



TÉCNICO LISBOA

UniqueBooksCO

Enterprise Architecture Project

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Table of Contents

INTRODUCTION	4
ASSUMPTIONS	4
QUESTIONS	5
1. CONTEXT	5
a)	5
b)	5
2. PRODUCTS AND SERVICES	6
3. BIG PICTURE	7
4. STRATEGY	8
a)	8
b)	9
c)	10
d)	10
5. ORGANIZATION STRUCTURE	11
6. BUSINESS PROCESS	11
.....	12
7. INFORMATION ENTITIES	13
7.1	13
7.2	14
7.3	15
8. APPLICATION ARCHITECTURE	15
8.1 <i>AS-IS</i>	15
8.2 <i>TO-BE</i>	18
.....	19
9. IT ARCHITECTURE	22
a)	22
b)	22
c)	23
d)	24
e)	24
f)	26
10. ROADMAP	26
a)	26
b)	27

Table of Figures

Figure 1. PESTEL analysis of UNIQUEBOOKSCO.....	5
Figure 2. UNIQUEBOOKSCO External Stakeholders.	5
Figure 3. Flows between UNIQUEBOOKSCO and its context.....	6
Figure 4. UNIQUEBOOKSCO Products and Services.....	6
Figure 5. UNIQUEBOOKSCO Big Picture.....	7
Figure 6. UNIQUEBOOKSCO Vision and Goals.	8
Figure 7. Business model canvas of UNIQUEBOOKSCO.....	9
Figure 8. Principle and contradictory Goal.	10
Figure 9. Principle and contradictory Outcome.	10
Figure 10. Organization and roles of UNIQUEBOOKSCO.	11
Figure 11. Representation of the Core UNIQUEBOOKSCO Processes.	12
Figure 12. Structural relations among the information entities.....	14
Figure 13. UNIQUEBOOKSCO CRUD matrix.	15
Figure 14. Applications that support UNIQUEBOOKSCO processes.	15
Figure 15. Processes supported by each application.	16
Figure 16. Information supported by each application.....	16
Figure 17. Business/Technical/Cost chart.....	17
Figure 18. New applications that should support UNIQUEBOOKSCO.	18
Figure 19. Proposal of new applications architecture.	19
Figure 20. Application Cooperation.....	20
Figure 21. Application Usage.....	21
Figure 22. Application Behavior.....	21
Figure 23. Technological options for the proposed applications.....	22
Figure 24. Processing, Storage and Communication Infrastructures recommended.	23
Figure 25. Recommended IT Architecture.....	24
Figure 26. System dependencies 1.....	24
Figure 27. System dependencies 2.....	25
Figure 28. System dependencies 3.....	25
Figure 29. Project Roadmap.	26
Figure 30. Global Roadmap.....	27

Introduction

For this project, we were proposed to access current business information and application architecture of UNIQUEBOOKSCO in order to answer certain questions. Therefore, we chose the more appropriate view to answer each question, using ArchiMate.

Assumptions

- (Question 1a)
 1. UNIQUEBOOKSCO is creating an online store in order to reduce paper waste;
 2. Growing interest in rare/historic books by population;
 3. UNIQUEBOOKS need a distribution company for the physical products and also online service providers for the online store;

- (Question 5)
 4. There is a CFO that is responsible for the Financial Department;
 5. A General Manager is responsible for the Sales Marketing Team, the Supply Chain Management Team and the management and Logistics Team;
 6. A Stores Manager is responsible for each Store Department;
 7. Each Store Department has employees assigned to the customer service management.

Questions

1. Context

a) The UNIQUEBOOKSCO context can be studied doing a PESTEL analysis and also by identifying the external stakeholders.

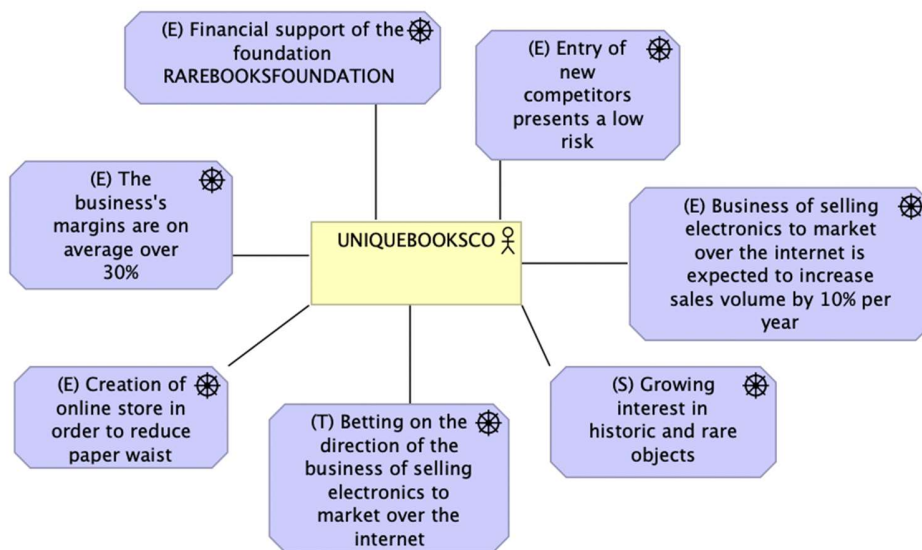


Figure 1. PESTEL analysis of UNIQUEBOOKSCO.

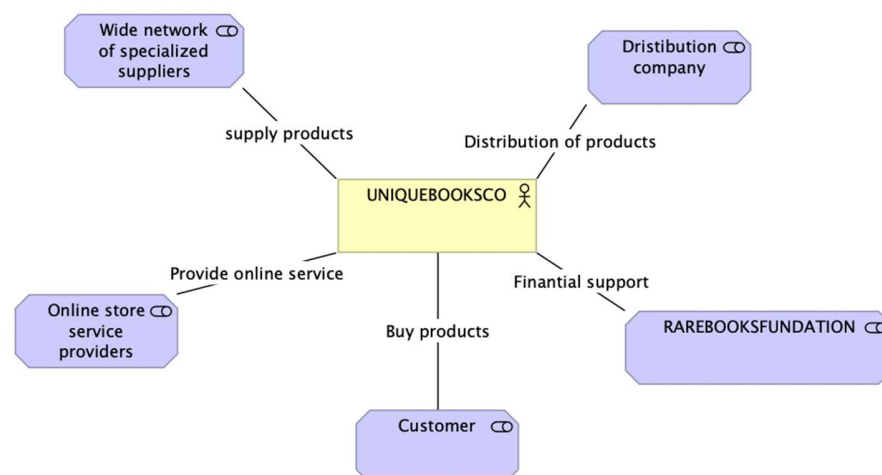


Figure 2. UNIQUEBOOKSCO External Stakeholders.

b) The following diagram shows the connections between UNIQUEBOOKSCO and its context, analyzed at the previous exercise.

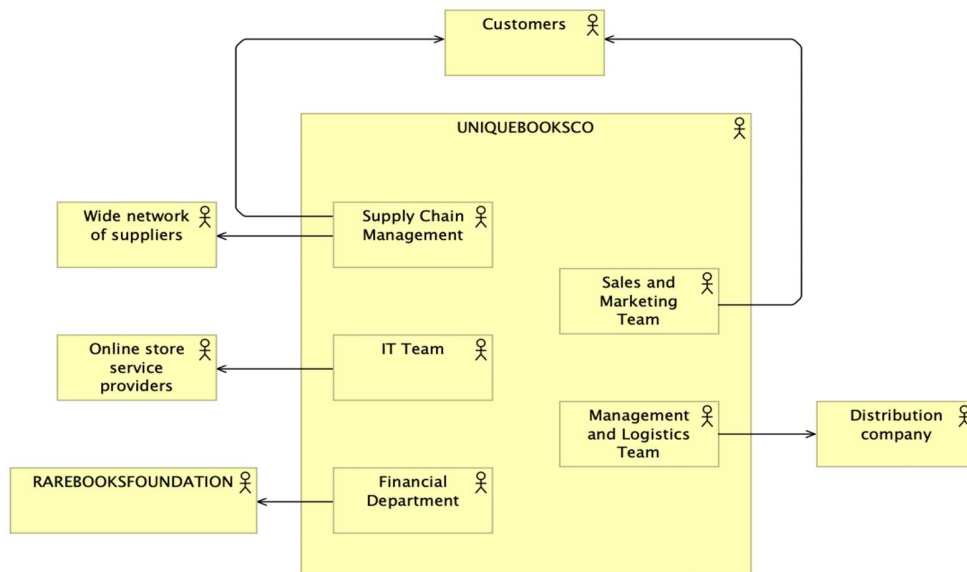


Figure 3. Flows between UNIQUEBOOKSCO and its context.

2. Products and Services

Represented below are the products and services that are provided by UNIQUEBOOKSCO as well as their respective stakeholders.

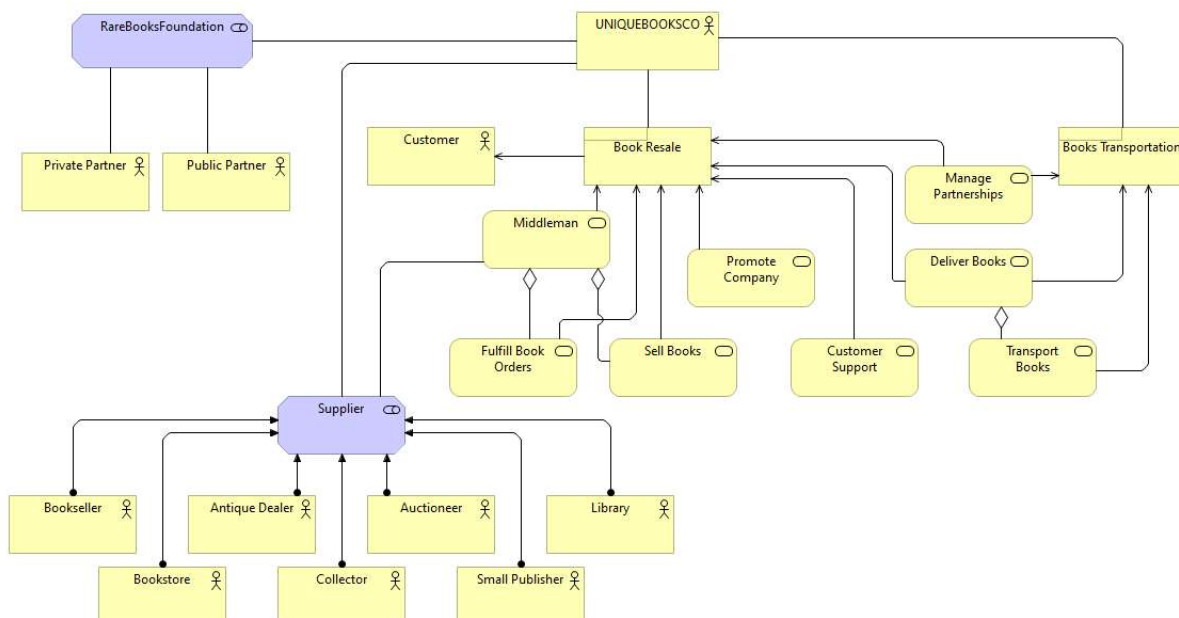


Figure 4. UNIQUEBOOKSCO Products and Services.

3. Big Picture

Here is our representation of the “Big Picture” of UNIQUEBOOKSCO as requested by the CEO. We identified the main business processes, business units, applications, and infrastructure that supports NHS products and services.

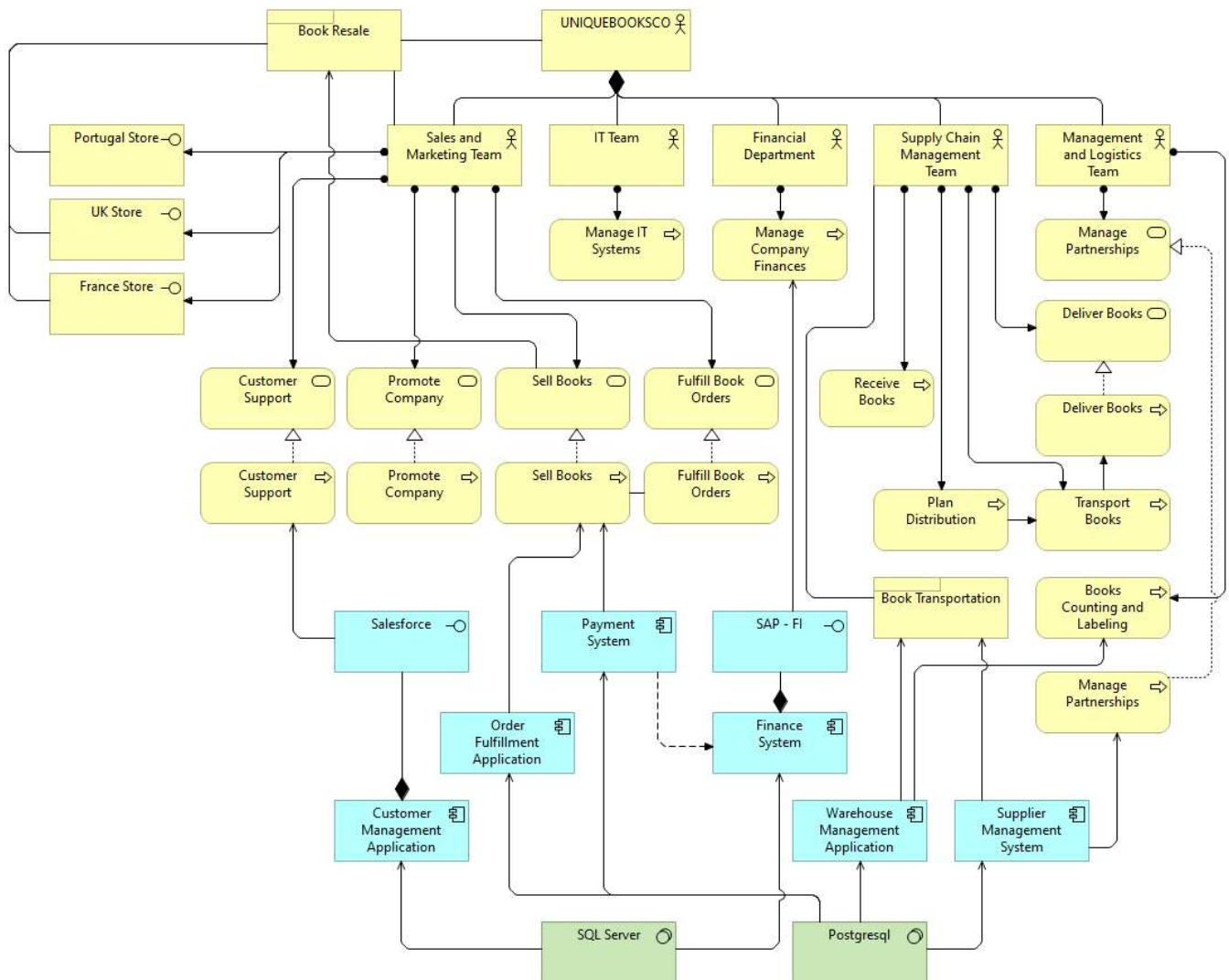


Figure 5. UNIQUEBOOKSCO Big Picture.

4. Strategy

a) Below, we identified the vision and the goals of UNIQUEBOOKSCO.

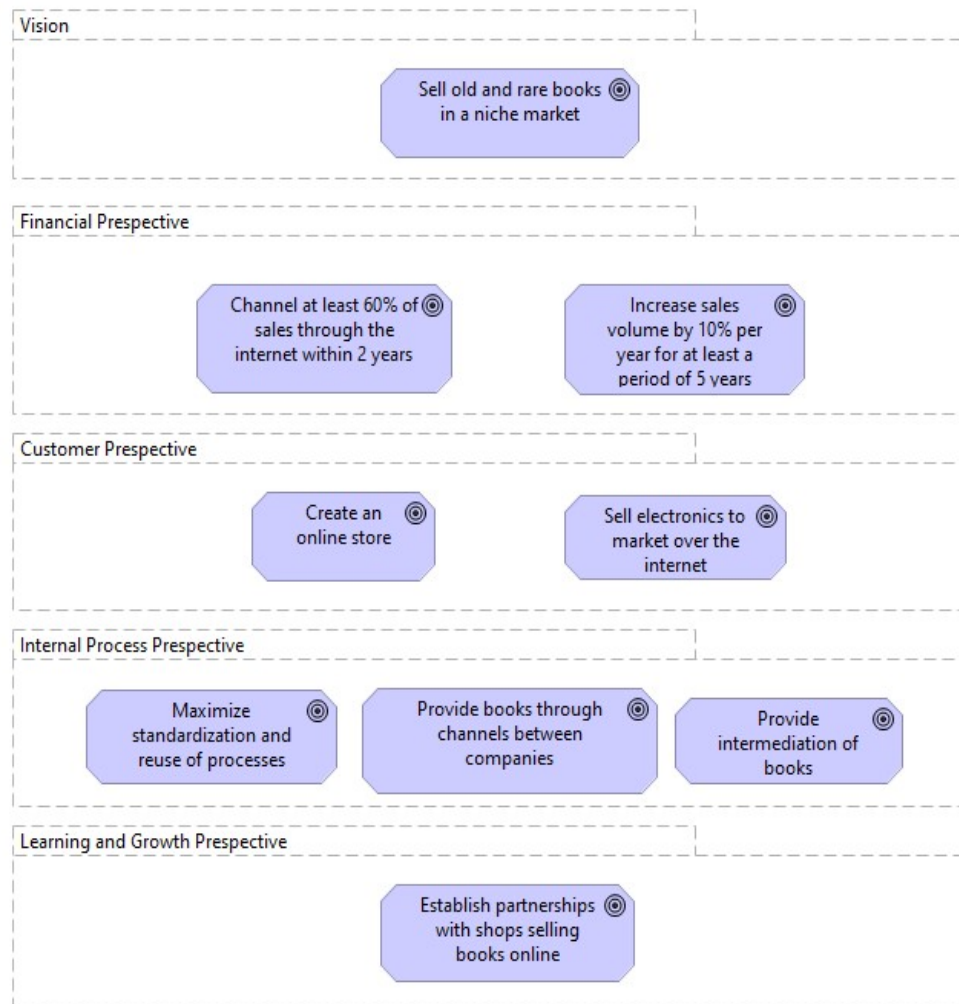


Figure 6. UNIQUEBOOKSCO Vision and Goals.

b) Here we represented our proposal of a business model canvas for UNIQUEBOOKSCO.

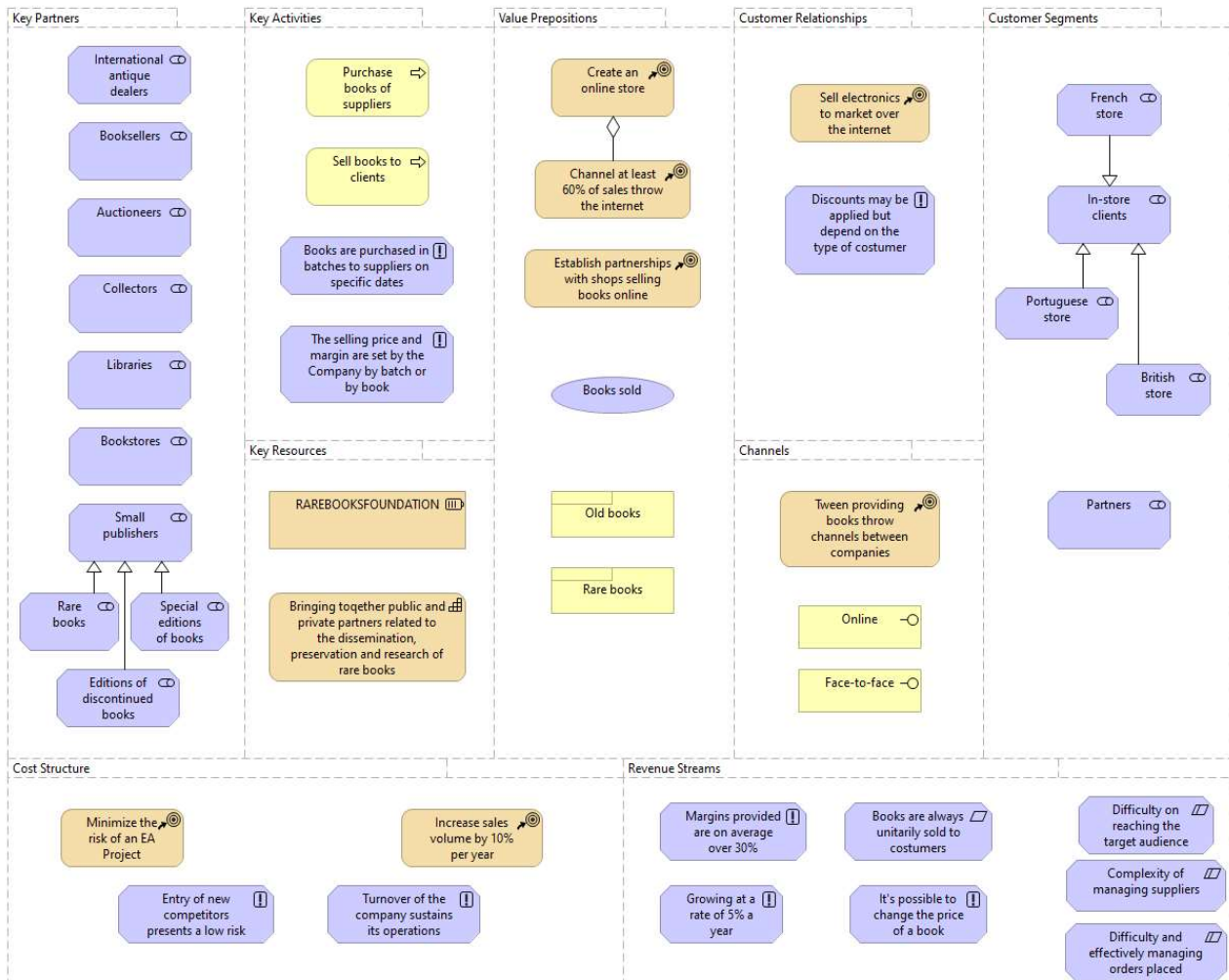


Figure 7. Business model canvas of UNIQUEBOOKSCO.

c) UNIQUEBOOKSCO aims to maximize the reuse of processes, systems, and technologies. However, there is also the desire to keep the diverse channels that several vendors use, that are traditional and heterogeneous. Even though the goal is to make sure all these processes are consistent, this approach means that there will always be some differences in dealing with different suppliers and standardization will be more difficult.

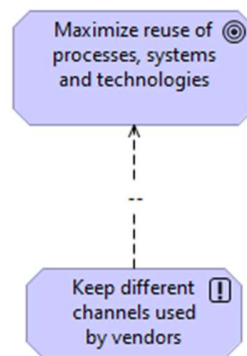


Figure 8. Principle and contradictory Goal.

d) Payments made in traditional stores guarantee delivery between the terminal and the interbank network, however, this does not consider payments in cash, which can't be transferred to the interbank network instantaneously.

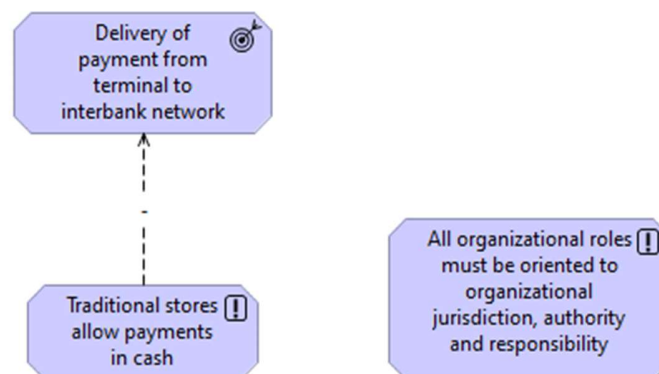


Figure 9. Principle and contradictory Outcome.

5. Organization structure

The following diagram presents the organization structure of UNIQUEBOOKSCO and respective roles.

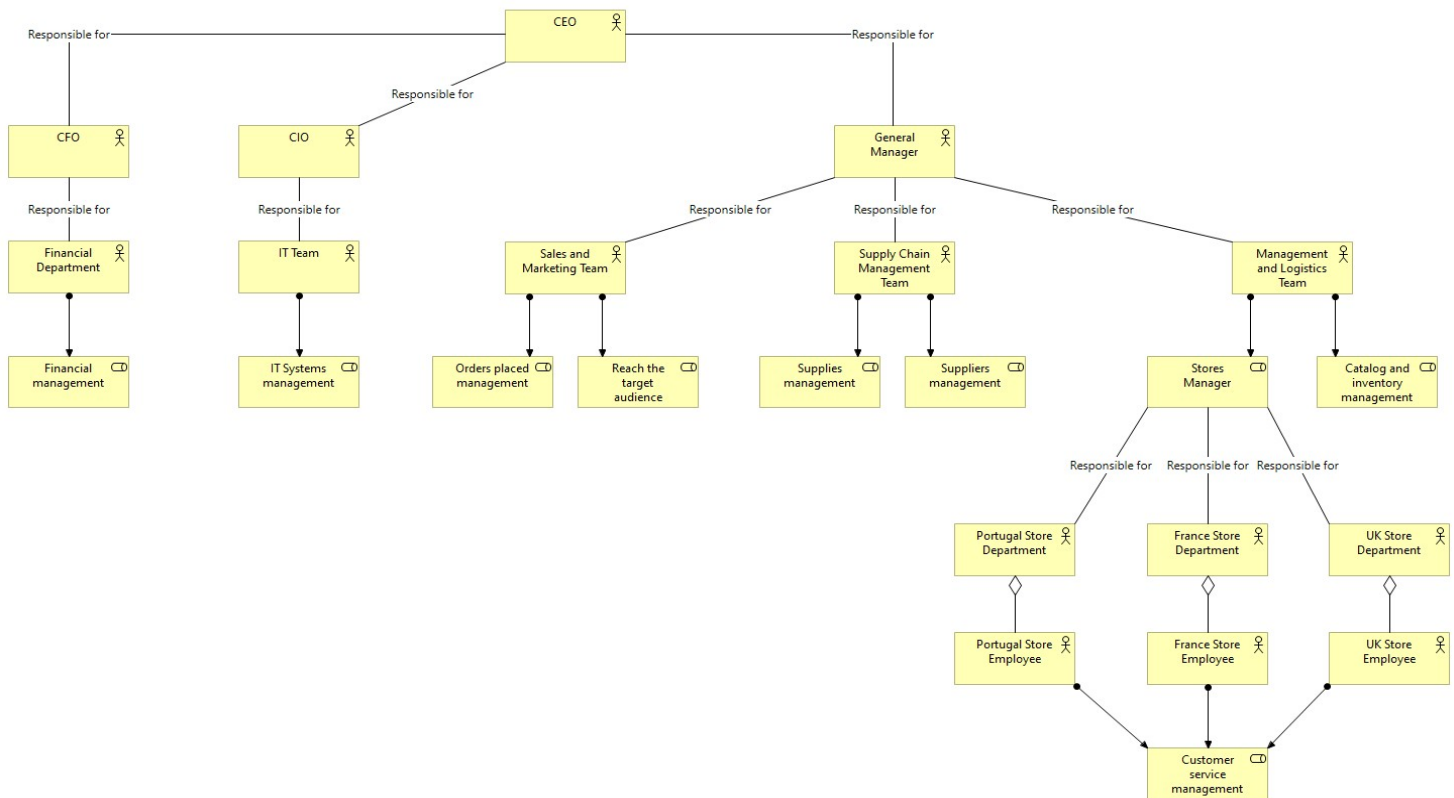
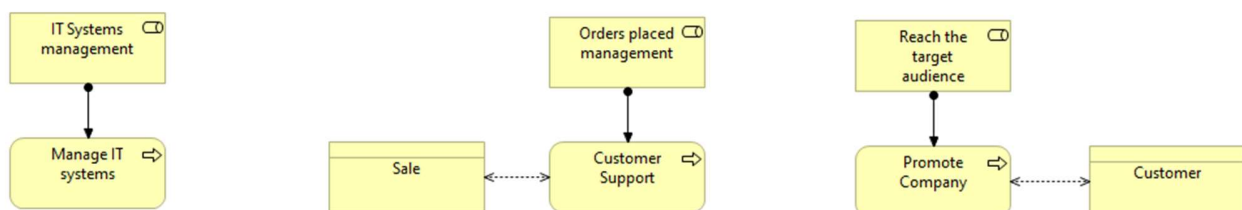


Figure 10. Organization and roles of UNIQUEBOOKSCO.

6. Business Process

For this question, we decided to merge the subheadings a) and b) to make them legible. In the diagrams below, we represented the processes we identified for UNIQUEBOOKSCO. We also represented the roles associated with the identified processes as well as the information entities (inputs and outputs) that are related with each process. The diagrams are separated by the role associated.



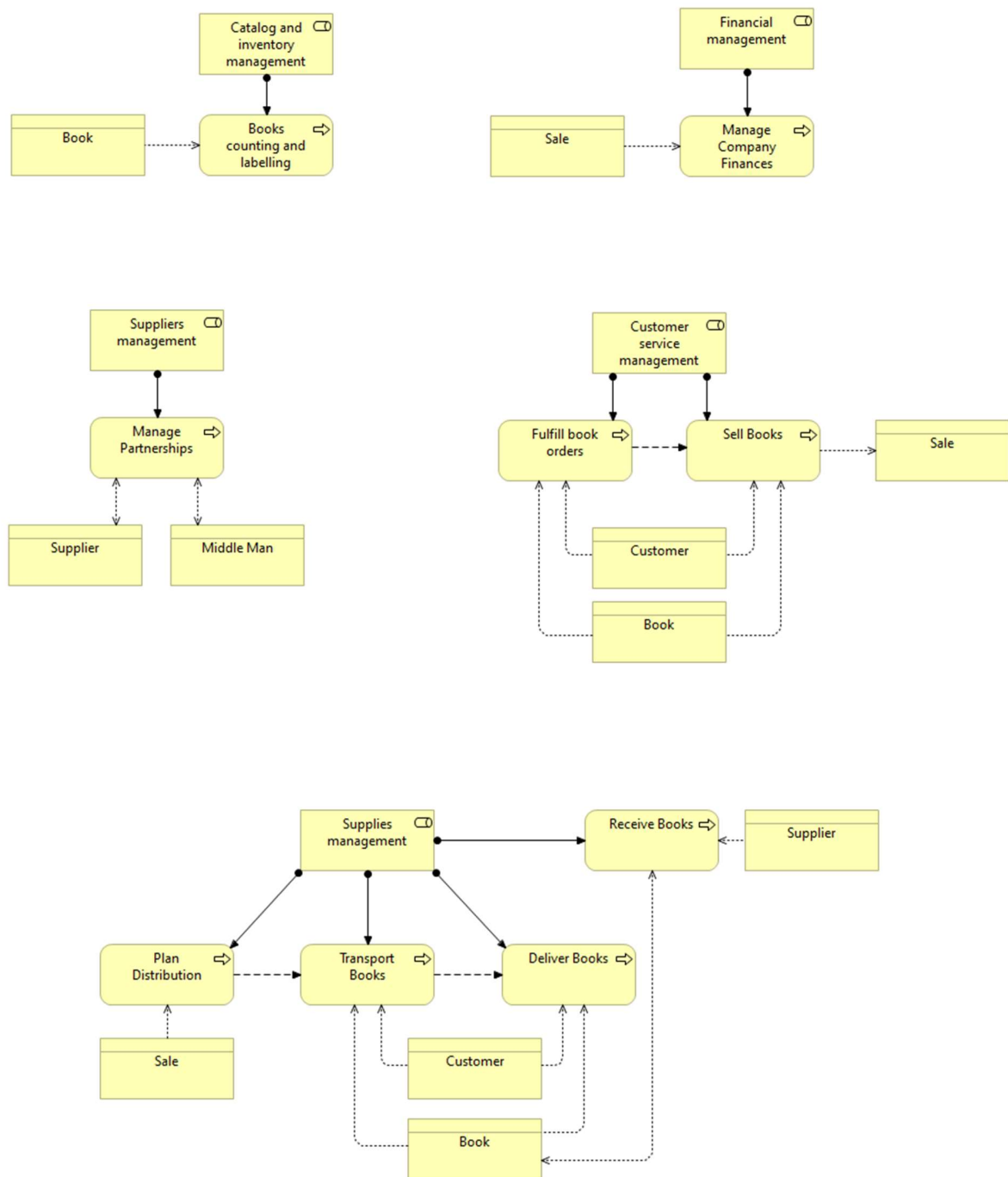


Figure 11. Representation of the Core UNIQUEBOOKSCO Processes.

7. Information Entities

7.1

To represent the Information Entities that support the business processes, we have done a table for each entity that includes the major attributes of the entity, the business identifiers of each attribute and its Inmon classification.

Entity: Sale

Attributes name	Primitive	Derived	Historical	Projected	Public	Private
Book	X		X		X	
Quantity	X			X	X	
Customer	X		X		X	
Means of purchase	X		X		X	
Date of purchase	X		X		X	
Middle Man	X		X		X	
Supplier	X		X		X	

Entity: Book

Attributes name	Primitive	Derived	Historical	Projected	Public	Private
Name	X		X		X	
Purchase price	X		X		X	
Selling price	X		X		X	
Stock available	X			X		X

Entity: Supplier

Attributes name	Primitive	Derived	Historical	Projected	Public	Private
Contract	X		X			X
Name	X		X		X	
Quantities sold		X		X		X

Entity: Middle Man

Attributes name	Primitive	Derived	Historical	Projected	Public	Private
Contract	X		X			X
Name	X		X		X	
Quantities sold		X		X		X

Entity: Customer

Attributes name	Primitive	Derived	Historical	Projected	Public	Private
Purchase Order	X		X			X
Name	X		X		X	

7.2

The diagram that follows represents the structural relations among the information entities of UNIQUEBOOKSCO.

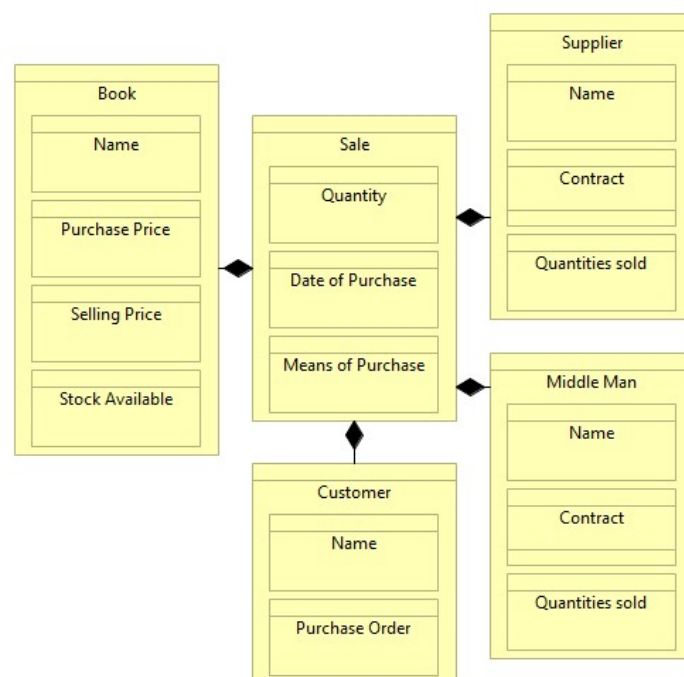


Figure 12. Structural relations among the information entities.

7.3

In the matrix below we can see what processes create, update, read or delete the respective Information Entities.

Business Processes	Information Entities				
	Sale	Book	Customer	Supplier	Middle Man
	Customer Support	CRUD			
	Sell Books	CRUD	RU	RU	
	Receive Books		CRUD	RU	
	Deliver Books		RU	R	
	Promote Company		CRUD		
	Manage Partnerships			CRUD	CRUD
	Books Counting and Labelling		R		
	Manage Company Finances + Plan Distribution	R			
	Fulfill book orders + Transport Books		R	R	

Figure 13. UNIQUEBOOKSCO CRUD matrix.

8. Application Architecture

8.1 AS-IS

a) The applications that support the business processes of UNIQUEBOOKSCO are the following:

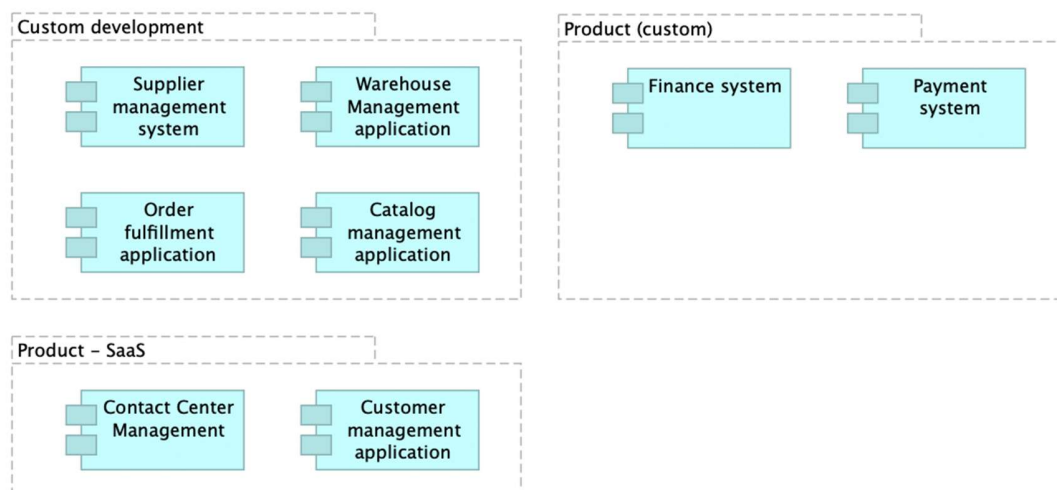


Figure 14. Applications that support UNIQUEBOOKSCO processes.

b) To represent which processes and information each application supports, we used two views, the first one represents the applications and their supported processes and the second one the connections between each application and supported information.

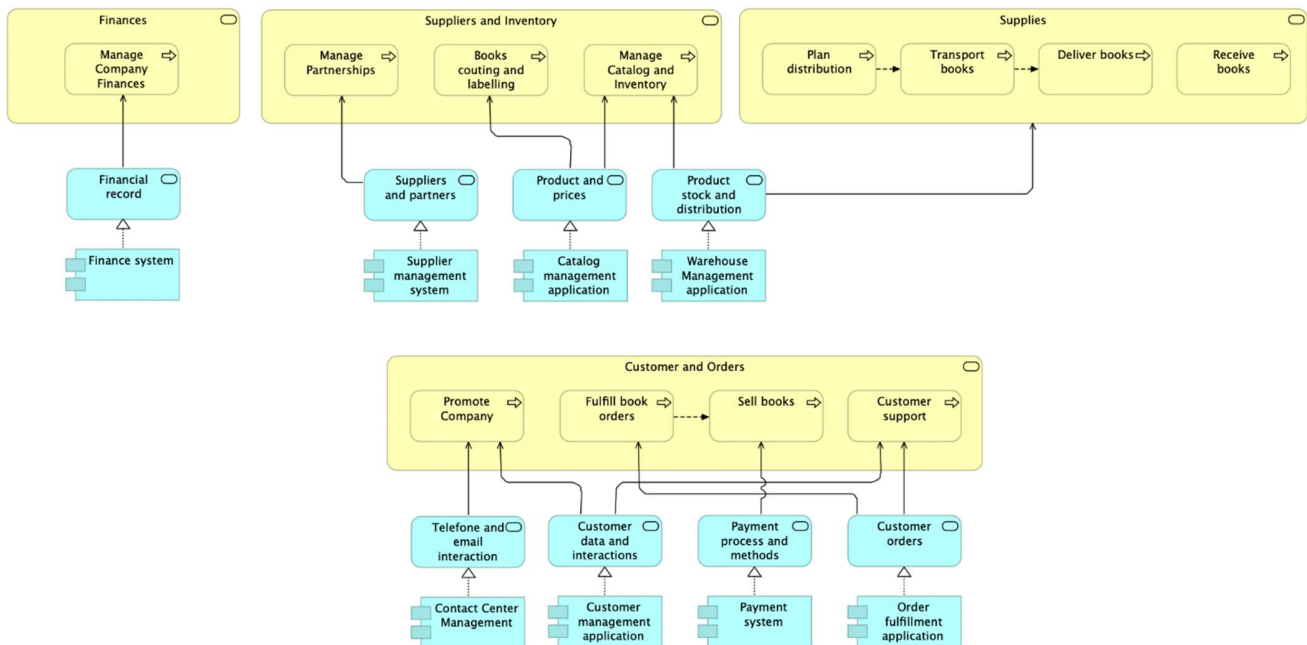


Figure 15. Processes supported by each application.

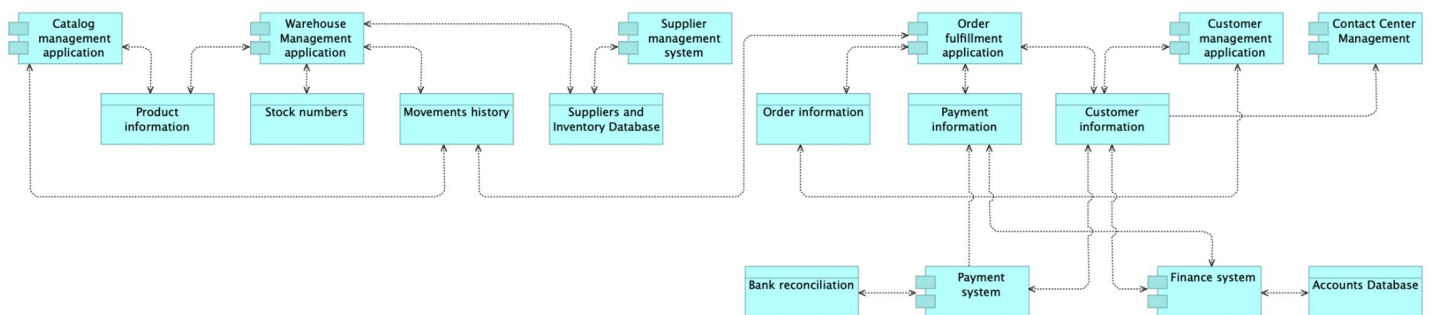


Figure 16. Information supported by each application.

c) By looking at the APM indicators present in the UNIQUEBOOKSCO application table, and implying the Business Relevance of each application regarding the services where it is inserted, we propose the following table with each applications Business Relevance, Technical Quality and Cost:

	WM App	OF App	CCM App	CuM App	CaM App	SMS App	PS App	FS App
Business Relevance	3	3	3	2	2	2	3	1
Cost	3	2	2	3	2	1	2	3
Technical Quality	1	1	3	2	3	2	2	2

NOTE: While 3 is good in terms of Business Value and Technical Quality, in Cost it means that the application has great expenses associated.

With this information, it is possible to plot the following Business/Technical/Cost chart:

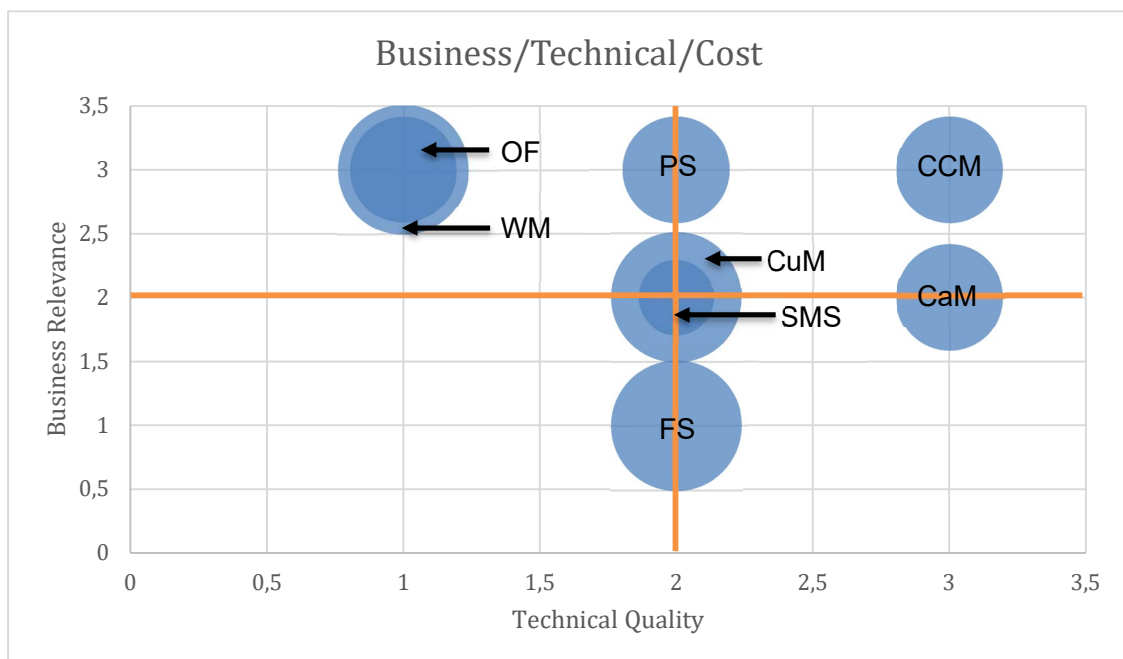


Figure 17. Business/Technical/Cost chart.

Therefore, by analysing the information given in the chart, the below table expresses what is the best solution regarding each application:

Contact Center management, Payment System and Catalog management	Keep
Finance System	Discontinue
Order fulfillment, Customer management, Supplier management system, Warehouse management	Don't know

8.2 TO-BE

a) The applications that should be available at UNIQUEBOOKSCO to support current business and information processes are the following:

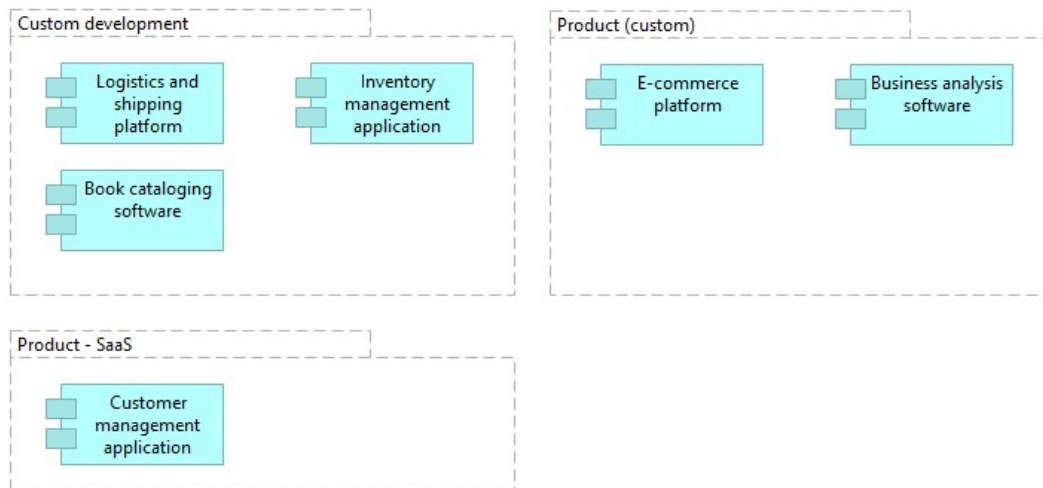


Figure 18. New applications that should support UNIQUEBOOKSCO.

b) The following table shows the roadmap for each application of UNIQUEBOOKSCO defined in question 8.1 a):

Customer Management Application	Maintain
Supplier Management System	Discard
Finance System, Order fulfillment application, Warehouse management application	Replace
Contact Center Management	Consolidate
Payment system	Improve functionalities
Catalog management application	Upgrade technology

The only system that is maintained is the Customer Management Application. The functions associated with the Contact Center Management were transferred to the Customer Management Application. Also, the Supplier Management System application was decided to be discarded.

In terms of upgrades, the Finance System were replaced by the Business Analysis Software, the Warehouse Management Application by the Inventory Management Application, and the Order fulfillment application by the Logistics and Shipping platform. The Catalog management application was upgraded and now it's called Book cataloging software. The Payment System has improved its functionalities and now it's called E-commerce platform.

c) As the purpose of an application structure is to obtain a design taking into consideration the applications structure, consistency, completeness, and complexity reduction, and the structure of UNIQUEBOOKSCO structure tends to be flat, it is a good idea to use application patterns such as MVC which separates the application in model view and controller to help manage the complexity and maintainability.

d) The following diagram describes the application architecture that we propose, including the applications functions and services provided:

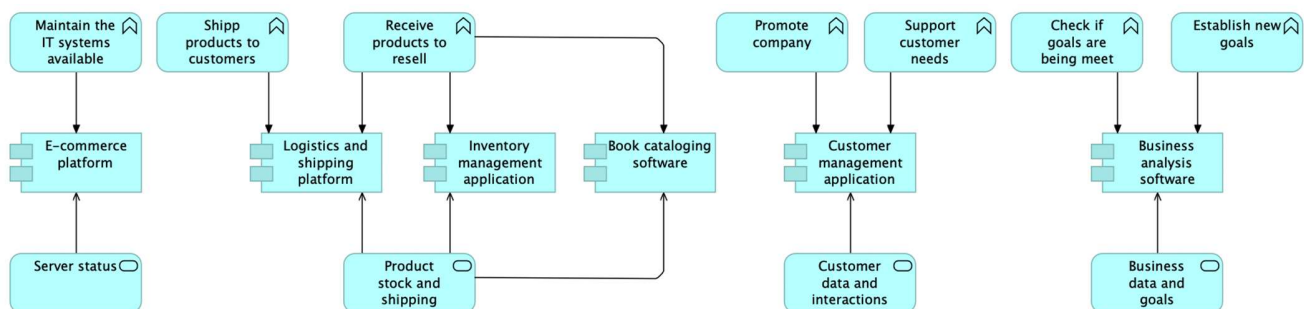


Figure 19. Proposal of new applications architecture.

e) To have a complete analysis of the Application Architecture, the Application Cooperation, Usage and Behavior viewpoints are presented in the below diagrams.

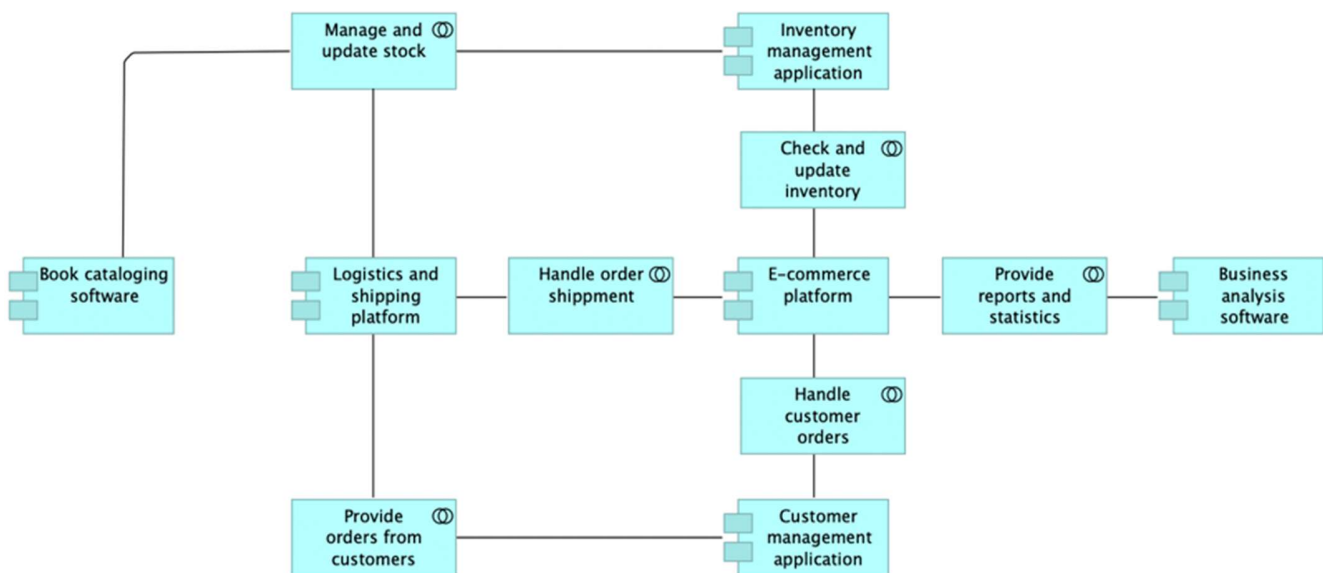


Figure 20. Application Cooperation.

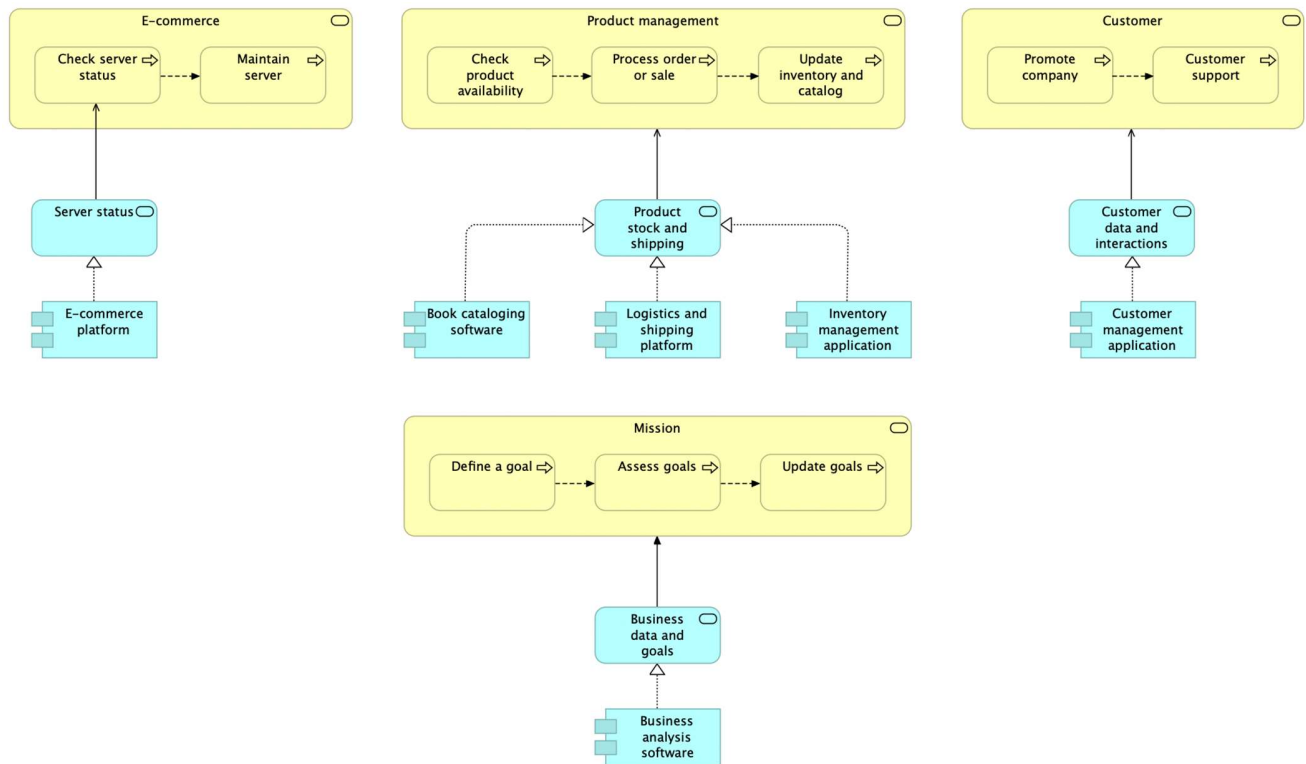


Figure 21. Application Usage.

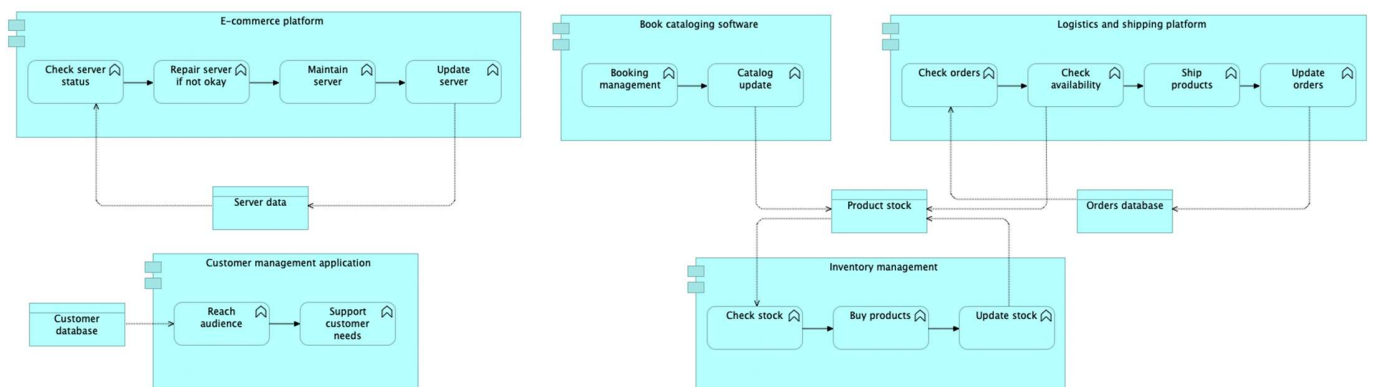


Figure 22. Application Behavior.

9. IT architecture

a) For the technological options that best fit the implementation of the applications, we chose the following:

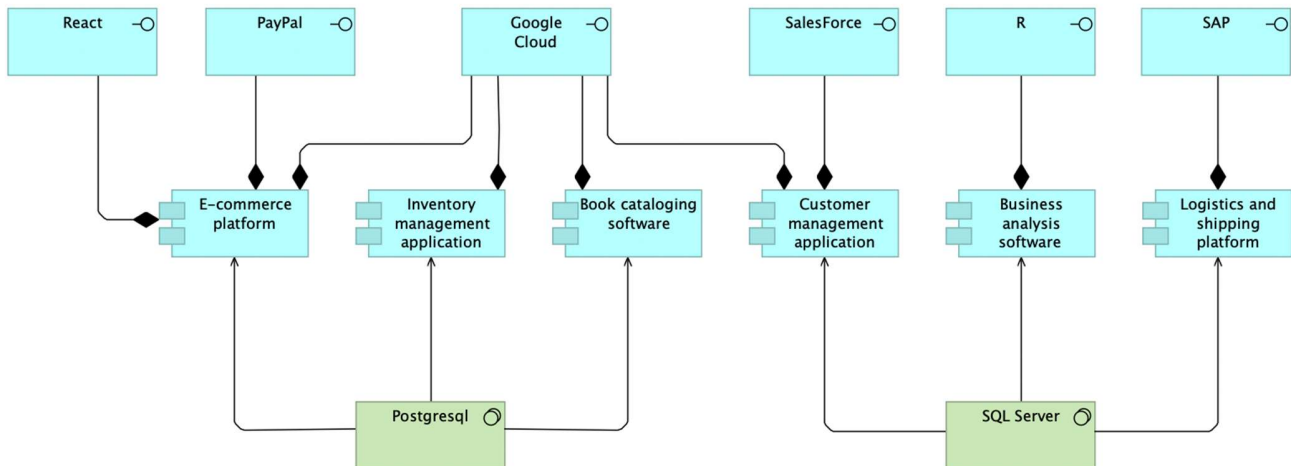


Figure 23. Technological options for the proposed applications.

b) For each application we need, we analyzed the advantages and disadvantages of using an “off-the-shelf” software package versus a custom development in order to choose one of the two approaches. In each case, we based our decision on the “off-the-shelf” options for the application in question, as well as if we would need to customize the software package to better fit our needs.

Of the six applications we need most are standard use in the retail business, namely the Inventory Management application, the Customer Management application, the Business Analysis software and the Logistics and Shipping platform. All of these are used by several types of businesses and have several different options available “off-the-shelf”. As such, given that the use of such applications by UNIQUEBOOKSCO would be standard we believe the best option for these applications would be to obtain an “off-the-shelf” option.

The other two applications we need are a Book Cataloguing software and an E-commerce platform. The analysis for the two differs given that there are a lot of “off-the-shelf” options available for an e-commerce platform but not for a Book Cataloguing software.

For the Book Cataloguing software, we believe that the best option would be to get a custom development of the software needed. Not only are there few options available, but the customization that would be necessary based on the needs of the company, namely managing the catalogue of each physical store as well as the online store and the warehouses, would mean that getting an “off-the-shelf” option would be more work and cost more than developing a custom build.

In the case of the E-commerce platform, there are a lot of “off-the-shelf” options available however, in the case of UNIQUEBOOKSCO there is the addition of the intermediation of books as well as the partnership with the RAREBOOKSFOUNDATION. With these additional factors, any “off-the-shelf” software package would need customization to accomplish the required functions. Given that this necessity for customization will always be there and the fact that a unique online store platform would be more appealing to customers, we believe the best option would be to get custom development of the platform.

c) We analyzed the Processing infrastructure as well as the storage and Communication infrastructures and addressed them in the following view:

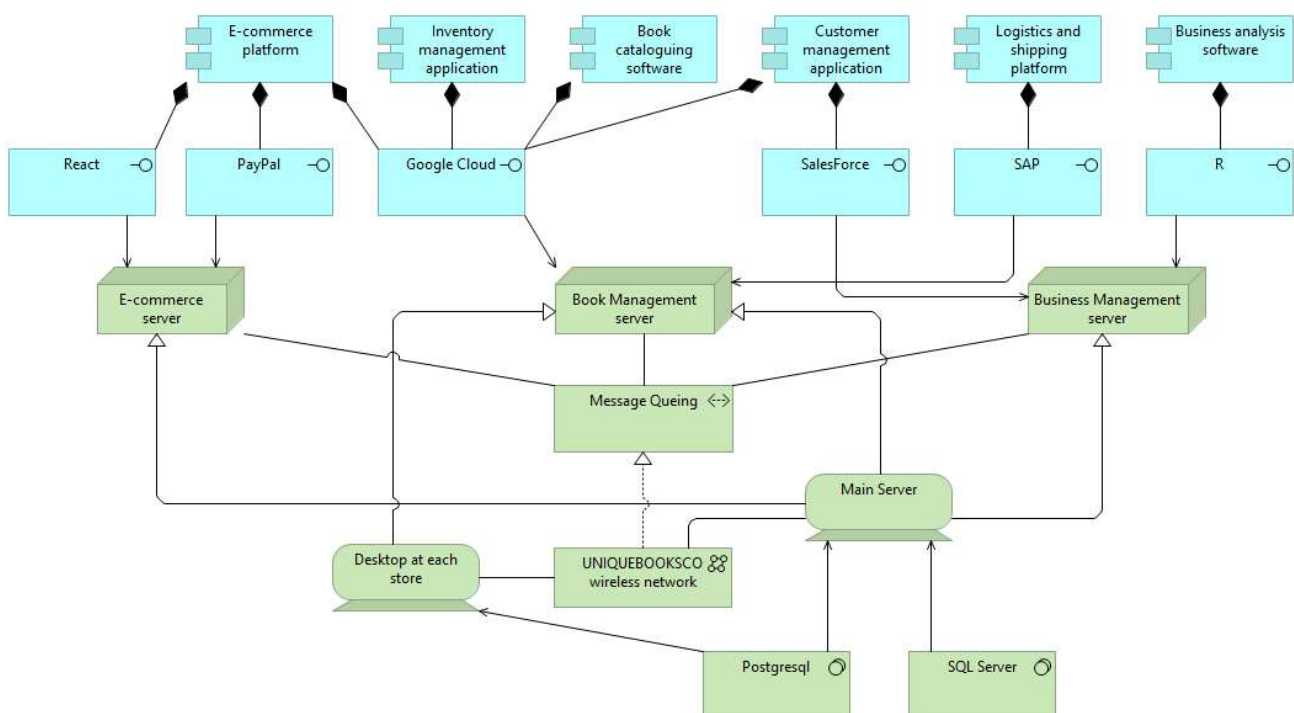


Figure 24. Processing, Storage and Communication Infrastructures recommended.

d) Taking into consideration the recommendations made above we present below the recommended IT architecture.

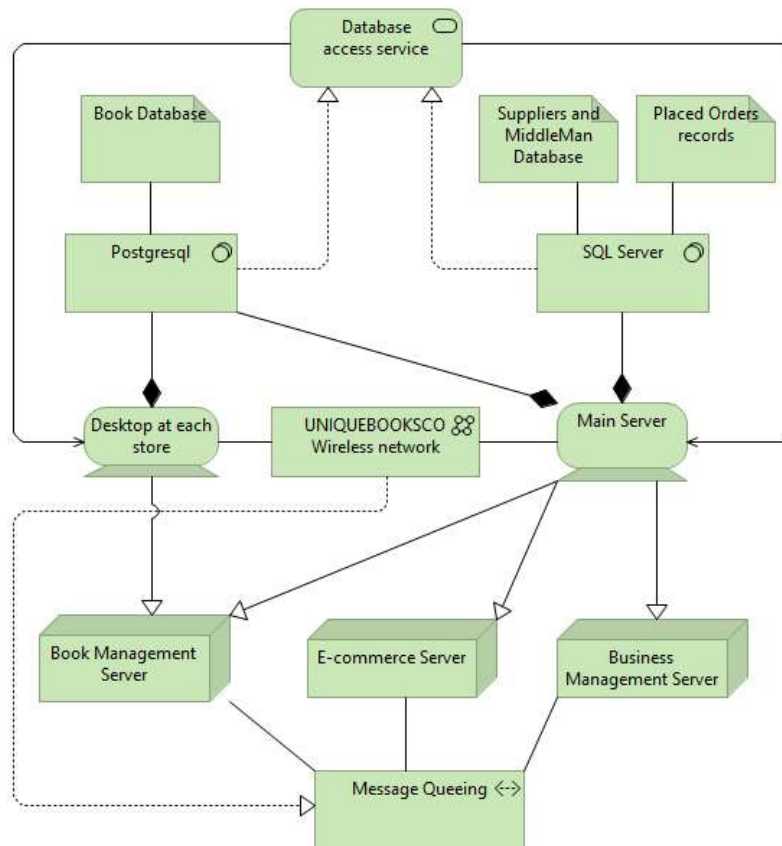


Figure 25. Recommended IT Architecture.

e)

All the applications require access to one of the servers, according to their purpose (Book Management, E-commerce, or Business Management). Ultimately, they are all connected to the main server of the company, communicating through UNIQUEBOOKSCO's wireless network.

At a lower level, the applications rely on the databases, built on PostgreSQL and SQL Server, where the data, related to different aspects of the company, is stored. These databases are accessed by the main server and, in some cases, by the terminals in each store.

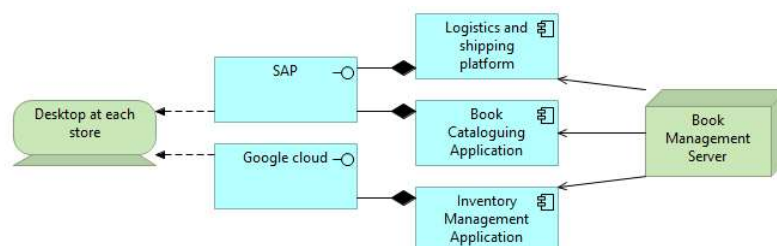


Figure 26. System dependencies 1.

The apps concerning Logistics/Shipping, Book Cataloguing and Inventory Management are connected to the Book Management Server, since the changes made or information that someone might consult in those areas can affect the others. This helps in maintain coherence in inventory data across the company. Particularly, these apps, besides their connection to the main server, need to be run on the devices located in each store in order to keep the information updated even when it comes to smaller transactions. The interaction with the apps in these terminals is done through interfaces such as SAP and Google cloud.

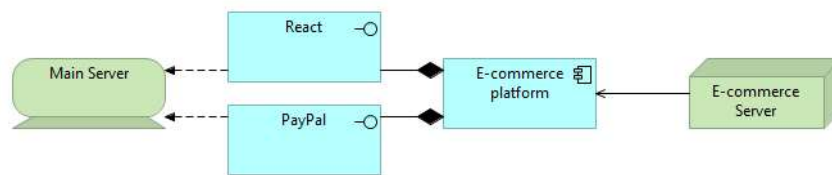


Figure 27. System dependencies 2.

As for the e-commerce platform, it depends on its dedicated e-commerce server, which in turn is connected directly only to the main server, although some financial information might be accessible through other devices as well, thanks to the communication network established. The use of this application also depends on interfaces that are more directed towards commercial transactions: in this case, PayPal and another interface based on React.

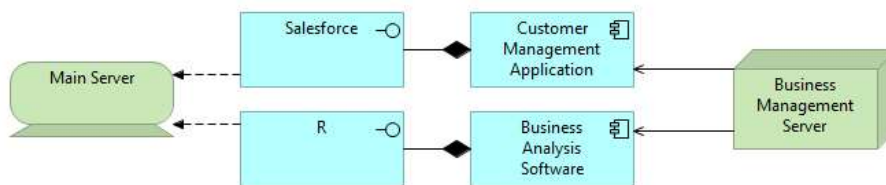


Figure 28. System dependencies 3.

Regarding the remaining apps, since the purpose they serve is more inserted in the business level, they rely on the Business Management Server, to which that kind of information is assigned within UNIQUEBOOKSCO. Both the Customer Management and Business Analysis components run on/are accessible through the main server, relying on Salesforce and R-based interfaces.

f) In the Enterprise Architecture proposed by us for UNIQUEBOOKSCO, the design pattern used approaches the “building blocks” infrastructure, since different application components are used for different functions, and there are also various servers (nodes) that allow the company to better organize the information related to the different services and areas of the business.

For this particular case, the “three-tier application” structure could also be considered, because this option, despite including only a central presentation layer for the application/system, still has the possibility of having the servers distributed for various nodes, that fulfill different purposes. At a lower level, this solution would be similar to the one we followed, but the more “visible” parts of the system would be joined.

10. Roadmap

a) The following diagram shows the proposed project roadmap. The solution/application that we recommend being implemented first is the E-commerce Platform, because it is the core of the changes to be made to the UniqueBooksCo system and business model. The Business Analysis Software may be the last component of the system to be added since it doesn't directly affect a part of the company's operations. As for the applications dedicated to Logistics/Shipping and Inventory Management, they are crucial for the business, so they should be implemented right after the e-commerce component. Either one could be implemented first, since we believe they are of equal importance, or if possible, they could be implemented simultaneously.

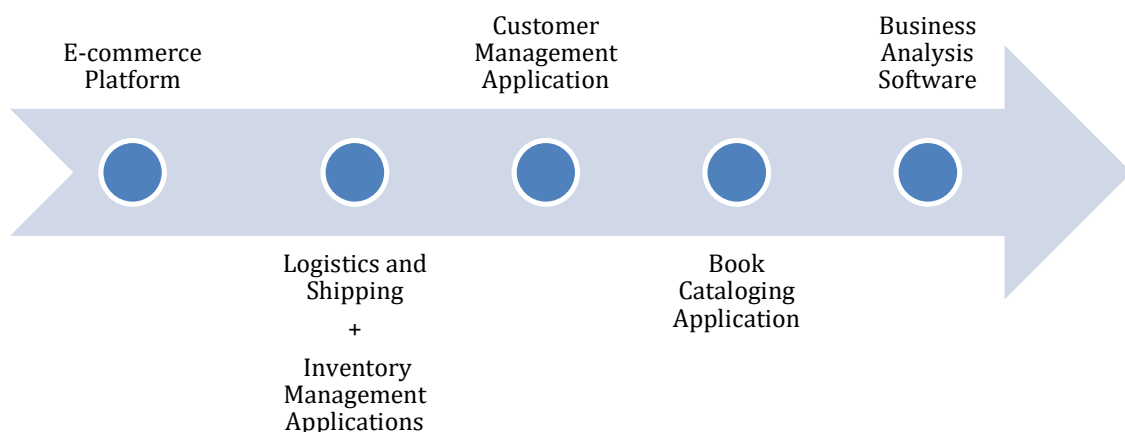


Figure 29. Project Roadmap.

b) Looking forward to our TO-BE applications, the following changes must be done in order to improve the AS-IS applications. For this, we propose the below roadmap:

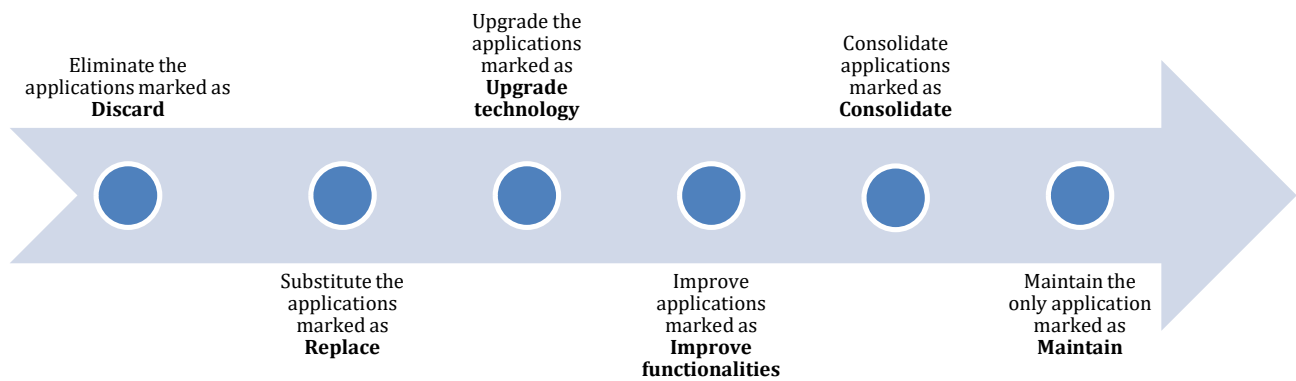


Figure 30. Global Roadmap.