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The Importance of Business Continuity for Making Business: The Case of Design Kitchen

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The Importance of Business Continuity: The Case of Design Kitchen

Teaching Case

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Abstract

Design Kitchen is a typical, small business about to secure a major deal with a prospective customer. The crux of this deal: Design Kitchen's ability to work as a reliable subcontractor. Business continuity (BC) teaching cases usually describe a disruption that requires reaction. This teaching case elucidates the importance of BC for making business. It provides a rich description of Design Kitchen receiving an audit, and posits the task of creating a BC plan based on this audit's findings. Completing this case, students will learn how to analyze and identify BC risks; how to craft a BC plan; and about the complications stirring when top management is not engaged in BC. While fictional, the case description presents a composite narrative based on empirical studies of several companies' BC risks. Besides teaching BC, lecturers can use the case text for courses of information security management or business process modeling.

Keywords: Business Continuity Management, Teaching Case, Information Security, Process Modeling

Introduction

On a snowy afternoon, Jude Jefferson, an information technology (IT) consultant, was walking to a client meeting pondering "how will it turn out?" Couple of weeks ago, Design Kitchen had assigned her for an external business continuity (BC) audit. The company was in the process of bidding for a large contract with the construction company DreamHomes. DreamHomes was looking for a long-time partnership with a company that could deliver high-quality kitchen cabinets on time for their apartment buildings. Since just-in-time deliveries were important for DreamHomes, Design Kitchen's CEO, Kim Kline, had hired Jude Jefferson to provide evidence that they could deliver their kitchen cabinets in time. Over the past weeks, Jude had conducted an external review assessing the company's processes and IT systems. She had noticed that Design Kitchen had the personnel and production capacity to deliver the kitchen cabinets in time and had made considerable efforts to ensure that its business could run in the event of failure in the manufacturing machines. However, the company had left its IT systems mostly unattended. Design Kitchen's IT systems were rather old, unstable, and insecure. Jude was surprised on this finding since CEO Kline had not mentioned the IT systems' state during their kick-off meeting; not even a whiff. Indeed, the CEO seemed to take pride in how well they had managed the company and ensured its resilience toward BC issues. Jude knew she had to confront the CEO with her findings that would be in conflict with her client's views. Walking, she was pondering, how she could convince the CEO of these issues, which were apparent

to her but seemed invisible to the CEO. Jude Jefferson knew that a lot was required for Design Kitchen's BC meeting DreamHomes' expectations.

Business continuity management

BC management aims to identify potential risks and to avoid, minimize or prepare for them in order to allow business processes and services to continue without interruption (Gibb and Buchanan 2006a). It is a socio-technical approach, emphasizing the importance of proactive preparation for possible continuity problems. Therefore, it has also implications in preserving the value of organizations (Herbane et al. 2004) Click or tap here to enter text.. Service disruptions have been found to have significant negative effects on customer loyalty, which suggests continuous IT systems operations should be ensured (Wang et al. 2010). BC management also includes social aspects, not just technical backups, thus awareness of the importance of BC is essential for ensuring disruption-free operations (Niemimaa 2015a; Niemimaa and Järveläinen 2013).

Butler and Gray (2006) have emphasized that reliable IS require routines and mindful behavior on operational and management levels as well as in system design. There are a number of risks related to IT systems, but business process or impact analysis of critical processes and IT resources can help prevent interruptions (Salmela 2008). Disaster recovery and BC planning studies have presented several ways to technically avoid or mitigate interruptions (Chow and Ha 2009; Herbane 2010). Backup and facility redundancy have been found important (Turetken, 2008) while disaster identification, preparedness and an organizational recovery team further ensure operational recovery as does maintenance of BC plans (Shropshire and Kadlec 2009).

Business continuity planning

Several BC planning methods list business impact analysis, training employees, testing BC plans and a cyclic approach to planning as essential parts of the BC planning process (Botha and Von Solms 2004; ISO 2012; Lindström et al. 2010). To gain benefits from BC planning, it is important to focus on business processes rather than merely ensuring the continuity of IT, since IT is so intertwined in organizational processes (Arduini and Morabito 2010; Järveläinen 2016; Järveläinen et al. 2022). Chow and Ha (2009) also point out that top management should take responsibility, define the scope and provide sufficient resources for recovery.

BC planning begins with a project initiation, in which the *scope of BC planning* is defined (e.g. a business unit, or the whole organization) and objectives are set (Lindström et al. 2010). Typically the planning methods are holistic, guiding organizations to define a scope that covers every business process and their sub-processes, and to include all systems, infrastructure etc. which can require significant resources (Geelen-Baass and Johnstone 2008; Tammineedi 2010). Some methods are also scalable to smaller organizations, and encourage organizations to focus resources on a narrow scope and key measures (Botha and Von Solms 2004; Järveläinen et al. 2022).

To understand the business (in the set scope) and its environment, a good starting point is to *identify the business processes* within the defined scope. A business process is a set of logically related tasks/activities performed to achieve a defined business outcome (Davenport and Short 1990). One common business process is the order-delivery process, i.e., when a manufacturer, service provider or vendor receives an order from a customer and then delivers it. Focusing first on the most critical processes, which frequently are customer-facing, can have significant benefits for a company during a disruption (Järveläinen 2016). A critical business process is, e.g., one without which the company cannot operate or which is critical for generating revenue. Sometimes even a momentary disruption to the critical process may have severe impact on the business, but occasionally the disruption may take several hours or even days to become severe.

After the project initiation follows a *business impact analysis*. This step comprises identifying the (IT) assets that support the selected business process(es) (Elliott et al. 2010). These assets can be, e.g., IT services, data, applications, infrastructure (machinery), facilities, personnel etc. Understanding dependencies between different processes, systems, data and infrastructure is essential (Arduini and Morabito 2010), since the same system can be central for many processes. For instance, if a data base is used for calculating salaries as well as for billing customers, then two processes (the billing and salary

payment process) would be interrupted, if a failure affects the data base. If the organization is located only in one facility with one network cable, an excavator hitting the cable while digging can cause severe problems for the entire facility.

Business continuity key metrics	*Definition of key metric*
MTD – Maximum tolerable (period of) downtime	Estimated total time period that an organization can survive without the respective key process.
RTO – Recovery Time Objective	The period of time within which an asset (e.g., IT system) must be recovered. The RTO must be shorter than the MTD.
RPO – Recovery Point Objective	The amount of data that can be lost after recovery indicated as a time period. This metric determines backup routines.

Table 1. Overview of business continuity key metrics defined during the business impact analysis

As part of the business impact analysis, key metrics for BC are also determined (see Table 1). These metrics are needed to define acceptable levels of operations and losses in the event of an incident. Maximum tolerable (period of) downtime (MTD) is the estimated total period of time that an organization can survive without its key process(es). While the estimate is always hypothetical and cannot be defined with great accuracy, key business figures (such as hourly cost of not being able to deliver services), can be used in the estimate. MTD can then be used to define other BC objectives, such as the time within which an IT system must be recovered, i.e., Recovery Time Objective (RTO). The RTO must always be shorter than the MTD, since the MTD should always represent the point of no recovery, i.e., a period of downtime after which recovery is no longer possible. For IT systems, recovery time might not be a sufficient objective, but other objectives might be required. For systems that process and store data, Recovery Point Objective (RPO) is a key metric. RPO should be used to define the amount of data that can be lost after a recovery. Thus, an RPO of 24 hours defines that after an incident the maximum acceptable data loss is the last 24 hours. In practice, this means, that the most recent data backup available must not be older than 24 hours, and that the system can be restored from this backup within the set RTO.

After the supporting (IT) assets are known, a *risk assessment* is carried out. Risk assessment involves identifying BC risks, i.e., threats and vulnerabilities to the identified assets (Gibb and Buchanan 2006b). Single-points of failure are especially problematic (Bryant 2013). Besides these, the Business Continuity Institute (2022) lists, e.g., cyber security risks, climate or extreme weather-related risks, pandemics, technology failures, supply chain risks, regulatory changes as long-term BC risks (see Table 2). Haghighi and Torabi (2019) mention software, hardware, network, database and personnel risks, either inside the organization or external. For example, an IT service provider could have an interruption in their services that affects the client company. Maintenance errors, e.g., outdated or not patched systems, also affect BC, but also intentional or unintentional human errors (Haghighi and Torabi 2019).

Business continuity reports	*Listed disruptions and global business continuity risks*
Causes of disruption in 2021 (Business Continuity Institute 2022)	Non-occupational disease
	IT and telecom outage
	Supply chain disruption
	Extreme weather events
	Remote working / new workplace environment
	Travel restrictions
	Cyber-attack / data breach
	Lack of talent / key skills
	Cyber incidents (crime, IT failure/outage, data breaches, fines and penalties

The most important global business risks for 2022 (Allianz Group 2022)	Business interruption (incl. supply chain interruption)
	Natural catastrophes
	Pandemic
	Changes in legislation and regulation (trade wars, sanctions etc.)
	Climate change
	Fire, explosion
	Market developments (e.g., volatility, intensified competition/ new entrants)

Table 2. Causes of disruptions and global business risks.

Finally, the business impacts of those possible risks for the chosen assets are identified and their probability and severity are used for prioritization (Torabi et al. 2014). Assets with most severe and probable risks are prioritized for BC risk management and then, risk management strategies are defined. It is important to remember that risks with lower probability or severity should also be managed. Merely monitoring risks is a strategy only liable for risks that have low probability and low business impact. Gibb & Buchanan (2006b) propose three different strategies, 1) transferring risks with insurance policies or outsourcing, 2) mitigating risks with redundancy or by enhancing management procedures and security or 3) absorbing risks by preparing financially for losses or sharing risk management measures with other similar organizations. Thus, creating alternative processes, having multiple data storage spaces, network alternatives etc. and ensuring that there are several persons capable of performing critical activities in the process are effective risk mitigation strategies (see Table 3).

Business continuity risk management strategies	*Definition of risk management strategy*
Transferring risks	Transfer risk with insurance policies or outsourcing. Consequently, a third party manages the risk.
Mitigating risks	Including reducing risk with redundancy (such as back-ups, alternative technical measures etc.), eliminating risk or avoiding risk with for example alternative technical or managerial measures.
Absorbing risks	Preparing for residual risks financially or pooling risks with other similar organizations.

Table 3. Overview of business continuity risk management strategies (Gibb & Buchanan 2006)

This information forms the basis of a *BC plan*, which contains also business recovery procedures in case of disruption, contact details of a crisis team etc. (Elliott et al. 2010). Alternatively, more specific recovery plans can be separate, necessary documents (Baham et al. 2017). In addition to the BC plan, transformative leadership, engaged personnel and an organizational culture of learning facilitate effectively managing BC (Tracey et al. 2017).

Figure 1 provides an overview of the described BC planning process. Captured in Figure 1 is the iterative nature of BC planning. After formulating plans for the most critical business process, a second planning cycle starts. Alternatively, improving or updating existing BC plans can trigger consecutive BC planning cycles. Since organizing and business processes can change, subsequent planning cycles also start with (re)defining the scope and identifying the critical business processes to ensure that the BC planning rests on accurate information. For the purposes of this teaching case, the BC planning process is intentionally simplified to aid learning the basic BC planning steps. Turulja and Bajgoric (2018) and Niemimaa (2015a) provide more complete and complex reviews of BC planning literature and related methods.

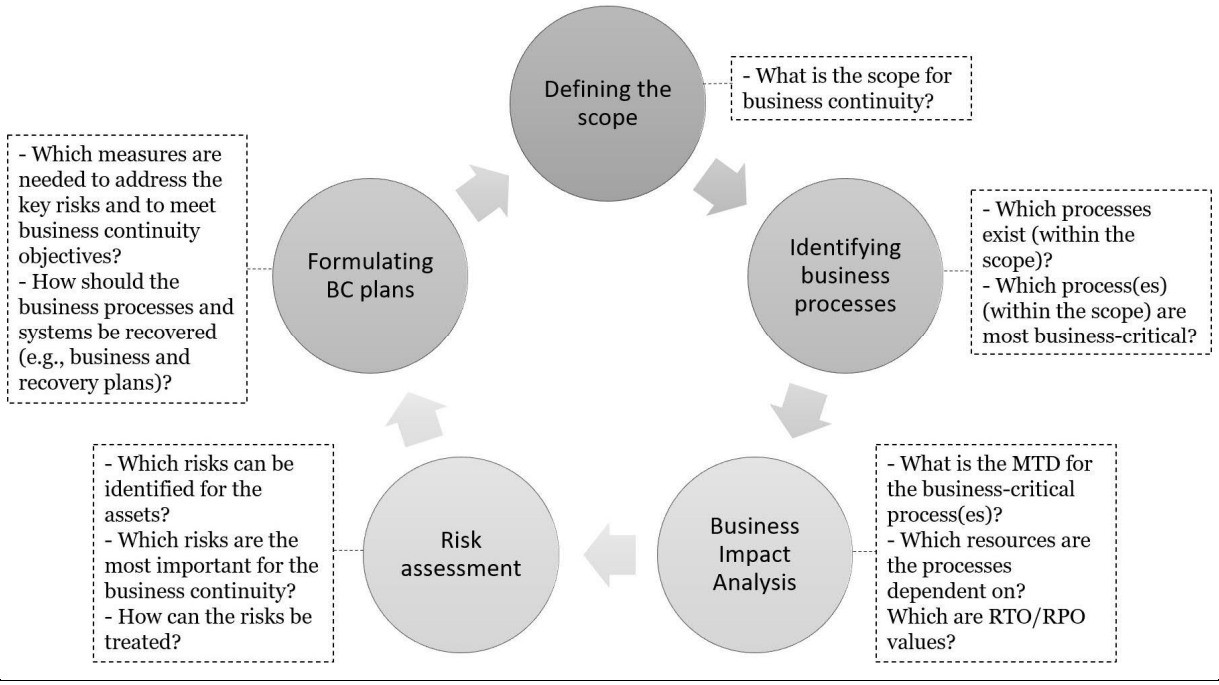

Figure 1. A simplified BC planning process

Top management has the ultimate business responsibility. If incidents disrupt business processes; they may decrease customer loyalty and company reputation and therefore also the company value. For example, a disruption of the ordering process can entail a drop in order volume with detrimental impact on revenue. In addition, customer may start perceiving a company as unreliable affecting their future decisions to buy from this company. Thus, BC planning can prevent dents in companies' key performance indicators (KPIs), which warrants top management involvement in embedding BC processes into the company. Otherwise acceptance of the BC plans within the organization is unlikely (Niemimaa and Järveläinen 2013). Therefore, gaining top management support, e.g., in financing the required changes or requiring regular reports on relevant BC measures, is essential. Merely technical preparedness or holistic planning is not sufficient for effective BC management, but constant monitoring and handling of even smallest disruptions is necessary (Butler and Gray 2006; Niemimaa 2015b; Weick et al. 1999). Herbane et al (2004) argue that the idea of BC management is to preserve the value of the organization, by proactively avoiding disruptions and reacting quickly to unexpected incidents.

The case company – Design Kitchen

The value proposition of Design Kitchen is to support customers in their everyday cooking tasks, by creating affordable and functional kitchen cabinet modules and combinations that can be tailored to customers' preferences. Their customer-base includes both private and business customers. Via their key business partners, Design Kitchen also delivers stoves, ovens, refrigerators, and other kitchen appliances to customers' doorstep, if they wish. Design Kitchen started with two carpenters but today the company employs 120 persons across its different departments including management, procurement, production (people manufacturing and assembling the kitchen cabinets), sales, finance and controlling, human resources, IT expert and one kitchen designer.

Two carpenters, Colin Cooper and Fiona Fisher, established the company in 2003. Their vision was to produce functional kitchen cabinets that were affordable, but also innovative. Until 2017, the company grew steadily but slowly. During this time, Design Kitchen focused on private customers. When its founders wanted to focus on designing new cabinet models rather than running the company's daily business, they hired Kim Kline as CEO. Taking over, Kline introduced innovative business ideas and a business plan for

extending the company's product range from exclusive kitchen cabinets for private customers to also produce tailor made cabinets in volume for business customers. For this, Kim started to make plans for strategic partnerships with construction companies and to make biddings for high-quality apartment buildings, in which tailor-made kitchens were one major selling point for customers buying the flats.

The new business plan of extending Design Kitchen's product range picked up pace between 2019 and 2021. During these years Design Kitchen's personnel jumped from 70 to 120 persons. While some employees had worked for Design Kitchen since the beginning, most had joined recently. For example, Sam Sharp, the Senior Purchaser had spent the majority of her career in several large corporations in high positions, and decided, in 2015, that she would like to help the carpenters in growing their business and slow down her work life before her expected retirement next year. Indeed, the employees at Design Kitchen were quite happy at their workplace. They appreciated their jobs as varied and independent making the company seem like a family rather than a performance-oriented machine. Besides hiring personnel, Design Kitchen also acquired a new factory building in a commercial area at the outskirts of a small town in 2020. The small town is known for its river, which was running close to the factory and connected to a water reservoir. Despite Kim Kline's business plan for extending the product range, the rapid growth between 2019 and 2021 was unexpected and required many ad-hoc solutions for emergent needs, e.g., in the company's IT systems. Figure 2 illustrates Design Kitchen's organization chart.

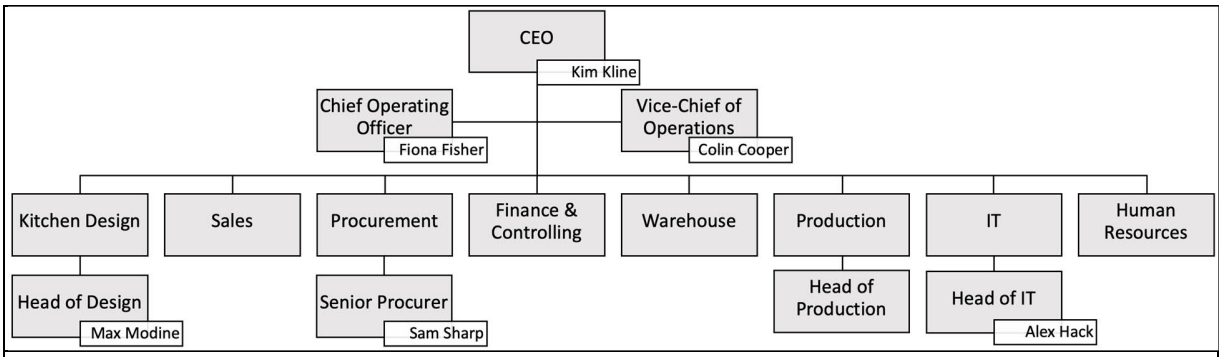

Figure 2. Organization Chart of Design Kitchen

IT systems and data for business processes

The company manufactures kitchen cabinets according to customer requirements and delivers them, either as separate cabinets or as ready-to-use kitchens, to customers in time. Customers can browse the different cabinet models on the Design Kitchen's webstore, designkitchen.com. The company offers 10 different cabinet models with special interiors, 20 different cabinet doors and 10 different kitchen counter models. Customers can pick and combine these different models according to their needs and even adjust the measurements to their desires.

Appearance of webstore

At the start, customers could only view the different models online. If they wished to purchase tailor-made cabinets, they had to eventually visit Design Kitchen's brick-and-mortar store to configure their tailored kitchen together with sales personnel. A few years ago, Fiona Fisher proposed that instead of just presenting the models, they could also sell the kitchen cabinets online through a webstore including a 3D configurator. The functionalities for both webstore and 3D configurator, were built by an external provider in 2016, and then connected to Design Kitchen's Product Data Management (PDM) system. The PDM runs on company owned servers placed in a server room. Design Kitchen moved the server room to the basement of the new factory building bought in 2020. For access to the PDM system, the external provider created different user roles for manufacturing, procurement, and sales personnel as well as the one designer.

Besides visiting the brick-and-mortar store, customers could now also configure and place their orders for kitchen cabinets online. When customers place an order on the webstore, the PDM calculates the order details including the prices for the ordered kitchen cabinets and updates the inventory levels to the web

store. The webstore is also connected to different payment systems of banks and credit card companies. Thus, customers can directly place the 20 % order deposit on the webstore. Since the introduction of the 3D configurator and webstore, the share of online orders rose to more than 80%. On average, receives 73 private customer orders a week with a mean price tag of € 12,589. These orders range from entire kitchens comprising multiple pieces or individual kitchen cabinets and spare parts. The busiest days are Friday to Sunday, on which up to 70% of all orders are placed, and especially during business hours (09:00 to 17:00) since customers, who want their whole kitchen remodeled, usually still contact a salesperson to facilitate the designing of the new kitchen.

Placing new orders to order system

After customers self-order online or in a meeting with a salesperson (face-to-face or virtually), the respective order is entered to the Sales system. This is either automatically done by the webstore or manually by the salesperson. Basically, the Sales system is a customer relationship management system, which contained the order details, order status and payment status as well as customer details (e.g., order history, address, phone number, email address and payment details). The Sales system is also connected to the Billing and Accounting system. The number of personnel with access to the Sales system is limited to Design Kitchen's salespeople, one person from finance and controlling department, Alex Hack, the IT expert, and the supervisors from the manufacturing department. Personnel with access to the Sales system have access to all the data. The Sales system is a cloud-based system from a small provider, which has servers in two different locations but no one knows where exactly.

After the new CEO took over, Design Kitchens key customer segment shifted from private customers to construction companies, which build apartment buildings. By now, this customer segment accounts for 60-70% of yearly sales. In the beginning, Design Kitchen targeted smaller construction companies that built one or two buildings per year. For these loyal customers, the company created an online extranet, which the professional interior designers at the construction companies could access. The extranet is a modified version of the webstore featuring the same interfaces to the PDM and Sales systems. However, the extranet uses pre-negotiated price tables for each individual construction project and offers pre-designed kitchen cabinets. These price tables and pre-designed cabinets are created in the PDM system under a project number, which provides the unique identifier in the Sales system and connects to customer data.

When a construction company starts a new apartment building project, their interior designer contacts the Design Kitchen's company designer, Max Modine. They then negotiate what kind of kitchen cabinets are required for each apartment. In some projects, almost all kitchens are similar and share components as cabinet doors, but in some projects the end customers are given a small range of cabinet doors and designs to choose from. Thus, prices for kitchen cabinets vary among projects, but since the construction companies buy several kitchens at the same time, the prices are lower than for individual customers.

Delivering ordered products

Besides pricing, another central issue that Design Kitchen negotiates with the construction companies is the delivery schedule. Nowadays, the construction projects of apartment buildings have very strict time management. Hence, when the apartment building is ready for the kitchen cabinets' installation, it is essential that every cabinet is ready. In the negotiations, an initial time estimate for the kitchen cabinets is established and entered to the Sales system, but due to several variables in the construction project, this time estimate is usually far from final. Usually, some points for interim information about the project status are agreed before the actual manufacturing and assembling of the cabinets start. At this point, the order is printed from the Sales system and placed on the bulletin board in the factory building. There the assemblers check what kind of cabinets have to be assembled and they collect the required parts from the warehouse. When an order is ready for the customer, and all the cabinets have been assembled, an assembly team member takes the printed paper to their supervisor who then marks the order 'ready for delivery' in the Sales system.

The customer service for the business-to-business customers is important. Since the orders comprise large volumes, the dialogue between the Design Kitchen warehouse and construction company employees installing the cabinets is emphasized. The supervisor responsible for kitchen and interior part of the project informs the final dates of delivery to the extranet at least on the Monday before the week in which the

installation begins. Since construction work often holds surprises, they usually enter the final dates on the last possible Monday during early hours (between 06:00 and 07:30). With multiple business customers awaiting cabinets at the same time, the extranet can be quite busy during this time. Usually only one or two kitchens per day are installed, and therefore the extranet has to contain information on which cabinets are needed and when. Thus, the statistics vary between 3 to 5 business customers requesting the delivery of 3 to 10 kitchens for the following week. Upon delivery, the information is sometimes not correct or cabinets are missing and then the supervisor has to contact the customer service, who then checks the entered information from the Sales system, and modifies the order, if the problem seems to be in the entered order or contacts the warehouse, if they have delivered a wrong order or part of it. For the large construction companies, it is crucial that they are able to trust that kitchen cabinets are delivered on time and that the supplier is reliable. Delays in deliveries of the kitchen cabinets could mean delays for the construction company and should the delivery of the cabinets fail, it is next to impossible for the construction company to source new cabinets with such big volumes from another supplier without engendering significant delays in the construction of new apartments.

In both individual and business customer orders, the customers can pick up their order from the warehouse or request for a delivery and assembly of the kitchen cabinets to the apartment/house. For small individual orders as well as business customer orders, a pick-up option is the most usual. For individual customers, as soon as the order has been assembled, the supervisor from the factory enters this information to the Sales system, which creates the invoice for the outstanding payments (via the Billing system) and informs the customer, via email, that the order is ready to be collected after they have paid the remaining amount stated on the attached invoice. When the customer picks up the order, the warehouse worker checks from the Sales system that the bill has been paid. If Design Kitchen has received all payments, the warehouse worker hands out the ordered kitchen cabinets to the customer and marks the order in the Sales system as completed. For a business customer, the delivery dates and billing details have been agreed, so when the cabinets are being collected, the warehouse worker checks the content of the order from the Sales system, gives the cabinets to the business customers and then marks the handed-out cabinets in the order as fulfilled. For those customers, who request a delivery with or without assembly, a Sales person calls the customer and agrees when the cabinets are delivered and afterwards marks the order fulfilled. In any case, the payments have to be settled before delivery.

Procurement and billing processes

The procurement department purchases the raw materials and parts for manufacturing the cabinets. Some of these materials are processed further in the factory (such as cutting sheets for specific measurements for the cabinet walls), but others (such as hinges, handles) are purchased as finished products. The delivered materials and parts are entered to the PDM to keep a real time record of Design Kitchen's inventory. However, the procurers have a shared archiving system, which contains all contracts with key partners, procurement orders and other related documents. The archiving procedure is developed and maintained by the Senior Purchaser. The shared archiving system is in Microsoft OneDrive which has come part of the Office 365 subscription, so that all procurers can access the folders anywhere they want. Bills payable go straight to accountants, who then request the order documents from the procurers before settling the bills.

The billing system contains financial data related to customer accounts and purchasing accounts, since it is essential to record receivables (how much customers had already paid) and payables (what Design Kitchen had to pay to suppliers). This system also contains other bills the company has to pay, for instance rents of the factory property and other property related costs like maintenance and cleaning, computing related costs as well as several other costs related to business. The billing system is also connected to the payroll system, which contains information on employees, their salaries and bank accounts etc. The payroll system and billing system are connected to the accounting system, which integrates all the financial information into one system. The accounting system thus manages the financial reporting. There are three persons in the finance and controlling department as well as one HR expert, who can access these systems, along with the CEO, who nowadays manages daily operations of the company. Data from these systems is backed up to a network storage located in the same physical location as the PDM system (server room in the factory building's basement) and incremental backups are taken daily and full backups bimonthly. However, the recovery from backups is not regularly tested, but so far recoveries have been mostly successful.

IT infrastructure

Physical office premises and server facilities

The company has a small server room in the basement of its new factory building. In the same building, the administrative and sales personnel have their offices. The server room contains the necessary servers for the PDM, billing and accounting systems, the payroll system and the network access storage for backups. The server room has all the basic safety features such as air conditioning, sprinklers (for fire extinguishing) and uninterruptible power supply. The server room can only be accessed by the IT expert or the CEO, who has a general key to all rooms. Sales system is in the public cloud. The company has a single optical fiber connection from the factory building dedicated for their use only.

The administrative personnel offices are upstairs and the factory downstairs. Normaly, the factory door is locked and company employees can access the factory with their electronic key card. However, the company does not see any reason for a receptionist, so they have created an automated registration point for guests. The registration point in the lobby consists of a desktop computer, where guests arriving from the door (not locked during the day) should register with their name and indicate, who they came to visit. When they have entered the name of their host, the system sends an email to the person, who can collect the visitors from the lobby. However, those guests who visit the premises often know that they can just pass the registration point and walk upstairs, since the door to the office is open during office hours from 7 AM to 5 PM.

The office is an open office, so only the managerial level people have separate rooms, which are automatically shut and locked. In the open office, the finance, human resources, and IT expert as well as the kitchen designer occupy one room. The salespersons share another room, so that their calls do not bother the other administrative personnel. All office personnel have personal laptops, which they diligently remember to lock, when they jointly go for lunch in the cafeteria or to local restaurants. The laptops have virus scanners installed and are updated automatically. There is, however, very little control or governance over what systems and software the personnel use to get their work done. This is due to the fact that for many of the functions of the company, there is only one person doing the job. Thus, it has not made much sense to standardize the tools each uses for work. As a result, no one has a clear understanding what tools each employee uses in their day-to-day work, besides the PDM system.

Network infrastructure

All the normal office equipment and the PDM system are connected to one network with a flat topology, i.e., all devices are in the same logical network. The exception to this is the production network to which the computer-controlled CNC milling machine is located together with a storage system that contains all the CAD images. This network is separated with a firewall to protect it from external attackers. However, the production network requires information from the PDM system so that the customer orders can be viewed by the production workers. In addition, the systems can be accessed from outside by the vendor's engineers that provide support for the system in case of failures. The CNC system, once a state-of-the-art system, is updated only very infrequently and runs on a Windows 2000 operated computer. Despite the system's criticality, Design Kitchen is still a small company and updating the CNC system to the latest versions would require to update their CNC milling machine as well which is an investment beyond their reach – especially since the current system is working. The company's management has ensured that spare-parts for the milling machine exist such that production can continue promptly in case of a small failure such as a bearing failure. The management has, however, made the – more or less conscious – decision that no spare exists for the milling spindle because of its hefty price tag.

Infrastructure security responsibilities

Alex Hack, the IT expert, is sure that the administrative and factory employees are well aware of information security risks, since, from time to time, they ask him about suspicious emails and other threats. Alex nor anyone else has actually organized any cybersecurity trainings, but he sends emails about current threats couple of times a year, when some threats become so relevant that even the newspapers discuss them. The CEO and chief operating officer have placed cybersecurity into the capable hands of Alex, since no serious incidents have occurred before. Figure 3 shows Design Kitchen's IT infrastructure.

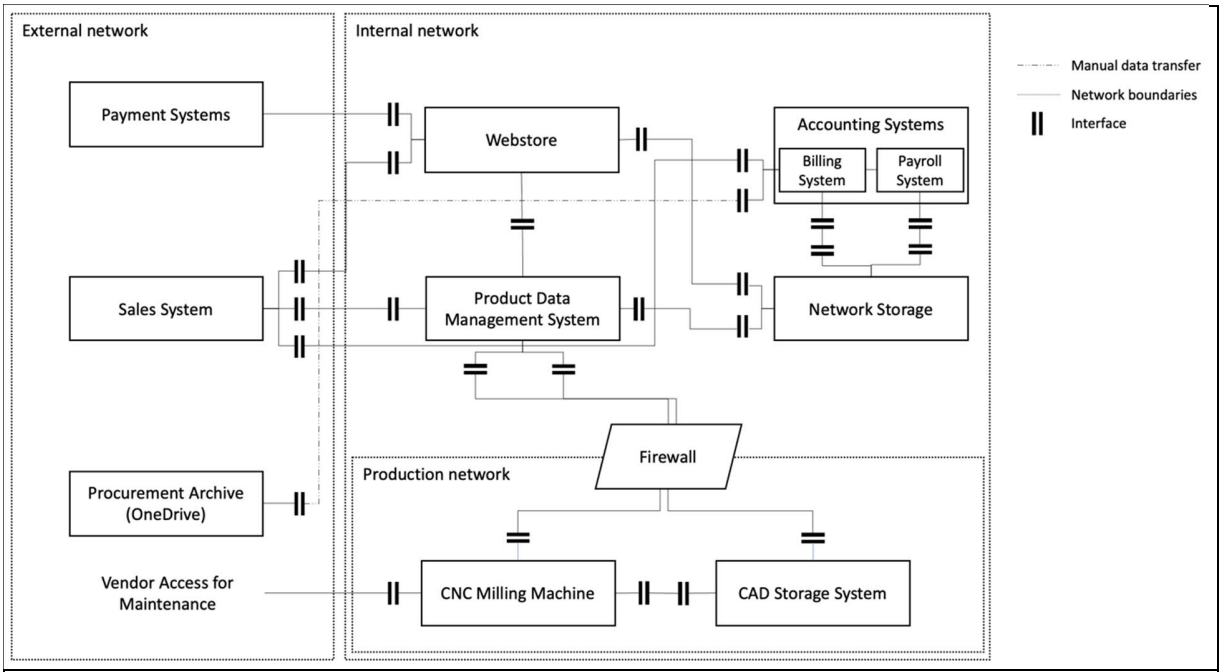

Figure 3. Design Kitchens IT infrastructure including interfaces among its IT systems.

Meeting with the CEO and head of IT

The external auditor, Jude Jefferson, had gathered all this information by talking to Design Kitchen's employees and collecting documents on the company's processes. Despite her effort to compile an overview of Design Kitchen, she feels that an engaged discussion with the CEO Kim Kline was necessary to convince the head of the company that actions are required to fulfill the expectations toward Design Kitchen's BC in order to seal the deal with DreamHomes. During her research, Jude occasionally conversed with the CEO who seemed to have turned a blind eye to the company's BC issues. Kim often boasted "We've built this all from scratch. We know every process step, potential hick-up and most importantly, we help each other and can easily jump in, if something goes wrong. I'm sure you'll see that when you talk to our personnel and browse through the documents." Well, Jude thought as she walks to her meeting with the CEO and head of IT, she has talked to the personnel and she had carefully read the documents. While she does not doubt the company's culture, she doubts that this culture would fix a milling spindle, a flooded server room or failure in any of Design Kitchen's IT systems. In her presentation for the upcoming meeting, she had therefore prepared slides that report the current state of the company's BC and the actions required to accomplish the level of BC expected by DreamHomes. When she enters the agreed meeting room, the CEO Kim Kline already awaits her.

Kim: "Hello Jude! Great to see you. I've been looking forward to our meeting today. DreamHomes have already asked when we can provide the asked audits. I told them that it should be any time soon, right?"

Jude: "Hello Kim, great seeing you. I've prepared a report of my research and actions that are required to successfully pass the audit. I'll run you through it."

Kim: "Alex will be here any time. Let's get started."

Jude and Kim start the meeting. Jude first presents how she had gathered all the information, who she talked to and which documents she had access to. Subsequently, she provides Kim and Alex, who had joined sometime after she started, visualizations of Design Kitchens most critical business processes as well as its IT infrastructure. In these visualizations, she has highlighted BC risks using color codes to indicate their likelihood of occurrence and potential business impact. When she elaborates these risks, she notices that the CEO Kim Kline sways back and forth on her chair. She wonders whether this is the CEO's unease about

the risks or something else. Jude points to the Sales System and says: "Unfortunately, I couldn't find information on whether and how the Sales System provider organized the premises that host the server farm for this public cloud, or whether they've any backup routine, database mirroring, or.."

"If I may jump in", the CEO Kim Kline interrupts Jude and continues: "I've an important meeting coming up. Can we hurry the last part? And for the Sales System, the vendor promised that all is handled at their end and since we work with them already for a couple of years, I'm sure that we can trust them to handle these issues at their end, right Alex?"

Alex Hack, the IT expert, nods in response to Kim's statement. Jude is quite baffled at the ignorance toward the mentioned BC risk. She stresses that for the audit, it was important that Design Kitchen can provide detailed information also for IT systems hosted by a vendor in a public cloud and how these IT system's BC is ensured.

Kim responds to Jude's concern with a wave of her hand while saying: "Okay, as I said, I'm sure this will be no biggie. We can just ask them. I've to go to my next meeting but Alex will stay. She knows our IT stuff best and as I see it, if there is any issue – Kim laughs – it's an IT issue, isn't it?"

Before Jude Jefferson has a chance to respond, Kim shakes her hand, turns on her heels and walks out of the meeting room. When she looks at Alex, she receives a smile and a nod signaling that she should continue where they left off.

DreamHomes' contract in jeopardy

After the meeting, the external auditor, Jude Jefferson, continues to feel worried. Despite her analysis of BC risks based on systematic research into Design Kitchen's business processes and IT infrastructure, the meeting clearly indicated that the CEO, Kim Kline, and the IT expert, Alex Hack, have strong views on Design Kitchen's BC. Indeed, they are proud about how they have organized everything and that their history of no hick-ups is a sign of good BC rather than coincidence – or luck. They have been doing the kitchen cabinets already for years and what has changed is merely that some new IT systems have been installed but otherwise the business is still the same. So far, they have not had any major issues to justify any investments to improve their BC. And as far as the CEO sees it, there is very little imperative in doing so since they have such a good track record of being a reliable kitchen manufacturer. Well, Jude thinks to herself, DreamHomes is unlikely to accept these arguments as testifying of an up-to-snuff BC management.

Questions for students

- What is the most critical business process at the Design Kitchen? Identify also the environment and external demands for the process. What resources (people, IT assets and technologies, premises, and artifacts) are needed to for running the key business process and its subprocesses?
- What are the key risks for this critical business process that could interrupt the operations? Explain your choices and assess the severity of business impacts and the probability of risks.
- How would you manage the chosen business continuity risks?
- How Jude Jefferson can convince the CEO to manage IT related business continuity risks?

Teaching note

This teaching case comes with a teaching note. Teachers can obtain it via emailing the first author.

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