefact itself. Since the eight identified challenges of content-driven commerce were based on a specific integration they cannot be abstracted into a model for content-driven commerce. A technical focus group will be conducted to validate and review the identified technical challenges. After validation, the technical challenges will be related to theory in the main "Discussion" chapter of this thesis.

## 6.5.2 Go To Market Plan

The Go-To-Market plan has been developed during the third and final phase of the DSRM study. It was based off the POC built in previous two phases and determined the value of the integrated solution. By developing the GTM plan we can answer the following two research questions:

- 4. How can we bring the developed system to market?
- 5. What are the perceived benefits of an integrated content and commerce solution?

To answer question 4, we developed and presented the GTM plan. In itself, the GTM plan is a specific description of the Go-To-Market strategy for the integration of Hippo CMS and Elastic Path. In the background analysis part of this study, we reasoned how personalization would

fit into the Technology Acceptance Model. Multi-channel was initially perceived as an aspect of personalization, as the presentation is adapted based on the channel by which the user accesses the page. However, during the development phase we noticed that in the jargon of web development experts, they are two different aspects. A channel is determined on the first page visit, and mainly influences how the content is structured, so it can be comfortably consumed through the chosen channel. Personalization adapts parts of a page, based on the user's behaviour and context variables which can be done regardless of the channel used.

As with the POC, the GTM plan in itself is mostly relevant to practice. The process of developing the GTM plan however, was used to answer question 5. The knowledge gained during the development of the GTM plan has more scientific worth than the GTM plan itself. Since the four identified benefits of content-driven commerce were based on a specific integration they cannot be directly abstracted into a general model for content-driven commerce. A business-focused focus group will be conducted to validate and review the identified benefits of content-driven commerce. After validation, the business benefits will be related to theory in the main "Discussion" chapter of this thesis.

# 7 Validation & Further exploration

In this master project we aim to get exploratory insight into the field of content and commerce. For this purpose we have developed an integration layer between a WCM system and an ecommerce system (Phase I and II). Additionally we have developed a Go-To-Market plan for these joint propositions (Phase III). In order to gain additional insight into the value of such integrations. While designing the integration layer we identified a number of design challenges for an integrated content and commerce system. The Go-To-Market plan gave us insight into the business value of such a system.

These business values are based on our own experiences, building one particular integration between Hippo CMS and Elastic Path. In order to be applicable and gain practical relevance, they require validation. This chapter is dedicated on this phase. In what follows, we present an evaluation study in which we discussed these findings from the previous chapters with experts in the field of commerce. These expert opinions were gained through the use of focus groups [10]. The focus group study will serve two purposes:

- 1. Validation To learn about the opinion of experts on the factors we identified.
- 2. **Further exploration** To learn about factors we possibly missed and gain ideas to extend the model.

We note that in this study we are not looking for a statistically proven, generalizable model for content and commerce integration. Our goal is to understand the business value and technical challenges of such systems, rather than fully generalizable model for all. The focus group research method [10] was adopted for the following reasons: (1) It is a suitable technique for clarifying findings of other research methods (our initial design science approach); (2) It can be executed in a short time span; (3) It allows us to further explore concepts and gain a critical review of our own findings through group interaction.

A focus group will be set up for both the technical and business perspective of content driven commerce. Both focus groups were set up as an online asynchronous focus group [12]. This choice for carrying out our evaluation study is justified because of its suitability to our research context. First, our evaluation included participants dispersed across multiple geographic zones around the world. Second, the researcher (the author of the thesis) wanted to allow the participants to take some time and reflect on the concepts and also to read each other answers and reflect on those answers. As already suggested by other researchers who did evaluation and validation studies by means of asynchronous focus groups (for example [50]), the benefit of this method is in its inclusiveness of participation and flexibility to let participants drop in and out of conversations at their convenience, and to return to points of interest as further relevant comments were made.

# 7.1 Question formulation

Krueger developed a number of practical guidelines for developing focus group questions [51]. The core goal is to ask questions that will yield powerful information. Questions should be open-ended and should not be answerable with "yes" or "no". Since group interaction is a core aspect of focus groups, questions should be phrased in a way that gets participants involved.

Breen created a practical guide for conducting focus group research [52]. Her assessment shows that Focus Groups can be hard to give direction, and therefore the research goals should be the primary driver for the research questions. Throughout the entire focus group planning process, the researcher should be considering "What do I ultimately want to get out of this research?" Articulating the answer to this question takes time and attention. The expectancy for the outcome of this focus group study is as follows:

- 1. For the technical-perspective focus group, we expect to get (1) an understanding of the technical challenges concerned with integrating WCM and e-commerce systems; (2) a critical assessment of the technical challenges we identified during the design science part of this study.
- 2. For the business-perspective focus group, we expect to get (1) an insight into the perceived business value that drives companies into acquiring content-driven commerce solutions; (2) a critical assessment of the business values we identified during the design science part of this study.

For both focus groups, a set of questions was developed which are aligned with these expected outcomes. Two different approaches were identified for the validation goals of the focus groups. The first option is to ask mainly open ended questions, and see if these align with the factors we identified. This way we minimize interference in the conversation. The second option is to phrase the questions around our earlier findings. This option was chosen, as it allows us to steer the discussion into those topics that are important to our research goals. Breen suggests using a certain progressiveness in the questioning, going from open questions to more specific ones. We adopted this principle by starting from an open starting question, and moving to more specific topics based on our earlier findings. This way participants were given the opportunity to converse about topics we might have missed, while still maintaining the capability to validate the design challenges and business values we found in the design science part of this study.

# 7.2 Focus group planning

Organising focus group interviews usually requires more planning than other types of interviewing as getting people to group gatherings can be difficult and setting up appropriate venues with adequate recording facilities requires a lot of time [11]. In our study, the facilitating efforts are managed by using an online Focus Group tool called FocusGroupIt (available on focusgroupit.com). This tool features basic online discussion capabilities for setting up focus groups.

Both focus groups were conducted over a period of 10 business days. In order to give the researcher enough time for preparation, the two groups did not start at the same time. The technical focus group was planned first, with the business focus group starting a week later.

The moderator involvement into the focus group is an important design choice [10]. The moderator is responsible for ensuring the discussion is aligned with the research goals. In this study, the researcher took on the role of moderator. Both focus groups took a structured approach, where the moderator provides the questions, controls the topics of discussion and determines the order in which they are discussed. In respect to the moderator's involvement into the discussion we took a much less structured approach. Since the moderation role was taken by the researcher we wanted to minimize any interference into the discussion by taking a passive role. As methodologists suggest [10][12], by not partaking in the discussion, the researcher would get a more balanced and critical review of the concepts that were identified in the first part of this study.

To minimize the need for moderator interference, we set up a number of guidelines for participants. The discussion guide can be found in Appendix 4. They were informed about the goals of the study, and the value of their interaction among each other. It was made clear that we are not looking for a consensus, and expressing alternative views is encouraged. Moreover, the participants were notified that the researcher would only interfere in the discussion should some problems arise. These participation guidelines were provided to all participants along with a step-by-step guide on how to register and contribute to the online discussion platform.

# 7.3 Participants

It is not always easy to identify the most appropriate participants for a focus group. If a group is too heterogeneous, whether in terms of gender or class, or in terms of professional and 'lay' perspectives, the differences between participants can make a considerable impact on their contributions. Alternatively, if a group is homogenous with regard to specific characteristics, diverse opinions and experiences may not be revealed [11]. While selecting the participants for both focus groups, we used a purposive sampling approach. The researcher asked seniors at three companies to provide them with a list of suitable candidates. The researcher then selected appropriate candidates based on his own judgement. Participants for both focus groups will be discussed separately.

For the technical-perspective focus group consisted of 8 participants. At the time of conducting the discussion 2 of them worked for Elastic Path, 2 of them worked for Hippo CMS and 4 of them worked for HintTech. Their job functions fall in the following categories: Two product managers, two solution architects, two developers, one pre-sales engineer and one solution consultant. They were selected based on their experience in system integration, and their knowledge of the content driven commerce proposition. The researcher has worked with all eight participants personally and was able to assess their potential contribution to this study based on that experience. All participants work for an organization that is operating in the field of content-driven commerce. They all have at least 8 years of experience in technical roles of software engineering.

The business-perspective focus group consisted of 8 participants. At the time of conducting this study 3 of them worked for Elastic Path, 2 of them worked for Hippo CMS and 3 of them worked for HintTech. Their job functions fall in the following categories: Two operations executives, two sales engineers, two product marketers, one sales manager and one operations manager. They were selected based on their knowledge of the content-driven commerce proposition and their awareness of demands from the market. The researcher has worked with all 8 participants personally and was able to assess their potential contribution to this study based on that experience. All participants work for an organization that is operating in the field of content-driven commerce. At their respective organizations, they are concerned with developing content-driven commerce solutions based on client's needs.

Because of the business relation that some of these participants have, we decided to make participation anonymous. This way, participants would not be constrained by existing relations and be able to give a critical response. For this purpose, the names of all participants were inserted in an online randomiser tool, and then assigned a number: "Participant1" etc. These 'usernames' on the online board were only known to the researcher, and it was made very clear to the participants that their identity would not be shared. Participation to the focus group was voluntary, and the participants were not required to do so by any of their superiors.

## 7.4 Focus group execution

All participants were contacted either face-to-face, or through a personal e-mail to enquire about their possible participation. After setting the final dates in which the focus group was conducted, the researcher sent them a general invitation e-mail with a short description of the study and an explanation as to how their participation would make a difference. The researcher then waited a few days, in which the participant could give a notification on whether they would be able to participate. Those invitees that did not yet reply were then contacted a second time, either through e-mail, IM or face-to-face. Once the total number of participants was confirmed, the researcher sent them a final email with an attached participation guide. The guide described steps on how to register for the online discussion tool, and guidelines on how to best participate. After registration, the participants were shown a number of questions set up by the researcher. They were shown one question at a time, together with the input from their peers. They were then given the opportunity to (1) create a comment of their own, (2) respond on the comments of their peers and (3) agree with one of the reactions of their peers, similar to the "like" functionality seen in many social media platforms such as Facebook or LinkedIn. The author took the role of moderator, and his responsibility was to provide support to participants, as well as steer the conversation if needed. The moderator reviewed the feedback of participants and paraphrased responses when necessary, in order to probe deeper into the conversation an avoid misunderstandings.

## 7.5 Data analysis

Once the data was collected, the researcher immediately conducted preliminary analysis. The online conversations were exported, and the quality of the collected data was assessed. This was done for each participants comment, using a four-step procedure [10]:

- Did the participant directly address the question being asked? If so, proceed to Step 3. If not, go to Step 2. If the answer to this question is unclear, mark the text with red and review it later.
- 2. Did the participant address a different question in the focus group? If so, move the text fragment to the question it addresses. If not, go to Step 3.
- 3. Does the participant's comment say anything important about the topic? If so, move it to the related question. If not, mark it with a label 'set aside'.
- 4. Does this comment say something that had already been said earlier? If so, add this text fragment to the stack of similar quotes. If not, start a separate stack.

This process led to the following topic stacks:

Code	Technical discussion topic
T1	System architecture
T2	Implementation effort
T3	System performance
T4	System agility
T5	Using WCM relevance for commerce
T6	Joint data model
T7	Integrated search capabilities
T8	Developing a workflow for the joined system

Table 5: technical topic stacks

Code	Business discussion topic		
B1	Consistent multi-channel experience		
B2	Marketing tools		
B3	WCM Personalization for commerce		
B4	Pace layering		
M1	Target market		

Table 6: Business value topic stacks

During the analysis of the focus group results, these topics were evaluated. Where necessary, new topics were added to cover the input from industry experts. The focus group results are presented in the next chapter.

## 7.6 Focus group results

After the focus groups were conducted, the comments of participants were immediately analysed and coded among the topic stacks mentioned in the previous chapter. This chapter presents the results of the focus group research. The results have been split into two parts, according to the two focus group topics: Technical and Business.

## 7.6.1 Technical focus group results

The focus group results presented below are categorised per topic stack. The first eight topics were identified during the design of the POC. A ninth topic stack was added according to the input from the focus group participants: "T9: Organizational context".

## T1: System architecture

For this topic, participants were presented a description of the three architectural styles that were identified in chapter IV. They were then asked their preference in architectural style and the pros and cons of their style of choice. Experts noted that a decision needs to be made on which system is in control. As one participant noted, "This is usually a tough decision when multiple vendors are involved". The interaction between systems may sound easy, but in reality the integration can grow complex.

All industry experts agreed that their personal preference would be a WCM-led architecture. The main reason for this choice is that a WCM-led system has a much richer end-user experience, as noted by four of the participants. The WCM-led approach is noted to give business users a greater level of control in managing customer experiences. The marketing effort put into WCM must be more flexible to surprise customers and keep their attention. E-commerce systems on the other hand, have a stable generalised logic, which makes it easier to consume them as a service. The WCM-led approach has some cons as well. As one participant noted "In WCM-led, integrating the Commerce part might take more time to implement".

The side-by-side approach can "easily result in inconsistent experiences as the user moves back and forth between the systems". Another participant notes that the preference for WCMled is based on customer requirements: "I usually meet customers who need a WCM with ecommerce functions. I have never met a customer that only wants e-commerce without context. Therefore the WCM-led solution has my preference." Indeed, participants agreed that any decision in regards to system architecture should be made in regard to the organizational context in which the system will be implemented. In other words, the decision should be driven by customer requirements. Another participant notes that: "If they are looking for a content driven shopping experience, having a WCM is crucial [] However, if they have an existing commerce site with challenges around content, the side by side approach would be preferred. Mostly because a side by side approach is lightweight and has a much lower TTM than a full rebuild with a WCM-led approach. Finally, if the customer has virtually no need for a content driven shopping experience, the ecommerce-led approach wins hands down." Although WCM-led is noted to be the preferable solution, this may only be the case for organizations in which the marketing department is in a leading position. Another participant suggests that system implementers should look at which system covers most of the organizational requirements, and make that system leading. The context in which a contentdriven commerce solution is implemented, is covered in the newly added topic: "T9: Organizational context".

#### **T2: Implementation effort**

For this topic, participants were asked how WCM an e-commerce vendors would best manage the implementation effort required for integrating WCM and commerce. One of the participants acknowledges the implementation effort as the most important discussion point. As system engineers we need to make sure that "integrating applications will become easier and less labour-intensive".

Focus group participants observed a number of ways in which system vendors and implementers can manage the implementation effort. A general way for doing this is to develop a number of integration tools. Four experts noted the possibility of creating a commerce SDK, which makes it easier for WCM developers to consume commerce services. Two experts believe a productised integration layer will provide the greatest benefit from an effort standpoint. This would greatly cut down the amount of work required from developers, and allow them to work solely in the productised offering. A clear con of this approach is the development cost of the productised integration layer. One participant adds that a less costly approach would be to develop an accelerator kit with built out integration layers. This has a medium development cost for vendors and a big impact on implementation effort.

Four experts noted the need for a well-documented system. Documentation has a low vendor cost and has a medium impact on implementation effort. Without proper documentation, any developed integration option will be useless.

#### **T3: System performance**

For this topic, participants were given an explanation about the performance issues we ran into while developing the POC. They were then asked about the major performance pitfalls in content and commerce integration and their view on how these issues could be resolved. System performance was observed by three participants as one of the most important factors for the technical system implementation of content-driven commerce systems. One of the participants mentioned Performance is a tough challenge "because each system has an inherent way of working, which might, by nature, not work well with other systems. Those things are hard to address since they are built into the architecture of each system." Another participant notes that e-commerce systems require high performance and "any change should have immediate effect on to the customer. No performance solution should hinder this.

Experts identified three ways to optimize performance: Proximity of both systems, Caching and minimizing API calls. Proximity was observed by three participants. Having both systems in separate physical locations will have a negative impact on performance. One of them noted that "ideally, both systems would ideally run on the same LAN [(Local Area Network)]". The issue of caching was also observed by three participants, stressing the fact that caching prices will be difficult, as pricing information is dynamic and should be loaded from the e-commerce system. One participant notes that "Another option might be to store the list price in Hippo, but give the user an option to dynamically load the price." However, this option was mentioned as only suitable for some B2B (Business to Business) Scenario's. Two participants noted the need to minimize API calls in order to improve performance. One participant mentions the commerce systems need to be aware of the data requirements of WCM systems in order to "make it possible to make API calls as efficient as possible". Finally, one participant mentioned the need for exploring the scalability of both systems, as separate scalability might affect performance.

#### **T4: System agility**

For this topic, participants were asked what measures could be taken to minimize the impact of technical changes in one system, on the integrated system as a whole. Participants identified two measurements that can be taken to manage system agility: Versioning and building an agile integration model.

Five participants observed the need for versioned API's. As one participate phrases it: "As a vendor you can't simply change your API and stop supporting older ones. It should be up to the implementing party to decide if they want to upgrade to a newer version, not up to the vendor". Therefore the API should be versioned and older versions should be supported for a reasonable time. It is also stated that "in general [] adding things to an API is not really a problem, but removing is". One participant summarised the point as follows: "I think building the integration on an API that will continue to behave as it does now in future is key".

Two participants observed the need for building an agile implementation model. "We need an integration model that expects change, experimentation and optimization. [] they need to be updated to fit, to what is happening in the Data Integration and API spaces." Another states this should be reached through the development of a light weight integration: "I feel the integration should only consist of a number of smaller parts, rather than, say, create an entirely new backend UI to handle both systems."

### **T5: Using WCM relevance for commerce**

For this topic, participants were asked about their view on the responsibilities of both system in regards to personalization capabilities. The general consensus is that the responsibilities greatly depend on what both systems allow you to do in terms of customization. One participant states that personalization function would be best be integrated: "Ideally you'll want a single access point (both in the user interface and in the code) from which to access the personalization functions". Another participant notes that both systems have different scopes and this different knowledge of the customer behaviour and context. Therefore they will base their personalization rules on different data. "You could try to integrate / exchange this knowledge but in a first step determine different forms of recommendation and choose which platform should fill which form". This is agreed upon by three other participants who state that both systems should be able to handle their own level of responsibility, as they serve a different purpose. As one of them puts it: "The CMS is in charge of showing content, the business rules behind it can either be CMS related (focused on what the CMS knows) or ecommerce related". However, as stated by the same participant: "a CMS should never be in charge of anything that has to do with pricing. For instance, setting up promotions is ecommerce and the CMS should never do that". In order to split the personalization responsibilities among the two systems, one participant suggests to "boil things down to segments so that each side has the concept of a segment the customer is in and can tailor promotions and other dynamic elements to a segment".

#### T6: Joint data model

For this topic, participants were asked about their opinion on challenges regarding data management and data structure. Data management is a very important subject and has been identified by four of the six participants as "one of the most important factors". Participants listed a number of important questions to deal with when designing the data model:

- Should data be synchronized across each system or retrieved from the system of record?
- What is the minimum amount of data that can exist in each system?
- Does data from system A needs to be enriched in system B to be make it more useful in the end?
- How does presentation layer know what data to get where?
- One of the systems must be in the lead, but which one?
The largest issue related to data is data ownership. In determining the data ownership, it is key to gain a profound understanding of the data: "understanding the granularity, structure and semantics of the data" This may be a challenge as "Data is often seen from your own viewpoint, and therefore not completely understood." The biggest challenge will be dealing with concepts that span both systems. For example, "a promotion has a number of banners or visual elements that are probably managed in the WCM, but has rules for discounting products that are probably managed in the e-commerce system". One participant states that that "co-ordination of related assets across multiple systems and managing their production workflow is probably the biggest issue". As data will likely be split among both systems, they will need to have a way of communicating. This creates a challenge on both sides: ": having a way of getting information from one system, but also having a way of having the other system ask for the information". Another participant states this challenge is even larger when the instance of a system is stateful, as data states will have to be shared. For a convenient user experience, the data needs to be easily found in both systems. As one participant puts it: "having the structure based on an attribute (Catalog, group, tags, etc) of a product might help in this scenario".

### **T7: Integrated search capabilities**

For this topic, participants were asked how an integrated content and commerce system could offer an integrated search tool. Participants agree that the degree of search tool integration depends on end-user needs. If searching through CMS data is enough, than no integrated search tool is needed and the basic CMS search tool can be used. The most likely part of commerce data which will be searched on is pricing data. When this is needed there are basically two options: Cache non-promotional price in the CMS or use a federated search tool. Caching prices is suggested by one participant as a suitable solution in some cases. Four participants suggest the use of a federated search tool, which will index data from both systems. Federated search should however only be used when necessary. That is, in cases where searching on WCM data alone is not sufficient.

### **T8: Developing a workflow for the joined system**

For this topic, participants were asked about their concerns in regards to the workflow of the integrated content and commerce system. Four participants observed the need for working in two separate backend systems as a challenge to workflow. One of them states: "I think the workflow element, how to manage products and promotions in an effective manner across multiple systems is the biggest problem to solve". Integrating both systems will mean that the process of managing data is also changed: "When you're adding a WCM to the mix, you're changing the process of managing the data and where people should maintain what. Even if there is a clear separation".

In the integrated environment, non-technical marketers will expect to be able to launch products and campaigns, without the help of an IT specialist. Enabling them to do so without

ecommerce functionality leaking too far into the WCM system is identified as a challenge. In order to manage the workflow, a certain level of automation is required. This is in itself a controversial topic. One participant observes that "In standardized workflow solutions, systems should be able to notify each other of all relevant CRUD changes in their content". A second participant agrees by saying "systems should be able to notify each other. This does not mean that by notifying the systems are aware of each other. A message queue with certain listeners might be enough". Another participant however, does not agree and states that "only the aggregating system should be aware [] if someone adds an image to a product in the CMS, why should / would the ecommerce system care?" A fourth participant states that "In many cases product creation will start downstream in a ERP/MRM or PIM solution anyways. so we should probably be looking for a workflow that publishes from PIM directly into the CMS and commerce system rather than assuming either commerce or CMS will be the system of record for a product."

Summarized, the goal of workflow design is to make system use as convenient as possible. In a real world scenario, this likely means we should try and reduce the number of systems a business user needs to interact with to complete their task and automate as much as possible.

# **T9: Organizational context**

The topic of organizational context was identified during the technical focus group and newly introduced to the topic stack. The context of an organization in which a content-driven commerce system will be implemented has great impact on the technical design. It is the organizational requirements which will define what the final solution should look like. One participant states that when making decisions on any of the discussed topics, the system implementer should first think about a number of questions: What is the pain we are solving? How do we solve this? And finally, what do we need to do to (technically) to make this work?

Adopting a content-driven commerce strategy not only has challenges in technical implementation, but might also require organizational processes to adapt accordingly. As one participant puts it: "how do we deal with companies who have this governance model (marketers setting up commerce systems), or are in transition to this governance model?"

The effect of organizational context on the technical implementation of a content –driven commerce systems works both ways. The system will be built to suit organizational goals and organizational context. However, the organization might also have to adapt its processes to suit a content-driven commerce strategy.

# **Technical validation review**

The technical focus group aimed to validate the technical challenges found in the DSRM phase of this study. Eight technical experts participated, of which six participants participated until the end of the focus group. In order to assess the completeness of our technical review, the participants were presented with a list of topics discussed, and asked if there was any discussion topic that we missed. Of the six participants that participated until this part of the study, five commented that the basis was covered and no topic was missed. One participant mentioned the topic of organizational context which was discussed throughout the focus group. Indeed, the organizational context of a client will drive its requirements and in turn the required technical solution.

Although some of the discussion topics were inspired by system integration in general, this focus group has supplied us with an insight into the specific integration of content-driven commerce systems. The need for a technical assessment of such systems was put to words nicely by one of the participants: "the combination of commerce and content needs a different view. We aren't dealing with just data anymore, or even just services. We are dealing with Resources (Commerce resources) that need to be combined and exposed in various levels of granularity depending on the user experience. This is very different from traditional integrations because the two systems in the old SOA-driven world are for the most part stable and not being constantly optimized or experimented with". This statement reveals the challenge of integrating two complex systems, combined with high user expectations. It is that level of complexity, which makes this study important both for the industry and academics.

All technical discussion topics were observed by the participants. In order to get an understanding of their relative importance, we asked participants which topics were most important in their opinion. Since our test group was small, these numbers should be used as an indication only. Please note multiple answers were possible.

Торіс	Number of participants observing it	Number of participants who marked topic as "most important"
T1: System architecture	6/6 (100%)	2/6 (33%)
T2: Implementation effort	6/6 (100%)	1/6 (17%)
T3: System performance	6/6 (100%)	3/6 (50%)
T4: System agility	6/6 (100%)	0/6 (0%)
T5: Using WCM relevance for commerce	6/6 (100%)	0/6 (0%)
T6: Joint data model	6/6 (100%)	4/6 (67%)
T7: Integrated search capabilities	6/6 (100%)	1/6 (17%)
T8: Developing a workflow for the joined system	6/6 (100%)	3/6 (50%)
T9: Organizational context	3/6 (50%)	1/6 (17%)

Table 7: Overview of discussion topics observed by technical focus group participants

## 7.6.2 Business focus group results

The focus group results presented below are categorised per topic stack. First we present seven business benefits, of which four were identified during the DSRM part of this study, and three came up during the focus group. Second, the target market is identified, presenting a set of common characteristics among companies that could benefit from adopting a content-driven commerce strategy. By doing so, we not only explore the benefits of content-driven commerce, but also identify what type of company would be most likely to reap those benefits.

### B1: Consistent multi-channel experience

During the development of the Go-To-Market plan, multi-channel capabilities were identified as one of the drivers for content-driven commerce adoption. In order to better understand this potential benefit, focus group participants were asked if they feel multi-channel capabilities are a benefit of integrating content and commerce systems.

Participants identified two main benefits of multi-channel capabilities in a commerce environment: Reusing content and flexibility in the presentation later. Reusing the same content over multiple channels was observed by three participants as a benefit of content and commerce integration. "Multichannel capacities are critical. A marketer needs to be able to design and control the experience across channels and ensure that the customer journey is seamless and contextualized". Reusing content can help create such a seamless journey, as noted by another participant: "The main value is the consistency it creates for all channels, by using the same content instead of duplicating it, with all errors and outdating caused by this". As consumers are using a wide variety of channel to access content, this reuse of content becomes increasingly important. As phrased by a third participant: "WCM should be used to control the content across different channels, and less about constructing the 'page' for each of the channels - why, because devices such as mobile need content to dynamically include into both their 'web' page and into their native app".

The second benefit is increased flexibility in the presentation layer. Whereas the contentmanagement capabilities of commerce systems are generally page driven, WCM systems allow for much greater flexibility in the way content is used. As one participant states: "to show content in the context, you need a WCM which separates the content from the design. This is where ecommerce players can benefit from a WCM."

Finally, the extent in which multi-channel capabilities are a benefit for integrated content and commerce systems is controversial. One participant notes that this benefit greatly depends on organizational requirements and the added value will not apply to all cases: "the need for this will really depend on the client. It is, in my opinion, one of the 'weaker' arguments as it does not apply to all". Another participant mentions that instead of focussing on multi-channel capabilities, Omni-channel could be seen as a main driver for content-driven commerce adoption. In an Omni-channel approach companies present users a consistent experience over multiple channels. This clearly aligns with the drive for consistency, which was discussed in this chapter. The term Omni-channel is mostly used in a strategic context, whereas multi-channel is generally used in the technical domain. Since "Multi-channel" seems to be the standard term used by WCMS vendors, we will refer to this value as a "consistent multi-channel experience". Obviously, the technical and strategic goals must be aligned for an effective multi-channel approach.

#### **B2: Marketing tools**

During the development of the Go-To-Market plan, utilising the WCM's marketing tools for commerce was identified as one of the drivers for content-driven commerce adoption. In order to better understand this potential benefit, focus group participants were asked if they feel WCM marketing tools are a benefit of integrating content and commerce systems.

The general consensus among focus group participants is that marketing tools are very valuable in a commerce environment. When setting out the marketing strategy, marketing folks need a toolset that includes all content and commerce elements when planning campaigns and promotions. "Marketers need a broad range of content marketing functionality such as rich media, personalisation, contextualisation, supporting social media channels, A/B testing etc." The introduction of such tools is directly aligned with organizational goals. One participant states that an important metric is Revenue per Visit (RPV). "By combing CMS and Ecommerce you have all the pieces of the puzzle required to strategize and deploy tactics to increase RPV." Apart from increasing revenues, another point of focus of introducing marketing tools is the Total Cost of Ownership (TCO): "You could focus on a TCO aspect [] updates will be cheaper, development of additional features like campaigns are faster".

Participants discussed two aspects of marketing tools in a commerce environment in particular: Empowering marketers and publishing workflow. Five participants observed the need for empowering marketers. They notify that by giving marketers the right toolset, they can effectively manage the customer journey. One participant notes this is of particular importance to branded manufacturers: "the only differentiator for a branded manufacturer or speciality retailer is their overall customer experience value prop - which could be based on exclusivity, storytelling, emotional identification, unique customer life cycle elements etc. Content-driven commerce systems allow for the maximum marketing flexibility to address these kinds of scenarios." WCM tools which are identified to support this need are A/B testing, in-preview editing, component configuration, rich media etc. The general message is that these marketing efforts should be supported by an easy to use Graphical User Interface (GUI), rather than by writing code.

For large organizations, the aspect of a structured workflow could be very important. As one participant states: "This [workflow] could be a Go/no Go criteria in a pitch. By adding a WCM to the Ecommerce solution, they could win the deal." Other participants state that workflow will help improve the quality of the user experience as several stakeholders will be involved in the process of experience design. Workflow is noted to be of real value when it crosses the boundaries of WCM and commerce, and also include other external systems such as Product Information Management systems. One participant notes that workflow is a debatable benefit however, as the WCM will indeed cover the content workflow, but the overall workflow might actually gain a new layer of complexity by using two systems. Another participant adds to this, stating: "in my experience not many folks use workflows as they are seen as a hindrance rather

than a benefit". Therefore the benefit of introducing a content workflow in a WCM environment strongly depends on the context of the organization in which the system is implemented.

## **B3: WCM Personalization for commerce**

During the development of the Go-To-Market plan, utilising WCM personalization in commerce environments was identified as one of the drivers for content-driven commerce adoption. In order to better understand this potential benefit, focus group participants were asked if they feel WCM personalization capabilities are a benefit of integrating content and commerce systems.

Personalization in itself is observed as a key aspect of content-driven commerce. As phrased by one participant: "No personalization, no content-driven commerce". Another participant states that this aspect is only going to increase in importance. The reason for this is that a targeted offering will increase conversion rates, as observed by five participants. "In the wide landscape of online places to buy, people want to be addressed in a personal way with items that match their need. Content-driven commerce helps addressing this question by tuning commerce to the individual."

Content and commerce systems typically have their own personalization tools. Three participants observe the opportunity for these tools to complement each other. Both tools serve different needs: "Ecommerce solutions often have a targeting engine which is focussed on upselling products or enlarging the shopping the value of the shopping basket. Personalization functionality of a WCM is more focussed on the content. I see that they can add value to each other". Other than complementing each other's functionality, personalization tools could also benefit from shared context data: "WCM personalization should be used in combination with commerce. It should provide valuable data to the commerce targeting engine and should be able to personalize based on commerce data." The WCM system should share data on which content has been consumed by the user. In that way, the commerce personalization engine can improve its suggestions.

"In the end it's obviously all about getting more visitors and converting them into customers. And Content, engagement & personalization helps in this matter".

## **B4: Pace layering**

During the development of the Go-To-Market plan, pace layering of technology was identified as one of the drivers for content-driven commerce adoption. In order to better understand this potential benefit, focus group participants were asked if they feel technology pace layering is a benefit of integrating content and commerce systems. Pace layering was generally observed by participants as an important benefit of content-driven commerce. One participant even states: "I think the most important driver is the pace layering, because this will solve a lot of the challenges regarding time to market, quality assurance and provides a brand new landscape to explore and build".

Splitting content and commerce systems into different layers of development pace has a number of benefits. For one, the highly adaptive field of WCM will be supported by an agile system: "you can have people working on campaign sites without interfering with the existing environment". The WCM will need to evolve fast to keep up with rapid changes in the presentation technology. These different ways of consumption are essentially independent of commerce systems. "It would be important here for the commerce 'offers' to stay consistent independent of the presentation engine." System integration technology is observed as an enabler of pace layering. When components in the bigger business eco-system are 'pluggable', they are not locked into a large monolithic system and can thus evolve at different speeds. One participant notes that pace layering will also allow for easier adoption of cloud based ecommerce solutions under a Software as a Service model. Another participant notes that pace layering is not solely a technical principle. Managing content in a WCM system makes content way more fluid. "It empowers the business to separate product management and content management. This is just as much pace layering but more from an organizational aspect."

### **B5:** Content as a competitive edge

The benefit of using content to gain a competitive edge was identified during the focus group discussion and was observed by five participants. As search engine optimization is at its limits for most companies. Engaging content will help in drawing customers to the site, especially since search engines are starting to increasingly value content over keywords. Current e-commerce solutions feature little customization options for product pages and make it difficult for brands to stand out. The flexible content management capabilities of a WCM will help communicating brand value in a commerce environment. As stated by one participant: "Strong content helps online retailers address the core needs behind purchases, by providing the dynamic and engaging information needed to truly make their decisions".

Commerce systems today are more about building the brand, not only for online transactions but also as a significant influencer for the physical showroom and the extended experience. The original idea of doing commerce based on presenting a catalogue of products or services is no longer enough to convince customers to make a purchase. Every step of the buying cycle should be supported across multiple touch points, eventually leading to a sale. Content and commerce are a natural fit, as observed by a participant: "The separation of content from commerce has been an unnatural divide. We are a story-driven, visually-driven species who buys things on impulse, on peer pressure".

### **B6: Analytics and reporting**

Three participants identified the potential of using WCM analytic tools for commerce. One participant observes that in most solutions, analytics are not available during the buying process, as the e-commerce system does not have the required toolset. This a handicap of a side-by-side architectural approach. In an integrated environment, the buying process will be incorporated into the WCM system. This means analytics for the entire website could be integrated. Another participant states that "a WCM which provides a good set of 'default' reports, and ability to add in other data and customise reports would be an advantage". Reporting tools are observed to enable reviews on how content and personalization settings affect conversion.

### **B7: Best of breed**

The integration of content and commerce systems has the benefit of utilising two specialised systems, instead of using a monolithic one-fits-all solution. The benefit of using such 'best of breed' systems was observed by three focus group participants. Building the application out of smaller, specialised components also mean that components can be independently replaced by a different component. For example, the solution could adopt a new WCMS without having to necessarily change the commerce platform. This is not possible in a monolithic approach. One participant states: "By acquiring and integrating best of breed systems, businesses can eliminate the scenario where an All-in-one solution provides a great commerce solution but

weak CMS solution and vice versa". Another participant identifies best-of-breed as the primary driver for content and commerce integration: "The most important driver is the ability for each to be 'best-of-breed' - which is needed to enable the most valuable experience proposition." By adopting a best-of-breed approach, companies can acquire the combined benefit of two specialised systems which excel in their own field.

## M1: Customer profile

One of the first questions asked in the focus group dealt with the target market for contentdriven commerce solutions. In order to get a better understanding of what types of organizations could benefit from adopting a content-driven commerce strategy, participants were asked to sketch a profile of a typical client in this domain. By doing so, we not only identify what the possible benefits are, but also gain an understanding of which companies would be most likely to reap those benefits.

Understanding the ideal customer was confirmed by one of the participants as an important activity: "the ideal customer profile is definitely something that needs an answer, which allows us to come up with a solution that covers their needs". The general consensus among participants is that organizations with a strong focus on branding are most likely to benefit from a content-driven commerce strategy. As one participant puts it, these are the companies that have a story to tell. They are organizations that sell an experience and require a more extensive pre-sales orientation. Prime examples of this would be luxury goods, automotive and many recreational verticals. These are complex products or services that not only rely on the offering, but also on their image and status. For some of these companies "Brand matters just as much as (or even more than) the product itself". This is especially clear in the B2C market.

Such up-scale offerings generally deal with fierce competition and market disruption from lower-price vendors. "To reinforce their brand they need to strengthen the story they tell, expand their reach and encourage more people to share their story." Catalogue size is a controversial topic. One participant observes that organizations with a large product catalogue will greatly benefit from content-driven commerce. A second participant however does not agree and states that "the companies might have a large product catalog, but it is not given. [] I feel the smaller (luxury) brands will benefit immensely"

### Business focus group review

The business related focus group aimed to validate the benefits of content-driven commerce adoption which we found during the development of the Go-To-Market strategy. Eight experts participated, of which six participants were active until the end of the focus group. In order to assess the completeness of our business review, the participants were presented with a list of topics discussed, and asked if there was any discussion topic that we missed. By doing so we identified three more benefits of content-driven commerce adoption. Five participants identified the benefit of gaining a competitive advantage with content. Three participants observed the benefit of utilising best-of-breed systems. Lastly, the use of WCM analytics tools in a commerce environment was also observed as a benefit. The results of the business focus group is a set of seven benefits of content-driven commerce adoption and an insight into the organizational profile of potential clients.

# 7.7 Reflection on the use of focus groups

In order to guide the participants through the registration process of the online discussion tool, we provided them with a step-by-step guide. In one of these registration steps participants were asked to use a randomly assigned username, in order to ensure their anonymity. This worked well for most of the participants but one of them misread the guide and used a different name format. In the second focus group we added an image to the registration guide in order to further clarify the steps required. As there is no real-time or face-to-face contact with the participants in an online focus group, it seems important to provide extremely clear instructions.

During the first focus group, we posted a series of 11 questions, which were answered in a sequence. However, we noticed that many participants would stop after finishing around half the questions. In order to give them a better indication of how far they are along, all questions were then numbered, and the total number of questions was shown. That was, participants were better able to estimate the effort required for participation and plan their response.

# 8 Discussion

In this study we aimed to gain an exploratory insight into the domain of content-driven commerce by taking a design science approach and developing an integration layer between a WCM system and an e-commerce system. Together with experts from the industry we were involved in both the technical implementation, as well as the development of a Go-To-Market plan for such a system. This allowed the researcher to gain an understanding of both the technical challenges and the business value of content-driven commerce. These findings were then validated by a number of experts using a focus group methodology. This chapter will discuss the findings of this study in the light of our background study. The findings have been split up into technical principles and business values.

# 8.1 Technical principles when integrating WCM and e-commerce

This section discusses the technical discussion topics that were identified during the design of the Proof of Concept and the focus group discussion. Each discussion topic is presented in a separate part.

## 8.1.1 System architecture

In the background study we identified a Service-Oriented Architecture (SOA) as one of the main enablers of content-driven commerce. SOA is an architectural style which allows for loose coupling between two pieces of software, by building a set of simple interfaces between the participating software agents. This principle was adopted in the design of our artefact. In this study we discussed three different approaches for implementing a content-driven commerce system. These are: Side-by-side, WCM-led and commerce-led. While building the artefact we adopted the WCM-led approach. This implementation approach makes the WCM system leading, and consumes commerce functionality as a service. As discussed, this approach possibly has the highest integration complexity, bus also yields the largest potential benefit, as the conjoined system can make use of the experience management capabilities of the WCM system. Experts in the focus group discussion all agreed their preference would be a WCM-led approach. The main reason for this being the richer end-user experience. A commerce-led system has some benefits, as it allows the WCM system to be used as a dedicated content repository, but it completely ignores its frontend capabilities. The easiest option to implement is the side-by-side approach. In this approach both systems run in their own environment and are tied together on the frontend by sharing the same look and feel. However this means that both systems will be using their own personalization and search capabilities, which are hard to integrate. Focus group participants also noted that the side-byside approach runs the risk of creating an inconsistent user experience, as users will be moving back and forth between systems. The general consensus among focus group participants was that the architectural approach should be driven by organizational requirements. In other words, the correct approach depends on the context in which the system will be implemented.

#### 8.1.2 Implementation effort

One of the participants in the focus group study noted that implementation effort is possibly the most important discussion point. In our artefact design, commerce is utilised as a service. Main implementation tasks are done using the WCM technology, while commerce functionality is sourced through the commerce API. This means customizations are only necessary for those customer requirements which the API does not support. With a welldeveloped and functional API, system implementers might not have to worry about any development efforts on the commerce platform. In that case the commerce tool is fully sourced on a SaaS basis. In the background study we saw potential for the commerce engine to be deployed on a cloud server, with a single click of a button. Doing so would allow developers to rapidly set up the commerce environment and start consuming its services. We experienced this first-hand while developing the Proof of Concept. Configuring, building and deploying the commerce engine proved a complex task, given the fact that for our system we did not need any customizations. After a few days we decided our system would not require any development on the commerce side and it would be easier to deploy a cloud instance. We were ready to go virtually instantly. Having an easily deployable commerce system, with a thoroughly developed API, will allow WCM developers to set up commerce environment, without having to learn about the technology behind the commerce system. During the design of the artefact, the researcher was able to build a functional integration layer between the WCM system and the commerce system within four months, having no experience with the technology of both systems. By using the commerce tools as service, the researcher was not required to perform any development efforts on the commerce tools. Moreover, since the API was built according to REST level 3 principles, the researcher was able to explore the API without the need for reading documentation.

The focus group study revealed a number of ways in which the implementation effort can be managed. One option is to build a number of integration tools, such as a commerce SDK, a productised integration layer or an accelerator kit. A second way is to focus on documentation of the systems API's. Documentation is observed as a very cost-effective way to manage implementation effort.

### 8.1.3 System performance

System performance was ranked as a very important issue by the focus group participants. Ecommerce environments require high performance, and any change in the system should have immediate effect on the customer. Performance is a challenge in an integrated environment as both systems has an inherent way of working, which may not work well with others. This point is hard to address as many aspects of the system are built into its architecture. One of the performance issues we noted during the development of the artefact was latency in API calls. The testing of the artefact was done on a local system in the Netherlands, while the cloud instance of the commerce tools were hosted in the Vancouver area of Canada. We noticed this created some performance issues, especially on those pages that required a lot of calls to the commerce API. An obvious principle to derive from this is to have both systems running at a location which creates the least latency between calls. This was confirmed during the focus group review with industry experts. In the background study we identified two forms of web services: These are Stateless services and Stateful services. The commerce API that was used in the artefact design was a stateless service. In a stateless service each message that a consumer sends to a provider must contain all necessary information for the provider to process it, since the state is not stored. This means that we stored our authentication tokens in the WCM session, and sent these with every request we made to the commerce tool. The benefit of using this stateless API however, was the fact that API calls can be bundled. In our initial design, we would wait for each request to be processed before sending the next which caused the aforementioned performance issues. After a technical review by an Elastic Path system architect, we found that bundling the API calls can greatly improve performance. Minimizing the number of API calls was confirmed to be an effective measure by focus group participants. Another issue related to performance is caching. WCM systems generally include a smart caching system for quickly rendering pages. In a joint environment, part of the information will come from the commerce tool. This makes caching a challenge as commerce data, such as pricing information, might change without the WCMS being aware of this. Caching list prices in the WCM system could greatly improve performance, but this will create new issues in regards to the actuality of data. Focus group participants noted that caching list prices might only be suitable for B2B scenarios.

#### 8.1.4 System agility

During the final review of the Proof of Concept agility was identified as an important design principle. In our implementation, several components of the WCMS make direct calls into the API. The responses are then mapped over JAVA objects so they can be used by the WCMS. The issue with the mapping process is that the original data structure of the response is maintained. The response data usually contains a number of parent and child nodes, which are mapped into JAVA objects with the same structure. For the WCMS this creates a dependency on the data structure of the commerce system. During virtually any real-world implementation, parts of the application will have to be customized to fit the client's specific needs. It is important that changes in one of both systems have minimal impact on the application as a whole. In the design phase of this study, we identified an abstraction layer as the most likely candidate for maintaining system agility. Focus group participants noted two ways of managing agility: Building an agile integration model, such as the aforementioned abstraction layer, and versioning. The integration model should be able to adapt easily to changes in the data integration and API spaces. One participant noted this could be achieved by building a lightweight integration. Versioning will allow both vendor products to evolve independent of each other, without affecting the integration layer. Vendors will need to support older versions for an extended time, as the integrated solution will likely be more difficult to update than a sole instance of a vendor product. By doing so the system implementer can decide when it is time to update.

#### 8.1.5 Using WCM relevance for commerce

Most WCM systems feature a relevance engine which can be utilised to personalize content on the user's behaviour and context variables. Commerce tools, on the other hand, feature extensive tools for recommendations, upsells and cross sells. On the administration side of the online commerce platform, marketers need a single interface to create a unified user experience. That is, they should be able to define and test personalization rules from a single view. In order to achieve this goal, personalization capabilities of the commerce tool should be exposed through the API. The WCMS can then use custom data collectors for its own relevance engine to include those targeting rules which have been set by the commerce system. Moreover, it will allow the WCMS to use commerce data for its contextualization. For example, a free shipping promotion could be shown at a certain cart value, or a product could be suggested based on the other products in the cart.

Although working from a single interface is the ideal solution, the technical implementation of such a solution will be very challenging. As one focus group participant notes, we could try to combine the systems into a single access point, but as a first step we could divide personalization responsibilities among both systems. Other participants noted that both sets of personalization tools serve a different purpose and should handle their own level of responsibility. That is, they should remain in their own environment and not be integrated into a single access point. Even when such an approach is taken, the two personalization engines could exchange contextual data to create a better personalized experience overall. For example, the WCMS will not be responsible for setting up promotions, but it could use commerce data to drive its personalization engine.

### 8.1.6 Joint data model

In an integrated content and commerce system, both systems will be responsible for part of the data. It is up to the system architect to determine which data is stored in what environment and how both sources are presented to the user as a cohesive whole. One option for solving the shared data issue is to join databases, so both systems retrieve data from a single source. All experts we contacted during the design part of this study identified database integration as highly unsuitable, as it creates the need for messy integration scripts. Moreover, the joined data model would create dependencies on the data models of both individual software packages. Another option is to make one system leading, and synchronize between data sources. Experts involved in this integration noted that data synchronization is a very errorprone process, and should be avoided. The third alternative, which is the one we adopted when building the artefact, is to have a clear separation of data between both systems. The reasoning behind this is that much of the data is irrelevant for one of either systems. For example, the cart contents or product availability can be stored in the e-commerce system. If the WCMS needs this data for presenting it to the user, or as input for its relevance engine, the data can simply be requested from the commerce API. On the other hand, images and other page contents are typical content and should be stored in the WCMS, since it has to tools to manage that particular data. During the development of the Proof of Concept, we found that

most of the data is easily allocated to one of either systems, based on which system will be consuming and managing the data. Focus group participants noted that the biggest data challenge will be dealing with concepts that span both systems. This was true for the proof of concept, where the most complex concept was product data. This is because the product is where the worlds of content and commerce come together. Products typically feature a lot of promotional content, but are also involved in most of the commerce processes. Therefore we decided to split up product data, according to its function, and which system would be manipulating it. The WCMS stores content such as product description, images and videos. The commerce system stores the availability, pricing and shipping information for a product. In order to link the two pieces of data, they both shared a unique identifier.

## 8.1.7 Integrated search capabilities

Searching in an integrated WCM and commerce system is a challenge because the data is saved in multiple locations. Integrated search functionality has been determined out of scope for the Proof of Concept level product we have built. However, it is still an important piece of functionality that came up in a number technical discussions we have had. A possible way to solve this is to use an external search engine, or adapt the data model based on searching requirements. Although we did not develop and test any of the possible solutions, this challenge was further explored in the technical focus group. Participants agreed that the degree of search tool integration depends on end-user needs. If the integrated system requires a search tool that can access all sources, a (3<sup>rd</sup> party) federated search tool is observed to be the best solution. In some cases however, this may not be needed as most searches will be done on content stored in the WCMS. The most likely part of the e-commerce functionality that users would like to search on is pricing information.

### 8.1.8 Developing a workflow for the joint system

As discussed in the data model chapter of this discussion, the designed Proof of Concept uses a unique identifier to link the product data in the WCMS with the product data in the commerce engine. This is a very important connection, as it allows the CMS to retrieve the right commerce data for each product it presents to the user, such as pricing information and "add to cart" calls. In the initial design, a simple text field was added to the product data node in the WCMS, representing the unique identifier of the product in the commerce tools. In order to link two products, and make the commerce functionality show up on the frontend, the administrator had to look up the product ID and insert this into the corresponding product in the CMS. In the second phase, we found that this is not a workable process. In order to improve the workflow, we added a search tool to the identifier field. This allowed us to select corresponding commerce data for each product in the WCMS, by simply looking up the right product in the commerce tool. This improved the workflow significantly as the user was no longer required to work with identification codes, but rather with easily readable product titles. This process however, still requires a lot of manual operations. A data import and export tool could help in automatically generating linked product data in both systems. When a new product is added to the commerce system, a trigger could also automatically create the same

product in the WCMS, and link both. By putting the new product in a draft state, it will not affect the live system and purely serve as a more convenient way of linking product data. An additional benefit is that the marketing team responsible for the website will see that action from their part is needed to add product content, and publish the product to the live website.

During the focus group discussion we took a high level look at workflow. A large challenge to the workflow of an integrated content and commerce system is the need to work in two backend systems. Adding WCM into a commerce environment means you are also changing the process in which data is managed. Non-technical marketing staff should be able to use the joint toolset to launch new products and campaigns, without the help of an IT specialist. The technical degree of workflow integration is a controversial topic. Experts were divided over the need for both systems to update each other on changes in their system. Doing so could help automate part of the workflow between both systems, but others believe there is little added value. Another view is that many parts of the workflow will start in an Enterprise Resource Planning or Product Information Management System anyway, so we cannot assume either commerce of WCM will be the system of record.

Workflow design should make system use as convenient as possible by reducing the number of systems a user has to interact with to complete their tasks and by automating as much as possible.

## 8.1.9 Organizational context

The organizational context in which a content-driven commerce system is implemented is not directly a technical discussion point. However, it was identified during the focus group discussion as a very important factor, which will influence virtually all other technical aspects. Technical components are developed to support a certain business function. Therefore the client's requirements will greatly influence technical decision making. Adopting a content-driven commerce strategy not only has challenges in technical implementation, but might also require organizational processes to adapt accordingly.

### 8.1.10 Relations between technical aspects

The diagram below shows the theorised relations between different technical discussion topics. Rectangles represent technical challenges and lines represent their relations. For example, integrated search is strongly related to the data model. During the technical focus group discussion, organizational context was observed to cover the entire technical domain. That is, the context of an organization at which a content-driven commerce solution will be implemented will have a great impact on the implementation. Ultimately, the technical solution will be driven by certain requirements from the organizational context. The high-level system architecture is a central aspect, which influences most of the other technical aspects. The relations presented below are generalised and serve solely as an overview of the technical domain. Depending on the context in which a content-driven commerce system is implemented, other relations may be possible. For example, depending on your architectural approach, the chosen data model might influence the workflow.



Figure 19: relations between technical discussion points

# 8.2 Business value of content-driven commerce

This chapter discusses the business value of content-driven commerce. First we will discuss the benefits and customer profile that were identified during the development of the Go-TO-Market plan and the focus group discussion. Second we will align these findings to the Technology Acceptance Model and the Information Systems Success Model. In total, we identified seven benefits of content-driven commerce adoption. Four benefits are functional, and three are non-functional.

Functional benefits	Non-functional benefits
Multi-channel	Pace layering
Marketing tools	Content as a competitive edge
Personalization tools	Best-of-breed
Analytics and reporting	

Table 8: Identified benefits of content-driven commerce adoption

### 8.2.1 Commerce over multiple channels

The strong multi-channel capabilities of a WCMS can be utilized to adopt the way commerce is presented, based on the channel of the user. WCMS systems make it relatively easy to set up specific views for visitors using a mobile devices such as a smartphone or tablet. These devices use different input methods and have smaller screens. Ensuring the website is suited for a certain channel can greatly improve usability. Focus group participants observed the benefit of having multi-channel capabilities in a commerce environment. Commerce tools will generally use tricks, such as responsiveness to cover multi-channel needs. Integration with a WCMS will provide the integrated solution with a much more extensive set of multi-channel tools. During the focus group discussion we identified the need for marketers to be able to design and control the user experience across multiple channels. A main value created by the WCMS is that content can easily be reused across a number of channels, creating a consistent user experience. By using a WCMS, the marketer can focus on managing the content, instead of managing pages. This way content can be dynamically included into mobile pages, or a native mobile app. Another identified benefit is the increased flexibility in the presentation layer. WCMS systems are generally well equipped to separate content from design. This benefit was also noted during the design of the POC. The researcher was able to easily change the way commerce data was presented, using the toolkit provided by the WCMS. However, the focus group discussion also revealed that multi-channel capabilities are not always a benefit for adoption. It was noted that the perceived benefit greatly depends on organizational context. Indeed, we can theorise how the capability to reuse content over multiple channels is an added value, but it may not make sense in all cases. The researcher believes this value will be of great benefit to organizations which require a consistent multi-channel experience.

#### 8.2.2 Marketing tools

The marketing toolset is an important feature of any WCMS. It allows marketers to take a structured approach for the creation, testing and publishing of new content. In turn, this enables marketers to conveniently keep content relevant and up-to-date. Focus group participants note that by giving marketers the right toolset, they can effectively manage the customer journey. Examples of content marketing functionality required by marketers are: rich media, personalisation, contextualisation, supporting social media channels and A/B testing. It is believed that by empowering marketers with the right tools, they can increase the Revenue per Visit (RPV). Another benefit is that with the right toolset, development of additional features such as marketing campaigns will be faster and cheaper. Theory describes how users of a WCMS are non-technical and require a simple interface for doing their work [15]. Focus group participants agree that marketing efforts should be supported by an easy to use GUI, rather than by writing code. Another possible benefit of using WCM marketing tools is the included workflow. Focus group participants state this could be a requirement for some large organizations, but others might perceive it as a hindrance, rather than a benefit. Workflow is stated to become a real benefit once it covers other systems in the domain as well, such as Product Information Management or Enterprise Resource Management systems.

In a non-integrated content and commerce environment, marketers are required to operate the backend of both systems. In an integrated WCM-led content-driven commerce system, they could potentially operate the WCMS and manage the entire system from a single platform, using a single workflow. Integrating some commerce related concepts, such as promotions, into the WCMS can be a very complex task however. Doing so would be time consuming and break with the principle of a light integration, which could create additional problems (see chapter on system agility). This a trade-off between usability and integration complexity.

### 8.2.3 WCM Personalization for commerce

In a customer driven environment, responsive companies will provide the content their customers need, when and where they need it [15]. By personalizing the products offered and content presented based on the characteristics of the user, the platform can create a personalized offering, which better fits the user's needs. Focus group participants observed personalization as a key aspect of content-driven commerce. With the large number of web shops and offerings available on the web, customers look for relevant experiences and items that match their needs. Content-driven commerce addresses this need, by tuning commerce to the individual. Content and commerce systems generally have their own set of personalization tools, which serve different needs. E-commerce tools have a targeting engine which focusses on upselling, and increasing the value of the shopping cart. The WCM focusses its personalization effort on content. By sharing context data, both systems could complement each other and offer a greater personalised experience. Focus group participants recognise this opportunity for WCM personalization to be used in combination with commerce.

#### 8.2.4 Pace layering

During Phase III of the Design Science part of this study, it became clear one of the perceived benefits at Elastic Path of adopting a "headless commerce" strategy is to comply with Gartner's Pace Layering model. Applied to content and commerce, the model shows how the underlying business processes that drive content and commerce are moving at different paces. Content will need to reflect rapid changes in the business processes, whereas the more logistics oriented commerce system will move at a much slower pace. Because of its different pace of change, commerce systems are not able to keep up with the rapidly changing demands of marketers. Their needs are much better suited by an agile WCM system. It is Elastic Path's philosophy that marketing tools should be built into the rapidly changing domain of Content Management. As an e-commerce provider they focus on building core aspects of commerce within their own pace layer and exposing this through an API. These services can then be consumed by a more agile WCM. This approach of rapidly changing technology consuming services from slower moving technology complies with the Gartner's design principles on Pace Layering [48]. Focus group participants observed pace layering as an important benefit of adopting a content-driven commerce strategy. Doing so will allow marketers to work on the campaign sites without interfering with the existing environment. Commerce functions can remain consistent, regardless of the rapidly changing presentation layer. System integration technology will help businesses adopt a pace-layered approach, as it becomes easier to plug in new components to support certain business functions. Having a stable commerce system and an adaptive WCMS also allows for the commerce tools to be easily source under a SaaS model. As described in the background study, and observed by focus group participants, cloud technology can be an enabler for this concept. It is also observed that pace layering in a content-driven commerce environment is not solely a technical principle. By empowering businesses to separate product and content management, content-driven commerce systems can enable organizational pace layering.

### 8.2.5 Content as a competitive edge

The ability to use content as a competitive edge was initially theorised by the researcher as part of the marketing toolset. During the focus group discussion it became clear that this is in fact a concept on its own. The marketing toolset is concerned with empowering marketers to manage content in order to create customer experiences. The use of content to drive sales describes the effect content will have on the decision making process of the user. Focus group participants observe that content can help organizations gain a competitive edge. In order to drive traffic to the web store, organizations have adopted strategies for search engine optimization. As search engines such as Google start to increasingly value content over simple keywords, engaging content will help draw visitors to the site. E-commerce solutions generally allow for little customization on the product pages. A WCMS will help in this regard as the presentation of content can be adapted to product requirements. Strong content is perceived to help customers address the core needs behind their purchases are driven by the

experience around a product. This experience is greatly influenced by the stories and visuals offered on the web store. In this way, the content offered around a product will impact the decision making process of a potential customer.

## 8.2.6 Analytics and reporting

The benefit of adding WCM analytics and reporting capabilities to a commerce environment was identified during the focus group discussion. In a side-by-side integration, system-wide analytics will not be available. Integrated analytics tools will allow marketers to measure a larger set of user behaviour. This information could be used to review the impact of content and personalization settings. Apart from being identified as a benefit by focus group participants, analytics were not integrated in the Proof of Concept, and this concept has not been further explored in this study.

# 8.2.7 Best of breed

Focus group participants observed the benefit of utilising best-of-breed systems in contentdriven commerce. Instead of using a monolithic one-fits-all solution, both commerce and content functions are supported by a specialised set of tools. Since WCM and commerce systems are specifically built for their corresponding domain, they are observed to excel at their core functions.

# 8.2.8 Profile of suitable content-driven commerce adopter

In this chapter we discussed a number of benefits organizations may perceive when adopting a content-driven commerce strategy. To complement these findings, we asked focus group participants to sketch the profile of the ideal customer. That is, what type of organizations would be most likely to benefits from the benefits described in this chapter? The customer profile was confirmed as an important question to ask, as vendors and system implementers need to tie the final solution to their needs. Although customer profiles and requirements may greatly vary, participants did identify number of characteristics for companies most likely to benefit from content-driven commerce adoption. These are the organizations with a strong focus on branding, and creating a customer journey. Indeed, as discussed in this chapter, one of the perceived benefits is conveying a message through the use of content. Companies with a strong brand image have a story to tell, and could use an integrated content and commerce solution to communicate their value. These organizations may also deal with a lengthy presales orientation phase. As discussed, content can support customers in this lengthy decision making process. Prime examples of this would be luxury goods, automotive and many recreational verticals. In general, if your brand matters as much as your product or service, you could greatly benefit from a content-driven commerce solution as the integrated marketing tools allow you to effectively communicate your brand value.

#### 8.2.9 Application to TAM2

This sections describes how the identified benefits fit into the TAM2 model [33]. It is important to note here that we theorize benefits for two different user groups. First there are the end-users, these are the website visitors browsing products and potentially making a purchase. The organization implementing content-driven commerce will want to organise their experience in such a way that they are most likely to make a purchase. The second group are the marketers using the backend tools of the WCM in order to drive sales. First we will describe the benefits from the perspective of the end user. Then we will describe the benefits from the perspective of the marketers using the backend of the content-driven commerce solution.

The first benefit applied to the TAM2 model <u>multi-channel</u> capability Ensuring the website is suitable for a variety of channels and input methods will greatly improve usability, or <u>ease of use</u>. The usefulness of a commerce site for end-users is influenced by the degree in which the site helps them decide on making a purchase. We theorize that by offering high quality content, which is relevant and up-to-date, marketers can help customers in their decision making process which will improve the perceived <u>value</u>. In Figure 20 this theorised value is shown as "<u>Quality</u>". In the extended Technology Acceptance Model (TAM2) the authors incorporated additional theoretical constructs and their causal relationships. They found that Relevance is an important factor for the perceived usefulness of a system. By personalizing content based on the context of the user, marketers can increase the relevance of content. In this way, <u>personalization</u> will improve the perceived <u>value</u> of the system. The TAM2 model theorizes that this improved ease of use and perceived value positively affects the intention to use the website [33]. These relations are shown in the diagram below.



Figure 20: TAM2 adopted for end users of content-driven commerce systems

The following diagram applies content-driven commerce on the TAM2 model from the perspective of a marketer. In the TAM2 model Perceived usefulness (in this case "perceived value") is defined as "the extent to which a person believes that using the system will enhance his or her job performance". We believe that an advanced toolset, specifically built for marketers, allows them to do their job more effectively. Depending on the level of workflow automation, the marketing toolset can potentially also improve the ease of using the system, by minimizing the effort required to finish tasks.



Figure 21: TAM2 adopted for marketers using content-driven commerce systems

### 8.2.10 Application to the IS Success Model

In the theoretical background chapter of this study, we presented the DeLone and McLean success model, adopted for commerce [35]. As described in that chapter, Wang suggests to replace Perceived Value by Perceived Usefulness, as it is perceived to be a more comprehensive measure in an e-commerce context [35]. Delone and McLean identified a number of success measures for each of these dimensions [34]. The measures for the Perceived Value dimension have been complemented by the work of Wang [35]. As the number of success measures is large, some have been merged and irrelevant measures – to the field of content-driven commerce – have not been listed. :

Success model dimension	E-commerce success measures
Information Quality	Relevance
	Accuracy
	Completeness
	Dynamic content
	Content personalization
	Variety of information
System Quality	Usability
	Responsiveness
	Customization
	Ease of Navigation
Service Quality	Customized site intelligence
	Order tracking
	Quick responsiveness
User Satisfaction	Repeat purchases
	Evaluation survey's
Perceived Value	Price
	Brand Name
	Store Name
Intention to Use	Site visits
	Length of stay
Net benefits	Brand awareness
	Improved customer experience
	Increased sales
	Competitive advantage

 Table 9: E-commerce success measures

The diagram below shows which success measures in the e-commerce success model may be directly affected by adopting a content-driven commerce solution. Because of the interrelations between different dimensions, other effect are likely to occur indirectly. For example, personalised pricing may improve User Satisfaction through the higher Perceived Value.



Figure 22: E-commerce success model adopted for content-driven commerce systems

The table below shows the relations between the identified values of content-driven commerce and their respective e-commerce success measurement. These values have been thoroughly discussed in this chapter. Based on this discussion, we have theorised a number of relations, which are summarized in the table below.

Content-driven	Related e-commerce success measurement
commerce value	
Multi-channel	Multi-channel capabilities enable the integrated system to adapt the site to the
	user's channel. A light weight mobile site will increase <u>responsiveness</u> , while the
	adoption to different input method improves the ease of navigation.
Personalization	Personalization tools allow the marketers to create personalized content and
	improve the system <u>relevance</u> . In an integrated environment, the commerce
	system can use data collected in the WCMS to offer personalised pricing. Focus
	group participants observed a personalised offering will improve the user
	experience.
Marketing tools	Marketing tools enable marketers to publish a variety of product information to
	help customers in their decision making process, including dynamic content.
	Another important aspect of the marketing toolset is that it enables marketers to
	create a brand-focused customer journey. By utilising the <u>brand name</u> , marketers
	can increase the customer's perceived value, while at the same time creating <u>brand</u>
	<u>awareness</u> .
Content as a	A content-driven commerce approach allows marketers to offer interesting and
competitive edge	engaging content, which will increase the number of <u>site visits</u> , as search engines
	are increasingly using content instead of keywords to determine site results.
	Offering interesting content can also improve the <u>length of stay</u> , creating a larger
	time window for a user to consider a purchase.
Combined	Content-driven commerce is observed to improve the customer journey. In doing
	so they it enables the business to gain a <u>competitive advantage</u> and <u>increase sales</u> .

Figure 23: Relations between content-driven commerce values and e-commerce success measurements

# 9 Conclusion

This chapter presents the conclusions of this study. The first part provides an answer to the research questions. The contribution to theory and practice are presented in the second and third part respectively. The fourth part presents the results and recommendations.

# 9.1 Summary of findings concerning the research question

This thesis presents an exploratory overview of content-driven commerce systems. In doing so we provide an answer to the main research question:

# How to assess the content-driven commerce proposition?

We found that the content-driven commerce proposition can be assessed by evaluating the benefits and design challenges of content-driven commerce systems. In order to further explore this question, five sub-questions have been answered. These are presented in the following chapters.

# 9.1.1 State of literature

To assess the content-driven commerce proposition, this study aims to identify the important concepts in the domain. The first step in this process is to study existing literature in order to answer the first research question:

1. What is the state of literature on content-driven commerce?

The answer to this question is presented in section 4. Content-driven commerce has received little academic attention, which means the available theory is very limited. Studying business analyst reports revealed that content management capabilities of existing e-commerce solutions are generally underdeveloped. Therefore e-commerce environments can benefit from integration with WCM systems. Three system integration methods were identified in literature: SOAP, REST and database integration. These are described in sections 4.4 to 0. The literature study also revealed three possible ways of integrating WCM and e-commerce systems: WCM-led, commerce-led and side-by-side. These are described in section 4.8.

As an extension of the domain background, both the Content Management and e-commerce domains have been explored. The results of this additional part of the literature study can be found in section 3.

# 9.1.2 System design

The second question is concerned with the technical implementation of a content-driven commerce system:

2. How can we integrate a WCM and e-commerce system?

This sub question was answered by designing a Proof of Concept, using a Design Science research methodology. For this purpose the researcher developed an integration layer between

Elastic Path and Hippo CMS, an ecommerce platform and WCMS respectively. The Proof of Concept was the first deliverable for HintTech. The design process is described in sections 6.1 and 6.2. The resulting system architecture is presented in section 6.4.1 and section 6.4.2 provides a short functional overview.

# 9.1.3 Technical challenges

The artefact design also led the researcher to identify a number of technical challenges for the implementation of content-driven commerce systems. These for the foundation for the next sub question:

- 3. What are the technical challenges for integrating content and commerce systems?
  - What are the architectural options?
  - How is data managed?
  - What are the design challenges?

The architectural options were first identified in section 4.8. Section 6.1.2 describes why a WCM-driven approach was chosen for the POC. Focus Group discussion results on system architecture can be found in section 7.6.1. The final system architecture discussion is presented in section 8.1.1.

The data model which was adopted for the Proof of Concept is presented in section 6.1.2. Data management was further discussed in the focus group, the results of which can be found in section 7.6.1. The final data management discussion can be found in section 8.1.6.

During the development of the Proof of Concept we identified eight technical challenges for the integration of content and commerce systems. These can be found in section 6.4.3. The technical challenges were then evaluated by a group of experts through a focus group discussion. The results of this discussion can be found in section 7.6.1. A final discussion of the technical challenges is presented in section 8.1. Figure 24 presents an overview of the identified technical challenges and their theorised relations.



Figure 24: Recap of the identified technical challenges and their relations

Content-Driven Commerce

## 9.1.4 Bringing the system to the market

After proving an integrated solution was technically feasible, HintTech required a strategy for moving the project further. For this purpose the following research question was formulated:

- 4. How can we bring the developed system to market?
  - What is the business case for such a system?

To answer this question, the researcher developed a Go-To-Market plan for the joint solution, in collaboration with marketing professionals at Elastic Path. This Go-To-Market plan is the second deliverable for HintTech. The result is presented in Appendix 3, and contains the following content:

- Value proposition
- Market positioning
- Competitor differentiation
- Opportunity quantification
- Project planning

As an extension of the Go-To-Market plan, the researcher asked focus group participants about the ideal customer profile. That is, what sort of organization would benefit from adopting a content-driven content strategy? This is discussed in section 8.2.8.

# 9.1.5 Business value

The final sub-question of this study is concerned with the value businesses gain by adopting a content-driven commerce strategy:

5. What are the perceived benefits of an integrated content and commerce solution?
o How do these benefits align with theory?

During the development of the Go-To-Market plan, four benefits were observed. These are presented in section 6.4.4. During the focus group validation three more benefits were identified, bringing the total to seven. The focus group discussion on benefits of content-driven commerce adoption can be found in section 7.6.2. A final discussion on the business benefits is presented in section 8.2. The seven identified benefits are listed below:

- 1. Multi-channel commerce (Section 8.2.1)
- 2. Advanced marketing tools (Section 8.2.2)
- 3. WCM personalization for commerce (Section 8.2.3)
- 4. Pace layering (Section 0)
- 5. Content as a competitive advantage (Section 8.2.5)
- 6. Analytics and reporting (Section 8.2.6)
- 7. Best of breed systems (*Section 8.2.7*)

Finally, the researcher applied the domain of content-driven commerce to the TAM2 model and the IS Success Model (as updated for commerce). Both original models are described in section 4.1.

The application of content-driven commerce on TAM2 is presented in below. Figure 25 presents TAM2 from the perspective of end-users and Figure 26 presents TAM2 from the perspective of marketer using the systems backend. A description of both can be found in section 0.



Figure 25: Recap of TAM2 adopted for end users of content-driven commerce systems



Figure 26: Recap of TAM2 adopted for marketers using content-driven commerce systems

Lastly, the application of content-driven commerce on the IS Success Model is presented in Figure 27. A description can be found in section 8.2.10.



Figure 27: Recap of the IS Success Model for content-driven commerce systems

# 9.2 Contribution to theory

As content-driven commerce is an emerging paradigm, little research has been done on the implementation of integrated content and commerce systems. Moreover, the benefits of such integrations are unclear. This research provides a contribution to current theory by exploring the technical challenges of integrating WCM and commerce systems, and by identifying the benefits of doing so.

Literature describes a number of principles for various types of system integration. The challenges of integrating content and commerce systems in particular however, were unclear. This study presents a description of eight design challenges related to the integration of such content and commerce systems.

This thesis also reveals a number of perceived business benefits of adopting a content-driven commerce strategy. No prior research investigated what the main drivers are for investing in the design and implementation of an integrated content and commerce solution. This study presents seven perceived benefits of content-driven commerce adoption. By theorising how our findings can be applied to TAM2 and the IS Success Model, we provide the academic field with a handle for evaluating the content-driven commerce proposition - using a commonly adapted evaluation model.

As a whole, this study provides an exploratory insight into the domain of content-driven commerce. The core concepts have been identified and described, and through the focus group validation, we provide a solid base for future research.

# 9.3 Contribution to practice

This study contributes to practice by:

- Describing the benefits of adopting a content-driven commerce strategy
- Identifying the design challenges of integrating content and commerce systems.

These insights into the pros and cons of adopting an integrated content and commerce system serve as a handle for assessing a content-driven commerce project.

Software vendors in either the WCM or e-commerce market can use the identified design challenges to adapt their integration strategy. By understanding the challenges that system integrators experience, they can better support their implementation partners and potentially redesign parts of their integration framework, in order to minimize the implementation effort. Secondly, they can use the identified benefits of integration to communicate the potential of the content and commerce proposition to prospective clients.

System implementers will likely be the party building the integration layer, and making the final client implementation. They will benefit from this study by gaining an understanding of the design challenges of building the integration layer. In doing so this study empowers system architects working on content and commerce integration in their decision making. The identified design challenges are not exhaustive, but they do provide a handle for assessing a content and commerce integration project.

Lastly, for organizations considering the adoption of a content-driven commerce strategy, this study offers an insight into the benefits of doing so. They can project these benefits on their own organizational context and assess the potential value of acquiring an integrated content and commerce system.

# 9.4 Results and recommendations

For HintTech, three deliverables were presented: (1) Proof of Concept for the integration between Elastic Path and Hippo CMS. This can be used to communicate the potential of the solution to prospective clients and serves as a base integration layer for further development; (2) a Go-To-Market plan for the joint proposition. This provides HintTech with an overview of the competitive landscape and a concrete set of suggested actions for moving the project further; (3) this thesis and the handle it provides for assessing a content and commerce integration project.

We advise HintTech to use the findings of this thesis when evaluating the content-driven commerce proposition. As a digital agency, HintTech has a strong interest in being a preferred system integration partner. Being directly involved in the integration between Elastic Path and Hippo CMS will give them credibility to prospective clients. We advise HintTech to take the technical challenges identified in this study into consideration, should they decide to build a productised integration layer. The Proof of Concept that was created as part of this study can serve as a reference for further development.

When engaging prospective clients, we advise HintTech to project the identified business benefits on the context of the client. Doing so will enable them to communicate the potential of a content-driven commerce system. The Go-To-Market plan and promotional flyers that were created during this study can serve as a starting point for developing the marketing story.

# 10 Limitations and future research

This section describes the limitations of this study and the possibilities for future research.

# **10.1 Limitations**

This study took an exploratory approach into the field of content-driven commerce. We have found a number of valuable design principles and have gotten a better insight into the business values that drive the implementations of such systems. It is however vital that we discuss some limitations to this study.

This study was conducted in the context of two software vendors and an implementation party. In such a context there are two types of limitations concerning the generalizability of our results. First, clearly the two vendors cannot be considered as representative for all other software vendors engaged in projects like ours. However, following case study research methodologists, e.g. Seddon and Scheppers [53], while we cannot claim universal generalizability, we do think that it might well be possible to observe findings similar to ours in organizations that have similar contexts to those of our two vendors. As these authors indicate ([53], page 12), "if the forces within an organization that drove the observed behavior are likely to exist in other organizations, it is likely that those other organizations, too will exhibit similar behavior". During the competitor analyses we found that most vendors use similar technologies and implementation approaches. Furthermore, it was clearly communicated to focus group participants that the discussion level was the general domain of content-driven commerce, and not the Hippo-Elastic Path integration in particular. We therefore think that our findings will apply to other vendors that share an integration strategy for content and commerce systems as opposed to a monolithic one-fits-all solution.

Second, we make the note that although the organizations in our design science study are on the frontline of the content-driven commerce concept, they do not represent all stakeholders that are relevant in a project like ours. For example, we did not include the view of the clients, those organizations who have acquired a content-driven commerce system for their online channels. These were initially planned to be interviewed during the second part of the study, but this was not possible due to a number of changes in organizational strategy. The lack of input from those companies that have adopted a content –driven commerce strategy is a limitation to this study. As this is an exploratory study, definitive conclusions should be made with caution.

In the final phase the Proof of Concept was tested and presented within the context of the three organizations collaborating on this integration. Although this provided us with valuable feedback, the system has not been tested within the context of a client. Therefore we have not measured what the impact of implementing such systems is. Doing so was not possible within the timeframe of a Masters Project, as the system would have to be implemented according to the context of a client, and the results would have to be measured over an extended time period.

# 10.2 Future research

As an exploratory study, this research provides an excellent basis for further studies into the field of content-driven commerce. By making conceptual distinctions in the challenges and benefits of integrating content and commerce systems, this study can give direction to future research.

The benefits of integrating content and commerce system that were identified in this study were based on the opinions of experts working on the implementation of such systems. Future research could examine company data before and after the implementation of a content-driven commerce system. By measuring the impact of adopting such a strategy, future research can quantify the potential benefits. Doing so allows us to measure if implementation goals are met, and helps organizations determine the return on investment of the content-driven commerce paradigm. As more organizations start to adopt the content-driven commerce paradigm, more data will become available for such explanatory studies.

On the technical implementation side of the content-driven commerce concept, this study provides an overview of implementation challenges. Business analysts have developed a distinction between three architectural styles, which have been adopted by industry experts. Future research could study implementations using these three different architectural styles and compare the implementation effort and achieved benefits. By doing so, system implementers are better equipped to make decisions on the architectural style of contentdriven commerce systems.

Lastly, the design science methodology of this study is a limitation as it is based on a single integration of two systems. A further study could compare content and commerce integrations using an array of vendor packages, in order to get a more cohesive and generalizable set of integration challenges.
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## Appendix 1: Overview of keywords used in literature study

Keywords
Content driven commerce
Content commerce integration
Customer experience
E-commerce
E-commerce success factors
Electronic commerce
Web content management
System integration
Database integration
SOAP
REST

Table 10: Keywords used in literature study

	HP livesite	AEM	Sitecore	Tridion	Hybris	KonaKart	Elastic Path	Oracle
Rich media								
management								
Authoring								
tools								
Publishing								
Workflow								
Presentation								
Personalization								
Multi-channel								
Catalog / PIM								
Pricing								
Order								
management								
Payments								

# Appendix 2: Comparison of CMS and Commerce features

## Appendix 3: Go-To-Market plan

Appendix 3 is confidential and therefore not available to the public.

### **Appendix 4: Focus group guidelines**

The guidelines supplied to focus group participants are presented below. The introduction, background information and registration guideline have been removed.

#### Guidelines

- The online focus group allows you to provide your input to the discussion at any time convenient within the coming two weeks. If possible, please provide your initial feedback at an early stage, so others have the opportunity to comment on your input.
- There are no wrong answers, only different points of view. Please feel free to share your point of view, even if it is different from what others have said.
- For this study I am just as interested in negative comments as positive comments. At times, negative comments are the most useful, so please be critical if you don't agree with anything that has been stated.
- Participation is <u>anonymous</u> and the identities of the participants will <u>not be shared</u> by the researcher. For this purpose please use the ID that has been sent to you by email. All ID's have been randomised so that no relation between the participant and his/her ID exists. You are free to provide specific information about your experience, but are not required to do so. (see: "REGISTRATION STEPS" below)
- The researcher will take a passive approach to the discussion, only steering the area of focus when necessary.
- As this is a discussion rather than an interview, most of the value is gained through interaction between you as participants. Therefore I would like to kindly ask you to provide your input at multiple times during the coming two weeks.
- Please be as <u>clear</u> in your answers as possible. External marketing of content and commerce systems usually involves a lot of buzzwords. In this study we attempt to get a concrete view of the business value of adopting a content-driven commerce strategy. For example, when talking about creating a "customer experience" please explain which aspects of the CMS enables the creation of such an experience.
- Transcripts of the discussion will be kept by the researcher for evaluation purposes until the project is finished.
- If anything is unclear, please do not hesitate to contact me at [e-mail address]