Architecture of Information System

University of Twente

Milestone 3

Case: BriteLite

Group 8

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Introduction

This report is for the BriteLite case and it includes:

- The SWOT analysis and identification of directions of change. (M0)
- The baseline enterprise architecture corresponding with the organization's as-is situation; It serves as a vehicle to explain the board of the organization what is the current situation; (M1)
- Showing the board of BriteLite what the desirable future situation is; Identifying what is a desirable future situation in terms of an enterprise architecture that can be achieved by the implementation of certain changes in the organization; (M2)
- Comparing the baseline architecture (M1) with the target architecture (M2) and assessing what needs to be done, with affordable efforts, in order to implement the proposed changes; the impact of the proposed changes on the enterprise and the feasibility of the changes to be really implemented(M3)
- Impact Analysis to examine the impact of the proposed changes for BriteLite in financial and organizational terms.
- Conclusion and Future Recommendations.

Summary

BriteLite has been one of the most successful lamp producers in The Netherlands. The company was founded in 1923 as 'Lampenfabriek Jansma' and later renamed to BriteLite. The company sells its products and services in the market for conventional light bulbs as well as corresponding fittings. In addition to these manufactured products, BriteLite offers both maintenance and consultancy services on the use of conventional light bulbs, mostly for industrial and public environments. The maintenance line covers not only the repair and replacement of the company's original bulbs but other groups of lamps and fittings. BriteLite has been providing consulting for artificial light appliances in professional environments since 1995. This part of the organization, in recent years, has gained more and more attention. Overall, the organization consists of three business lines: Production, Engineering, and Consultancy. These business lines are marketed externally as BriteLite, BriteLite Engineering Solutions, and BriteLite Ideas, respectively. The new Board is planning a major strategic shift for the lamp manufacturer. Among other things, the company will shift its focus from the national to the international market.

SWOT Analysis and Direction of Changes

Fig 1. SWOT Analysis

Strengths

- BriteLite has a long history of producing several types of lightbulbs and provides both maintenance and consultancy services.
- BriteLite has a wide variety of products, from conventional light bulbs to fluorescent tubes and LED lights.
- BriteLite already has a webshop where customers can order lightbulbs.
- BriteLite has a clear and well-structured organizational hierarchy.
- BriteLite already has a great share of the lightbulb market.
- BriteLite offers two types of Maintenance services, regular and a 24/7 emergency service.
- BriteLite offers tracking and tracing services for its customers.
- BriteLite already has a SAAS E-support solution.
- BriteLite has a good quality assurance process and a diverse engineering team, each with its own specialty.

Weakness

- Their current portfolio only has incandescent bulbs, and no LED bulbs, so they do not have any experience in manufacturing the LED bulbs. Becoming familiar with the production using LED technology will require more resources in the beginning. Moreover, if something unplanned comes out, BriteLite will have to ask for consultancy(help) from other parties.
- The L-info is running on a mainframe server which is generally very expensive to manage. It should be replaced with a newer system.
- Consultancy lacks any formal structure. Many consultants have a specific area of expertise and sometimes they are not available when a job in that area is offered for them.
- Variable shipping rates make price estimates unreliable.
- Due to the restrictions in the QPlus system and its limited abilities to communicate with other systems, a lean process in which the type of quality error is documented and strict processes govern the action taken upon certain types of errors cannot be deployed for now.
- The heat that is generated from the light bulbs and from the conventional light emitters attracts animals. Animal rights activists are complaining about that.
- BriteLite has limited experience in making LED lights.

Opportunities

- Applying a major strategic shift to focus from the national to the international market.This will enable BriteLite to reach more customers and therefore it will sell more products.
- The ZAP trains all BriteLite's employees in the production department in order to make the transition to the new system easier. The training of the employees to use this system will provide them with better knowledge. That's why BriteLite should use this new ERP system that is provided by ZAP-vendor.
- Applying environmental protection factors to products and involve environmental activist organizations and animal rights groups to promote and advertise these products
- OTOMATIC controller software controls the behavior of the machine itself. The software also provides an interface at which the production schedule is entered in advance.
- Launching an extra production line for the production of regular glass bulbs, this production line can also be used to temporarily increase production capacity.
- Mature lean process approach that can be introduced to BriteLite in which the type of quality error is documented (such as problems with raw material or another issues during the particular stage of the production line)
- BriteLite can use additional sales channels like Amazon, Bol.com to sell Direct to customers. Thus, customers can order a product from this channel and then have it delivered in their home.

Threats

- Environmental Issues - pressure from several environmental activist organizations and animal rights groups about the production of light-emitters because the heat generated by these products attracts animals.
- Incandescent light bulbs are banned and production with matte coatings is prohibited.

- Low quality products produced by partners can reflect poorly on Britelite's brand image.
- Security threats to Britelite due to the usage of outdated systems -Windows 2000 based systems need to be updated as they are a security threat
- Industrial companies prefer to buy household products over industrial products for lower prices.
- BriteLite would outsource their orders to a plant in the Czech republic if the demand is too high the variable shipping rates will make the price estimates unreliable. Also, the quality of materials obtained from that plant would be low.

ID	Topic	Level	Stakeholder	Stakeholder Goal/Upgrade Direction
W1	No experience in manufacturing the LED bulbs	Business	BriteLite	Focus on LED technology
W2	The heat from light bulbs is attracting animals	Business	Animal right groups Eu environmental org	Reduction of the heat emissions
W3	L-info system running on mainframe	Technology	BriteLite, ZAP	Upgrade IT services
W4	QPlus systems have restrictive compatibilities	Application	BriteLite	Upgrade IT services
W5	Product Portfolio is limited to incandescent bulbs	Business	BriteLite	Increase the number of products
W6	Consultancy lacks formal structure	Business	Consultancy department	Optimization of processes
W7	Variable shipping rates from outsourcing factory	Business	BriteLite Shipping company	Have a stable relationship with shipping company
T1	Applications running on Windows 2000 which is a security threat	Technology	BriteLite	Upgrade IT services
T2	Risk of losing out on new technology because of outsourced R&D	Application	BriteLite	Increasing technology opportunities
T3	A complete ban on incandescent bulbs in the EU	Business	EU environmental organisations	Reduction of the heat emissions
T4	Pressure from environmental activists	Business	Animal right groups; Eu environmental org	Reduction of the heat emissions
T5	Low quality products	Business	Production plant located in Czech republic	Quality checks
T6	Household products are preferred over industrial products	Business	Industrial companies, BriteLite	Have a better pricing strategy towards industrial clients

S1	Long history of producing several types of lightbulbs	Business	BriteLite	N/A
S2	Wide variety of products	Business	BriteLite	N/A
S3	Active webshop is already there	Technology	BriteLite	N/A
S4	Clear and well-structured organizational hierarchy	Technology	BriteLite	N/A
S5	A great share of the lightbulb market	Business	BriteLite	N/A
S6	Optional Maintenance services: a) regular b) 24/7 emergency service	Business	BriteLite	N/A
S7	Tracking and tracing services	Application	BriteLite	N/A
S8	SAAS E-support solution	Application	BriteLite	N/A
S9	Diverse engineering team and Good quality assurance processes	Business	BriteLite, Customers	N/A
O1	Focus shift from the local to the international market	Business	BriteLite	
O2	Trained employees	Application	BriteLite	
O3	Environmental protection improvement	Business	BriteLite, Animal right groups	
O4	Automatic control of the machines	Technology	BriteLite	
O5	Extend the production lines	Business	BriteLite	
O6	Document the whole process	Technology	BriteLite	
O7	Additional sales channels	Business	BriteLite, customers	

Table 1. SWOT and their upgrade direction

Identification of directions of change

Changes in order to retain or improve relevance to customers

- **(C1)** The production of new products that are more energy-efficient and with a lower carbon-footprint. Using LED technology and halogen lights should be more prominent for BriteLite. The heat that comes off of the LED light emitters is limited and that's why this technology is more friendly for the environment and for the animals. The stable color temperature of LED lights is also a big advantage for the use of this technology, especially in color-sensitive environments such as the graphic sector. **[W1], [W2], [W5], [T3], [T4], [T6]**
- **(C2)** Shift the focus to the international market by exploiting international sales channels like Amazon **[O1]**

Changes in the organizational structure and process

- **(C3)** Form a structural consultancy group so that the consultants will have different shifts to serve new clients. The consultancy division is extremely flexible. Although this offers its advantages that they may be deployed for any work but there are cases when consultants are not available to work and BriteLite has to turn down offers. This service needs to be improved to increase utilization of the consultants. **[W6]**
- **(C4)** A lean process in which the type of quality error is documented and strict processes govern the action taken upon certain types of errors. **[T5]**
- **(C5)** Having its own R&D department. This will allow BriteLite to be more innovative and to find more opportunities in terms of new technologies. Therefore, the production of new products and/or improvement of products that already exist will take less time.**[T2]**

Changes in the application support

- **(C6)** Using ZAP's ERP system and technical training to BriteLite to upgrade its current information system. **[T1]**
- **(C7)** The replacement/update of the Q-plus system; This one is currently running in Windows 2000 and is used in quality management. In addition, It runs a proprietary database.**[W4]**
- **(C8)** The replacement/update of the L-info -"homegrown" which contains all specifications of Jasma/BriteLite products.**[W3]**

Changes in technology (IT infrastructure)

- **(C9)** Windows 2000 based systems need to be updated as they are a security threat.**[T1]**
- **(C10)** Having a failover and backup system in order to have less risk if something unexpected happens.**[T5]**
- **(C11)** Another change can be about implementing security in their systems in order to have login authentication when a user tries to login. This will be directly related to giving access and permission only to the allowed employees.**[T1],[W7]**

Baseline Architecture

Total Overview

In order to provide you with details about how the main concepts of BriteLite are integrated we have created the total view. We know that it is quite large but our main focus here is to show the full integration between the three layers. Therefore, this view provides an overview of all the Applications used by BriteLite and the underlying technology for it. The core application for the production process is OrderPRO, which is connected to most of the other applications in the ecosystem.

The application performs Order management for BriteLite and the services include - Order documentation, Order Processing, Billing, Payment processing, Product tracking and production planning. It is running on a Unix server hosted in the Veghel location, which may be a cause of concern for such a critical application to be running in only one location. The application is also connected to the webshop for BriteLite and acts as the backend for processing orders on the website. The distribution department also uses the OrderPRO system for its drivers, who can update the delivery status using PDA with internet access. The Accounting department uses the system for the financial management services it has.

The OrderPRO system is also connected to the QPlus system used by the Quality control function of production. One lamp from every batch is scanned by the barcode scanner that is attached to the QPlus system and the quality data is sent to the OrderPRO system. The main issue with the QPlus application is that it runs on Windows 2000 systems, which are a security threat as they have stopped receiving software updates, and its limited integration options with other applications. This is leading to the inability to introduce a lean process for error documentation which would make the Quality control processes more efficient.

Another important system in the It environment is the ERP system provided by ZAP. It is a new system which is yet to be rolled out completely but has received a positive response from half of the production department personnel trained on it till now. The training and maintenance of ZAP are outsourced to the vendor and as there is no lock-in, it has its advantages. The application is running on Unix clusters running at both the production locations and connected through a Cisco firewall over the internet. The ERP system is responsible for Production Scheduling, Inventory management, Production planning and outstanding production runs. The production line also relies on the OTOMATIC controller software which controls the behaviour of the machines. It runs on a Unix system and uses a MySQL Database, both of which are running on the same server in Dordrecht. The ERP system is linked with the corporate network to allow employees to access the data of production.
Arocle is the CRM system running in the IT ecosystem and manages all the customer interactions. It is used by the Marketing, Engineering, and Sales and Account management functions of BriteLite. It also has a custom developed solution called BriteCampaign which manages the marketing campaign for BriteLite. There are many newer marketing automation solutions available now, that may have to be reconsidered if running a custom marketing solution still makes sense.

The oldest running application in the environment is L-info, which contains specifications of all the products BriteLite manufactures. It is running on AS400 mainframe servers which are no longer supported or updated. The application supports inventory management, production planning and production quality control. It is also connected to the webshop and e-support application, while a connection with ZAP is in the works. The E-support application is used by the engineering function of BriteLite to perform most of their tasks. It supports workload handling which it sends and receives from the Arocle System.

The consultancy department uses the TeilPunkt system for file storage. It contains folders for all the customers and the consultants' store all files - rough sketches of solutions, photos, drawings of client locations, materials received from customers etc. on TeilPunkt. The application runs on a Windows server and uses a simple file storage database. The system is linked with the corporate network as well.

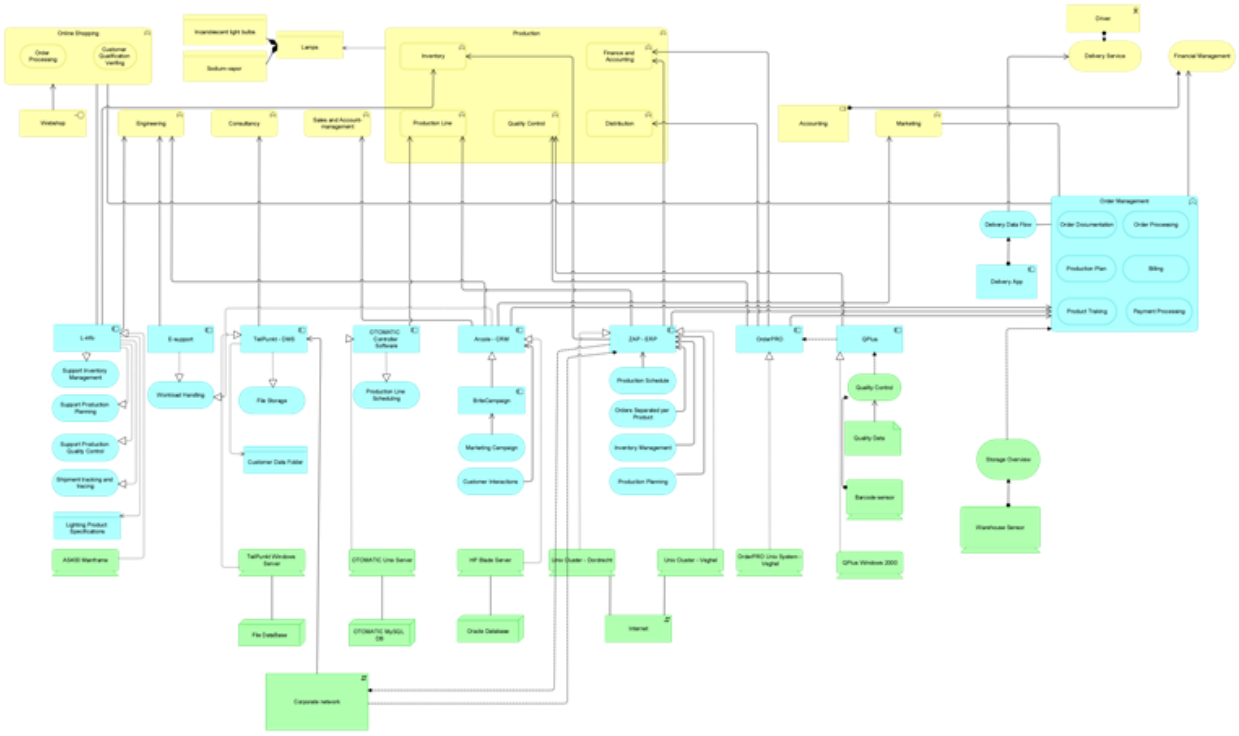

Fig 2 : Total overview

Motivation viewpoint

The motivation viewpoint covers the motivational aspects of BriteLite. These aspects are related to the stakeholders, to their goals and requirements, to the drivers as well as to the assessments that are based on the SWOT analysis.
BriteLite itself is one of the stakeholders in this viewpoint. In addition, the consultancy department within BriteLite is also considered as a sub stakeholder. There are multiple drivers for BriteLite and the consultancy department.

Profit is one of the main drivers for BriteLite. There are a couple of factors that positively affect this driver. The reduction of the personnel costs and the increase of revenue have a great impact on making profit. In addition, customer satisfaction also contributes to the increase of revenue for BriteLite. BriteLite has a great opportunity and that's documenting the whole production process (O6) which leads to the optimization of processes inside the company. This affects the profitability of BriteLite positively. Having additional sales channels (O7) and the clear and the well structured organizational structure (S4) of BriteLite also have a positive impact on the profitability.

One of the weaknesses of BriteLite and which has a negative impact on generating revenue, is the variable shipping rates (W7). This negatively affects the products' prices. Besides, industrial clients use household series to cut on their costs (T6).

The second driver for BriteLite is the modernization of the IT infrastructure, this is very important since multiple software packages are being used within different departments of BriteLite. The integration of those software packages will contribute to the modernization process. The further integration of the different IT systems contribute to the optimization of processes inside the company as well. BriteLite already has SAAS E-support solutions (S8). This contributes to this driver.

The upgrade of the IT infrastructure is needed since parts of the infrastructure use outdated software and operating systems like Windows 200 (T1) (W3). In addition, the Qplus systems have restrictive compatibilities (W4). The process of outsourcing the R&D poses a threat to the position of (T2)

The third driver for BriteLite is Market Competitiveness. BriteLite has a long history of producing light bulbs and that gives it a good competitive position in the national market (S1)(S5). This position is further strengthened by having multiple sale channels including a webshop (S3). Beside the focus on the national market, BriteLite is also focusing on the international market (O1). One of its goals is to focus more on LED technology to bring more LED products to the both national and international markets. However, this is not an easy task for BriteLite because it has no experience in manufacturing LED bulbs(W1).

Increasing the market share and increasing the number of products can further increase the competitiveness of BriteLite, yet this can be hindered by the fact that BriteLite has a portfolio limited to incandescent lamps (W5).
The position of BriteLite is threatened by a couple of weaknesses and threats, the main threat is the complete ban on the incandescent bulbs in the EU (T3)

The third stakeholder in the motivation viewpoint is Customer. For BriteLite customers the satisfaction factor is very important. Having a wide variety of products with reasonable product prices (S2) is very important. However, the product price is affected by the variable shipping rates (W7).

In addition, the quality of the products is crucial. One of the strengths of BriteLite is the good quality assurance processes that incorporate a very strict quality control (S9). Nevertheless, this is negatively affected by the low quality products delivered from partnered companies(T5).
The presence of tracking and tracing services (S7), offering different types of maintenance services (S6), the fact that BriteLite has a wide variety of products (S2), and the clear and well-structured organization (S4) are strengths factors that contribute to the customer satisfaction. In addition to these strengths, BriteLite can exploit the opportunities of training its employees (O2) and the existence of additional sales channels (O7).

The customer satisfaction is also affected by a clear weakness inside the consultancy department of BriteLite, the consultancy lacks formal structure (W6). This is a very important point which must be addressed to increase the engagement with existing and new customers and also because the consultancy is an independent line inside BriteLite.

The last two stakeholders are the animal rights groups and the EU environmental agencies. The environmental issues caused by the traditional lights and the green development of BriteLite are their drivers (T4) (W2). For them, it's very important that the production as well as the products themselves are environmentally friendly products. Complying with the EU environment's regulations is a primary goal to achieve green and sustainable development (O3).

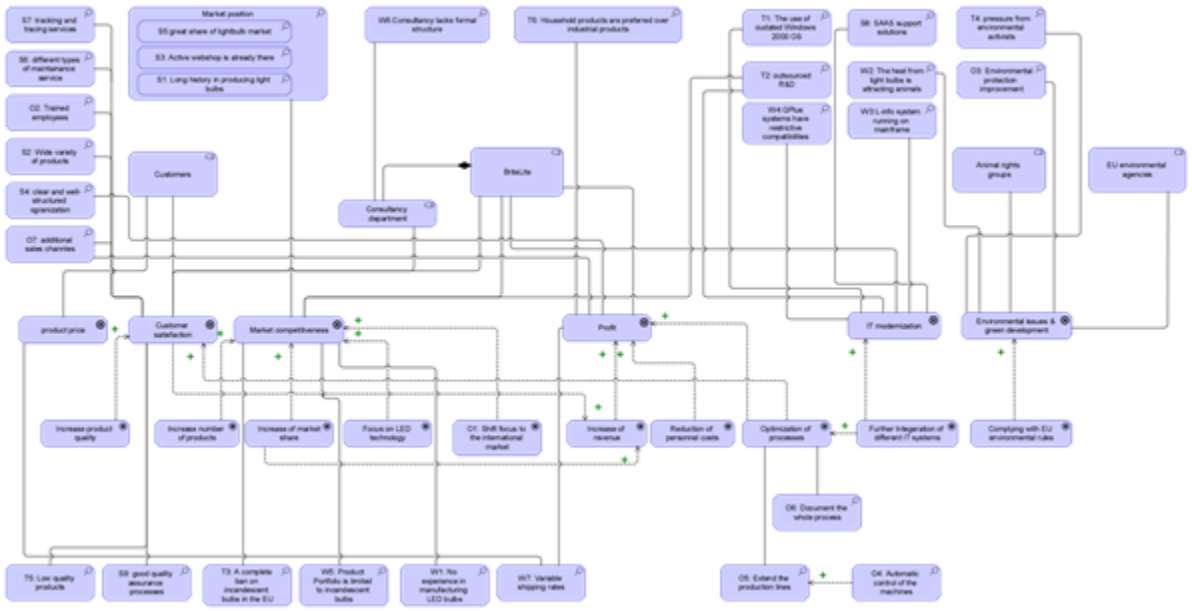

Fig 3 : Motivation viewpoint

Organization viewpoint

The Organization viewpoint focuses on the organization of a company, a department, a network of companies, or of another organizational entity. It is very useful in identifying competencies, authority, and responsibilities in an organization. We have mentioned in our SWOT analysis that one strength of this organization is that it is well-structured.

The main actor is BriteLite which is composed from the “Board of Directors"(another actor in this view). The organization runs the business in a different environment which will be presented by the location concept. In “Home headquarters” three roles have been assigned “Sales and Account Management", “Marketing” and “Finance and Accounting”. The reason why we choose to present them with role concepts is because these are some of the departments of the organization which are associated with different activities that they have.

Moreover, BriteLite has two main production lines in locations, namely Dordrecht and in Veghel. These are assigned to the “Production”(role), which is composed of three other roles: “Distribution”, “Inventory” and “Maintenance”.

To completely run the business, BriteLite has also outsourced: “External organizations". These organizations are assigned to “ICT support”, and “Legal” to “R&D”. In our SWOT analysis we have defined that having an outsourced “R&D” is a threat for the organization and it will have more technological opportunities if it comes in-house (this will be a change in the future). Lastly in this view we have included two interfaces in order to present the points of access. These interfaces are “BL Ideas" which is assigned to “Consultancy”(a role) and other is “BL Engineering Solutions.

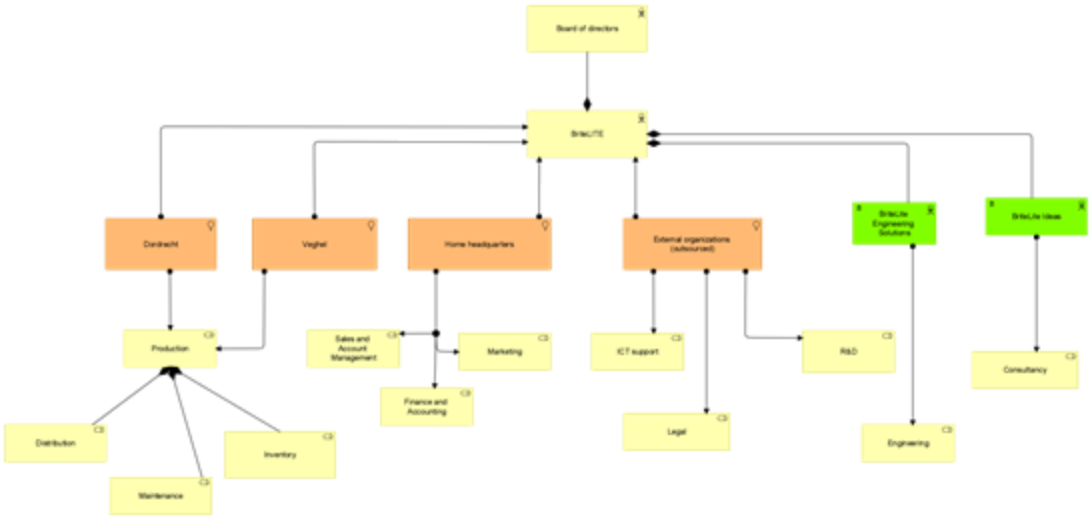

Fig 4 : Organization viewpoint

Product viewpoint

The Product viewpoint depicts the value that these products offer to the customers or other external parties involved and shows the composition of one or more products in terms of the constituting services, and the associated contract. It may also be used to show the interfaces through which this product is offered. The stakeholder is BriteLite as product developer.
BriteLite offers two types of lamps: Incandescent light-bulb, Sodium-vapor lamps; each of them belongs to different sectors such as household, graphic, corporate and industrial.

- The household series (Regular, Comfort and Comfort+) are only available through resellers.
- The ReliaBulb series are only available for sale through the webshop of BriteLite.
- The light bulbs for industrial use are only available for order in quantities of 250 pieces (Ultra and Ultra+ series) and 500 pieces (Power and Extreme series).

Additionally, BriteLite offers two types of services: regular service visits and a 24/7 emergency service. The 24/7 emergency service is only available as an extension of the regular service contract.

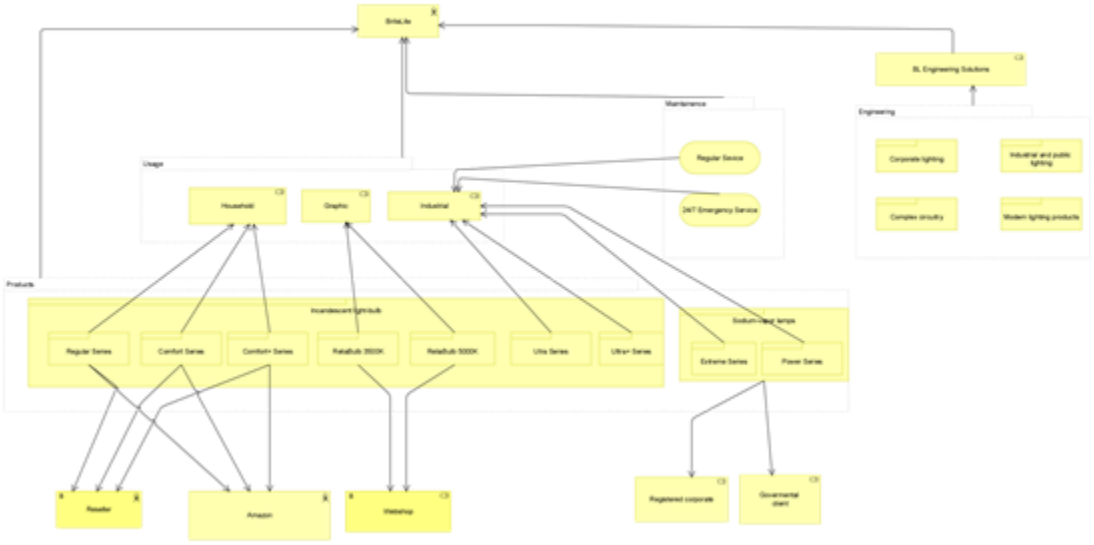

Fig 5 : Product viewpoint

Information structure viewpoint

The model is designed as a 3-tier structure: Production Plan, Customer folder, Order Data & Production Line Management. Firstly, we created “Order detail” in the application layer, which contains the specific data of order. Then we have selling policies which are from offline selling consultants and online demands form written directly from clients. Also, from the case description we can see that customer information is gathered to see whether the customer fits the selling policy to buy specific products. Then the pack of selling policy and order details aggregate “order data”.

On the other side, the core concept in the 3rd layer is “production line management”. The pack of it is combined with “storage data”, “production data”, “accounting” and “raw material acquisition”. The storage data and production data are stored in the local servers and therefore they belong to the application layer. Since accounting data and raw material acquisition data are variable, these data need to be acquired from the departments responsible for these data.

The second layer is “customer folder”. It stands for the file folder that combines product catalogue, selling policy and, the most important, order data. This folder directly serves the top layer “production plan” with “production line management”. We believe that the production plan is the most important data that serves other services and business; thus, it belongs to the business layer.

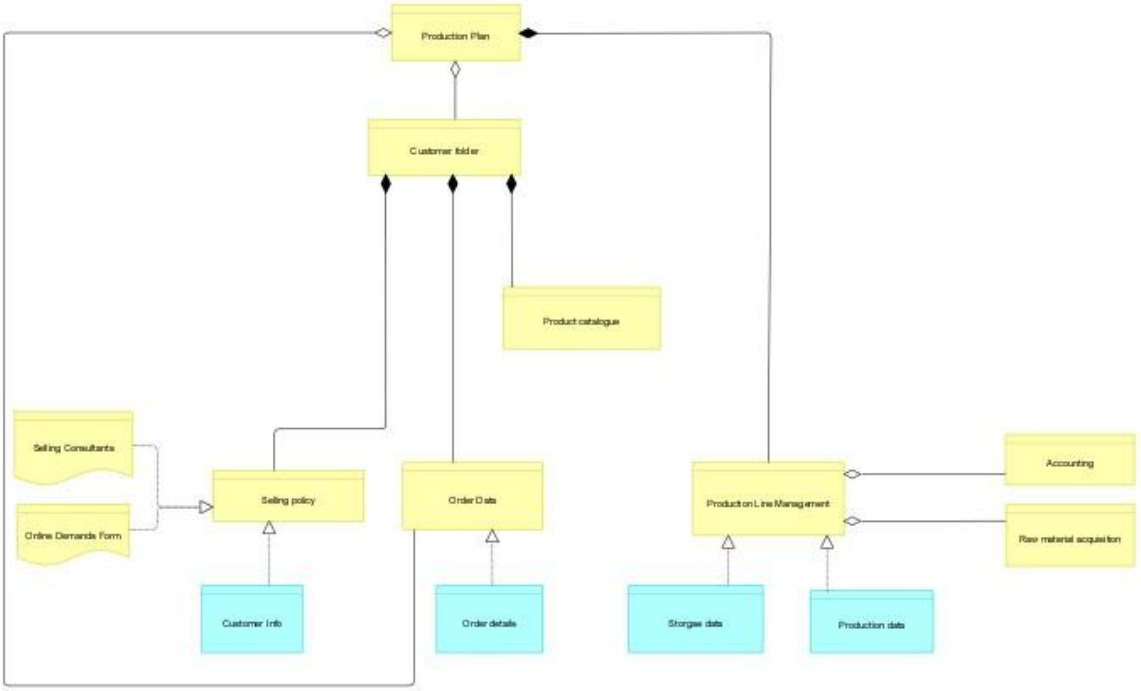

Fig 6 : Information Structure viewpoint

Service Realization viewpoint

BriteLite offers several services to different customer segments which are represented in this view. The business layer and application layer elements are used to depict the services offered by BriteLite. The central component of this view is the services that BriteLite offers which are represented as Business Service. These services are realized by the 3 main business lines form BriteLite, namely Consultancy, Engineering and Production. These business lines are represented as business functions in this view as we want to show the processes each of the business lines perform to deliver service to its customer. For consultancy, their main service is providing consultancy to BriteLite customers and when they make a sale, the process 'Sale of Lighting Solution' is triggered. As we have represented the applications used by BriteLite as application components in this view, the information that BriteLite consultants provide in the process of making a sale of lighting solution is fed into the 'TeilPunkt' application, which is a DMS (Document Management) solution and is stored in 'order details' component which is a data object. The Production business line of BriteLite provides 3 services which are depicted in the architecture model - Lamp manufacturing, Webshop and Maintenance.

The maintenance service consists of Regular service visits and Emergency services for which we have used the aggregation relationship. The details of the maintenance service are governed by the service level agreement, which is represented by a business object associated with the maintenance service. The reason for not choosing a contract is that it is not available in the service realization view.

Within the production function, there are different processes which the business line performs to realize the services it offers. OrderPRO is the main application which the Production function uses and is represented by a serving relation. As there are instances that data flows from one application to another, we have represented that using flow relationships. The QPlus application which is used in the Quality control process is one such example. The data flows from the Quality control process into the QPlus application and on completion of the process, it is sent to the OrderPRO application. The ICT Department and the Finance and Administration department are the additional roles shown in this view. The services provided by the finance and administration department are internal to BriteLite and are provided to all the business lines.

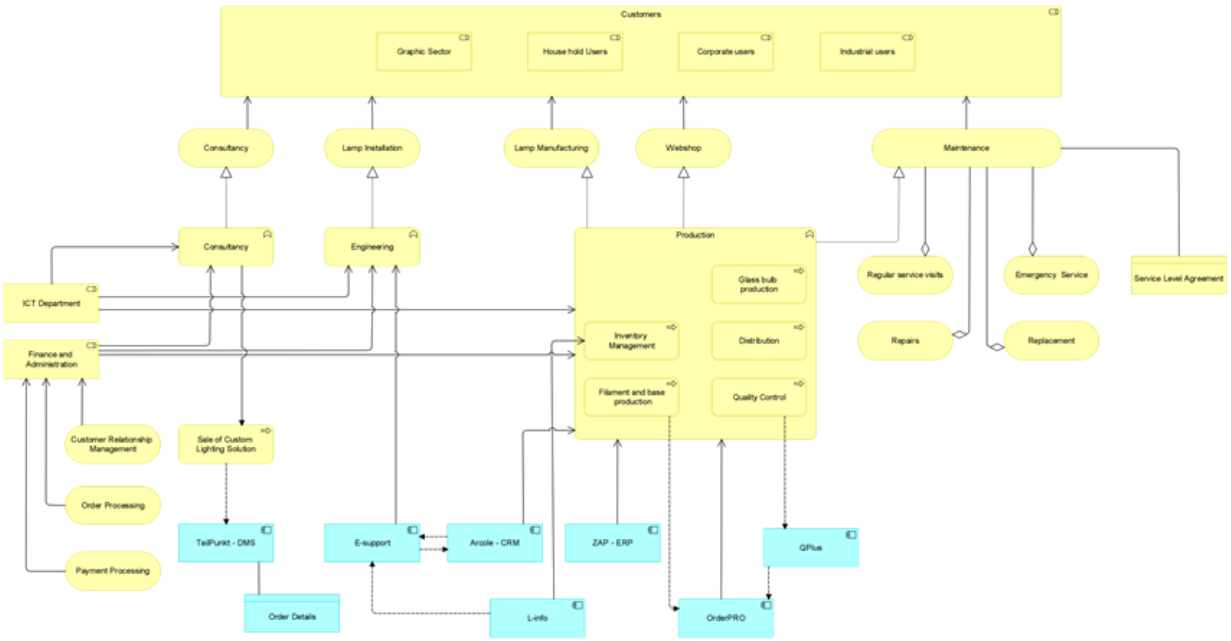

Fig 7 : Service Realization viewpoint

Target Architecture

Introduction

In this section, we will present the target architecture of BriteLite. We have modeled different views in order to explain the architecture and the changes as much as possible. Basically we will go through the same views as in Milestone 1. In the beginning, there is the total overview of BriteLite which has an integration of the main concepts from 4 layers. Then, there is a more detailed overview that represents the main changes for the target architecture. We have used the green color in order to empathize with them better. Moreover, the motivation view, organization view, product view, information structure view, as well as the service realization view, have some changes inside them. An extra viewpoint that we think is necessary for the target architecture is the Strategy and Motivation view where we have related the main goals and requirements of BriteLite to capabilities, resources, and to values of actions.

Total overview

Below is the total viewpoint of BriteLite. We know that it is quite large, but our main focus here is to show the full integration between three layers. We will describe here the main changes that are necessary for the target architecture.

The L-info system running on the mainframe was a weakness for BriteLite and had to be replaced. As BriteLite has a ZAP ERP system that offers most of the functionality L-info offers, it is best to leverage those capabilities in the future state. The main functionality L-info offers that BriiteLite relies upon is inventory management, and this can be done by ZAP. We suggest evaluating the capabilities of ZAP in detail and plan to migrate the inventory there. Much of the product specifications that L-info stores would not be relevant as the product portfolio is being transformed and incandescent bulbs would no longer be manufactured. Thus new products should only be added to ZAP so that the use of L-info is minimized. We have thus represented the Lighting product specification linked to ZAP.

Additional functionality of tracking and tracing is offered by L-info, which can be supported through ZAP by integrating it with shipment & tracking service. We recommend using AfterShip as it is the #1 shipment tracking platform and can track shipments worldwide.

The QPlus system was running on Windows 2000, which had to be upgraded. While QPlus offers quality control services and is deeply integrated with the OrderPRO system, we do not recommend replacing the system. Instead, the best option is to upgrade the underlying Operating System and use Windows Server 2019 while keeping the QPlus application in place. Software compatibility is an issue that may come up, and it is recommended to hire specialists who have previous experience in migrating Windows software to eliminate potential issues in the migration.

To improve the resilience of the organization, we recommend using a backup system. The backup system takes a backup of all the servers and databases in the BriteLite IT environment. This ensures that in case there is any hardware or software issue, there is no data loss. We

recommend using Backblaze, which is a cloud backup solution and is versatile enough to integrate with the diverse set of applications and databases which are present in the BriteLite IT environment.

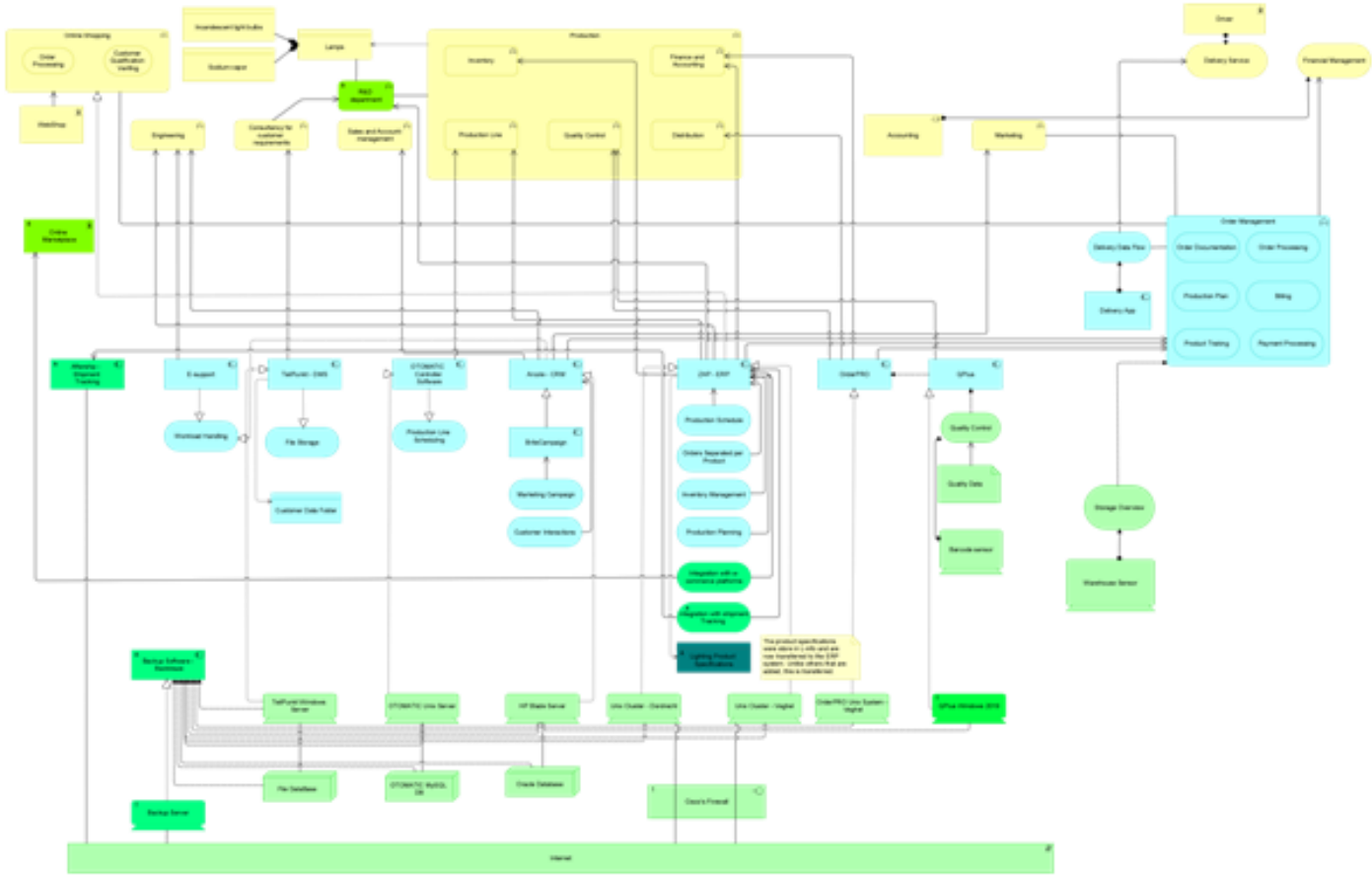

Fig 8. Total viewpoint

Motivation viewpoint

The motivation viewpoint covers the aspects that are very important for BriteLite to stay relevant for its customer, push the organization forward and make more profit. These aspects are related to the stakeholders, to their goals and requirements, to the drivers as well as to the assessments that are based on the SWOT analysis.

BriteLite itself is one of the stakeholders in this viewpoint. The consultancy department within BriteLite is also considered as a sub stakeholder. In addition to BriteLite, the customers, Animal rights groups, and EU environmental agencies are also considered as stakeholders.

The main changes between this motivation viewpoint (Target) and the one in the Baseline phase are the colors and the change of elements. We have chosen to change the colors of the elements in the motivation viewpoint to make it easier to spot the differences between the baseline motivation viewpoint and the target motivation viewpoint. The red color was chosen to indicate the elements that are removed from the viewpoint. Those elements could be threats or weaknesses. The green color was chosen to demonstrate the elements that will be either added or reinforced to help BriteLite achieve its goals.

The elements with unchanged colors in comparison to the baseline motivation viewpoint, are still present (mainly assessments) whether they are weaknesses or threats that represent the target situation. In other words, the situation is unchanged for those elements.

It’s crucial for BriteLite to consider those requirements to be able to push the organization forward. To achieve the goal of increasing customer satisfaction, BriteLite must facilitate training its own employees (O2) and it needs to make use of additional sales channels like Amazon, Bol.com (O7). On the other hand, BriteLite must consider in-sourcing the R&D department to ensure the ability to compete with other manufacturers to produce LED and Halogen light bulbs and also to increase the number of products. Besides, to become a key player in the international market, BiteLite has to shift its focus and invest more in its presence internationally.

BriteLite can increase customer satisfaction by working on the current loose structure of its consultancy department by forming a structural consultancy group to meet the requirements of customers and to be able to work on realizing new special lighting projects.

Another driver for BriteLite was making profit, to achieve the goals which contribute to this driver, BriteLite must make use of the following opportunities: documenting the whole process (O1), extending the production lines (O5). In addition, these opportunities contribute to the goal of BriteLite in optimizing the production processes.. This goal is strengthened by BriteLite’s goal “Further integration of different IT systems”. Updating the used Windows server to the 2019, replacing the old L-info system, improving the access control and management of the current network, and implementing a backup and failover system must happen to realize the latter goal of BriteLite.

Lastly, it is very important for BriteLite to comply with EU environmental regulations and rules. Therefore, it must improve the products it produces and focuses more on producing LED lights (O3).

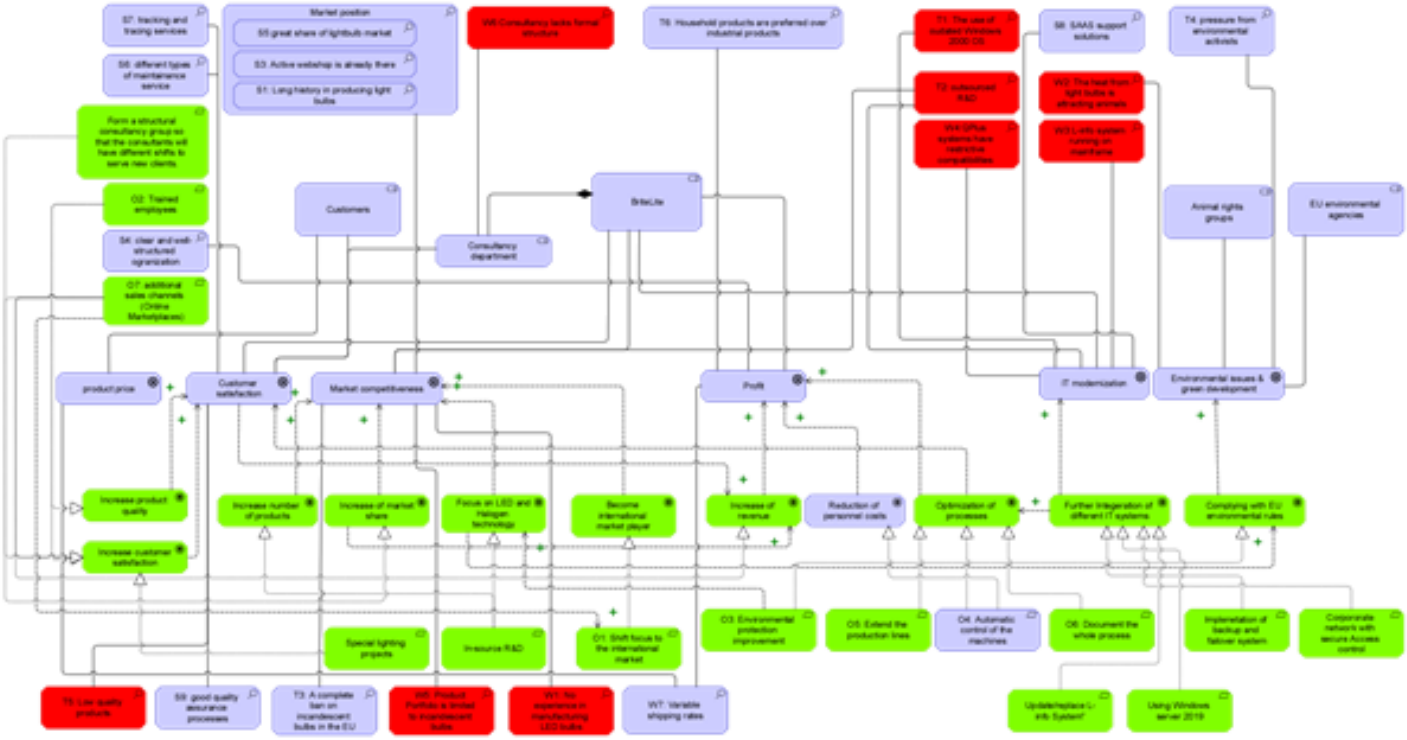

Fig 9 : Motivation viewpoint

Organization viewpoint

The previous Archimate organization viewpoint is focused on the internal of the company together with outsourcing. The baseline viewpoint will stay the same.

Consultancy can be improved on two main points, creating a formal structure and adding more expertise to the department. Adding more expertise to the department is important because consultancy gains a big focus and is increasing in revenue, so more consultants are needed to keep up with the increasing demands.

In Figure 10 multiple smaller departments have been added to the consultancy department to increase the amount of consultants and to add some structures added in W6 , so different consultancy jobs can be assigned to the right department. By this approach, more structure will be added to the consultancy department.. It is important that BriteLite can offer enough and competent consultants.

Within the headquarter office, the R & D sector is added. Therefore, R&D is no longer an outsourcing sector. This could eliminate the potential threat of outsourcing R&D leaking new technology. Since R&D is an internal office now, more technology opportunities can be expected in the future because BriteLite can control the direction of R&D. It can also provide a development advantage for BriteLite so that the technology they are using will not get outdated. Last but not least, once the R&D sector is built inside BriteLite, it could work more closely with the sales and consultancy team. From that way, customer-focused marketing campaigns can be held more efficiently, which leads to a better customer experience.

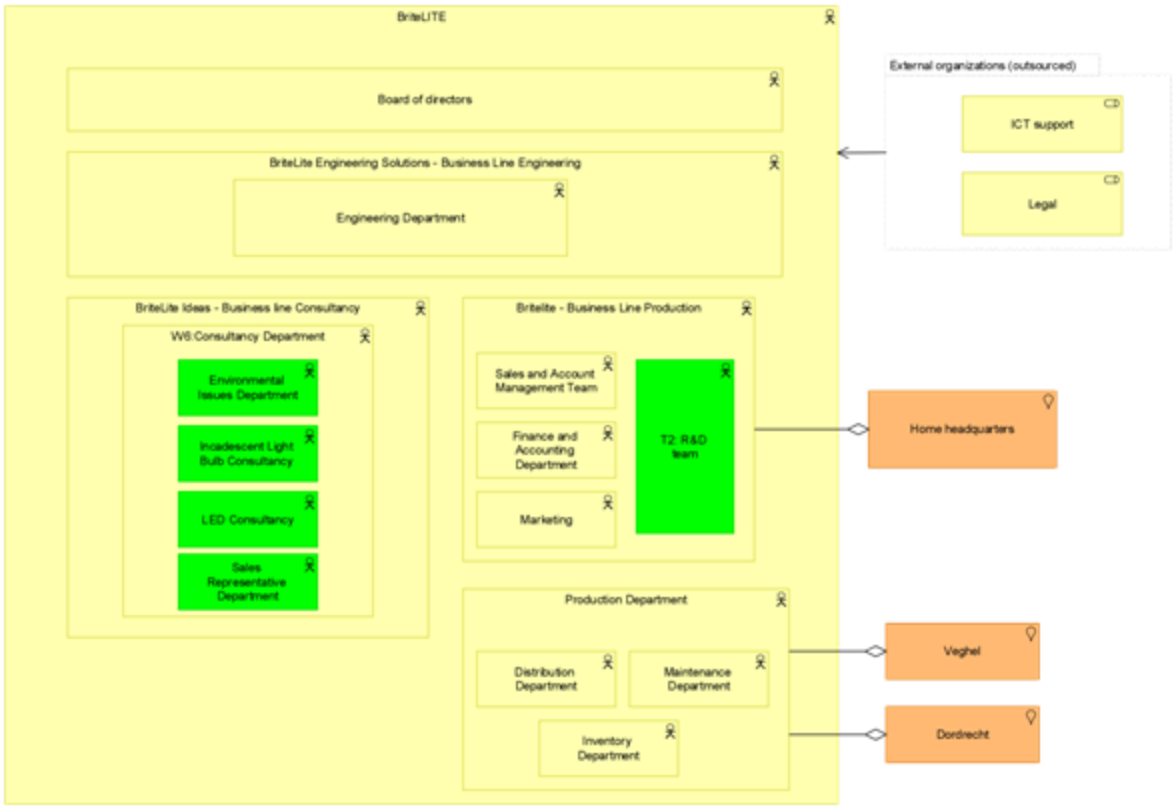

Fig 10 : Organization viewpoint

Product viewpoint

The Product viewpoint explains the value BriteLite provides to its customers and depicts it in the business layer. We have divided this viewpoint into three segments. The first segment describes the products and services offered by BriteLite. The company's focus still remains on their three lines: Production, Consultancy, and Maintenance which are grouped as individual entities. Second is the sales channel through which these products are offered, and we have therefore listed them as interfaces. The third section includes the end-users, i.e., the BriteLite Customers, which are represented with the business role concept. In our target architecture, we have highlighted the changes in green, as seen in figure 4.

The ban on incandescent bulbs is one of the weaknesses in regards to Britlite products. A threat from the environmental activist organizations and animal rights groups is due to heat emissions from these bulbs. In order to address these drawbacks and risks, BriteLite needs to discontinue the current products such as incandescent bulbs and sodium vapor bulbs. The new products added are the energy-efficient LED bulbs and Halogen Lights. Furthermore, it solves the problem of difference in the price range which led users to purchase only the cheaper products as now Household users and Industrial users will be provided with the same product line. The new category bulbs are applicable to all sectors.

The consultancy group is doing well; thus, in addition to existing services, we have decided to add another service which is "specialized lighting projects." Thus, along with understanding customer requirements and generating the standard lighting plan, the consultancy team can work on other highly specialized projects such as custom plans and deliver energy-efficient and environmentally friendly solutions.

The engineering group has its own specialty responsible for producing corporate lighting, industrial and public lighting, complex circuitry, and modern lighting products. These are directly served to BriteLite's customers.

Alongside the current sales channel, we have added platforms such as Amazon, Bol.com to sell directly to customers. The household users, corporate users, and graphic sectors can therefore order a product from this site and then have it delivered at home. Selling products on Amazon further addresses our opportunity to focus on international sales. Furthermore, they can order through their original channels, which are the "webshop and BriteLite resellers." Finally, the two key maintenance services offered by BriteLite: regular and the emergency service (an extension of the normal services based) on the agreed contract remain as it is the architecture model since it is one of the strengths of the organization. These services are available through the sales representatives of Britelite, which are offered to industrial, government, and corporate users.

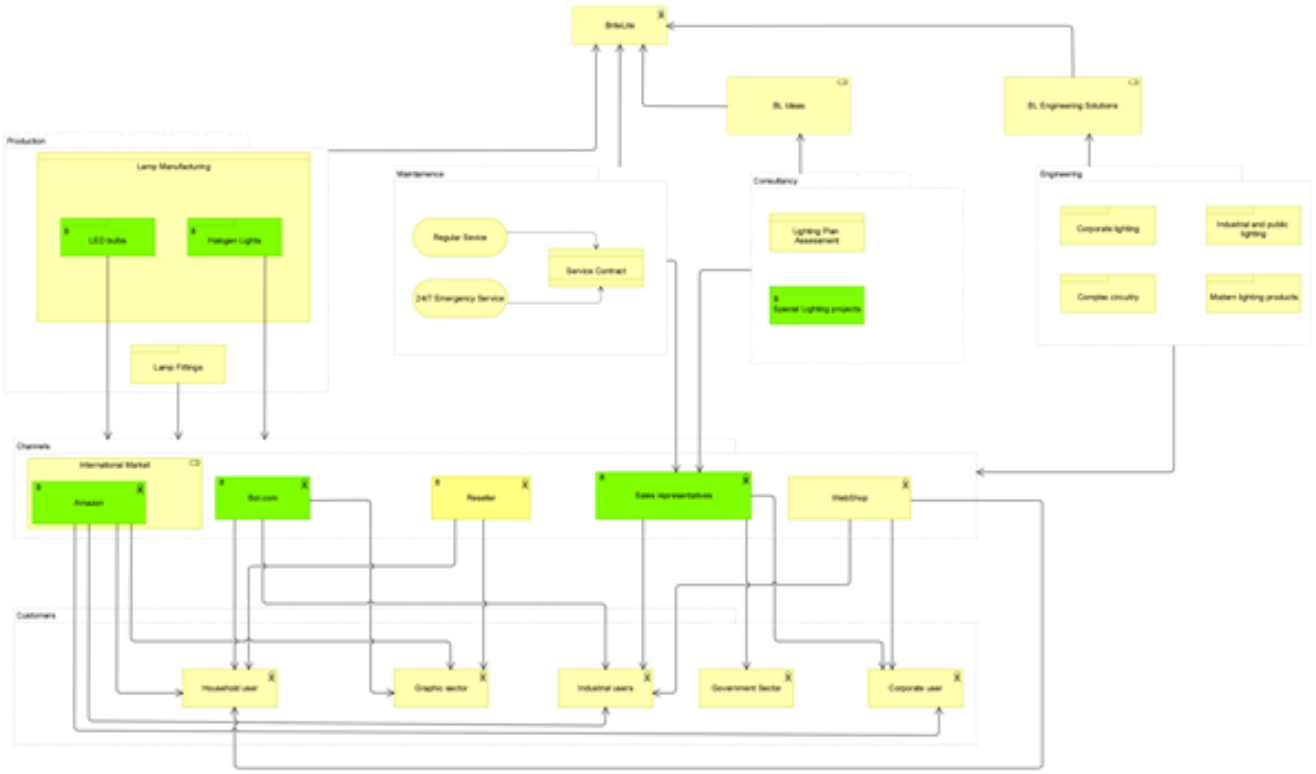

Fig 11: Product viewpoint

Information structure viewpoint

In this view, we have not made many changes as the main business object, and the data object will remain the same. However, we decided to add two concepts to our previous information structure viewpoint. One of them is the order data from Amazon and Bol.com. Since the order data from online shops go directly to the OrderPro system, which is treated differently from the order data from offline sources, we think it would be more clear to show it specifically. Due to the fact that the data from Amazon and Bol.com are transferred into the OrderPro system digitally, we plan to use a data object. The other part is the representation of "Online Marketplace." Currently, BriteLite has only its own webshop, but that's not enough for online customers. Therefore we decided to add more online sale channels like Amazon and Bol.com. They belong to the top 10 web stores in the Netherlands; therefore, putting products on these websites could serve more customers online. Besides that, since the L-info system is removed, the production data is transferred from ZAP's ERP system.

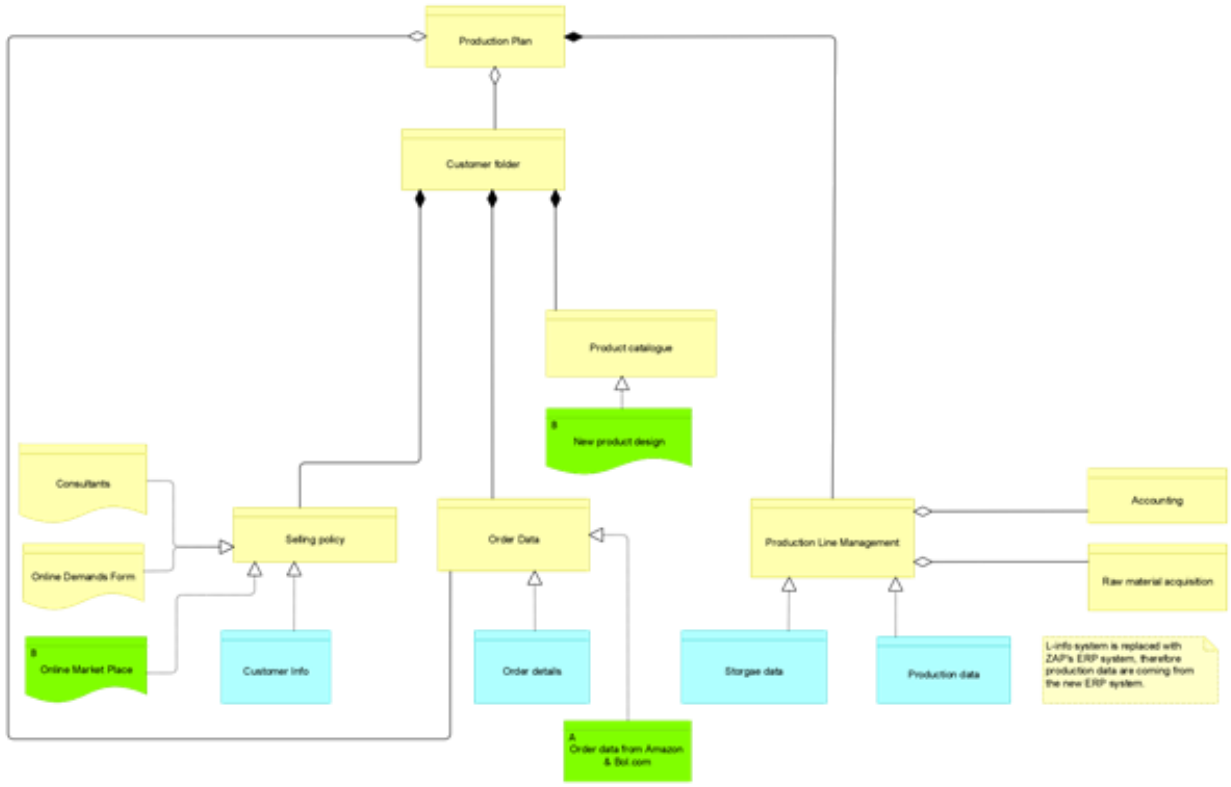

Fig 12: Information structure viewpoint

Service realization viewpoint

BriteLite offers several services to different customer segments, which are represented in this view. The business layer and application layer elements are used to depict the services offered by BriteLite. The central component of this view is the services that BriteLite offers, which are represented as Business Service. These services are realized by the three main business lines from BriteLite, namely Consultancy, Engineering, and Production. These business lines are represented as business functions in this view as we want to show the processes each of the business lines perform to deliver service to its customer.

As part of the reorganization of the product portfolio, the service realization view of BriteLite will also undergo certain changes. Mainly the production business line will be affected by the stopping of incandescent bulb manufacturing and starting the production of LED and Halogen lamps. The filament & base production and the glass bulb production processes will be removed from the production function. Additionally, new services will be offered by the production business - Shipment Tracking and Sale through online marketplaces.

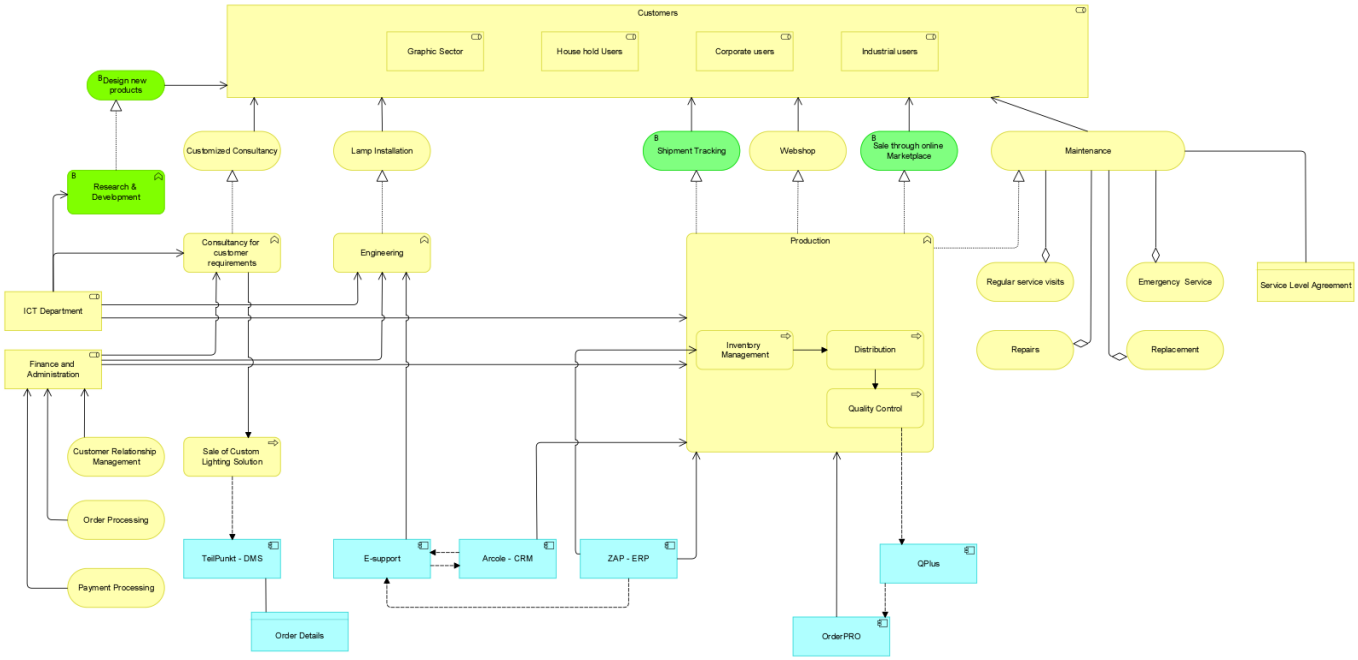

Fig 13: Service realization viewpoint

Architecture change analysis

Product Migration view

The product migration viewpoint is specifying the transition from the existing architecture to a desired architecture. BriteLite is capable of using other sales channels like Amazon.com and Bol.com to extend to the international markets (C2) .

BriteLite can extend its product portfolio by producing new products like LED bulbs and Halogen Lights (C1).

The current gap with regard to consultancy can be used as motivation to achieve goals like increasing the customer satisfaction by introducing special lighting projects. This is the result of forming a new specialized consultancy group.

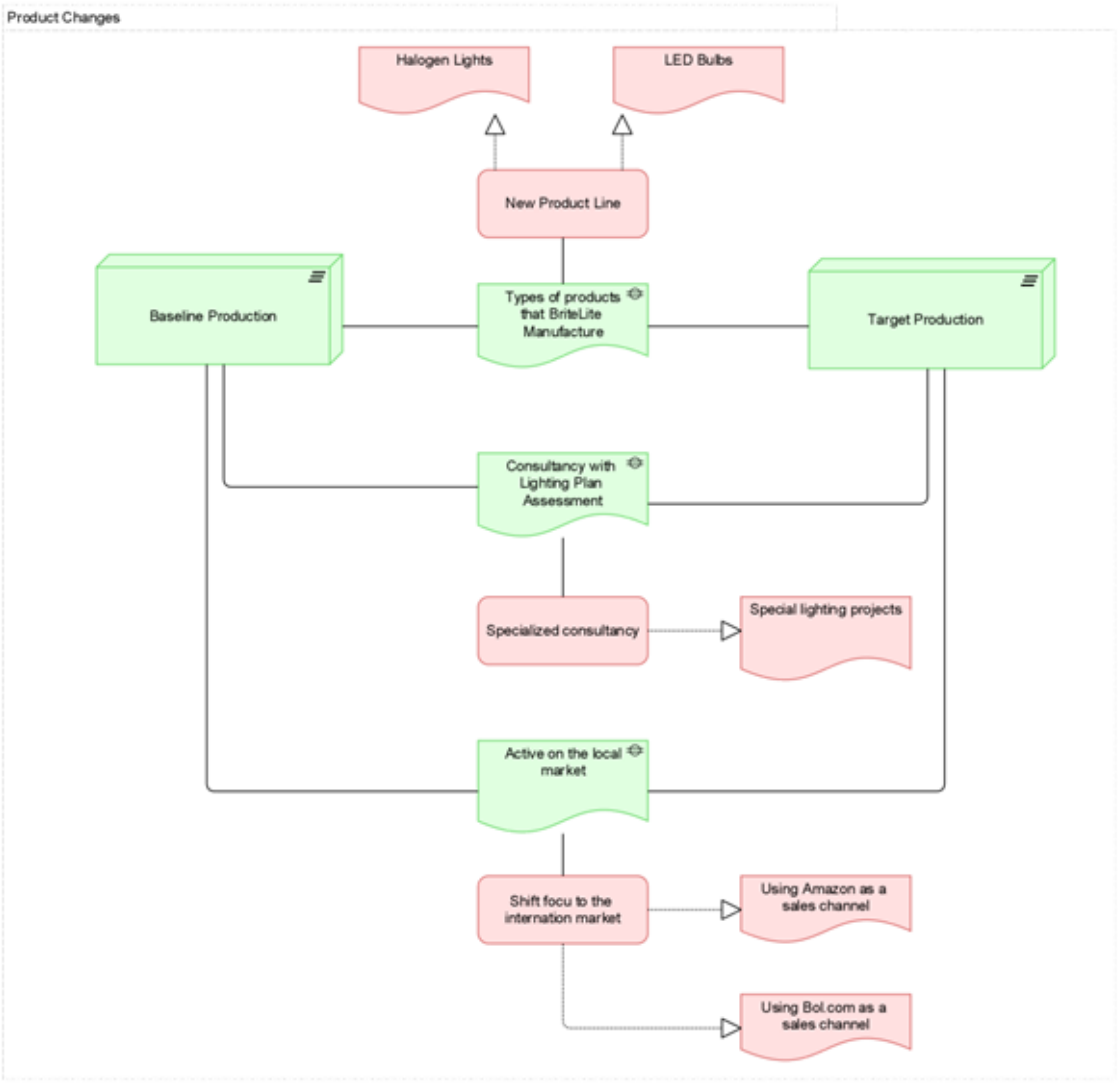

Fig 14: Product migration viewpoint

IT Migration view

The IT migration view shows clearly which software systems and applications will be updated. (C7)(C8)(C9)(C10) (C11). In addition, it shows the need of phasing out the outdated L-info system which is a security burden for BriteLite.

For the purpose of updating the outdated Windows 2000, a transition process is required. The target Windows 2019 with the updated version of QPlus will be first deployed on a test machine. If the current functionalities continue working without any disruption, the deployment to the production environment will be initiated. By performing the upgrade in this way, we ensure there will be no service disruption for BriteLite.

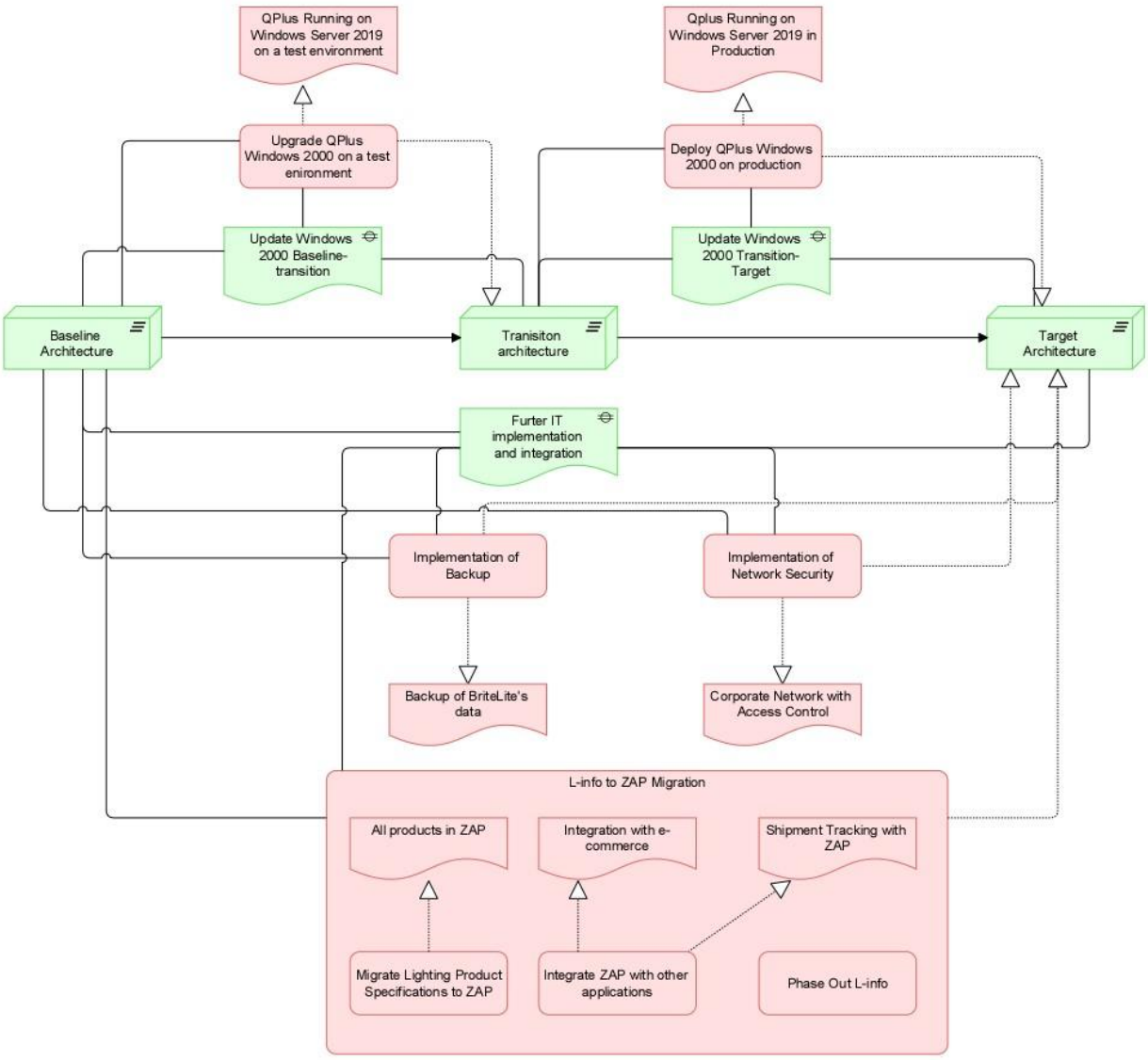

Fig 15: IT migration viewpoint

Organization Migration view

This migration view shows the transition of BriteLite from the current situation to the desired situation where a R&D department will be established to ensure producing products with innovative technology and environmentally friendly lights like LED. (C3)

Furthermore, it reveals the opportunity that BriteLite takes advantage of to form a new structured consultancy group. As a result of this, environmental issues can be handled separately, specialized consultancy on outdated incandescent light bulbs and also LED technology can be offered to customers in a professional manner. This contributes to increasing the customer satisfaction which automatically leads to greater revenu generation.

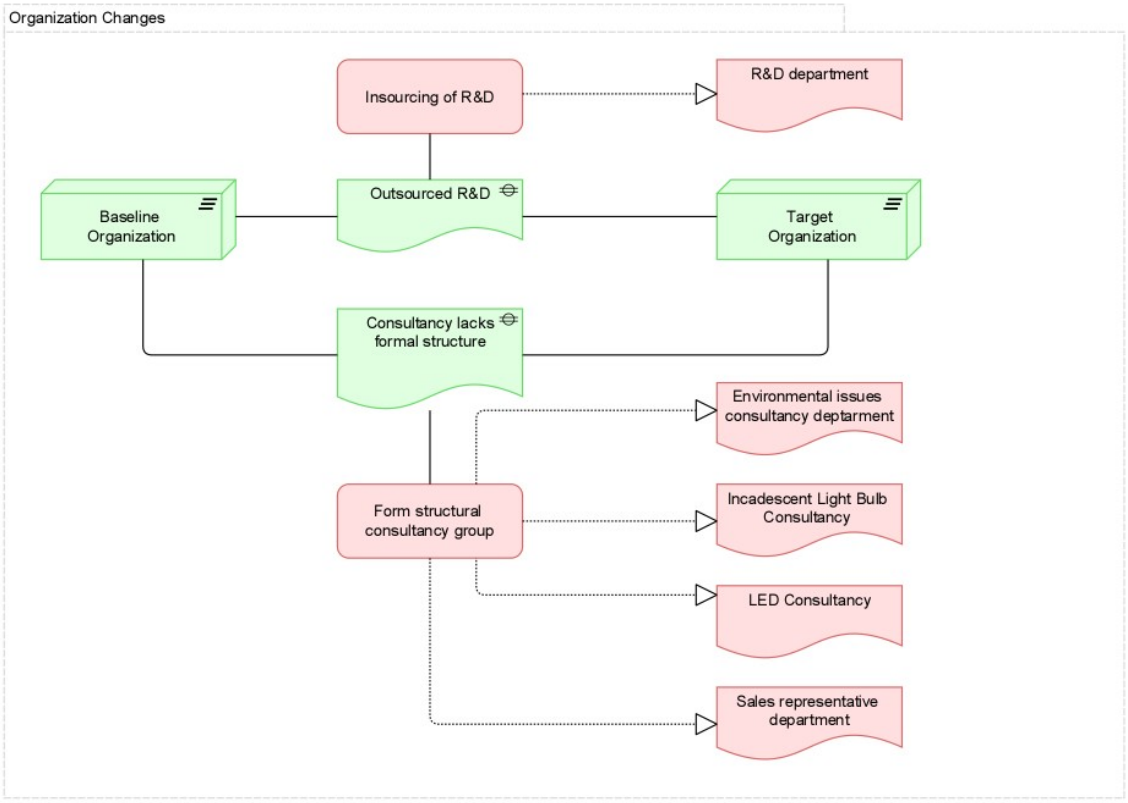

Fig 16:Organization migration viewpoint

Impact Analysis

This section examines the feasibility and impact of the proposed changes for BriteLite in financial and organizational terms. The proposed changes resulted from the analysis we did in the case analysis phase (M0) to push BriteLite forward, make it more relevant for its customers and enforce its position on the national and international market.

Change	Feasibility	Impact
C1	Yes	BriteLite can realize this change by introducing new production lines for LED and Halogen lights technologies. For developing these kinds of products, BriteLite must insource the R & D (C5). This change means that BriteLite must invest heavily in setting up a whole new department and starting the recruitment process to find good researchers and employees. However, this change results in improving the image of BriteLite w.r.t green and sustainable development. LED products are the development direction of lighting systems. So this could also help BriteLite to fit the change of the market.
C2	Yes	BriteLite must start using other sales channels like Amazon.com and Bol.com to be able to operate internationally. Using both channels does not require BriteLite to invest much money since Amazon and Bol offer all the necessary infrastructure to sell products worldwide. BriteLite can also extend the usage of the online marketplaces and shut down its webshop in favor of using those online marketplaces.
C3	Yes	This change will help BriteLite offer more specialized consultancy on different kinds of projects inside the organization. BriteLite must invest more money in recruitment and managing the consultants to be able to realize this change. This change would result in more customer satisfaction which in turn helps to generate more revenue for BriteLite.
C4	Yes	Creating a lean production process will help BriteLite to address quality control issues and error documentation errors. This change requires BriteLite to invest more in connecting the different departments inside the organization, which can be realized by introducing new processes supported by required IT technologies.
C5	Yes	This change has a very positive impact on BriteLite. It helps it stay relevant to its customers and enforce its position on the national and the international markets. Yet, this change requires BriteLite to invest more money than it has been doing before.
C6	Yes	This change ensures that BriteLite uses an ERP system with no vendor lock-in. This guarantees that BriteLite uses a stable ERP system with a reasonable future perspective.
C7	Yes	This change provides a more secure and up to date quality control system. Also, it will allow the new system to have better compatibility with other documents and systems.

C8	Yes	BriteLight will benefit from this change and eliminate all security risks accompanied by using the outdated L-info system.
C9	Yes	BriteLight will benefit from this change and eliminate all security risks accompanied by using the outdated Windows server 2000. This change requires an intermediate step which is to first test this upgrade outside the production environment to test if the software installed on the older system would work properly with the new Windows server 2019. After finishing the test, the change could be taken into production.
C10	Yes	BriteLite must invest more in such measures because it ensures that all internal and external customer data, processes data, and product data are safely stored with almost no chance of data loss. Introducing a redundant storage fail-over system helps BriteLite in achieving this. However, introducing such a measure requires BriteLite to spend more money on purchasing failover systems and hardware.
C11	Yes	Introducing a central identity management system to ensure the security of all IT application systems inside BriteLite. It will also increase ease of access for employees since they don't have to deal with every related system and get too much information. This would help to improve efficiency. Introducing these measures requires BriteLite to invest more money in acquiring such software systems to enable this change.

Tabel 2:Impact analysis

Conclusions and recommendations

During the first two stages of this project, we have analyzed the situation of BriteLite by making a SWOT analysis that helped us identify the current weaknesses and threats and the existing strengths and opportunities. BrightLight might take advantage of these opportunities to make more profit, increase customer satisfaction, ensure its market position nationally and internationally, and lastly, ensure sustainable and green production.

In addition, we have used TOGAF framework architecture viewpoints to demonstrate how the architecture parts are connected and where and how BriteLite can make use of proposed changes to achieve its goals.

In the last two stages (M1 and M3), we have shown which changes BriteLite must consider to achieve its goals. Besides, we have provided a couple of migration and implementation viewpoints to support our vision of the proposed changes, how they could be done, and the results.

On the organization and production level, we have proposed establishing a better consultancy department where specialized consultancy could be continually offered to customers. Furthermore, we have advised BriteLite to set up its R&D department to enforce the focus on producing more sustainable and environmentally friendly products like LED lights.
On the IT level, we have limited our advice to updating the current IT infrastructure to minimize the security risks of the outdated used software systems. In addition, BriteLite must utilize a failover and backup system to ensure storage security. Lastly, we have proposed implementing a central identity management system to ensure prominent users' authentication and authorization services.

We were very cautious with the changes we introduced. We have limited ourselves to the organizational and the product level and minimally to the IT support level. Our goal is to make BriteLite be more relevant to its customers and make more profit by introducing new products before moving the organization forward to adapt more complex IT systems and technologies.

Finally, we have a couple of recommendations for BriteLite to consider in the future. We firmly believe that BriteLite can strengthen its position and achieve more relevance to its customers by considering our advice.

We recommend BriteLite to consider the following points:

1. More utilization of SaaS solutions on the IT and application support level among all departments.
2. Utilization of more enterprise architectural patterns like microservices to guarantee the application services are loosely coupled in in-house developed software applications.

3. Continuous investment in the R&D department to develop new products to avoid ending up with outdated and non-eco-friendly products.
4. Investment in smart and innovative LED technology to retain its market position and play a vital role in the smart industry.