



Escola d'Enginyeria de Telecomunicació i
Aeroespacial de Castelldefels

UNIVERSITAT POLITÈCNICA DE CATALUNYA

MASTER THESIS

TITLE: Innovation to Market

MASTER DEGREE: Master in Applied Telecommunications and Engineering Management

AUTHOR: Lucía Medina Huerta

DIRECTOR: Jesús Alcober Segura

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Resumen

Este proyecto tiene como objetivo desarrollar una solución viable y eficaz para salvar la distancia entre el mundo académico y la industria. La idea está financiada por la Generalitat de Catalunya y tiene como objetivo involucrar a la Universidad Politécnica de Cataluña y el Ayuntamiento de Castelldefels en esta transferencia tecnológica.

El interés del Ayuntamiento de Castelldefels es beneficiarse de una tienda en línea, que muestra los recursos que ofrece la UPC y que podrían ser de interés para las pequeñas empresas de la zona del Baix Llobregat.

Por otra parte, la UPC está interesada en la centralización de los procesos de venta, así como la mejora de la comunicación entre las partes implicadas en una transferencia tecnológica, el aumento de la satisfacción del cliente y el mantenimiento de un control estricto sobre las fuentes de ingresos.

La solución propuesta en este documento implica el uso de software de Planificación de Recursos Empresariales (ERP), que además ofrezca una funcionalidad de web para poder poner en marcha una tienda en línea. Esta plataforma cuenta con funcionalidades de back-end, que reúne las necesidades de la UPC, y las características de front-end que son de interés para el Ayuntamiento de Castelldefels.

De esta manera, la plataforma de Innovación para el Mercado, también conocida como i2m, propone una solución novedosa, a la par que eficiente, para facilitar, promover y centralizar el proceso comercial de una transferencia tecnológica.

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Overview

This project aims at developing a viable and working solution to bridge the gap between the academic world and the industry. The idea is funded by the Generalitat de Catalunya, and involves the Universidad Politécnic de Catalunya (UPC) and the Ayuntamiento de Castelldefels in this technologic transfer.

The Ayuntamiento de Castelldefels requirement is to design an online marketplace showcasing the marketable resources offered by the UPC and which could be of interest to the small businesses in the Baix Llobregat area.

On the other hand, the UPC is interested in centralising the sales process, easing the communication between the parties involved in a technological transfer, increasing the customer satisfaction, and keeping a tighter control over the revenue streams.

The solution proposed in this document involves the use of Enterprise Resource Planning (ERP) software, featuring a website functionality to showcase an on-line marketplace. This platform has back-end functionalities meeting the needs of the UPC, and front-end features that are of interest to the Ayuntamiento de Castelldefels.

In this way, the Innovation to Market platform, also known as i2m, proposes an all-rounded and state-of-the art solution to ease, promote and centralise the technological transfer business process.

ÍNDIX

INTRODUCTION	7
INTRODUCING ERPS	7
1.1. Objectives and Requirements	9
1.1.1. The Ayuntamiento de Castelldefels' requirements	9
1.1.2. Universidad Politécnica de Cataluña (UPC) objectives	9
1.1.3. The i2m platform	10
1.2. Market research	10
1.3. Introduction to ERPs	12
1.4. Expansion of ERPs	13
1.5. ERPs in the market	14
1.5.1. Proprietary ERPs	14
1.5.2. Open source ERPs	15
ODOO	17
2.1 Installation and early configuration	17
2.2 App installation	17
2.2.1 Customer Relationship Management (CRM)	18
2.2.2 Invoicing	18
2.2.3 Purchase Management	19
2.2.4 Sales Management	19
2.2.5 Mass Mailing	19
2.2.6 Website Builder	20
2.3 Specific sales-based terminology	20
I2M	21
3.1 Exploring different scenarios	21
3.1.1 Approach A: Sales teams	22
3.1.2 Approach B: i2m as an individual platform	23
3.1.3 The preferred approach	26
3.2 User roles and rights	26
3.3 Categorisation	28
3.3.1 External categorisation	29
3.3.2 Internal categorisation	31
3.4 Defining products and services	32
3.4.1 Generalising product names	32
3.4.2 Pricelist features	33
ADAPTING THE SOFTWARE	35
4.1 Front-end capabilities	35
4.1.1 The website	35
4.1.2 The contact form	36
4.1.3 Reverse proxy	37

4.2	Modifying the code	37
4.2.1	Hidden prices for non-logged in users	38
4.2.2	Substituting the "Add to Cart" feature	38
4.2.3	Adapting the contact form	40
4.2.4	Including product urls : back-end and front-end	41
	STUDY CASES	44
5.1	Aim behind the study cases	44
5.2	Study case 1: Sale of an unpackaged product	44
5.3	Study case 2: Sale of a packaged product via the CST website	45
5.4	Study case 3: Request for Quotation	47
5.5	Study case 4: Mass mailing	49
5.6	Study case 5: Multicompany and multiwebsite	50
	CONCLUDING REMARKS	53
6.1	Conclusion	53
6.2	Environmental impact	54
	Bibliography	55
	APPENDIX	57
	INSTALLATION OF ODOO AND COMMON ERRORS	58
1.1	Installation of Odoo	58
1.2	Debugging of common errors	61
	NGINX FINAL CONFIGURATION	63
2.1	ODOO9 Configuration file	64
2.2	SERVER:CONF file	66
	WEBSITE	67
3.1	Homepage	67
3.2	What do we offer	68
3.3	The Marketplace	69
3.4	Contact us	70
	DIAGRAMS OF ANALYSIS OF PROCESSES	71
4.1	Analysis 1: Sale of an un-packaged product	71
4.2	Analysis 2: Sale of a packaged product via the CST website	73
4.3	Analysis 3: Request for Quotation	75

4.4 Analysis 4: Mass mailing..... 77

INTRODUCTION

Over the years, the matter of bridging the gap between academia and the industry has become increasingly relevant. The benefits that result from this collaboration are many, and include the creation of good industrial solutions based on elaborate academic research, and the creation of industrial based-documentation, more approachable than current papers. The advantages of the collaboration also ripple through the academic pyramid to reach the students, hence obtaining a know-how targeted at industry while improving their access to the job market.

In this way, the Generalitat de Catalunya has envisioned a change to bring closer the small businesses located in the Baix Llobregat area and the local academic workhorse of the Universidad Politécnic de Catalunya. (UPC). The Generalitat aims at bringing innovation to the industry, to help with the modernization of the businesses and ensure their success, and has put the funds forward to make this vision a reality.

The two main parties involved in this early trial project include the Ayuntamiento de Castelldefels and the Campus del Baix Llobregat, the latter under the direction of the UPC. Both together have been responsible for defining the requirements and the needs of their institutions, while keeping in mind the target market. Finally, it was decided that an online marketplace would be needed, which would feature the marketable resources offered by the UPC, in a way that seems attractive and approachable for the small businesses in Castelldefels and surroundings.

The aim of this project was to explore a possible viable solution that would put in place an online marketplace, while centralizing the complete sale process, to increase the control over requests, and ease tracking revenue. The proposed solution involves the use of an Enterprise Resource Planning (ERP) software package, provided by the firm Odoo, complemented with a website module to feature the desired marketplace. This platform, including the back-end aimed at centralising the sales process, and the front end intended to captivate the industry workers, has been named Innovation to Market, abbreviated as i2m.

This document has been divided in 6 main chapters, starting after the former introduction. Chapter 1 delves into the requirements set by each of the parties involved in the creation of i2m, and explores solutions aimed at bridging the gap between academia and industry implemented in other universities and research institutions across the globe. This chapter also gives an introduction into the world of ERPs, leverages their success and performance, and explores different opensource and proprietary software alternatives.

Chapter 2 informs about the installation of the software and the different modules installed for this project, as well as the features they introduce.

The next chapter explains the definition of the platform in the software environment offered by Odoo. This entails deciding the users that will have

internal access to the platform, as well as the different rights and roles of the users. Furthermore, the categorisation of the products and services, both at a website level and at an internal level, is explained and outlined, followed by the description of certain interesting features offered by Odoo.

Chapter 4 introduces the changes that had to be done to the software, majorly via coding, to achieve the required functionalities. The changes were performed in very different aspects, like for example the contact form, pricing, “add to cart” features and products.

Different study cases accompanied by the corresponding graphs are explored in Chapter 5. These study cases depict typical scenarios and target the generation of a sale, but alternative outcomes, such as a lost opportunity, are also envisaged. This section aims at helping the reader to understand how the software works from a practical point of view, and to have a better understanding of the processes and steps involved in a sale, as well as obtaining an in-depth knowledge of the role played by each of the parties involved.

Finally, Chapter 6 includes the concluding remarks. It is followed by the bibliography used to support this document and the Appendix section.

CHAPTER 1. INTRODUCING ERPs

1.1. Objectives and Requirements

The project outlined in this document, funded by the Generalitat de Catalunya in partnership with the UPC, aims at proposing a viable solution to narrow the technological gap between the small businesses in the Baix Llobregat area and the academic world. The added complexity of this project comes from the fact that there are many different parties involved in the funding of a potential solution. Hence, each partner demands a solution targeted to its needs and aimed at meeting their own specific requirements. This first section delves into the requirements of each party and the reasons behind these needs, as well as an introduction to the proposed approach.

1.1.1. The Ayuntamiento de Castelldefels' requirements

This project is funded by the Generalitat de Catalunya to help promote a stronger relationship between the academic world of the Universidad Politénica de Cataluña (UPC), and the small businesses in the Baix Llobregat area. The idea is to offer innovative solutions and state-of-the-art resources, owned by the UPC, to contribute in the success of the small to medium-sized companies in Castelldefels.

The initial proposal featured a website, managed by the Ayuntamiento de Castelldefels, where the resources offered by the UPC would be showcased. These products and services would be targeted to the small businesses in the region, mainly related to their business sector, such as tourism and restaurants, among others

1.1.2. Universidad Politénica de Cataluña (UPC) objectives

Following this idea, the Universidad Politénica de Cataluña (UPC) decided to use this project to streamline and centralise some of its internal processes, mainly concerning the tracking of projects and customer satisfaction.

At the moment, the UPC employs technologic promoters to go to fairs and meetings, and get in touch potential customers. Contact with these customers normally takes place via emails, but it quickly becomes confusing, inefficient and error-prone. Furthermore, the current course of action assigns an investigator to a specific project, but the UPC has neither a method of tracking the state of the project, nor the satisfaction of the customer, nor the revenue generated. The situation where a researcher never gets in touch with the customer has also occurred, and has given the UPC a bad name.

Hence, it has become crucial for the UPC to find a solution to manage customers, track projects and researcher's progress, achieve perfect customer satisfaction, and control revenue streams.

From the set of requirements expressed by both parties, Innovation to Market, abbreviated as i2m, was born.

1.1.3. The i2m platform

Innovation to Market, better known as i2m, is a platform designed to offer front-end and back-end capacities, with the aim of centralising and managing sales process, while easing communication and engagement from all the parties involved in a business transaction. The back-end part of the system is useful for storing customer information, listing potential customer's emails, documenting products, as well as generating quotations and invoices, among others.

The front-end part features a website aimed at the businesses within the Baix Llobregat area, who are seeking for innovative solutions and state-of-the-art resources and academia, to solve their business' problems or enhance their services. The website is simple, yet attractive, and informative enough for the potential customer to get a good idea of the resources offered. Furthermore, the website is accompanied by an online shop showcasing the available products and areas of knowledge offered by the UPC. Finally, the i2m website offers the possibility to potential customers to get in touch with the i2m personnel via an online contact form for any enquiries.

The platform is implemented using an Enterprise Resource Planning (ERP) software package, with Customer Relationship Management (CRM) features, in order to centralise business processes and interaction between the parties involved in a purchase order. Other functionalities have also been added to increase the flexibility of the software and target the usage to i2m's needs.

Ideally, i2m aims at becoming a reference platform within the UPC and the Baix Llobregat area, for technological transfer between an engineering-based university and the businesses in the region.

1.2. Market research

A fair amount of time has been dedicated to gain insight into alternative university-based platforms, or other existing solutions, offering innovation to businesses. To get a complete and varied outlook, universities across Europe and the rest of the world have been delved into, in order to find out about any platform, or a similar entity, aimed at narrowing the gap between the industry and the academic world.

First of all, renowned American universities from the east and west coast, such as UC Berkeley and Massachusetts Institute of Technology (MIT) have been researched. These universities offer leadership, entrepreneurship, intellectual

property courses for their alumni, but did not offer a commercial approach to showcase products or research to businesses.

Important engineering-based European universities came next. British-based universities, like Cambridge or Southampton, offers commercial consulting and advising services by putting in contact research academia with business people in need of advice [1] [2]. Initial contact takes place via e-mails, followed by a negotiation on pricing of this service and the type advising expert to be consulted. Next in line, French universities did not offer any services relating to innovation, any type business partnerships or technological transfer information.

In the Netherlands, Eindhoven Technical University offers cooperation with the industry in very specific fields, especially those concerning energy, health and transport. Furthermore, Eindhoven has put in place what they named the “TU Innovation Lab”, aimed at businesses looking for solutions to a specific problem. Contact is done by email and there is no catalogue on their previous projects or ongoing partnerships.

More interestingly, in Germany the Technische Universität München has a website which provides many services, only aimed at paying associated members, dedicated to innovation. Surprising services include the “Makerspace”, a 1500 metre square workshop which provides the usage of any machines, tools or software available in that laboratory [3]. The experts providing the varied services are divided into three main categories: scientific advisors, industry advisors, and entrepreneurial advisors [4]. The downside is that the advice from these experts is limited to four main areas, defined as health, ICT, natural sciences, and what they named “Cleantech” (ie. renewable energies). Moreover, this association also offers a lot of help to start-ups, such as counselling, boot camps, and financing [5]. Overall, this university offered the most complete package in the world to bring academic innovation to the business world.

More direct competitors like Spanish universities and local technology institutes, have also been looked into. When it comes to the Universidad Politécnica de Madrid, the sole platform they offer is a database listing projects, academia and articles.

The Universidad del País Vasco dedicates a complete section of their website to companies and businesses, where they offer R&D solutions, counselling and even training courses. The website is also divided into areas of expertise of the academia, accompanied by indicative information about which business sectors this knowledge could be applicable to [6].

Moreover, the Universidad Politécnica de Valencia (UPV) has a website with their technological offer classified by patents, software, results and R&D capacities [7]. This information is complemented by the “UPV Carta”, a complete catalogue of patents, filtered by economic sectors, research areas, and research groups [8]. Furthermore, the UPV has gone a step further by creating partnerships with companies and city halls to create a mutually beneficial technological network named “Ciudad Politécnica de la Innovación”. The most interesting element of this approach is what they name “Antenas de la Innovación” (Antennas of

Innovation), which are basically promoters encouraging business-based innovation locally, through public and private funding. Their most popular service includes technological licenses ready for commercial exploitation, partnerships (convenios), and contracts [9].

When it comes to Catalanian-based research institutes, EURECAT and CIT-UPC have been researched. The first one, Eurecat, has a very polished website which aims at offering companies innovative solutions and services via technological transfer. The knowledge that they offer is diversified over a wide range of fields, and their solutions categorized within the R&D sector, the technological services field, and the consulting sector. The latter, the Centre de Innovación y Tecnología, abbreviated as CIT, is the UPC's own technological centre, which offers a technological categorization giving access to downloadable documents of the different marketable technologies. Furthermore, the CIT also what they call "Tech training", which are basically technology-related courses in different areas [10].

Finally, from a commercial point of view, several platforms have been designed to put in contact universities and companies. The most surprising and complete platform is known as "Telanto", resulting from a partnership between different Catalanian and German universities, such as IESE, LaSalle, Woluwe University, and Hochschule Berlin. This platform is mostly directed to connecting students and universities to corporate challenges, in order to provide companies with unique solutions and talent. Their projects are not publicly displayed and the only way to join in is through a contact form.

From this market research, it can be concluded that there are no identical platforms to i2m. The most interesting approaches are offered by central European universities, as well as Spanish-based institutions, typically showcasing a website with the universities' current projects, notable academia, and interesting solutions. Most likely, these websites are not managed via an ERP software and the institutions behind them may experience similar problems to the UPC, concerning the tracking of emails and project satisfaction. Furthermore, it is very significant that commercial platforms are being put in place to connect talented students to industrial challenges, but the application's aim differs from i2m, since the latter aims at narrowing the gap between the academia and the industry.

1.3. Introduction to ERPs

Enterprise Resource Planning, often abbreviated as ERP, refers to a category of business management software generally composed of distinct modules for specific business applications. ERPs are often used by companies to collect, store, manage and interpret data from many different activities, such as product planning and purchase, marketing and sales, inventory management, manufacturing and payments, among others [11].

In this way, ERPs provide an integrated and global view of a business' core activities, often in real-time and sourcing the information from common databases. Henceforth, the applications within the ERP share data across the

different modules (manufacturing, marketing, sales, etc.), and thus facilitate the information flow between all different business functions. ERP systems are complex, and run on a variety of computer hardware and network configurations, typically using a database as an information source [12].



Figure 1.1. ERP system's modules [13]

Nowadays, ERPs are considered a crucial organizational tool and typically include three main characteristics:

- Integrated system operating in (near) real-time
- A common database supporting all the applications
- A consistent look, functionalities and usage across modules [14]

1.4. Expansion of ERPs

Despite first commercially launching in 1973, ERP software only began to become globalised in the early eighties, but the cost of these systems was still very high. With the internet boom, the year 2000 problems and the introduction of the euro, many companies saw the occasion as an opportunity to replace their old systems with ERP. At this stage, ERPs exclusively focused on automatic back office functions that were never customer or client related [15].

Nowadays, ERPs are more user centric by including front office functions, such as customer relationship management (CRM), E-business, and Supplier Relationship Management (SRM). This newer generation of ERPs is mostly web-based and allows the interaction of clients, employees and suppliers in real-time. Furthermore, latest advances aim to integrate mobile devices with ERP systems to increase the efficiency and ubiquity of such systems.

ERP software is a multi-billion dollar industry, producing modules to support a variety of business processes, and even if initially ERPs focused mainly in large enterprises, smaller companies are increasingly using this type of software to manage their business [16].

1.5. ERPs in the market

As it was previously mentioned, ERP software has been developed for many years and it has become a competitive sector. There are hundreds of proprietary and open source alternatives, each suited for different customers or business applications and benefitting from different trade-offs. When developing a platform like i2m, it is important to do extensive research to assess the different alternatives, and chose the best-suited option. This section aims at offering the reader an overview into the most famous ERP software brands and product catalogue.

1.5.1. Proprietary ERPs

The most well-known and widely available ERP software is proprietary and developed by SAP. The ERP software package is known as SAP Business Suite and includes a bundle of business applications allowing companies to optimize different business processes. This suite has been carefully designed to be very compatible, enabling the support of different operating systems, databases, applications and modules from almost any provider. It operates under SAP NetWeaver, a computing platform designed by SAP, integrating all SAP technologies from a technical point of view. The biggest compromises with SAP's software reside in its high price, aimed at big corporations, and its difficulty and complexity of use [15].

Other important SAP competitor, and the second largest ERP software market leader, is Oracle. Over the years, they have acquired big ERP making companies, such as JD Edwards, PeopleSoft and Siebel Systems. This has allowed them to build a significant customer list and a large portfolio of intellectual property. Furthermore, Oracle's software is well-known for being significantly more flexible than its counterparts. Again, Oracle is not aimed at the small company, henceforth pricing their services as a high-end product [17].

A more adapted player to small companies is Microsoft, offering a product known as Microsoft Dynamics. The software' is famous for its ease of use, and the distinct applications are delivered through a network of reselling partners who provide specialized services. Over the course of the years, Microsoft has acquired a few companies, like Great Planes and Navision, and has made emphasis in developing their individual solutions, which have become favorites in niche markets [17].



Figure 1.2. Gartner's magic quadrant for ERPs as of December 2015 [18]

1.5.2. Open source ERPs

With the globalization of the business, every company now needs to be supported by an agile and consolidated system, offering fast and clear results. In this ever-evolving world, the open source software is an alternative to the proprietary software, since it is more adapted to smaller companies.

Odoo, previously known as OpenERP, is an open source piece of software whose distinction revolves around a series of apps enabling different business-related modules, such as CRM. A benefit of this configuration is that the user does not have to mandatorily run a bloated system, but instead can have a slim setup, providing a scaled approach to every business. Furthermore, each app has an individual cost of 20 USD a month. Odoo is mainly a web-based tool, but there is also a desktop version and the source code is available on Github, enabling further tweaking [19]. Odoo's disadvantages include the limitation on a small number of users, however adding users beyond the first two is not prohibitively expensive. Finally, even if the graphical interface is user-friendly, intuitive and easy to use, the configuration of certain extra features requires a skilled technical team [20]. The user community has now reached two million people.

When it comes to open source ERPs, Openbravo is an all-time favorite which has earned the recognition of the ERP-world by receiving six consecutive years the Infoworld's Bossie award for best open source software application [21]. The software is a web-based ERP, complemented by a modular system, and offering three "packages" depending on the needs of your organization. Openbravo Community is the free release, featuring a stripped-down version of the paid

Enterprise (4 500\$/year) and Professional (22 000\$/year) editions. However, support from the Openbravo community comes at a cost, putting a damper on the lower cost option. Finally, the program is based on the Compiere ERP program, the second largest open source ERP solution. [20] and has a user community of 20 000 people.

Compiere is a popular open source middle-market solution, which despite gaining the early market share, went through a dormant period. After a large round of investment and new executives, as well as engineers, managed to revamp the original product and expanded the product line, selling Professional, Enterprise, and Cloud editions. Compiere has been criticized for not being a pure open source product because of its dependence on Oracle database, however this is slowly changing. The technology supports Apache and Linux platforms, as well as the Windows operating system. [17]

The project required a flexible, low-cost and light solution, and hence proprietary ERPs were quickly ruled out. Finally the chosen open source ERP was Odoo, not only it is backed up by an important and active user community offering help on the official Odoo forum, but it is also driven by an engaged set of consulting companies, including Odoo itself, which organize periodical meetings, presentations, and workshops across Europe. Also, a numerous amount of official documentation, including books and videos, have been produced and can be easily accessible online, offering a significant degree of help and guidance when initially understanding the software. Furthermore, the informative and user-friendly Odoo website, made it clear that integrating common ERP modules, such as the very needed CRM or Invoicing, could be integrated with the website module, a crucial requirement in the project. The “drag-and-drop” features offered by the website module (further explained in section 2.2.6) made it easy for anyone with no prior html knowledge to create an e-commerce website from scratch. Finally, the familiarity of the academic supervisor with this software and the confidence that this software would manage to give a solution to every requirement outlined was important when choosing Odoo.

CHAPTER 2. ODOO

2.1 Installation and early configuration

Once the ERP software package to be used has been selected, it was decided that to propose a state-of-the art solution, the project was to be deployed in the latest available release, Odoo version 9. This decision entails two main problems, the first one being the lack of official and unofficial documentation for this release, and secondly the missing stability of this version, which could possibly lead to certain inoperative features.

The first requirement to put the system in place is to make it remotely accessible. Hence, a server, provided by the UPC, is required. The installation of the software package has taken place remotely, on a laptop running Linux Mint. The commands that were for the installation, along with some detailed comments and typical error messages can be consulted in Appendix section 1. The installation involves the creation of a PostgreSQL database.

Once the software is successfully installed, an admin user is automatically created. Login with this user gives access to all the internal configurations and the rights to do any changes. The very first step that needs to be undertaken after an installation is setting up a chart of accounts, since Odoo is configured to limit any actions until this configuration has taken place. A chart of account manages taxing and sets appropriate internal account types, and thus there is a specific configuration for every country. A Chart of Accounts template is already provided for Spain by Odoo and can be easily selected in the “Invoice” menu. More details on how to select the Chart of Accounts can be found in Appendix section 1.2.3.

2.2 App installation

In the Odoo world, the admin user can install “apps” to increase the enable certain features. These modules target specific business processes, such as manufacturing, mass mailing, invoicing, human resource tracking, among many others. The advantage of this type of software is that it enables the company to tailor the tool according to its needs, hence running more smoothly since it does not have bulky unnecessary features. There is a specific menu entry under the Settings tab which gives access to the admin user to the “App menu”, listing all the official apps offered by Odoo. Furthermore, this App store offers a range of supporting modules enabling certain specific features within the software.

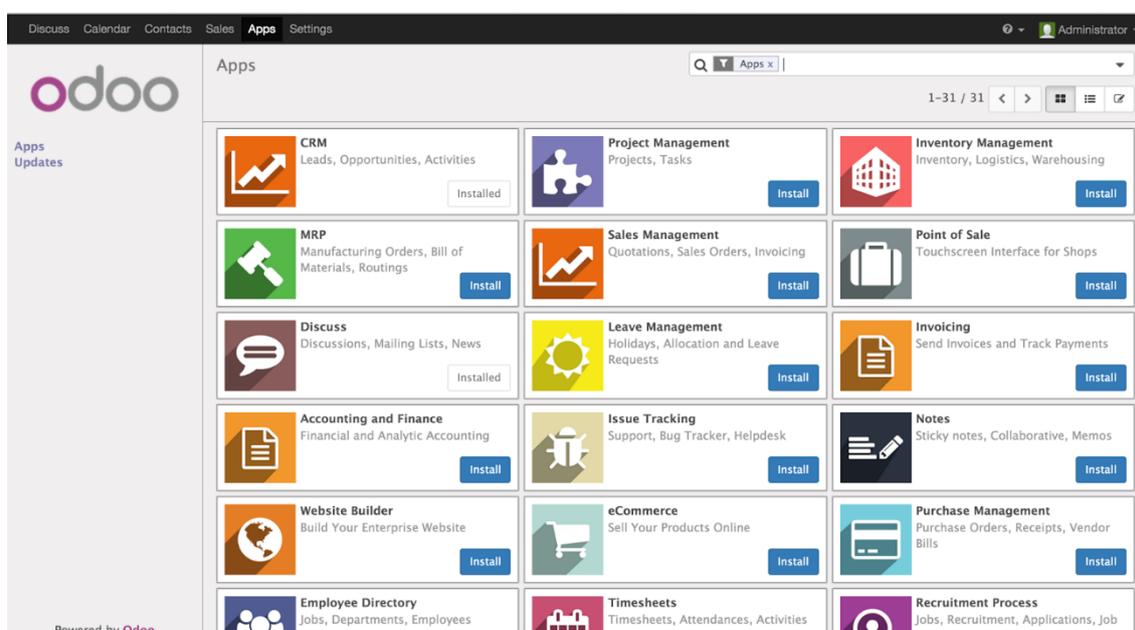


Figure 2.1. Odoo's “app store” [22]

Several modules have been installed to ensure the correct functioning of this project and will be detailed in the sections below. Furthermore, it must be noted that the installation of the modules herein mentioned entails the automatic installation of complementary modules, like the contact form.

2.2.1 Customer Relationship Management (CRM)

Customer Relationship Management is an approach to managing a company's interaction with current and future customers. A CRM software tool tries to analyse data about customers' history with a company, to improve business relationships with customers, specifically focusing on customer retention, and ultimately to drive sales growth [23]. Furthermore, an important aspect of CRM systems is that they compile information from a range of different communication channels, including a company's website, telephone, email, live chat, marketing materials, social media, among others. All this is meant to boost sales productivity, improve the success rate and grow revenue [24].

The CRM features introduced specifically by Odoo's CRM module are, for instance, a visual sales funnel and sales cycle with a kanban view, automated creation of leads from incoming emails, centralised interactions relating to an opportunity, and a collaborative agenda [22].

2.2.2 Invoicing

Invoicing software relates to the issuing and tracking of invoices and payments. The characteristics offered by the Odoo software allows the user to create professional looking invoices effortlessly, since the information related to the product and the customer are already stored, and generates a PDF automatically from this action. Odoo also improves payment routes, by offering integration with the Paypal platform, and automating follow up reminders for due payments. Another feature has to do with the integration of the company's different bank account statements and the visualization of sales and costing information in customizable dashboards [22].

2.2.3 Purchase Management

Purchase Management typically ensures that all goods, supplies and inventory needed to operate the business are ordered and kept in stock. It is also responsible for controlling the cost of the goods ordered, controlling inventory levels and building strong relationships with suppliers. The purchase management module offered by Odoo covers these tasks by offering automated requests for quotations and purchase orders to vendors, integrating their answers to compare different propositions to get the best prices. The added integration of these operations with the email module increases the traceability of the Requests for Quotations, as well as tracking issues related to vendors. This module also gives rise to different costing methods and keeps track of the inventory enabling the user to manage back orders, refunds, product reception and quality control [22].

2.2.4 Sales Management

The sales management module aims at driving the entire sales operation process, from quotations to invoices. This app allows the storage of customer's preferences, such as billing addresses or payment terms, while enabling the navigation through all the documents relating to that customer. Furthermore, it includes advanced invoicing methods, for example based on time or materials, and automate recurring invoices according to preconfigured contracts. This module can be very simple, but it can be configured to support complex sales scenarios, such as different pricelists, or product variants, different units of measure and various warehouses, among other features. Furthermore, this module integrates seamlessly with the CRM module to offer increased possibilities, and a greater control on transactions [22].

2.2.5 Mass Mailing

Mass mailing is a module that helps companies send a large quantity of mails simultaneously to newsletter subscribers or new leads, while allowing them to track their actions to increase the efficiency. The features enable you to have distinguished databases of contacts, and email templates, while the statistics provided by Odoo help the user leverage the success of the campaign. Furthermore, mass mailing is fully integrated with the mailing module, leading to

seamless follow-ups and efficient access to related documents. These features are complemented with a graphical dashboard, helpful to gain insight in the success rate and penetration of a campaign [22].

2.2.6 Website Builder

The website builder module gives rise to the functionalities that make possible for the company to have a professional-looking website. Creating a website is very simple with Odoo thanks to the “drag-and-drop” building block templates, which integrate pre-configured actions where only text-editing is required, as well as pre-defined themes. Odoo also gives the designer the possibility to integrate these blocks with the backend enterprise features and apps, such as e-commerce or mass-mailing. For the more skilled users, Odoo offers direct access to the HTML code, which allows changes on the fly. Odoo’s website builder module also includes multi-language usage via automated translations, is integrated with SEO tools such as Google Analytics and is mobile-friendly [22].

2.3 Specific sales-based terminology

Odoo, as well as other ERPs, have use sales-related terminology to describe certain business processes, or stages of a sale process.

The word “*lead*” represents a potential customer with whom you have not established a relationship yet. Usually a lead contains valuable information to reach future sales opportunities. Too often, this very important piece of information gets lost because it is not registered anywhere, and even when it's saved, it might be hard to track this customer’s activity since the information is not at hand. Hence, lead management is one of the problems that ERPs aim to solve. Furthermore, leads can be created manually or automatically, as a result of a trigger, which could be an enquiry email, or a business card in a conference [25].

The word “*opportunity*” is used to describe a worked-on lead with a tangible sale likelihood. When leads transform from interest to a real desire of purchase, they are named opportunities, and are then given individual attention by the sales department. Furthermore, in the course of a sale process, an opportunity might have a varying success rate based on the likelihood of achieving that specific sale [25].

CHAPTER 3. I2M

3.1 Exploring different scenarios

Open source ERPs are very flexible software, which make it possible to create different business scenarios, or approach business-related situations from different points of view. The situation affecting i2m relates to how the different parties involved in a business transaction should be represented within the software. In the i2m platform, three main parties have been defined: first of all, the research groups of the UPC's Baix Llobregat Campus, which are responsible of offering the knowledge and the research products. Next comes the platform, i2m, and the promoters, as well as the support IT staff, that manage the transactions and put customers and vendors in contact. Finally, the last party corresponds to the clients, in this case the little businesses from the Baix Llobregat area, interested in accessing the resources offered by the i2m platform, alongside the UPC researchers.

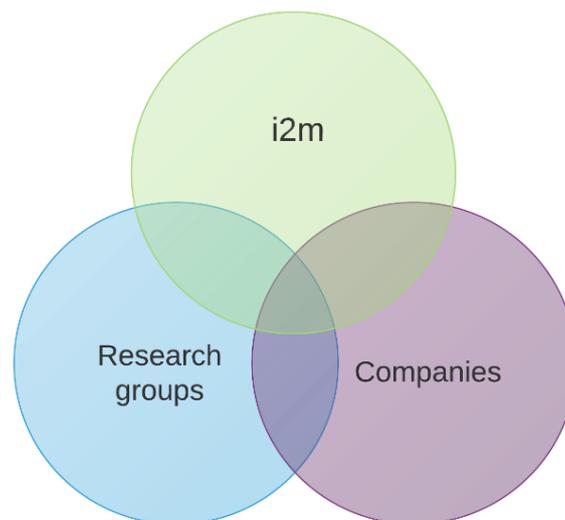


Figure 3.1. Symbiosis of the three parties involved in a technological transfer

In the upcoming subsections, two different approaches have been explored concerning the interaction between the three different parties. The Approach named A, merges the i2m personnel and the research groups into one unique entity, under the name of the UPC. The second approach, herein B, understands the importance of having three different and separate collaborative entities. Each of these approaches presents trade-offs, which need to be carefully assessed to create the most functional business scenario.

3.1.1 Approach A: Sales teams

This first scenario introduces the concept of sales teams, where each research group corresponds to one sales team. This scenario's particularity is that the research groups, as well as the promoters and remaining staff of the i2m platform, are merged under the company "UPC". Hence, the platform i2m loses is relegated to a second place, while the UPC is the main entity in Odoo.

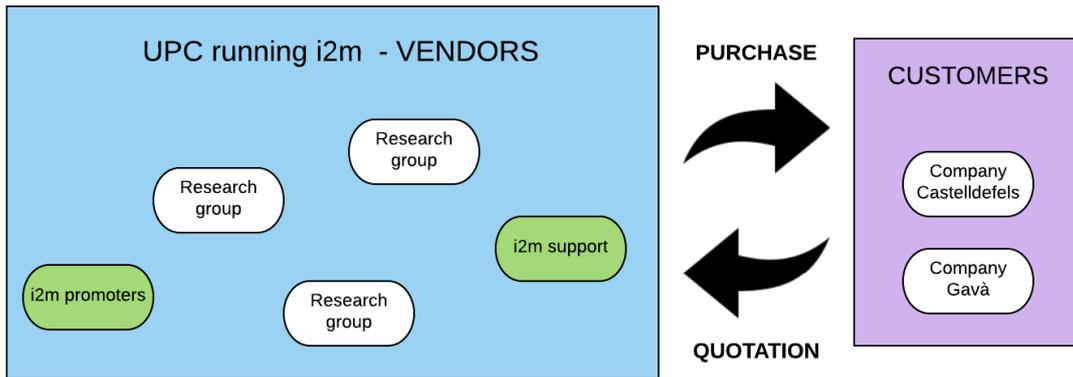


Figure 3.2. Sales team approach's diagram

The main consequence of this approach is that every single person englobed under the i2m platform needs to have access to the database and be a user within the Odoo world. Evidently, having dozens of users increases the complexity and the overload of the database, makes the management of the database and system more painful, and puts at risk the stability and well-functioning of the system.

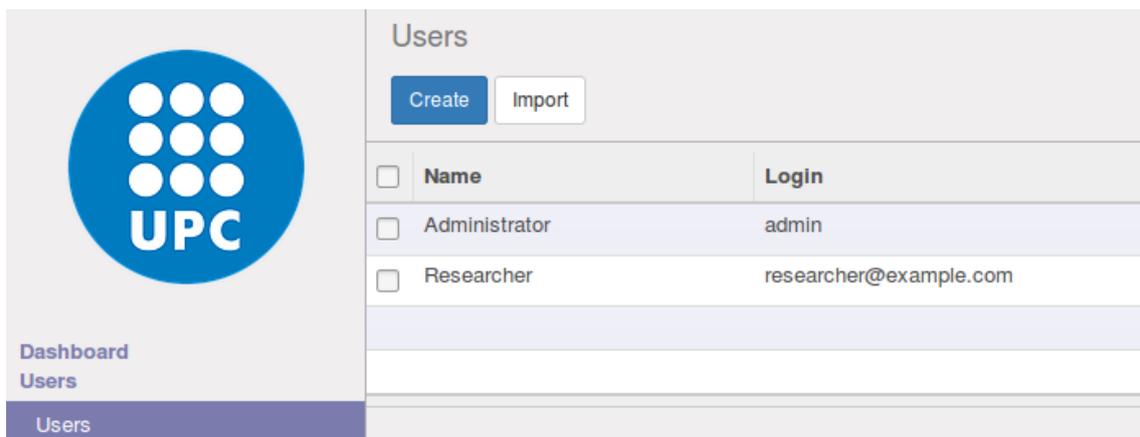


Figure 3.3. Caption depicting the users in the database – everyone needs to be logged in the platform.

This scenario can be put in place by assigning as providers the different sales teams created in Odoo. In this case, the sales teams correspond to the different research groups within the UPC, and each has to have an entry in the Odoo world. Internally this can be done by creating a sales team whose leader is the leader of the research group, and assigning the research group's name to the sales team.

On the other hand, the companies, which correspond to the customers, are stored as such within the database, but they do not have any access to the backend of the platform. The main advantage associated to this setup is that every group has an individual pipeline analysis, which facilitates benchmarking the different research groups in terms of sales, projects undertaken, and so on.



Figure 3.4. A research group's individual pipeline options

3.1.2 Approach B: i2m as an individual platform

The second scenario clearly distinguishes the three parties involved. In this case, i2m is an externally-run platform, which performs transactions with its vendors and customers, the research groups and the small businesses, respectively. The main implication of this scenario is that the promoters of the i2m platform are the only users who have access to the internal database and the backend operations. The advantage on this limitation of the number of logged-in users is that it increases the stability, scalability and manageability of the system.

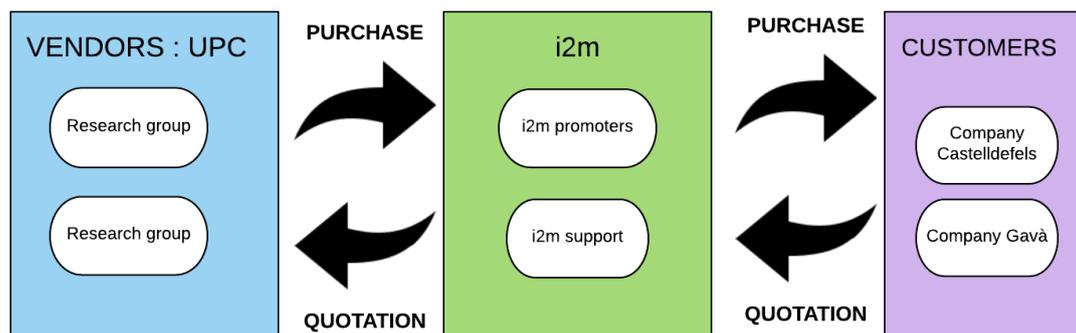


Figure 3.5. i2m as an individual platform diagram

This scenario is significantly more flexible than the previous one, since it gives rise to multiple new options. The i2m platform is the display of the resources, products and services offered by the UPC. Potential customers, in this case interested companies, get in touch with i2m to ask for quotations and, in a favorable scenario, buy a product or service.

In the case where a company desires to purchase a specific service which is not listed on the website, i2m can request a quotation from a research group and purchase the service from this group, to offer it to the final client. Furthermore, a research group of the UPC might want to use some services or rent the resources from another research group. The petition can be started via the i2m platform, where the interested research group is the customer, and the giving research group is the vendor. Henceforth, it is possible to see that i2m and the research groups “feed” each other with a catalogue of services, products and resources.

The latter scenario can be setup in Odoo through a simple nuance: the researchers must be entered as vendors and customers.

Individual Company

Researcher

UPC

0 Opportunities	0 Meetings	Not Published On Website
0.00 Invoiced	0 Sales	0 Vendor Bills.
		0 Purchases

Address [\(edit\)](#)

Website

Job Position

Phone

Mobile

Fax

Email

Title

Language

Tags

Contacts & Addresses Internal Notes Sales & Purchases Accounting

Sale **Purchase**

Is a Customer Is a Vendor

Figure 3.6. A UPC researcher stored as a vendor and customer

Furthermore, for correctness-sake, the vendor must be an individual, most likely the research group team leader or a keen researcher, and the company it works for, the UPC. A tag can be added corresponding to the research group to help filter contacts when needed.

Alongside, within the “contacts” section, a new contact named “UPC”, defined as a company, will be created, whose related contacts include the logged-in researchers.

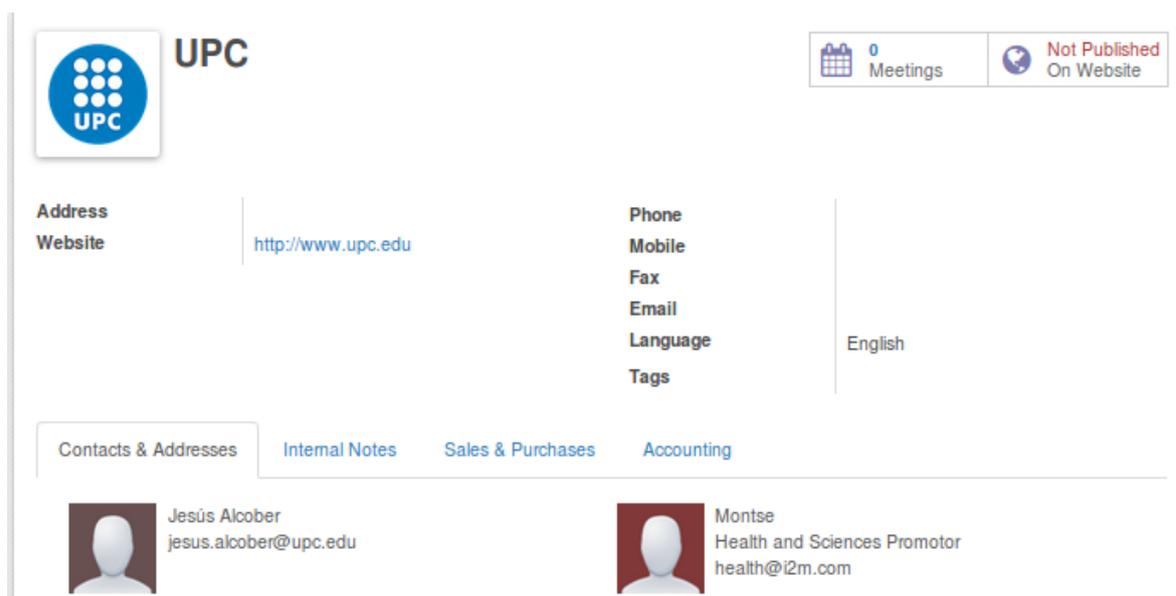


Figure 3.7. The UPC contact with the related researchers

This “dual role” propagates to another assumption, since now the products and services available on the website “Can be sold” and “Can be purchased”.



Figure 3.8. Characteristics of a product or service

3.1.3 The preferred approach

After analyzing the implications of each approach, both from an internal and practical point of view, it became clear that the approach where i2m is an independent entity is better suited for the present business scenario. This option is not only more scalable and stable, but also entails a greater degree of flexibility when it comes to representing the three parties involved in a transaction. The upcoming sections are based on this setup and interaction.

3.2 User roles and rights

Once the preferred business approach has been decided and the roles assigned, it is critical to define the rights that each of the users within the system will have. In the presented scenario, there are three entities that interact with each other to offer the requested service to the customers. First of all, the UPC researchers are

the backbone of the i2m platform since they are the ones providing the knowledge and the services. Then, the promoters are responsible for contacting potential customers and inserting leads into the system. Finally, the i2m support, staff specifically dedicated to maintaining and updating the back-end and front-end platform.

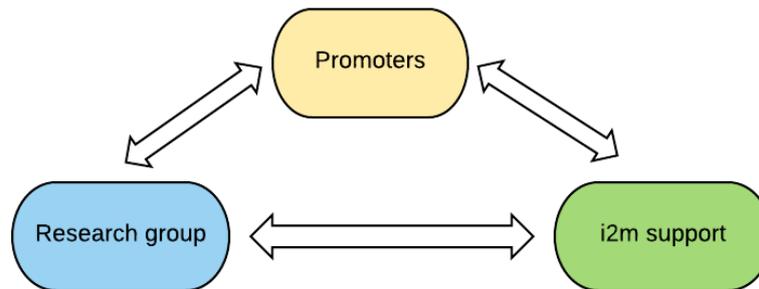


Figure 3.9. Interaction between the different entities

A very complete table has been designed outlining which rights should be assigned depending on the user's role, as well as the corresponding access and actions limitations that a certain rights configuration might have.

Table 3.1. Access rights depending on the user's configuration

Rights		Promoter	i2m support	Research group
Sales		See all leads	Manager	NA
Lead automation		User	Manager	NA
Human resources		Employee	Officer	NA
Mass mailing		Manager	Manager	NA
Inventory		NA	User	NA
Purchase		User	Manager	NA
Website		NA	Editor+Designer	NA
Category	Action			
Database	Logged in database	x	x	
Discuss	Contact internally with other logged users	x	x	
Contacts	Create and edit contacts	x	x	
Sales	Can see quotations, invoices	x	x	Only if in email chain
	Can generate quotations	Only self-assigned	x	
	Can create leads (for every user)	x	x	
	Can modify, add products		x	
	Can create invoices for everyone	Only on self-assigned	x	
Massmailing	Can see campaigns	x	x	
	Can create campaigns	x	x	
	Can create mailing lists	x	x	
	Can see reports	x	x	
Employees	Can follow employees	x	x	Only if in email chain
	Can create employees		x	
	Can assign employees to sales groups		x	
Website	Can edit the website content		x	
	Can modify the website's outline and looks		x	

It can be quickly noticed that the research groups are not logged-in users and therefore have no access rights, unless they are included in a message chain and added as “Followers” in a transaction.

When it comes to promoters, their job is to make contacts and promote the platform to potential customers. Hence, the rights of these workers are limited to inserting leads into the system, creating promotional campaigns and saving contacts. Furthermore, if they are considered the assigned salesperson for a specific product, they can also send invoices and quotations relating to that product.

Finally, since the i2m support is responsible for the system’s maintenance, customer contact and updates, this user should benefit from most of the rights. These rights give the user the option to insert products within the database, manage leads, create promotional campaigns, send invoices and quotations, and editing website content.

3.3 Categorisation

The classification of products and services is a crucial part of management projects, since they aim at making the search and storage of the resources simpler for the customers and employees. In this project, two different categorisations are needed: one for the website, and the other for internal matters. Both of these categorisations need to be meaningful to the user, whether

it is the website visitor or the i2m employee, and thus need to be distinguished and specifically targeted to the user. In order to successfully categorise products, it is essential to have a clear idea of the technological field the resource belongs to, and its usage.

The main problem arises from the fact that the UPC is an enormous entity with numerous research fields from a very wide range of scientific branches. Over the years, the UPC has done many efforts to categorise its research areas and main technological fields, resulting in a large number of documents proposing similar, yet different, categorisations. This documentation is not only hard to process, but also needs to be taken very seriously; one cannot simply decide to avoid a category, since it might affect dozens of research groups across the whole UPC.

3.3.1 External categorisation

The external categorisation is the one that will be displayed on the “Marketplace” section of the website, and will allow visitors to easily identify products. In order to create a good categorisation it is important to think who it is directed to, who is going to use it. Since the website is aimed at showcasing academic knowledge for the benefit of companies, it is clear that the categorisation should target the businesses in the Baix Llobregat’s area.

With the recipients in mind, the categorisation needs to be easily understood by non-academic visitors and thus familiar. Hence, it should not contain very technical names that companies cannot relate to, or where the application remains unclear. For practical purposes, the categorisation also needs to be short, with a maximum of two levels, since aimless continuous clicking is very tiring.

The first level categorisation, which remains always visible on the website was chosen as follows:

- Solutions
- Patents
- Courses
- Resource rental
- Advising and consulting

This first categorisation is clear and aimed at solving a specific type of issues that a company might face, hence a new user can easily relate to one of these categories and quickly find the resources of interest.

The second level of categorisation is decided from the merging of the different categorisations proposed by the UPC, and targeting only those fields that are available within the Baix Llobregat’s Campus, since the initial scope of this project is only local.

The final second level categorisation for the Solutions, Patents, Courses and Consulting and Advising categories, is as follows:

- Advanced manufacturing technologies
- Energy
- Agriculture and food processing
- Health and sciences
- ICT
- Logistics and transport



Figure 3.10. I2m external categorisation in catalán

In the case of the resource rental, the above categorisation does not apply and it is too complex, hence it has been shortened to only two main categories:

- Space rental
- Equipment rental

Hence, the final categorisation tree is made up of five main categories and twenty-six subcategories, which gives a good precision when categorising products and services, while limiting it to only two levels for simplicity.

3.3.2 Internal categorisation

In what concerns internal categorisation, it is created by following the same guidelines as for the external categorisation. First of all, the users of this category are the i2m employees, in this case the UPC promoters and i2m support. In hindsight, these users have a deeper understanding of technology and the nuances between the different research fields within the UPC. Thus, even if they are concerned on the type of service or products it (ie. patent, equipment, etc.) they grant more importance to the technological field it belongs to. Furthermore, the categorisation on the backend cannot be too simplistic and must be in-line with the UPC's official categorisations, to ensure the scalability of the system.

The final categorisation decided from an internal point-of-view has three levels. The first and second levels are exactly the same as for the front-end website, to maintain a degree of homogeneity across the system:

Table 3.2. Internal first and second level categorisation

First level categorisation	Second level categorisation
<ul style="list-style-type: none"> - Solutions - Patents - Courses - Resource rental - Advising and consulting 	<p><i>FOR SOLUTIONS, PATENTS, COURSES, CONSULTING AND ADVICING</i></p> <p>:</p> <ul style="list-style-type: none"> - Advanced manufacturing technologies - Energy - Agriculture and food processing - Health and sciences - ICT - Logistics and transport <p><i>FOR RESOURCE RENTAL:</i></p> <ul style="list-style-type: none"> - Space rental - Equipment rental

Finally, the third level of categorisation is more specific, since it aims at providing another degree of precision when storing products.

1. Advanced manufacturing technologies
 - a. Manufacturing processes and technologies [MANU]
 - b. Mechanical Engineering [MECH]
2. Energy
 - a. Energy [ENER]

- b. Electrical [ELEC]
- 3. Agriculture and food processing [AGRO]
 - a. Fishing
- 4. Health and sciences
 - a. Chemistry and natural resources [CHEM]
 - b. Materials [MATE]
 - c. Physics and Mathematics [PHYMA]
 - d. Health and biology [HEAL]
 - e. Management [MANA]
- 5. ICT
- 6. Logistics and transport
 - a. Logistics and transport [TRANS]
 - b. Civil Engineering and Infrastructure [CIVIL]

Furthermore, an internal acronym has been suggested to save products according to their third level categorisations, which for its correct use should be accompanied by a four-digit counter. This will allow i2m employees to instantly know what technological field does the resource belong to, easing the usage of the platform.

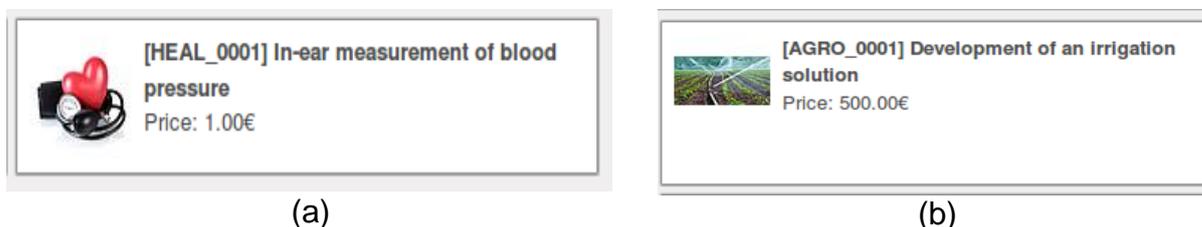


Figure 3.11.a and 3.11.b. Acronym usage example to categorise products according to their third level category

3.4 Defining products and services

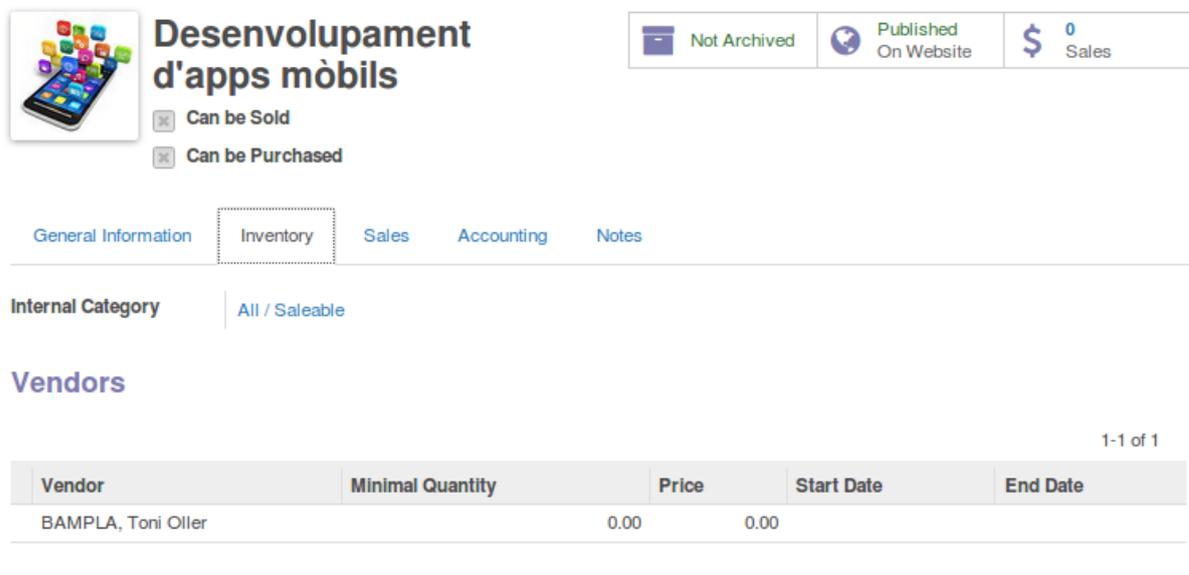
Once the categorization has been decided, along with the users of the platform and their rights, the products and services need further thinking. This section aims at reasoning the naming of the resources offered on the platform, along with the benefits associated, as well as understanding the pricelist features offered by Odoo.

3.4.1 Generalising product names

Due to the characteristics of the product and service's catalogue, it is important, and more especially in the beginning, to keep general names to describe the

items. This does not only have to do with the fact that it needs to remain understandable and relatable for companies, but also to try to create a catalogue of competences rather than definite products. Most of the research groups are very diverse in their knowledge and application of their research, and thus it becomes inflexible, un-scalable and narrow-minded to exclusively try to sell the products that they have thought off. For instance, it makes more sense to display “App design and programming” than to advertise “App design for weight control”, since most likely the person who has designed the latter app could do any other app.

The added benefit of defining products with a more general title is that it allows promoters to list all the research groups capable of offering that item, hence easing the task of finding and deciding the correct research group.



The screenshot shows the Odoo interface for product definition. The product is titled "Desenvolupament d'apps mòbils" and has a status of "Not Archived", "Published On Website", and "0 Sales". It is marked as "Can be Sold" and "Can be Purchased". The "Inventory" tab is selected, showing the "Internal Category" as "All / Saleable". Below this, the "Vendors" section displays a table with one vendor: "BAMPLA, Toni Oller" with a minimal quantity of 0.00 and a price of 0.00.

Vendor	Minimal Quantity	Price	Start Date	End Date
BAMPLA, Toni Oller	0.00	0.00		

Figure 3.12. Product definition and vendor’s list for that specific product in catalán

In the case displayed above, the product “Development of mobile apps” can only be offered by the researcher Toni Oller, from the BAMPLA research group.

3.4.2 Pricelist features

An interesting additional feature contained in Odoo software is the creation of pricelists. This is useful when offering similar products which have different prices, depending on the size, time, colour, or quantity, among other factors. This feature can be mostly used for solutions, resource rental and courses, since solutions can be priced differently depending on their complexity (starter, intermediate, or advanced solution), and courses, as well as resource rental, priced according to duration (5 hours, 10 hours, 15 hours).

Ofimatics course

Duration

- 15 hours
- 30 hours +250.00 €
- 45 hours +500.00 €

300.00 €

Add to Cart

Figure 3.13. Pricelist feature based on duration

In the example above, the base price for a 15 hour-long ofimatics course is 300 €, but if the course lasts for 30 hours, the price is incremented by 250€, reaching a total of 550 €. The exact same behaviour is appreciated for the 45 hours course, which entails a price increment of 500€ over the base price, and thus it is priced at 800 €

CHAPTER 4. ADAPTING THE SOFTWARE

4.1 Front-end capabilities

This project does not only require a structured back-end to manage leads and track sales, but also needs a front-end, a website featuring a catalogue of UPC's marketable resources. The website functionality is an installable module, as mentioned in section 2.1.6, that features "drag-and-drop" modules to ease the creation of the website for unexperienced users. This section explores the work put in the website, the additional creation of a contact form section, and the use of a reverse proxy.

4.1.1 The website

The i2m platform needs a way to showcase the products offered by the UPC, and the preferred way to attract and inform customers is to have a website. The website is composed of five main pages, which include the front page, the informative tab "what do we offer", the marketplace shop displaying the products, the contact form and the sign-in entry. Screenshots of the different pages of the website can be consulted in Appendix section 3.

The front-page is designed in an attractive and marketable fashion, with the aim of capturing the attention of the visitors. The banner captivates via the use of an appealing image, a large contrasting font and a hooking slogan "Looking for innovation", accompanied by a small description of the marketplace and a "Discover" button, directing the user to the shop. Below this caption, there is an explicative title stating that the website is aimed for the companies in Castelldefels seeking for innovation. Then, four small images accompanied by small text explain the main types of services and products marketed on the website. Following this section there are three icons with the main goals and vision of the company, and a newsletter box, allowing the visitors to leave their contact mail to be periodically informed about i2m's news.

The next tab offers the visitor the chance to get more information about the services and products offered by i2m. It is divided into five main sections, one for each type of resource: solutions, patents, courses, resource rental and consulting services. Each section is accompanied by a small text, aimed at showing understanding for our clients' main problems and showcasing what i2m can offer. Each section is accompanied by a link inviting the visitor to access the marketplace.

The third tab is the most important one, since it showcases the marketplace. The marketplace features at the top a search box, which eases the usability of the website and provides help when looking for specific keywords. On the left-hand side of the website, the visitor encounters a foldable product category list, depicting the five main areas of resources provided by i2m. When clicking, each

category unfolds to offer the user a more specific categorisation, based on the technological areas of expertise offered by the UPC, as explained in section 3.2.1. The main body of this page displays the range of products offered by i2m, each accompanied by a small icon. When clicking on a product, the visitor is directed to a new product page. This new view features a big picture of the product on the left, and the product title accompanied by a description, important links, and a “Contact us” button displayed on the right. There is also a small 5-star rating box and a comment section to get feedback from our visitors.

The contact form is the fourth and last tab of the i2m website, and it is also accessible via the “Contact us” button on the product’s page. The contact form is simple, yet direct, offering the visitor a short and efficient way to expose the issue, while giving the i2m personnel the required amount of information for this early stage of a sale. The contact form features exclusively four entries: name, email (mandatory), subject (mandatory) and main question’s textbox. On the right-hand side, the visitor can see a small map locating i2m, followed by the address, contact phone and contact e-mail.

The fifth and last tab displays the words “Sign-in” and offers the logged-in user access to the back-end. As previously mentioned, the only users having access to i2m’s system will be the i2m personnel, including promoters and support.

4.1.2 The contact form

The contact form is crucial in the success of the i2m platform, since it is responsible of giving the chance to potential customers to get in contact with i2m. The contact form has been designed to obtain the minimum amount of information to start a sales process, while offering the potential customer a short, yet effective, way to expose the issue they are facing. Henceforth, the contact form has four fields, and only two of them are mandatory: the email address and the subject.



The image shows a contact form with the following elements:

- A label "El Teu Nom" followed by a text input field.
- A label "Correu electrònic *" followed by a text input field.
- A label "Assumpte *" followed by a text input field.
- A label "La Teva Pregunta" followed by a larger text area input field.
- A blue button labeled "Enviar" centered below the input fields.

Figure 4.1. The modified contact form in catalán

The contact form's importance is based on the automation of the early stages of a sales process. Every time the button "Send" is clicked on after completing the form, a lead containing the name, subject and query is automatically created on the platform's back-end. This introduces an efficient and trackable way to manage, store and contact leads, maximising the chance of converting them to opportunities and reaching a sale.

05/04/2016 17:17:03	Estoy más interesado en píldoras de diagnostico	Jesus Alcober <jesus.alcober@upc.edu>
------------------------	----------------------------------------------------	------------------------------------------

Figure 4.2. Automated lead created via the completion of the contact form

Furthermore, once a lead is created it is possible to assign a salesperson to it. The following e-mail, quotations, and additional documentation exchanged will be exclusively directed to the assigned salesperson. Moreover, the "next tasks" (ie. call, send email) associated to that sale will be exclusively seen by the salesperson. This functionality is very useful in a large company with different sales teams, since it allows for the channelling of leads depending on their interests.

4.1.3 Reverse proxy

When installing Odoo, the default port is set to be 8069, and thus accessing the website had to be done by typing `www.i2m.info:8069`. Being able to see the port does not give a very professional nor a clean outlook, and hence an important requirement was to hide this value.

A method to do this involves a reverse proxy, which can be described as a type of proxy server that typically sits behind the firewall in a private network and directs client requests to the appropriate backend server. The benefits obtained from a reverse proxy is that it provides an additional level of abstraction and control to ensure the smooth flow of network traffic between clients and servers [26]. NGINX is a service which supports reverse proxy configuration and that is widely used by the Odoo community. The finalised configuration of the reverse proxy can be consulted in the Appendix section 2. The result was that a user could access the i2m platform by only typing "www.i2m.info" in their browser.

In future installations of Odoo dockers will be used, since with this method the reverse proxy configuration is automatic.

4.2 Modifying the code

Odoo offers a very large range of templates and out-of-the-box pre-configured features, but some of them are not always suited to a specific scenario. Henceforth, a big part of the project was dedicated to tailoring the software to the needs of i2m, both on the back-end and the front-end. Many variations have taken

place and therefore a detailed explanation of the reason behind each modification, as well as the “how to”, is provided in the upcoming sub-sections.

4.2.1 Hidden prices for non-logged in users

One important requirement of the platform entailed not displaying prices for public users, since most products sold on the marketplace are not packaged and thus do not have a fixed price. The implemented solution required changing, via code, the visibility of certain fields, in both the backend product price xml file and the frontend product HTML file. The visibility was defined by setting an if condition, where a div occurrence will not take place if the user is a public user, also known as non-logged-in visitor. The final code looks as follows:

```
<div t-if="not user_id.partner_id.name == 'Public user'" itemprop="offers"
itemscope="itemscope" itemType="http://schema.org/Offer" class="product_price
mt16">
```

The same condition was implemented on the product page of the website, the HTML file.

Before modification (non logged-in user)	After modification (non logged-in user)	After modification (logged-in user)
 <p>Asesoría y consultoría de despliegue de redes FTTH 1.00 €</p> <p>(a)</p>	 <p>Asesoría y consultoría de despliegue de redes FTTH</p> <p>(b)</p>	 <p>Asesoría y consultoría de despliegue de redes FTTH 1.00 €</p> <p>(c)</p>

Figure 4.3. a) Price shown before any modification took place, b) Desired behaviour: Price not shown for visitors, c) Price available for logged-in users

4.2.2 Substituting the “Add to Cart” feature

A critical requirement of the platform, was to dis-enable the “Add to cart” feature inherent to the e-commerce and website modules in Odoo, since most of the displayed products require negotiation and thus cannot be simply acquired by

adding them to the cart. The desired process flow requires the users to contact i2m, informing the platform promoters of their interest and their requirements.

To achieve this modification, the first step was to dis-enable the “Add to cart” direct button in the product listing, via the visual drop-down menu available in the website module.

Add to cart enabled (logged-in user)	Add to cart dis-enabled (logged-in user)
 <p>(a)</p>	 <p>(b)</p>

Figure 4.4. a) Add to cart icon enabled, b) Add to cart icon dis-enabled

The front-end html file, relating to the product view, had to be modified as well. In this case, it was required to remove the “Add to cart” button, directing the user to the payment process, and instead include an “Contact us” button, directing the visitor to the contact form.

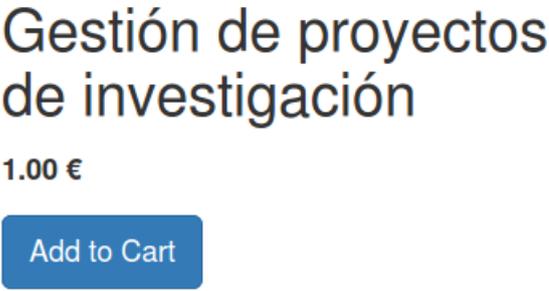
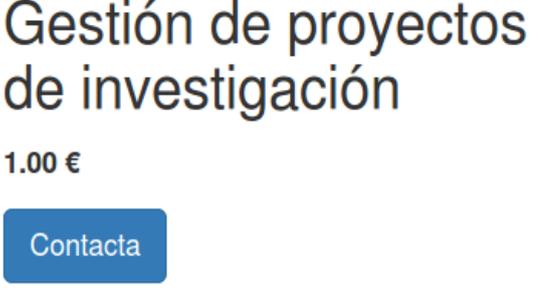
Add to cart enabled	Contact us enabled
 <p>(a)</p>	 <p>(b)</p>

Figure 4.4. a) Add to cart button enabled, b) Add to cart button replaced by a “contact us” button directing to the contact form

After testing, it was noticed that because of an embedded “update” function, anytime that a product was clicked on, it was automatically added to the shopping cart. Since the update feature was no longer required, because products cannot be added or removed from the virtual cart as there is no “Add to cart” feature, the function was removed.

It must be noted that none of the shopping cart files or payment files were modified, but they are simply not accessible from the front-end. If at any point i2m requires the implementation of an “Add to cart feature”, it can be re-implemented by placing buttons redirecting to the correct scripts.

4.2.3 Adapting the contact form

The contact form displayed on the website had to be adapted and shortened, to ensure the comfort of the visitors while still getting essential information. The original form featured six fields, all with mandatory filing, including “Company” and “Telephone number”, which were considered to be more redundant in the initial creation of a lead. Henceforth, to delete some fields and change others to non-mandatory, the original “contact us” xml form had to be modified.

In the end, only four fields were kept: name, email, subject and question textbox. Out of these, only email was marked as mandatory, along with subject which is a mandatory and non-modifiable field by Odoo. To remove the obligation of filling out a specific field, a class had to be changed and the attribute “required” deleted.

Before: Mandatory field	After: Optional field
<pre><div class="form-group form-field o_website_form_required_custom"> <label class="col-md-3 col-sm-4 control- label" for="contact_name">Your Name</label> <div class="col-md-7 col-sm-8"> <input type="text" class="form-control o_website_form_input" name="contact_name" t-att- value="request.params.get('contact_na me', '')" required="" /> </div> </div></pre>	<pre><div class="form-group form-field"> <label class="col-md-3 col-sm-4 control- label" for="contact_name">Your Name</label> <div class="col-md-7 col-sm-8"> <input type="text" class="form-control o_website_form_input" name="contact_name" t-att- value="request.params.get('contact_na me', '')" /> </div> </div></pre>

<p>Your Name * <input type="text"/></p> <p>(a)</p>	<p>Your Name <input type="text"/></p> <p>(b)</p>
-----------------------------------------------------------	---------------------------------------------------------

Figure 4.5. a) “Your name” field mandatory, b) “Your name” field optional

4.2.4 Including product urls : back-end and front-end

To enhance the product page and offer the visitor a wider range of information, it was required to display a URL linking to an appropriate UPC website, or a more detailed on-line documentation of the product.

Accomplishing this apparently simple task required several back-end modifications. To start with, a new “field” add to be created from scratch within the “database structure section”, accessible via the “developer mode”. The field name was defined as “x_product_website_template” (note: the x_ is mandatory for any self-made fields), the field label (ie. the word that will appear on the product menu) was defined as “Product website”, the type was set to char, and the model defined as Product Template. It is very important to define the field name without spacings, since otherwise it may create conflicts when using this field.

Field Name	x_product_website_template
Model	Product Template
Field Label	Product Website
Field Help	
Field Type	char

Figure 4.5. New field “x_product_website_template” definition

Once a field has been created, it has to be embedded in the code that is used to log all the products in Odoo’s backend. Furthermore, it must be defined which kind of information will the field contain, in this case it was set to url. The code is as follows:

```
<field name="x_product_website_template" widget="url"/>
```

The final result of these two steps can be seen on the graphical interface used to log product on Odoo’s backend.

The screenshot displays a product configuration form. At the top, there is a 'Product Name' field with a placeholder 'Product Name'. To the right, a summary table shows: 'Not Archived', 'Not Published On Website', 'Traceability', '0 Purchases', and '\$ 0 Sales'. Below the name field are checkboxes for 'Can be Sold' and 'Can be Purchased'. A tabbed interface shows 'General Information' selected, with other tabs for 'Inventory', 'Sales', 'Variants', 'Accounting', and 'Notes'. The 'Product Type' is set to 'Consumable'. 'Internal Reference' and 'Barcode' fields are empty. 'Invoicing Policy' has radio buttons for 'Ordered quantities' (selected), 'Delivered quantities', and 'Invoice based on time and material'. 'Sale Price' is 1.00 and 'Cost' is 0.00. 'Control Purchase Bills' has radio buttons for 'On ordered quantities' and 'On received quantities' (selected). The 'Product Website' field is a new empty text input box.

Figure 4.7. New “Product Website” field included in the back-end product section

The next step was to include this field box and its contents on the product description of the front-end website. To do this, the HTML code for the Product had to be modified in the following way:

```
<a      t-att-href="product.x_product_website_template"      class="text-muted"
target="_blank">
      <p      t-field="product.x_product_website_template"      class="text-
muted"/>
</a>
```

The code above is responsible for displaying the URL for each product

Cromatògraf de gasos

1.00 €

Contacta

Introducció

<http://futur.upc.edu/?locale=en>



 0

Figure 4.8. Each product features a specific URL

CHAPTER 5. STUDY CASES

5.1 Aim behind the study cases

A series of typical scenarios have been described in the following section, and the corresponding processes have been graphically depicted to be consulted in the Appendix section 4. All these processes target the generation of a sale, but alternative outcomes, such as a lost opportunity, are also envisaged. This section and the corresponding graphs, aim at helping the reader to understand how the software works from a practical point of view, and to have a better understanding of the processes and steps involved in a sale, as well as having an in-depth knowledge of the role played by each of the parties involved.

5.2 Study case 1: Sale of an unpackaged product

The following scenario presents the situation where a potential client is interested in acquiring a product that is not displayed on the website, or is in need of a more adapted product. These products or services are known as “un-packaged”, and a negotiation is necessary in order to offer something to fit the client’s needs.

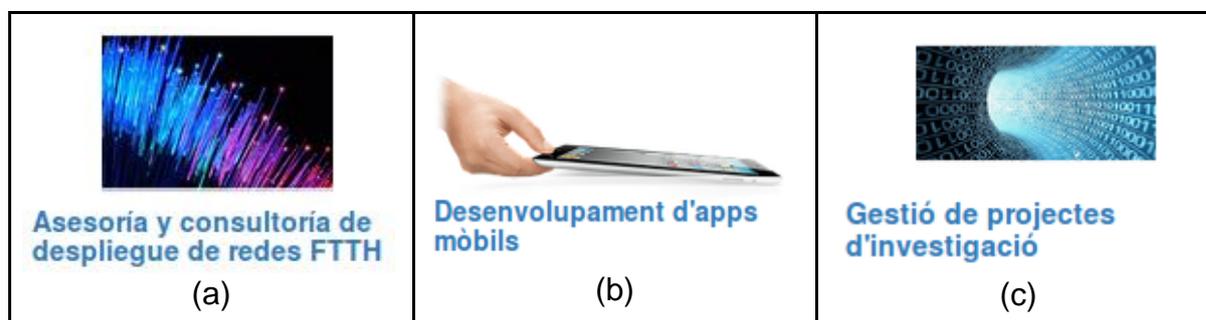


Figure 5.1 a) b) c) Examples of unpackaged products

Given a potential user has entered the website and has got in touch with the i2m personnel via the online contact form, then the i2m promoter can analyse the proposal, and when necessary ask for additional information to complete the petition.

Once the i2m personnel has correctly received the detailed information, they will contact the adequate research groups. Then, each of the research groups can evaluate the proposal, and if needed request more information to the customer, as well as suggest a price or deny the proposal. With this data, the i2m personnel can decide which research group is best suited for the task and offers a better pricing, and generate a quotation accordingly.

Given the quotation is received by the customer, the customer can assess whether the expectations have been reached with the proposed product. If the product is suited to the customers, a purchase will be generated. In the case where the product does not meet the expectations, the customer could either be disinterested in the proposal, resulting in a lost opportunity, or generate a counter offer, affecting the price or the product's requirements. When the latter is the chosen option, the research group will evaluate the counteroffer, where if accepted will result in a sale, and if rejected will become a lost opportunity.

5.3 Study case 2: Sale of a packaged product via the CST website

During the course of this project, the opportunity to expand i2m's product and service catalogue has been raised. The proposed method to achieve this efficiently and effectively would be to redirect the products advertised on the CST website (www.upc.edu/sct) to the i2m platform, via an i2m pre-defined email. The CST website (Serveis Científicotècnics de la UPC) offers a catalogue of equipment, laboratories and other facilities owned by the UPC, and which can be rented by companies.

Confocal laser microscope

Manufacturer: OLYMPUS

Model: LEXT

A laser microscope for observing and measuring samples with or without prior moderate preparation, with a magnification of up to 5000x. It can be used in confocal mode and allows the superposition of images obtained at different focus distances to create a 3D reconstruction. Alternatively, it has a halogen lighting system for use as a high performance metallography microscope. All images and measurements can be exported into the most common digital formats.



The UPC offers the services performance that the equipment could carry out.

Information and use

- For more information about equipment characteristics and possibilities and for use requirement, please contact us:

Francisco Heredero Alari

Telephone: 93 4054454

E-mail: francesc.heredero@upc.edu

Research unit: [Group for Structural Integrity, Micromechanics and Reliability of Materials \(CIEFMA\)](#)

- Equipment use can be requested to STC-UPC technical staff, for processing:

[Request form](#)

Figure 5.2 Screenshot of a resource offered on the CST website

The idea is that the email contact shown on the CST website is replaced by the generic i2m email contact (info-upc@i2m.info), so that every time someone is interested in a product and sends an email to this address, a lead would automatically be generated in the platform. Henceforth, the sales process of CST's resources can thus be managed in a centralised manner, while having a greater degree of control and traceability.

Given a potential customer sent an e-mail to the e-mail address pinned on the CST website, a lead will be generated in the platform. Then, the promoter's will be responsible for analysing the proposal and sending a questionnaire in the case where further information was needed.

Once all the issues have been cleared out, the i2m support personnel will send the detailed information to the corresponding research group. When the research group has analysed the information, they will be able to request more detailed

information or directly suggest a price. The quotation will be generated by the i2m support staff and sent to the potential customer.

The potential customer will then be able to reject the offer, resulting in a lost opportunity, accept the proposal, generating a sale, or creating a counter-offer. The new proposal can be rejected by the group, resulting again in a lost opportunity, or accept some changes and send the new quotation, finalising in an offer.

5.4 Study case 3: Request for Quotation

The situation where a customer is not interested in reading the product catalogue or knows exactly what they are looking for can exist. Typically, the potential customers will send an email detailing their situation and what they are looking for. In this case, the platform will manage the sale by buying the product or service from one of the research group, to later sell it to the client. This process is known as Request for Quotation.

Given the situation where the potential customer knows exactly what the desired product is, and has emailed the i2m personnel detailing the inherent requirements, then the promoters can analyse the proposal and request more information if they deem necessary. When the detailed information has been received, the promoter can assess whether there is a similar product or service in the i2m catalogue. In the case where a similar product is available, the customer would be informed and if the requirements were met, a sale would result.

In the case where the desired product did not exist, or the existing products did not meet the customer's needs, the promoter would be responsible for selecting potential research groups capable of offering an adequate product or service. Then, the i2m personnel would generate a Request for Quotation for each of the selected groups. The research groups having received the Request for Quotation will evaluate the proposal, and when appropriate, offer a service or a product adapted to the client's requirements.

Request for Quotation
PO00001

Vendor: BAMPLA, Jesus Alcober Order Date: 06/09/2016 11:40:14
Vendor Reference:

Products Deliveries & Invoices

1-1 of 1

Product	Description	Scheduled Date	Quantity	Unit Price	Taxes	Subtotal
[Castelldefels-0001] Desenvolupament d'apps mòbils	[Castelldefels-0001] App per intercanvi ortopèdic No tenen massa pressupost. No hi ha data d'entrega. Conveni pendent de signar. No podem iniciar el treball sense tenir l'acceptació per part de l'empresa.	06/30/2016 11:40:27	1.000	5,000.00	P_IVA21_BC	5,000.00

Untaxed Amount :	5,000.00 €
Taxes :	1,050.00 €
Total :	6,050.00 €

Figure 5.3 Screenshot of a typical Request for Quotation sent to BAMPLA research group

Given that all research groups have successfully completed the Request for Quotation, the promoter will decide which research group’s proposal and pricing seems more adequate to suit the customer. The i2m staff will then generate a purchase order to the selected research group and, in parallel, generate a sales order for the client. In this way, the research group offers the service to the client and once the bill is issued to the customer, the revenue goes to the research group’s account.

Re-Print RFQ **Confirm Order** Cancel Draft PO **RFQ Sent** Purchase Order

Request for Quotation
PO00001

Figure 5.4 Screenshot depicting how to generate a purchase order. Once the RFQ has been selected, the i2m personnel should click on the “Confirm order” button to confirm a purchase order

Once this transaction has been completed, the i2m personnel will be responsible for offering the client the requested product. Then, the customer can decide to buy the product, generating a sale, or reject it, resulting in a lost opportunity.

5.5 Study case 4: Mass mailing

Odoo allows the creation of marketing campaigns via the use of mass mailing, as was explained in section 2.1.5. This option allows the sending of the same promotional email to a large number of people contained within a specific mailing list, hence the customers will only receive promotional campaigns that may be of interest to them. The system also allows the creation of newsletters, which will periodically update the subscribers of the new products or promotions offered. Since this is a purely promotional task, most of the work is expected to be completed by the promoter.

The first phase of a promotional campaign requires brainstorming, where the promotion to take place, the information to be contained, the receivers, the launching date, and the expected reach, must be identified. Once this first step has been correctly completed, the promoter will create and launch the promotional campaign, making the information reach the desired customers.

Given that the customer has received the information, the opportunity to delete the e-mail will arise, in which case a sale will be impossible and the promotional campaign will have failed for this user, or on the contrary react to the email. If the latter occurred, the email incorporates a tracking method that will generate on the platform a notification informing that the email has been opened. Complementary information included in the tracking includes, number of replied emails, and number of clicked on emails, among others. This provides a quantitative method to benchmark the success of a promotional campaign.

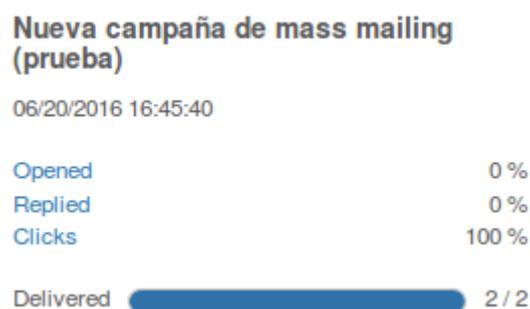


Figure 5.5 Screenshot of a mass mailing campaign tracking information

Once the email has been opened, the user can delete it, ignore it straight away, or get in touch. In the latter case, two options are then possible: the first one involves the potential customer accessing the website, and the second entails that the potential customer contacts with the platform or a promoter directly. The

process, as well as the outcomes, from this point on are the same as the ones described in the “Sale of an unpackaged product” in section 5.2.

As a precaution, all these processes should be accompanied by a retrospective analysis where the reasons to reach a sale will be delved into, as well as the factors determining a lost opportunity.

5.6 Study case 5: Multicompany and multiwebsite

The initial requirements outlined by the initiators of this project was to have different websites, one for each neighbouring and contributing city hall, as for example Castelldefels or Gavà, each displaying its own individual products and services. Furthermore, the services offered on these websites were to be provided by the UPC. Luckily, Odoo offers certain features which increment the flexibility, along with the complexity of the software, to recreate intricate business scenarios like the former.

The first feature is multi-company, which enables the management of several distinct companies. This module allows the creation of parent and child companies, all sharing a common database, and thus enabling the option to share partners, products, and modify currency, or taxing configurations, if the companies trade in different countries. The configuration of the module entails that the administrator of the parent company can have access and control the children companies, while the children companies cannot access each other nor the parent company, and thus cannot control other companies than the one they have been assigned to.

The second feature is named multi-website and allows the use of several websites for one database. This goes perfectly hand-in-hand with multi company, since it enables the possibility where each company has its own independent website, with different content and outlook, but with the same functionality and core code templates (ie. same contact form outline).

Evidently, these features give a greater degree of flexibility and give rise to a new unprecedented scenario. In this case, the platform behind the UPC, i2m, is the parent company and the Ayuntamiento de Castelldefels and Nautica are the children companies. In this scenario, all the products and services are provided by the UPC, or i2m in this case, and are applicable to both, or only one of these companies. Furthermore, each of these companies is required to have its own website, targeted to a specific region and set of customers, and with independent shopping contents. In addition to this, each company needs to be independently run and managed, contacting its own partners, generating individual revenue streams, and creating personalised marketing campaigns, among other business-related activities.

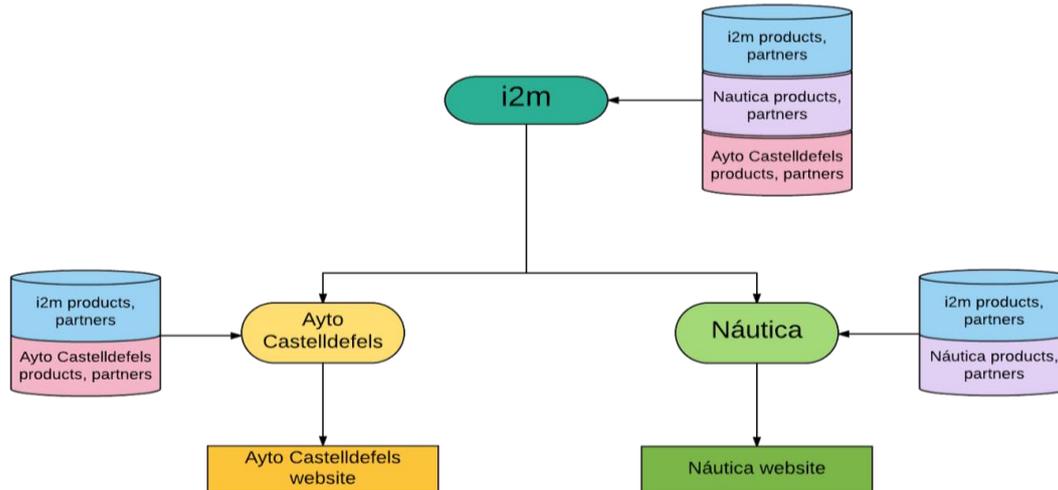


Figure 5.6 Diagram depicting the environment of multicompany and multiwebsite

When bringing this scenario to the Odoo world, the administrator user in i2m has access to all the products and partners created within its company and its children companies. Furthermore, the website associated to this company (i2m.info) was personalised with the UPC logo.

When entering the Ayuntamiento de Castelldefels section, with a specific administrator account created for the Ayuntamiento de Castelldefels database section (i.e. Admin Castelldefels), the products and contacts were limited to those provided by the Ayuntamiento de Castelldefels, as well as i2m. Moreover, when logging into the corresponding website (castelldefels.i2m.info), the shop had the products mentioned above and was personalised with the Ayuntamiento de Castelldefels logo.

A similar situation was perceived in the other children company, Nautica, which had its own administrator (Admin Nautica), contacts, product catalogue and website (nautica.i2m.info).

Despite the feasibility in the Odoo world of a complex business scenario, the presented solution has certain advantages and disadvantages. The main advantage is that it fulfils an important requirement set with the initial outline of this project where different websites, with a distinguished outlook, were required. The second advantage is that this configuration enables a different product catalogue for each company, alongside independent management and configuration of the back-end.

However, the main disadvantage is that this setup relegates the importance of the i2m entity to a second plane, and enhances the importance of the children companies. The project aimed at easing Baix Llobregat companies' success by making use of the UPC's equipment and investigators' knowledge. If each

children company targets a specific region and set of customers with its own product catalogue, the i2m shop does not have any relevance, since its products are covered in the children websites. The other disadvantage is that this configuration significantly increases the complexity of the system, which alongside the lack of official documentation for these features, could place the stability and usability of the system at risk. Finally, another thing to keep in mind is that even if certain contents are independent for each company, there are configurations which remain common, such as certain website templates, like products or contact form.

In hindsight, it is very interesting to conceive and implement a complex business scenario like the one described above. The difficulty relied on the lack of official and unofficial documentation on these features, which due to their complexity tend to be avoided. However, despite the correct functioning of this system, it is recommended to keep the databases and scenarios as simple as possible, to avoid unpredicted behaviour

CHAPTER 6. CONCLUDING REMARKS

6.1 Conclusion

Following the completion of this project, a set of concluding remarks can be drawn.

First of all, the implementation of a platform aimed at bridging the gap between the academic world and the industry has been successful. The platform features an attractive and enticing online marketplace, with a clear categorisation and appealing products, specifically aimed at the businesses within the area of Castelldefels. The products and services offered by the UPC ooze innovation and professionalism, hence bringing state-of-the art resources to the business sector within the area. At the moment, some new petitions have been received, such as the development of a mobile app, highlighting the potential of the platform and an interest from the industry.

Secondly, the use of an open source ERP software has proved to be a complete, yet flexible tool, with which to implement and bring to the software world complex business scenarios. Odoo enabled the implementation of a centralised and integrated invoicing, sales and emailing system, which eased the tracking of the different projects and improved the communication channels between the parties involved in a project. Furthermore, the possibility to create an uncomplicated website with an integrated shop functionality, enabled the creation of a front-end marketplace which can be easily be kept up-to-date by the appropriate staff. The next level of complexity radiated from the different parties involved, each requiring a specific resource catalogue, as well as an independent website. Odoo proved to be robust and complex enough to bring to life this scenario and meet the outmost specific requirement.

Furthermore, the designed platform has met the requirements set by both parties, the Ayuntamiento de Castelldefels and the UPC. With this platform, the latter institution as a greater control over leads and potential customers, while centralising the revenue streams and keeping track of customer satisfaction. On the other hand, the city hall benefits now from an interesting online catalogue of products offered by the UPC, which can be easily accessed by anyone. Furthermore, the automation of lead creation via the contact form guarantees an increased tracking of potential opportunities, which should entail an improved reply rate and a greater customer satisfaction.

Last, but not least, the project itself proved to be innovative and a state-of-the art solution to display academic-based unpackaged products online. So far, the implementation of an ERP platform, complemented by a website module to provide an online marketplace, has not been implemented by any other university or research institution in the world. Generally, these institutions do not provide a catalogue of their products and services, but instead urge the user to use a contact form. The approach offered by i2m offers an attractive marketplace of

some of the resources offered by the UPC in a comprehensible and informative manner, with the possibility of getting in touch via a contact form if interested.

Finally, the project proved to be an insightful and rewarding experience that allowed me to venture into the field of management. The scope of the project, as well as the potential changes that it will bring to the management of technological transfer, has been refreshing and stimulating. To conclude, this project was not only successful at every level, but also provided an state-of-the art solution to bring enrichment, at a knowledge and economic level, to the Baix Llobregat area.

6.2 Environmental impact

The implementation of an ERP-based platform has demonstrated the centralisation of communication, and has enabled the creation of an online catalogue of products. It is expected that with this improved communication channels, fewer transport displacements will be needed to track projects or correct misunderstandings, and thus a lower pollution due to fossil fuels.

Furthermore, the addition of an online catalogue and website, cuts the need to print periodically a resource catalogue to distribute to potential customers. Complemented with the mass-mailing functionality, which gives rise to an updated source of information, alongside the invoicing module, featuring the capability of sending digital invoices, entails that there is no longer a need for printed letters to keep customers updated. This sustainable practice lessens the environmental impact in the rainforest ecosystem and contributes at preventing massive deforestation.

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APPENDIX

TITLE: Innovation to Market

MASTER DEGREE: Master in Applied Telecommunications and Engineering Management

AUTHOR: Lucía Medina Huerta

DIRECTOR: Jesús Alcober Segura

DATE: July, 26th 2016

1. Installation of Odoo and common errors

1.1 Installation of Odoo

The following installation guide is meant for Odoo V9.0 in an Ubuntu 14.04 platform, alternatively you can use Linux Mint v17 Raffaella. The commands in boxes are expected to be inserted on the Terminal window.

Note: Before beginning the installation it is important to check the language of your keyboard and Linux environment is set to en_US and/or “UTF8”, since having any other configuration can lead to database compatibility issues. To double check this, type “locale -a” in your terminal and check that everything is set to “en_ACRONYM.utf8”.

- **Step 1.** The first step is to update and upgrade the system.

```
apt-get update && apt-get upgrade
```

- **Step 2.** Create a user to execute the Odoo server

```
adduser --system --home=/opt/odoo --group odoo
```

- **Step 3.** We want to create a database with Postgresql. Therefore, start by installing and configuring Postgresql and then log into Postgresql

```
apt-get install postgresql postgresql-server-dev-9.3  
su - postgres
```

At this stage, it is required to create a user, for instance “odoo” in Postgresql, with an associated password. It is very important to keep this password in mind for the future configuration of Odoo with Postgresql. The command to achieve this is:

```
createuser --createdb --username postgres --no-createrole --no-superuser --  
pwprompt odoo
```

Create the desired password:
Enter password for new role: *****
Enter it again: *****

Exit the Postgresql session:

```
exit
```

- **Step 4.** The next stage consists on the manual installation of libraries.

```
apt-get install python-pip python-dev python-ldap libjpeg-dev libevent-dev
libxml2-dev node-less libxslt1-dev libldap2-dev libsasl2-dev
```

- **Step 5.** Additional libraries are required for the correct execution of Odoo server. These libraries will be installed via the pip command. The libraries that I used were put together by Carlos Salazar in his blog, but they can be found on the official Odoo Github account under the name “dependencies.txt”

```
cd /tmp
wget http://salazarcarlos.com/dependencias.txt
pip install -r /tmp/dependencias.txt
```

To check whether the libraries were successfully installed, a “pip freeze” command can be executed, which should show the version of the different libraries, such as Jinja2, Babel, Pillow, etc.

- **Step 6.** It is now possible to start the installation of the Odoo Server. The idea behind the following code is to log in with the user “odoo” created in Step 2, and then install odoo via the “wget” command.

```
su - odoo -s /bin/bash
wget https://github.com/odoo/odoo/archive/9.0.zip
unzip 9.0.zip
cp -a odoo-9.0 server
rm -rf odoo-9.0
```

Initialize Odoo:

```
/opt/odoo/server/openerp-server
```

If the installation and setup has been successfully accomplished, you should see the following information on your terminal.

```
odoo@lucia-Aspire-5750G ~ $ /opt/odoo/server/openerp-server
2016-03-07 21:25:12,012 4352 INFO ? openerp: OpenERP version 9.0c
2016-03-07 21:25:12,012 4352 INFO ? openerp: addons paths: ['/opt/odoo/.local/share/odoo/addons/9.0', u'/opt/odoo/server/openerp/addons', u'/opt/odoo/server/addons']
2016-03-07 21:25:12,012 4352 INFO ? openerp: database: default@default:default
2016-03-07 21:25:12,196 4352 INFO ? openerp.service.server: HTTP service (werkzeug) running on 0.0.0.0:8069
```

To stop the Odoo Server press Ctrl+C and type the command “exit”

- **Step 7.** It is of much use to create a directory where all the log files can be stored, and accessed anytime in case things go wrong.

```
mkdir /var/log/odoo/  
chown odoo:root /var/log/odoo
```

- **Step 8.** The next stage is to configure the Odoo Server via sudo.

```
cp /opt/odoo/server/debian/openerp-server.conf /etc/odoo-server.conf  
chown odoo: /etc/odoo-server.conf  
chmod 640 /etc/odoo-server.conf
```

Then, edit the odoo-server.conf file with the following command:

```
nano /etc/odoo-server.conf
```

Once opened, modify or add the following information:

```
db_user = odoo  
db_password = PASSWORD CREATED IN STEP 3  
addons_path = /opt/odoo/server/addons  
logfile = /var/log/odoo/odoo-server.log
```

Then press Ctrl+O and Enter to save the file and Ctrl+X to exit.

- **Step 9.** To access Odoo, open your browser and type:

<http://localhost:8069>

The database name should be openerp-server and the password is the default password, set to admin.

Furthermore, to check Odoo’s log files, insert this command on the terminal

```
tail -f /var/log/odoo/odoo-server.log
```

Finally, to access the basic information of your database type and the encoding languages:

```
su  
su - postgres  
psql -l
```

List of databases						
Name	Owner	Encoding	Collate	Ctype	Access privileges	
Approach_RG	odoo	UTF8	en_US.UTF-8	en_US.UTF-8		
Approach_vendors	odoo	UTF8	en_US.UTF-8	en_US.UTF-8		
openerp-server	odoo	UTF8	en_US.UTF-8	en_US.UTF-8		
postgres	postgres	UTF8	en_US.UTF-8	en_US.UTF-8		
template0	postgres	UTF8	en_US.UTF-8	en_US.UTF-8	=c/postgres	+
template1	postgres	UTF8	en_US.UTF-8	en_US.UTF-8	postgres=Ctc/postgres	+
					=c/postgres	+
					postgres=Ctc/postgres	

(6 rows)

Disclaimer: Even if it is possible to create a file for automatic initialization of the server, it is not recommended, since this method is prone to issues. Therefore, every time that it is required to initialize Odoo I recommend to do it manually by placing these commands on the terminal:

```
su
su - odoo -s /bin/bash
/opt/odoo/server/openerp-server
```

1.2 Debugging of common errors

Over the course of the installation of Odoo, several problems were raised, which required a fair amount of time to be solved. This section aims to provide basic guidance with some of the problems that might arise during the installation of this software, along with useful command lines.

1.2.1 Error 98: Address already in use

Once the database has been correctly set up and you have been able to log in Odoo's web interface, it might occur that you log onto the web in different tabs and/or browsers. Evidently, the same program cannot simultaneously run on several ports and an error message might occur like the one shown on the image below.

```

odoo@lucia-Aspire-5750G ~ $ /opt/odoo/server/openerp-server
2016-03-07 21:55:46,306 5248 INFO ? openerp: OpenERP version 9.0c
2016-03-07 21:55:46,306 5248 INFO ? openerp: addons paths: ['/opt/odoo/.local/share/Odoo/addons/9.0', u'/opt/odoo/server/openerp/addons', u'/opt/odoo/server/addons']
2016-03-07 21:55:46,306 5248 INFO ? openerp: database: default@default:default
2016-03-07 21:55:46,436 5248 INFO ? openerp.service.server: HTTP service (werkzeug) running on 0.0.0.0:8069
Exception in thread openerp.service.httprd:
Traceback (most recent call last):
  File "/usr/lib/python2.7/threading.py", line 810, in __bootstrap_inner
    self.run()
  File "/usr/lib/python2.7/threading.py", line 763, in run
    self.__target(*self.__args, **self.__kwargs)
  File "/opt/odoo/server/openerp/service/server.py", line 246, in http_thread
    self.httprd = ThreadedWSGIServerReloadable(self.interface, self.port, app)
  File "/opt/odoo/server/openerp/service/server.py", line 105, in __init__
    handler=RequestHandler)
  File "/usr/local/lib/python2.7/dist-packages/werkzeug/serving.py", line 410, in __init__
    HTTPServer.__init__(self, (host, int(port)), handler)
  File "/usr/lib/python2.7/SocketServer.py", line 419, in __init__
    self.server_bind()
  File "/opt/odoo/server/openerp/service/server.py", line 115, in server_bind
    super(ThreadedWSGIServerReloadable, self).server_bind()
  File "/usr/lib/python2.7/BaseHTTPServer.py", line 108, in server_bind
    SocketServer.TCPServer.server_bind(self)
  File "/usr/lib/python2.7/SocketServer.py", line 430, in server_bind
    self.socket.bind(self.server_address)
  File "/usr/lib/python2.7/socket.py", line 224, in meth
    return getattr(self._sock,name)(*args)
error: [Errno 98] Address already in use

```

There are two simple options to solve this error. The first one consists on rebooting the pc and initializing the server as usual. The second one has to do with checking with ports are being used by the same program and manually killing them.

This command grabs the ports that are being used simultaneously for the same task

```
ps -fA | grep python
```

Then, insert the desired port to be killed were it says "PORTNUMBER" in the following command:

```
kill -9 PORTNUMBER
```

1.2.2 Installing modules

Before the installation of modules, I recommend a general update and upgrade on Linux's modules. To do this insert on the terminal:

```
apt-get -f install
```

When the database is created via the command lines explained in the section above, the Odoo service is loaded with demo data. This demo data is extremely sensitive to changes and can lead to numerous installation problems if it is not correctly handed. Therefore, it is highly recommended not to delete any of the contacts or entries shown, and instead “hide” them if we want to get a feel of the program. Despite this, if something is badly damaged and you find yourself unable to install new modules or insert new entries, it is possible to restore a database back to its initial settings with the following command:

```
sudo -H -u odoo createdb NAMEOFNEWDB
```

However, if you desire to start a database from scratch go to “<http://localhost:8069>” and click on the link which says “Manage databases”. There, you can manually click on create database and untick the box which states “load demo data”. In this way, a completely empty database can be created.

1.2.3 Installing a Chart of Accounts

When trying to create a customer or supplier contact, Odoo has three mandatory fields which must be completed and include Name, Accounts Payable and Accounts Receivable fields. The latter two have no specific field within the contact form and generally have to be set to default values via a pre-loaded Chart of Accounts, unless more complex scenarios are to be configured. To achieve this in Odoo version 9 it is required to activate the advanced settings options:

```
Administrator> About>Activate developer mode
```

Then, chose the appropriate Chart of Accounts by navigating through the various options.

```
Invoicing tab >Configuration header> Settings > Chart of Accounts>Install
```

2. NGINX Final Configuration

The installation was accomplished by Jesús Alcober following the tutorial proposed by André Schenkels in his blog for Odoo version 8:

<http://www.schenkels.nl/2014/12/reverse-proxy-with-odoo-8-nginx-ubuntu-14-04-lts/>

The adapted configuration to Odoo 9 and the setup is the following

2.1 ODOO9 Configuration file

```
upstream odoo9 {
server 127.0.0.1:8069 weight=1 fail_timeout=0;
}

upstream odoo9-im {
server 127.0.0.1:8072 weight=1 fail_timeout=0;
}

## http redirects to https ##
server {
listen 80;
server_name www.i2m.info test01.i2m.info test02.i2m.info;

# Strict Transport Security
add_header Strict-Transport-Security max-age=2592000;
rewrite ^.*$ https://$host$request_uri? permanent;
}

server {
# server port and name
listen 443;
server_name www.i2m.info test01.i2m.info test02.i2m.info;

# Specifies the maximum accepted body size of a client request,
# as indicated by the request header Content-Length.
client_max_body_size 200m;

# add ssl specific settings
keepalive_timeout 60;
ssl on;
ssl_certificate /etc/ssl/nginx/server.crt;
ssl_certificate_key /etc/ssl/nginx/server.key;

# limit ciphers
ssl_ciphers HIGH:!ADH:!MD5;
ssl_protocols SSLv3 TLSv1;
ssl_prefer_server_ciphers on;
# increase proxy buffer to handle some OpenERP web requests
proxy_buffers 16 64k;
proxy_buffer_size 128k;

#general proxy settings
# force timeouts if the backend dies
proxy_connect_timeout 600s;
proxy_send_timeout 600s;
proxy_read_timeout 600s;
proxy_next_upstream error timeout invalid_header http_500 http_502
http_503;
```

```
# set headers
proxy_set_header Host $host;
proxy_set_header X-Real-IP $remote_addr;
proxy_set_header X-Forward-For $proxy_add_x_forwarded_for;

# additional headers favourites odoo
proxy_set_header X-Forwarded-Host $http_host;
proxy_set_header Front-End-Https On;

# Let the OpenERP web service know that we.re using HTTPS, otherwise
# it will generate URL using http:// and not https://
proxy_set_header X-Forwarded-Proto https;

# by default, do not forward anything
proxy_redirect off;
proxy_buffering off;

location / {
rewrite ^/odoo/(.*)/$1 break;
proxy_pass http://odoo9;
}

location /longpolling {
proxy_pass http://odoo9-im;
}

# cache some static data in memory for 60mins.
# under heavy load this should relieve stress on the OpenERP web interface
a bit.
location /web/static/ {
proxy_cache_valid 200 60m;
proxy_buffering on;
expires 864000;
proxy_pass http://odoo9;
}
```

2.2 SERVER:CONF file

```
[options]
; This is the password that allows database operations:
; admin_passwd = admin
db_host = False
db_port = False
db_user = odoo
db_name = www_i2m_info
db_password = engagel3
addons_path = /opt/odoo/server/addons
logfile = /var/log/odoo/odoo-server.log
xmlrpc_interface = 127.0.0.1
netrpc_interface = 127.0.0.1
dbfilter = ^%h$
list_db= False
xmlrpc = True
xmlrpc_interface = 127.0.0.1
xmlrpc_port = 8069
xmlrpcs = True
xmlrpcs_interface = True
xmlrpcs_port = 8071
proxy_mode = True
longpolling_port = 8072
list_db = False
```

The only issue that remained unsolved with this configuration was directly accessing the website's front page of the main database. The reason for this was the use of several databases, the original and test databases, and the impossibility to select which one was the default database. A way to bypass this issue is to delete all the test databases when the real i2m platform is finalised and ready to be launched to the general public.

3. Website

3.1 Homepage

The screenshot shows the homepage of a website. At the top, there is a navigation bar with a logo on the left and menu items: 'Inici', 'Què oferim?', 'Tenda', 'Contacta'ns', and 'Administrador'. Below the navigation bar is a large hero section with a dark background featuring a glowing lightbulb and various icons like gears, arrows, and a lightbulb. The text in the hero section reads 'Strategy Innovation' and 'Busques innovació?' followed by 'Un marketplace de solucions innovadores per al teu negoci' and a 'Descobreix-nos!' button. Below the hero section is a main heading: 'Innovació cap a les empreses de Castelldefels' and a subtitle: 'El marketplace de solucions innovadores'. The main content area is divided into four columns, each with an image and a title: 'Solucions', 'Patents', 'Cursos', and 'Lloguer d'equips i d'espai'. Each column has a short paragraph of text. Below this is a section with three icons: a trophy for 'Excel·lència', a calendar for 'Seguiment', and a heart for 'Satisfacció', each with a short description. The next section is 'Butlletí de notícies' with a subscription form containing the email 'admin@i2m.info' and a 'Subscribe' button. The footer contains logos for 'Generalitat de Catalunya', 'Ajuntament de Castelldefels', and 'UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH'. Below the logos are three columns of contact information: 'Our products & Services' with 'Inici', 'Connecteu amb nosaltres' with 'Contacta'ns', 'Mailing List', '+9338967251', and 'info-upc@i2m.info', and 'Plataforma Universitat Empresa' with 'Sobre nosaltres', a paragraph in English, another paragraph in English, and 'Català' with an 'Add a language...' link. At the bottom left, there is a copyright notice: 'Copyright © Plataforma Universitat Empresa'.

3.2 What do we offer

Website Editar Promote Content Customize Help


Inici Què oferim? Tenda Contacta'ns | Administrador

Els nostres serveis

Per experts reconeguts

[Contacta'ns](#)

Solucions

Sabem que portar un negoci no és fàcil i de vegades es necessita una mica d'ajuda.

El nostre marketplace compta amb empreses innovadores de Castelldefels i grups de recerca de reconegut prestigi que treballen en l'avantguarda dels seus àmbits. Ofereixen les solucions més avançades i assequibles per al seu negoci.

D'altra banda, si no pots trobar el que s'adapti a les teves necessitats, et recomanem que contactis amb nosaltres per discutir una solució a mida pel teu negoci.

[Mira els nostres serveis >](#)





Patents

Alguna vegada has volgut ser propietari de tecnologies innovadores per fer créixer el teu negoci?

El nostre marketplace conté patents de les tecnologies més disruptives. Les patents estan ben documentades, testejaes, i no han estat encara explotades comercialment pel que el teu negoci pot treure el màxim profit.

[Mira el nostre port-foli>](#)

Cursos

Necessites formar els teus empleats?

El nostre marketplace ofereix una àmplia gamma de cursos dirigits als professionals que treballen i que necessiten adquirir una habilitat específica. Els cursos tenen diferents durades i nivells de complexitat, sense deixar de ser dinàmics i atractius.

No dubtis a compartir-nos la teva necessitat

[Mira la nostra llista >](#)





Lloguer d'espai i equipament

Escriu-nos un parell de paràgrafs que descriu la teva necessitat d'espai o recurs. Entre els nostres actius segur que trobem la solució adequada.

[Mira què oferim >](#)

Consultoria

A Castelldefels tenim experiència i coneixement en els més diversos àmbits de l'enginyeria. Oferim la nostra formació perquè et sigui útil a tu i el teu negoci.

[Comprova-ho! >](#)



Our products & Services

[Inici](#)

Connecteu amb nosaltres

[Contacta'ns](#)
[Mailing List](#)
 +9338967251
 info-upc@i2m.info

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We are a team of passionate people whose goal is to improve everyone's life through disruptive products. We build great products to solve your business problems.

Our products are designed for small to medium size companies willing to optimize their performance.

Català [Add a language...](#)

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3.3 The Marketplace

Website
Editar
Promote
Content
Customize
Help

Inici
Què oferim?
Tenda
Contacta'ns
Administrator

El Marketplace de Castelldefels

Tots els Productes

- > Solucions
- > Patents
- > Cursos
- > Lloguer de recursos
- > Assessorament

<p>Desenvolupament d'apps mòbils</p> <p>1.00 €</p>	<p>Cromatògraf de gasos</p> <p>1.00 €</p>	<p>Llisa de càrrega</p> <p>1.00 €</p>
<p>Gestió de projectes d'investigació</p> <p>1.00 €</p>	<p>Departament R+D externalitzat</p> <p>1.00 €</p>	<p>Asesoramiento sobre estándares en el área de las TIC</p> <p>1.00 €</p>
<p>Laboratorio de cultivos celulares escleróticos</p> <p>1.00 €</p>	<p>New device for bidirectional optical link</p> <p>1.00 €</p>	<p>Formación Labview</p> <p>1.00 €</p>
<p>producto de prueba</p> <p>1.00 €</p>	<p>UPC- el seu departament d'I+D</p> <p>1.00 €</p>	

Our products & Services

Inici

Connecteu amb nosaltres

Contacta'ns

Mailing List

+9338967251

info-upc@i2m.info

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3.4 Contact us

Website [Editar](#) [Promote](#) [Content](#) [Customize](#) [Help](#)

[Inici](#) [Què oferim?](#) [Tenda](#) [Contacta'ns](#) [Administrator](#)

Contacta'ns

Contacti amb nosaltres sobre qualsevol cosa relacionada amb aquesta web.
Farem el possible per respondre't el més aviat

El Teu Nom

Correu electrònic *

Assumpte *

La Teva Pregunta

[Enviar](#)

Plataforma Universitat Empresa
Calle Esteve Terradas
08860 Castelldefels
Espanya
+9338967251
info-upc@2m.info

Our products & Services
[Inici](#)

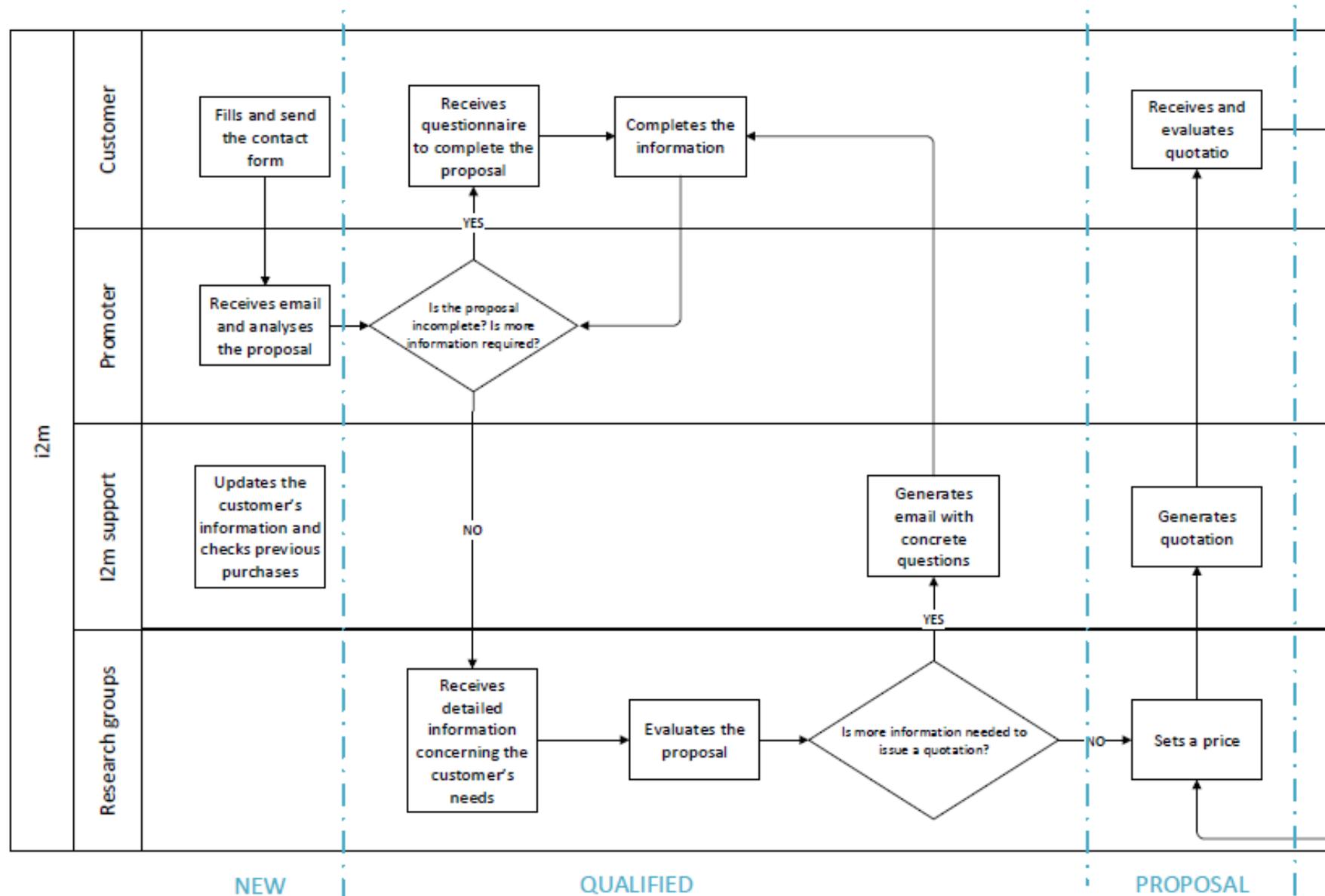
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info-upc@2m.info

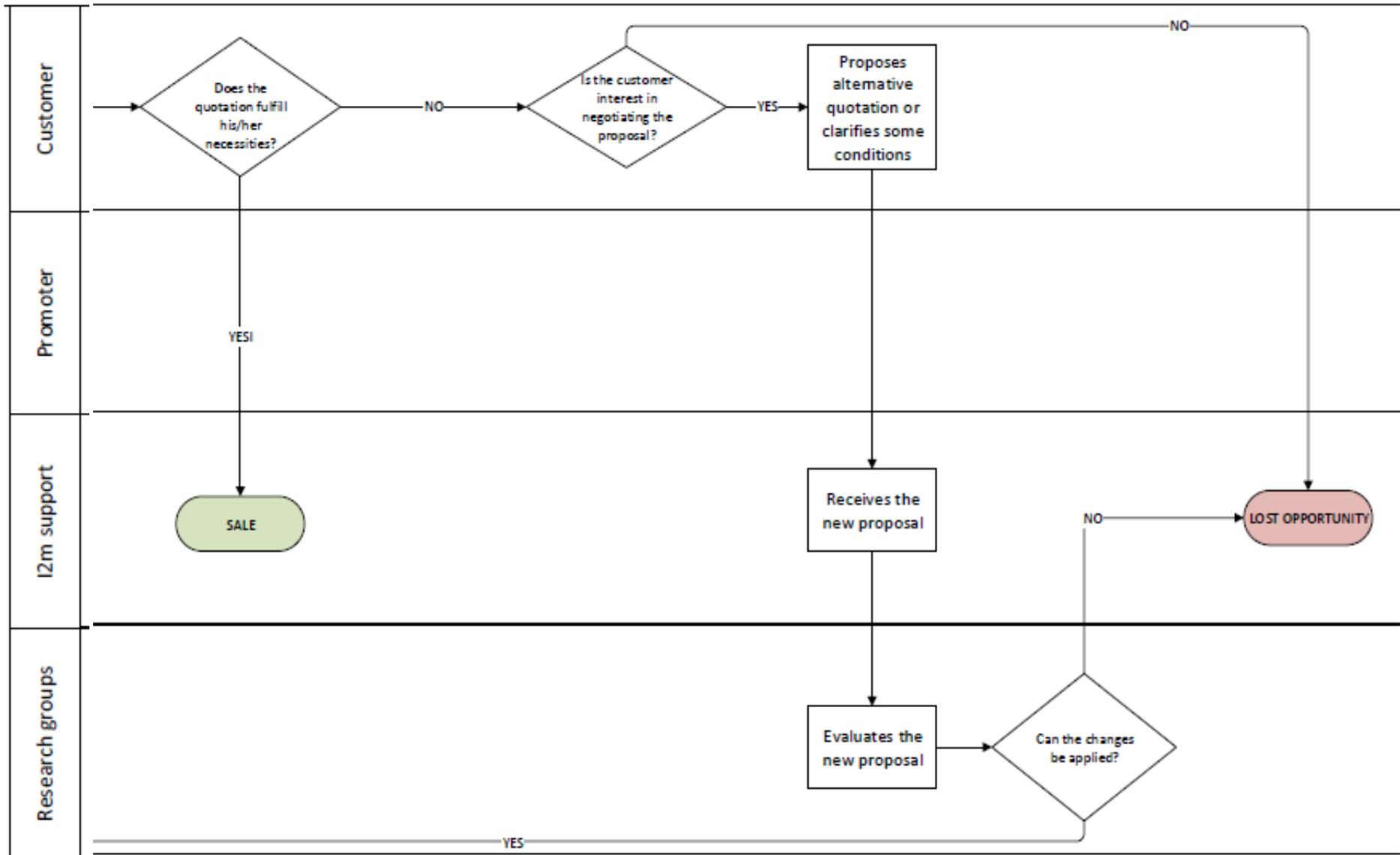
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4. Diagrams of analysis of processes

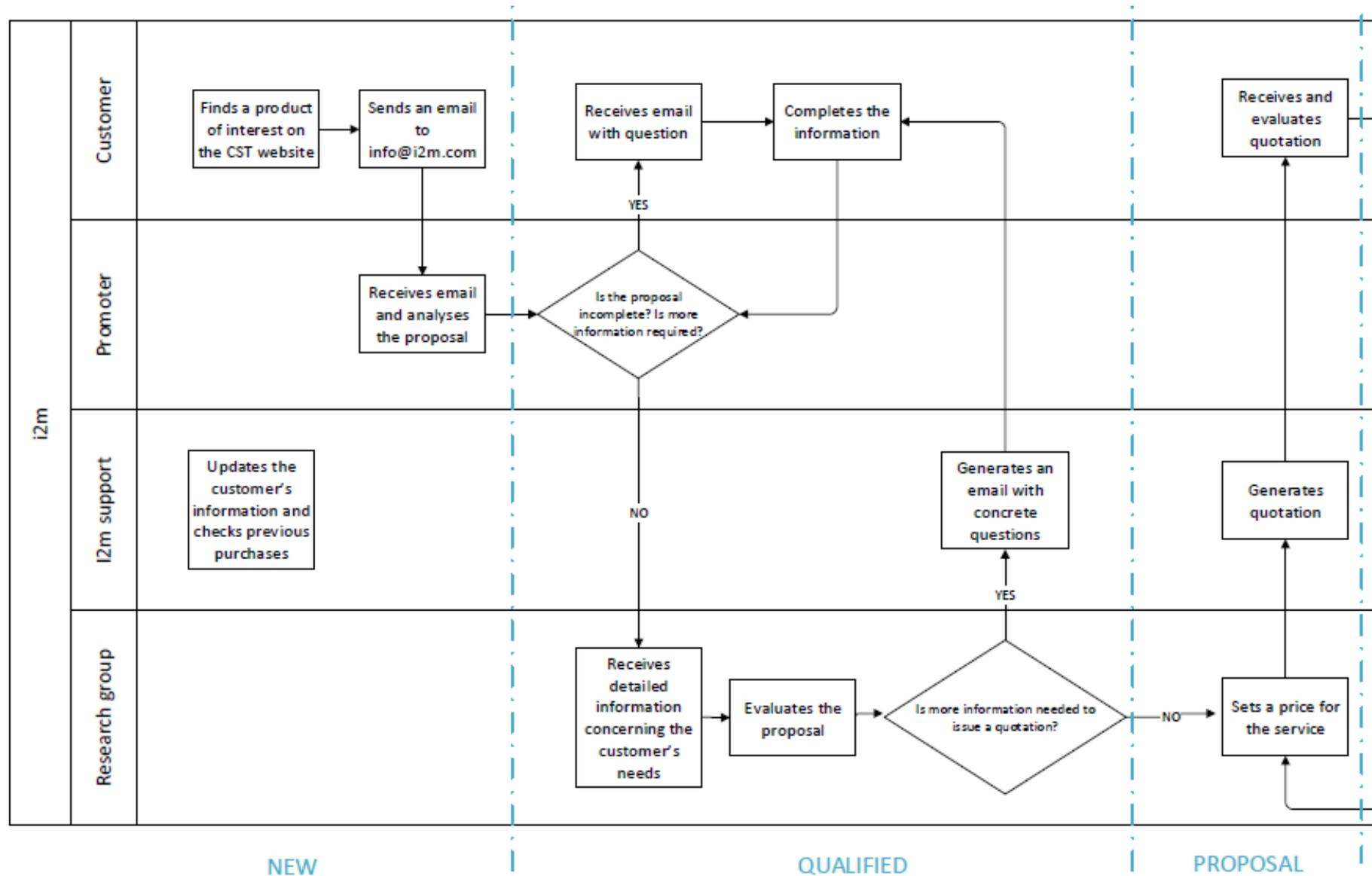
4.1 Analysis 1: Sale of an un-packaged product

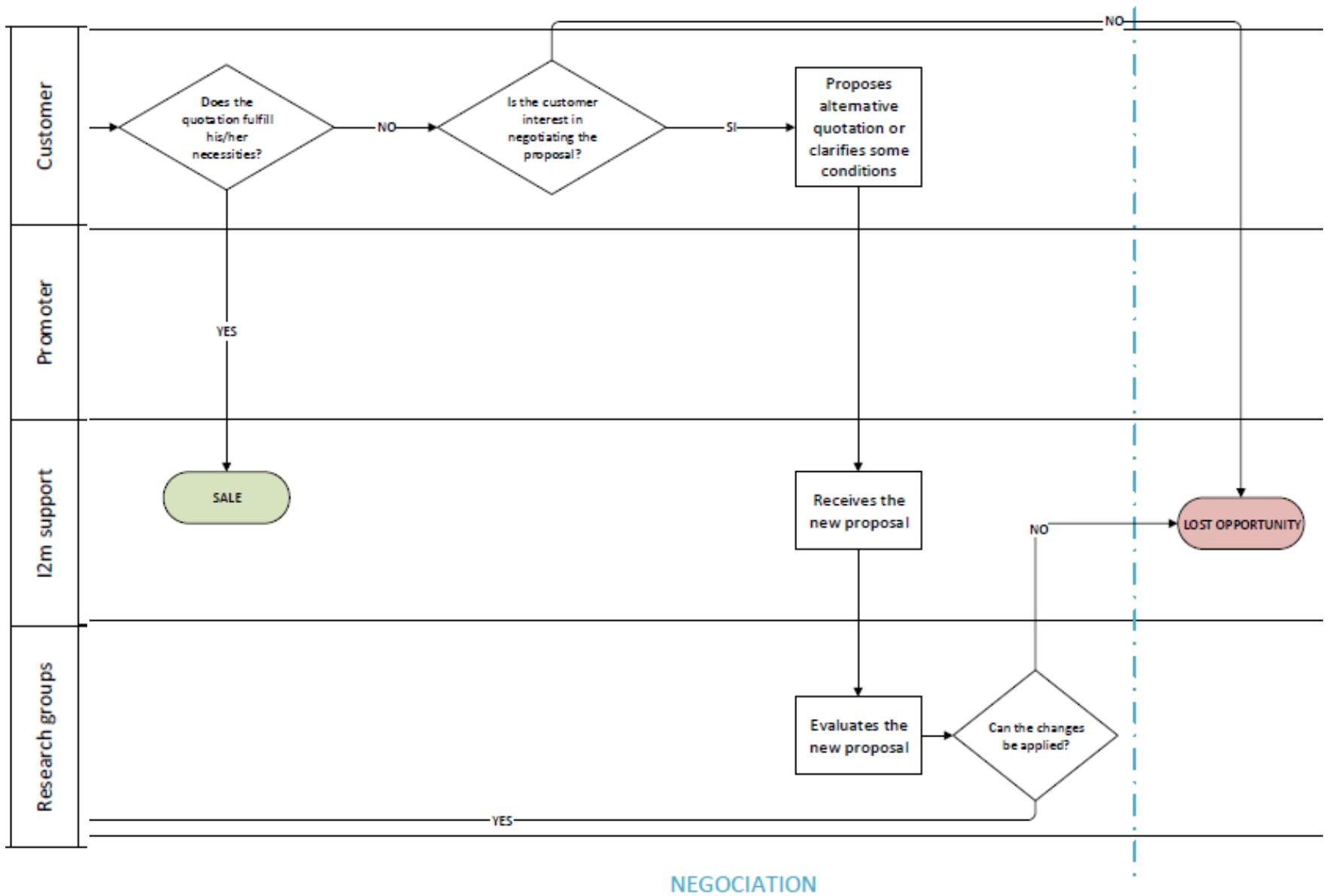




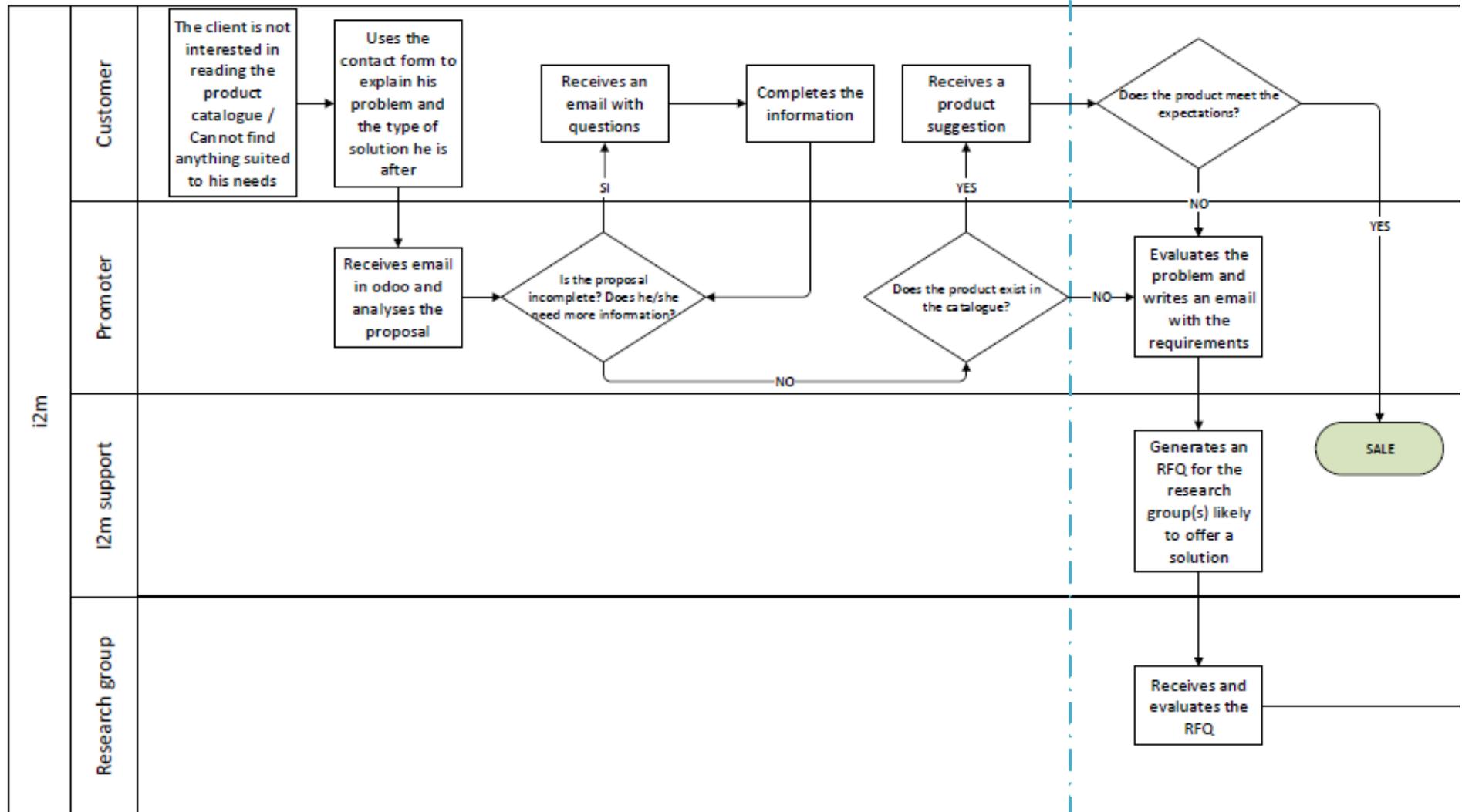
NEGOCIACION

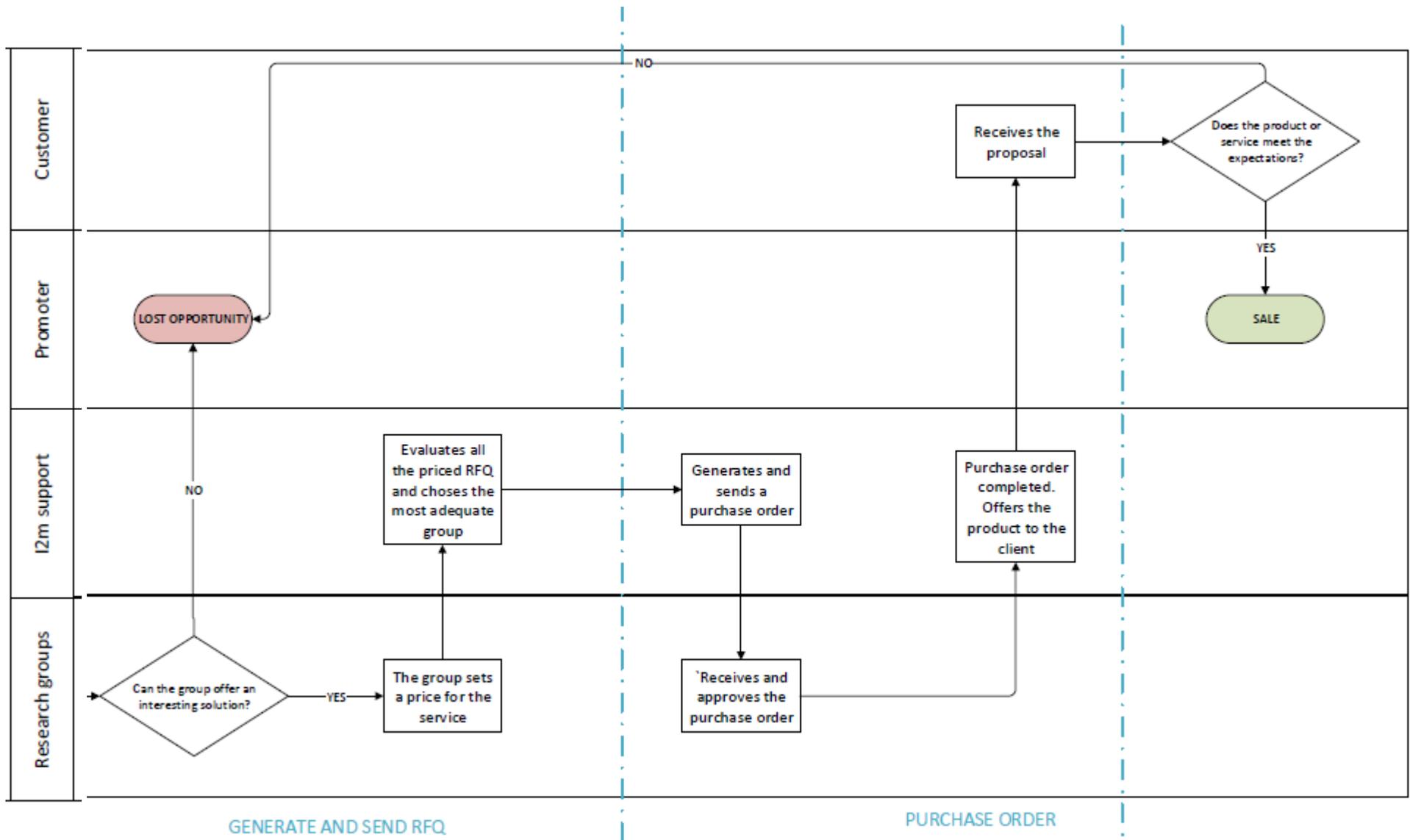
4.2 Analysis 2: Sale of a packaged product via the CST website



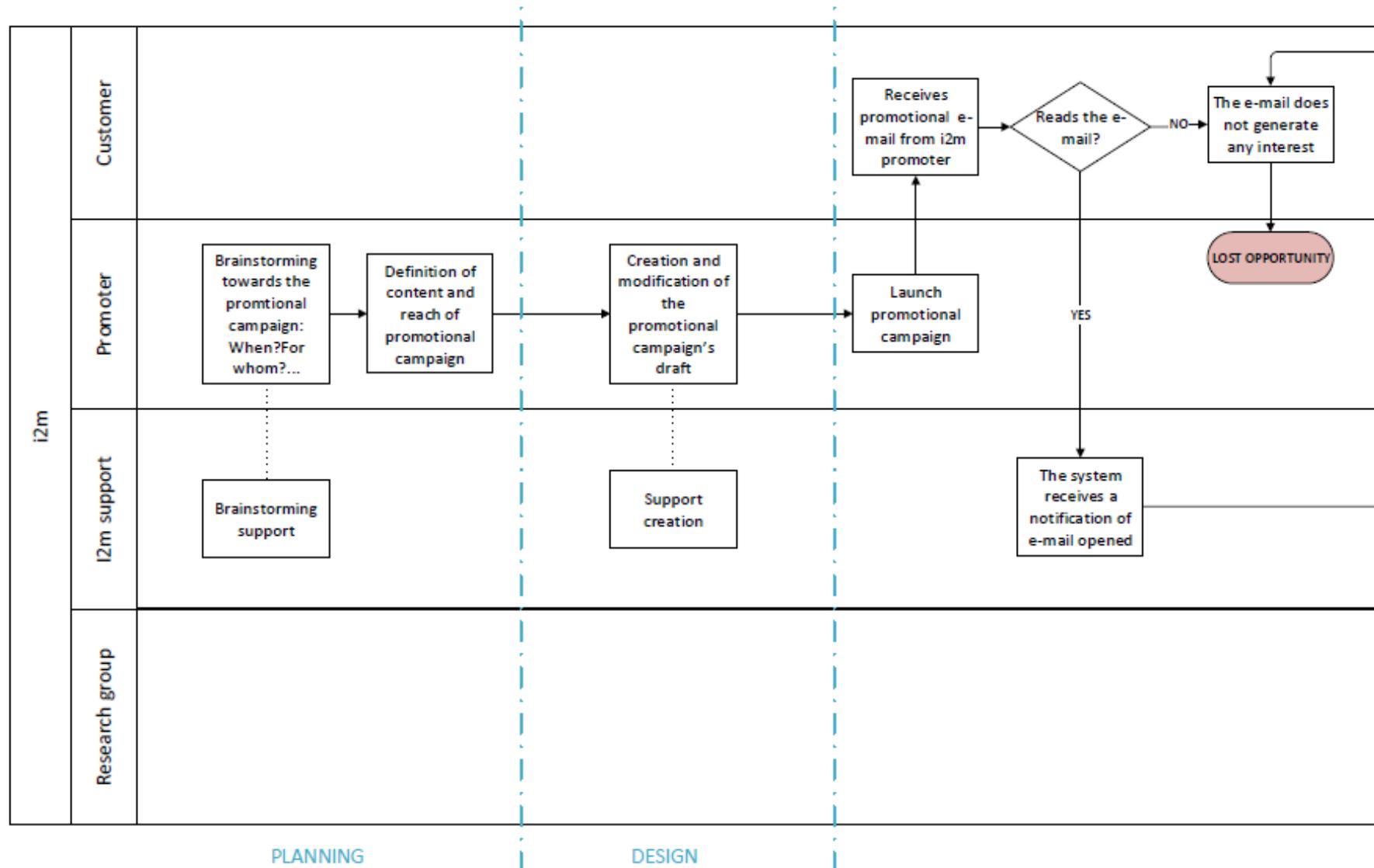


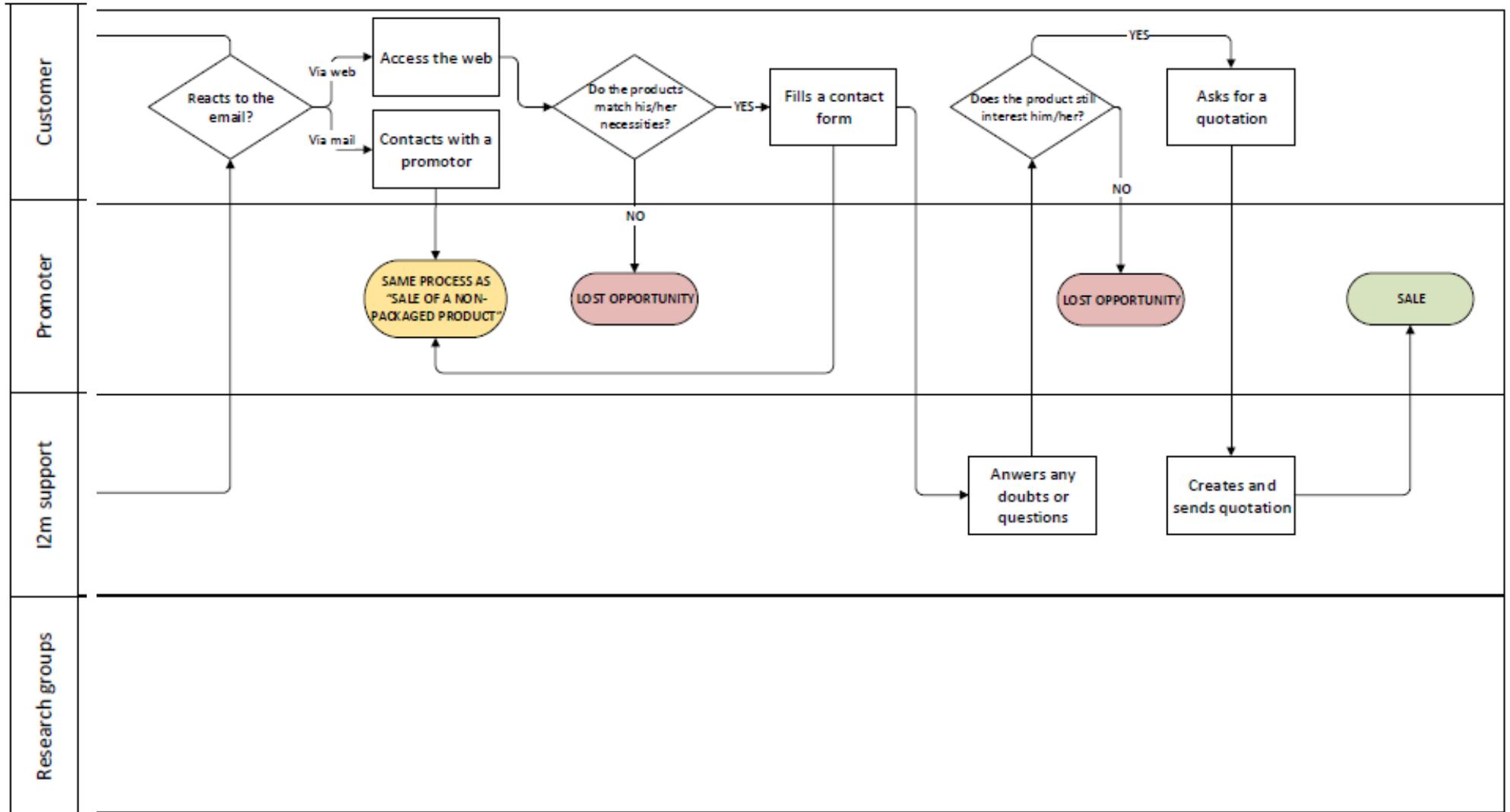
4.3 Analysis 3: Request for Quotation





4.4 Analysis 4: Mass mailing





SENT