PSA-systems and the Cloud: An introduction into the benefits and risks of cloud-based solutions and professional services automation

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With the growing importance of cloud-computing in both the private lives of people and especially in being utilized by companies in business, it is important to understand what this new technology is all about. Furthermore, for companies it is not only about understanding the technology, but also understanding how they can gain from utilizing it. This thesis was made for that purpose, but takes the introduction a step further by also presenting a type of system that is well on its way in moving to the cloud: PSA-systems.

The goal of the thesis is to introduce the various advantages and disadvantages of cloud-based systems along with the core functionality of a PSA-system. This package of theory can by utilized by a company looking to purchase a new system both as a whole, or specifically to look only at the advantages and disadvantages or core functionality. The goal is supported by the fact the thesis also presents the reader with analysis of a Finnish PSA-system offered in the cloud, thus providing an example of how the theory materializes in the real world.

The thesis starts off with introducing the various advantages found in utilizing cloud-based system, before moving on to cover the disadvantages. After this the core functionality of PSA-systems is introduced to the reader as five core functions that should be present. The final part, the analysis of a Finnish PSA-system, first covers how the advantages and disadvantages materialize in the system and its respective website, after which the second part covers the system's functionality as it appears in the system and compares it to the functionality listed in the theory.

The thesis itself meets the goals set to it well, and manages to cover both the theory and empirical parts sufficiently. All in all it should function well as a basis for the purchase of a new system, possibly even driving the decision with the coverage provided by the empirical portion.

Keywords
Cloud, SaaS, Professional services, PSA, System analysis

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1 Introduction

In recent years the term cloud-computing or the cloud in general has been the subject of much interest and discussion in various fields of business, and with good reason. Solutions such as Box and Dropbox have gained immense interest from consumers, up to the point where big players such as Google, Apple and Microsoft have developed their own solutions, such as Drive from Google and SkyDrive from Microsoft. As the cloud phenomenon has gathered steam and businesses have become aware of it, they have started to look at other ways to utilize the power of this new type of computing, leading to the development of cloud-based software solutions. This model of offering applications, known as SaaS or Software-as-a-Service, is the latest and greatest of the developments in the cloud.

Having grown from the desire to help companies take advantage of this new phenomenon, this thesis's first part will try and help with shedding light on what it actually entails. The questions that relate to the cloud are really quite simple: What exactly is this mysterious cloud, what on earth is SaaS, and why should any company move away from the true and tested method of having their own infrastructure and software in-house? The introduction along with the third and fourth chapter of this thesis try to answer these questions by listing the advantages and disadvantages of cloud-based systems, providing companies with the necessary information to see whether or not they would stand to gain anything from utilizing one.

This is not all the thesis will discuss however, as there is one specific area of business that stands to gain a lot from embracing the cloud: Professional services. Having realized the benefits offered by this new form of offering application services, many of the providers of PSA-systems, systems specifically for professional services, have embraced the cloud. Thus there is a wide variety of cloud-based options waiting for companies that see their business interests being served by utilizing this type of solution. In order to help companies see if that is the case, the second part of the thesis, consisting of chapter five, will list the core functionalities of PSA-systems.

Finally, after reading the chapters so far, companies have knowledge of the advantages and disadvantages of the cloud and the core functionalities of PSA-systems, but both are still only theory to the reader. In order to provide a concrete example of how this combination of new technology and type of system works, the final part of the thesis will look at the largest all Finnish cloud-based PSA-system. This ties technology and solution together into one concrete example, and finishes the basis that companies can utilize in seeing if cloud-based PSA-systems or perhaps even just cloud-based systems in general are a fit for them.

As preparation for the reader, it is good to note that when the latter portions of this thesis talk about cloud-based systems they are referring to the form of cloud-computing called SaaS or Software-as-a-Service. In addition to this form of cloud-computing there exist two other forms, IaaS and PaaS, which are short for Infrastructure-as-a-Service and Platform-as-a-Service. The differences between these three can be seen in Figure 1. below.
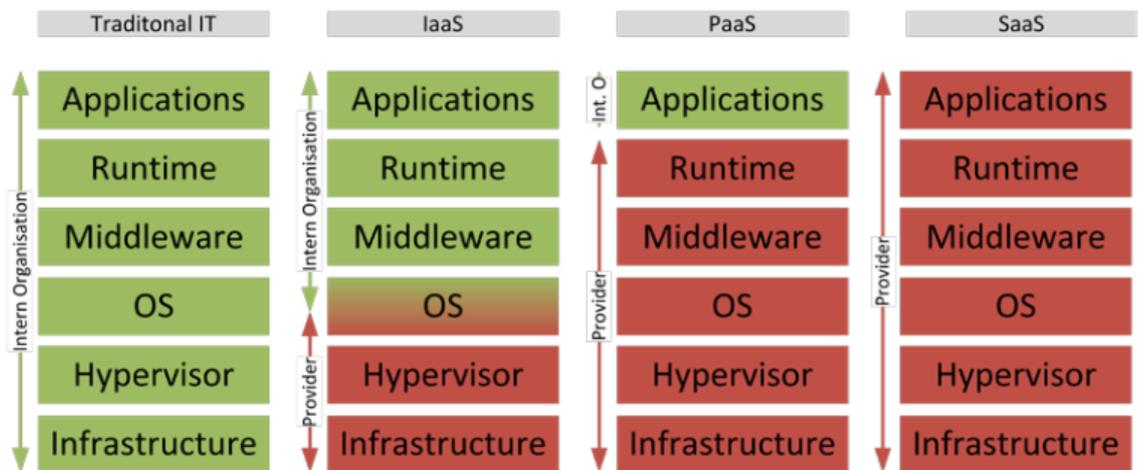
Figure 1. Cloud computing service models, green indicates the levels owned and operated by the organisation purchasing the cloud-computing services, red the ones provided by the provider of the service. (Brian et al. 2012)

As can be seen from Figure 1., the first form of providing cloud-computing services, IaaS, is just providing the infrastructure and related software in the OS (operating system) levels. The next level, PaaS, also includes most of the software environment. The final level, called SaaS, encompasses the services and infrastructure provided with IaaS

and PaaS, but also includes the actual applications, such as the PSA-systems this thesis is looking at.

It is important to realise that besides providing an additional level of services, SaaS provides the same services as IaaS and PaaS. This is meaningful as it means that in addition to its own benefits and risks, SaaS also includes the benefits and risks of IaaS and PaaS. This is referred to in the advantages and disadvantages sections, for example with costs related advantages, when talking about how the type of cloud solution doesn't matter. It also means that the term SaaS is covered by the term cloud, both of which are used in the thesis.

As a final part of the introduction before moving on to the methodology utilized and the actual thesis, it is good to shortly recap the process of purchasing a new ERP-system. This is done in order to show where and when the contents of this thesis should be taken into account in an actual acquisition process, thus creating the right frame for content.

The usual driver for the acquisition and implementation of such a system is the desire to drive growth and cut costs in the business of a company, and as such when selecting any kind of system the first step a company must take is identifying the type that fits the needs of the business. After this the company must determine the key functionalities required from the system, as no two systems are perfectly alike even if they belong to the same category and as such offer different functionalities. The final step is then comparing the resulting requirement list to possible alternatives, while obviously also giving weight to factors outside of functionality such as the cost and the reliability of the supplier. This process is well presented by Giuseppe Ercolani (2013) in his paper on evaluating systems provided with the SaaS model of cloud-services, even providing a methodology for identifying the suitability of each system based on its functionalities.

The functionality requirements of a PSA-system obviously lay in the second step of this process, while the advantages and disadvantages associated with a cloud-based solution are divided between the second and third steps. These advantages and disad-

vantages include for example financial advantages and data-related concerns (Ercolani 2013). A greater amount of especially the advantages belong into the factors outside of functionality in the third step, which is no surprise as a certain type of system requires certain functions regardless of the way it is delivered, be it through cloud or otherwise. Because of this it is important that every company considering a cloud-based solution realises that the needs of the business have to be taken into account before making the decision between cloud-based and traditional systems, instead of having the fact a system is cloud-based be the driving factor. Once these needs have been mapped however, the additional advantages brought by the cloud are considerable and certainly not overshadowed by the disadvantages in most cases.

2 Methodology

The methodologies utilized in the creation of this thesis were qualitative research for the theoretical parts and action research for the empirical one. Theoretical parts in this respect cover the advantages and disadvantages of cloud-based systems and the core functionality of PSA-systems, while empirical parts cover the analysis of the selected PSA-system. Qualitative research in the creation of this thesis consisted of searching for viable source material to base the thesis on, while action research consisted of testing the trial version of the selected system.

All of the research performed was based on research questions loosely set before the creation of the thesis and refined as the content took form. The research questions used to discover the advantages and disadvantages of cloud-based systems were the following:

- What are the key advantages and benefits of using cloud-based solutions over traditional ones?
- What are the key disadvantages and risks of using cloud-based solutions when compared to traditional ones?
- Can these advantages and disadvantages be grouped in some way, and if so how?
- Are there any advantages and disadvantages that are especially significant for in the context of PSA-systems?

The research questions used to map the core functionality of PSA-systems were the following:

- What are the core features or functions of PSA systems?
- Do these features or functions differ in any way from similar functions in other types of ERP-systems?

The research questions used as the basis in analyzing the selected PSA-system were the following:

- How are the advantages and disadvantages of cloud-based systems taken into account with the PSA-system being looked at and the company providing it?
- How well does the system meet the defined core functionality of PSA-systems?
- What other functionality does the system offer?

3   Advantages and benefits of cloud-based systems

This advantages section will be presented in four parts, with the advantages and benefits being divided into cost-related ones, other financial benefits, the ones that have to do with the ease of use of cloud-based solutions, and finally the ones that offer support and additional advantages to the business itself.

3.1   Cost related advantages

The low costs of cloud-based solutions are one of the top advantages driving companies into using them instead of traditional ERP systems run from a company's own servers. This is easily apparent from a lot of literature that talks about cloud-computing and even from shallower "top reasons" lists floating around. A good example of a credible source for this is a 2012 survey performed by the Aberdeen Group, which points out that the top three positive factors out of six that influence SaaS decisions are cost-related. The figure presenting this fact can be seen below as Figure 2. In this figure we can see that alongside the top 3, with even the 5th ranked reason, limited IT resources, has to do with costs. The same survey also points out how companies implementing SaaS solutions see a return on their investment in 23.61 months on average, while for traditional on-premise implementations the same takes 31.09 months, an increase of almost 32%. (Castellina 2012)
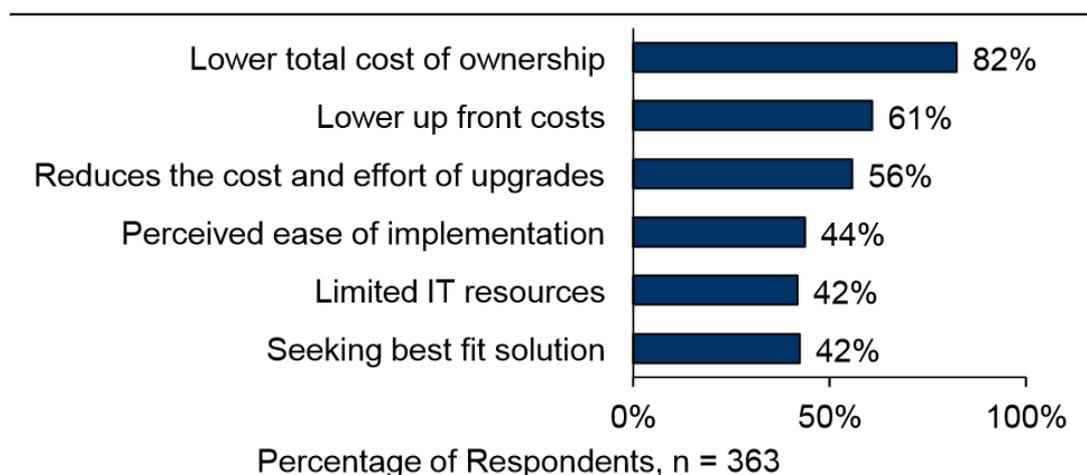

Figure 2. The top 6 positive factors influencing SaaS decisions (Aberdeen 2012 in Castellina 2012)

As proven by these statistics, the cost-related benefits of implementing a cloud-based ERP solution are not only rumours and hype, but instead based on facts and actual results. It is however important to realise what these benefits consist of and how implementing a cloud-based solution actually drives down costs.

The first and foremost of these advantages, and perhaps the most obvious, is the fact that by utilizing a cloud-based solution provided by an external supplier, the company can minimize their own internal IT resources. This factor is one that is generally applicable to all cloud-based solutions regardless of their type, be it applications such as PSA-systems or just storage space. Regardless of the type of cloud solution utilized, when talking about the hardware, software, and other infrastructure such as cabling needed to run an IT function internally, the advantage brought by externalizing them is two-fold.

The first of these is the fact that the costs related to the acquisition and implementation of new capacity will be taken off the hands of the company. These consist of things such as the implementation new servers for existing systems because of increasing demand or acquiring completely new systems along with the infrastructure investments needed to support them. When utilizing a cloud-based solution, such matters are handled provider of the solution, while the company itself only pays the monthly or other fee based on the contract made between them and the provider. The second advantage brought by this is the fact that the costs of maintaining existing capacity will follow suit. Costs of replacing older servers, upgrading to newer version of operating systems, keeping on extra capacity and back-ups in case of an unexpected failure and such will similarly be the concern of the provider instead of the user. (Brian et al. 2012)

Furthermore, it is good to keep in mind that the costs are not only related to the infrastructure itself, but also to the staff taking care of it. As pointed out by Ben Brumm (2012) in his article on IEEE's site Computing Now, the internal need for system and database administrators will go down with the reduced amount of systems ran internally. A direct result of this is the fact that the need to manage these people is also de-

creased, further decreasing the labour needed. The ability to scale down IT staff to the skeleton crew needed to take care of internal IT functions will allow a company to further reduce costs. This so called skeleton crew however cannot be completely removed, as the company still needs personnel for other internal functions. When dealing with suppliers of SaaS solutions, examples of such functions include security, standards, and information management as well as SaaS vendor management (Joha & Janssen 2012a.).

The above reductions in cost are made possible by the fact that by gathering the specific IT functions of several companies under one roof the providers of cloud-based solutions are able to take advantage of economies of scale. What this means is that by performing the functions companies would normally do individually in a centralised way, the provider is able to reduce the costs related. One example of this is given in the aforementioned article by Ben Brumm (2012) where he points out that even with the increased usage of cloud-computing, system support staff will still needed by cloud providers, but that they will be needed in lesser numbers as they will handle a wider range of companies on centralized infrastructure.

As a final cost related point, it is worth noting how with a cloud-based solution a company's always paying for what they use instead of what they might need. This ties in closely with the financial benefit of converting capital expenditure into operating expenditure, discussed further below, and is covered by Mache Creeger (2009) on his article on cloud-computing. He points out how cloud-computing eliminates the need to make large capital investments in order to be able to serve peak demand before it is ever realised, and instead allows companies to pay for what they use when they use it. He continues on to say this means that the companies don't have to fear investing on capacity that will never be needed, which would mean having to write off the extra as useless costs. Altogether this means that the IT costs correlate directly with usage, are evenly divided through the year instead of forming rare but high spikes in expenditure, and having to write off extra capacity that might result from those spikes is not a risk.

A real-life example of how this works can be given from the pricing of PSA-system provider PlanMill's PlanMill Cloud, where the monthly costs after the initial purchase are based on the number of users and selected features. As can be seen in Attachement 1., listed prices range from 20€ to 50€ per user per month based on included functions, meaning you pay for exactly what you want, as well as for the correct amount of users (PlanMill). This can be compared to a company purchasing their own server and software license in order to run a PSA or other ERP system, in which case they would have to guess on the highest amount of users during the system's lifecycle, map what features not required now might be needed in the future, and then invest on capacity accordingly.

3.2 Other financial benefits

While eliminating the direct costs arising from infrastructure and staff, further inflated by the need to prepare for the highest requirements predictable, are the obvious financial benefits of switching to a cloud-based solution, they are not the only ones. Already mentioned above was the fact that a company is able to switch large capital expenses into smoother operational expenditure through the utilization of cloud-based solutions, and this advantage as well as others will be explored further in this section.

Starting off with the capital expenditure to operating expenditure advantage, the most obvious benefit beyond the fact it eliminates high single-time investments and instead spreads them over a long period of time is the fact it brings transparency and predictability into IT costs. Unexpected costs arising from events such as servers breaking down or suppliers ending support for a specific line of products no longer have to be borne by the company itself, and are instead transferred over to the provider of the solution.

An example of this is presented in the SATW white paper by Brian et al (2012) when they talk about an online flower company called Fleurop-Interflora. The company in question had been suffering from unsatisfactory service from their outsourced data-centre, leading to additional follow-on investments and high support costs. As a solution to their problems Fleurop-Interflora decided to move their whole web platform

into the cloud, ridding themselves of the need to invest in IT infrastructure and develop IT skills. The resulting situation allowed them predictable operating expenditure instead of the previous situation of having to deal with unexpected costs from the dysfunctional data-centre. It also allowed Fleurop-Interflora to take advantage of the other attributes of the cloud, such as paying only for what they use instead of having to pay for the possible peak even when it isn't reached.

While the above example doesn't in and of itself speak of moving to a SaaS solution such as a cloud-based PSA-system, the unpredictable issues and costs generated from them are the same as the ones that might arise from running an application on your internal, or out-sourced, servers. The difference, as was discussed in the introduction, is in the fact that utilizing a SaaS solution takes the process a few steps further, also eliminating the need to worry about the applications on those servers.

In addition to improving the predictability of IT costs incurred after the original investments in this way, a harder to see advantage is that cloud-computing also allows the funds needed for those original investments to be utilized in other ways. What is meant by this is the fact that the capital a company would normally have to spend up front in order to acquire hardware and software and on other related costs can instead be invested in other business activities that see a faster return on investment. This point is brought up in the SATW white paper by Brian et al (2012) when talking about cost containment, suggesting that the money saved can be used in driving innovation into the core business of the organisation instead of being tied down in infrastructure.

Furthermore, for smaller and start-up companies those funds might not exist in the first place, meaning that for them cloud-based solutions remove a barrier preventing the adaptation of a system. Mache Creeger (2009) gives an example of this when he talks about how some Silicon Valley start-ups are able to go entirely without infrastructure, but it is not only the tech-savvy companies that are noticing this advantage as can be seen from Figure 3. below.

EMPLOYEES		2–10	11–25	26–50	51–100	101–250
TODAY	Current Adopters	25%	41%	53%	58%	60%
2-3 YEARS	Next Wave	51%	42%	32%	29%	31%
3 YEARS	**Total Using Cloud**	76%	82%	85%	87%	91%
2-3 YEARS	Nonadopters	24%	17%	15%	13%	10%

* Base excludes free services such as free Web mail in the cloud   **Microsoft** | Operator Channels

Figure 3. SMBs (small and medium businesses) and Cloud-Adaption (Microsoft 2012)

This figure from a study by Microsoft (2012) that covered 13 countries found that while for companies employing 2 to 10 people the amount that currently pays for cloud-based solutions is 25%, this amount will potentially triple to 76% in three years. For companies employing 11 to 25 people the study showed the numbers 41% and 82% respectively, and the same trend continues all the way to the end of small and medium sized businesses. At the end of this scale are companies employing 101 to 250 people, and for them percent currently paying for cloud-based solutions was 60%, with the number rising to 91% in three years. From this prediction it can be seen that the low entry barrier to use a cloud-based system is not just a sales pitch, and that companies are really realising the benefits of the cloud and grabbing them.

To provide a tangible example of what kind of investments are required to get a cloud-based system up and running, we can look at the largest cloud-based PSA-system in Finland, Visma Severa. For Visma Severa the implementation of a solution for 1-10 users costs between 290€-1450€ before tax, with a cost of 28€ per user per month afterwards (Visma Severa 2012a). As for extra days of training on-site, Visma Severa charges 1250€ per day before tax with other additional costs for training including travel costs (Visma Severa 2012b). As such we can count that even with an extra day of on-site training included the cost of taking Visma Severa into use should stay under 4000€ with taxes included, and will in a normal case most likely be much less.

3.3   Ease of use and operation

While costs and other financial advantages are perhaps the foremost and most obvious of the reasons for switching to cloud-based systems, they are certainly not the only ones. More advantages are brought by cloud-based systems in the fact that the systems themselves are easier and more flexible to use because the technical aspects of operating the software are left to the provider to handle. This materialises in several ways, talked about below.

The first and most obvious of these is the fact that cloud-based systems allow for a much higher degree of mobility for the companies utilizing them. This means that users are able to access their applications regardless of whether or not they are in their office or not, and in addition the applications available to a wider range of devices instead of just the traditional PC or laptop (Bhardwar, Jain & Jain 2010.). What this means is that with the growing power of devices such as smartphones, the same browsers traditionally running on PCs are now able to operate on a mobile device. A further advantage of this is the fact that the information being accessed is always up to date and the latest available. It can be pointed out that even traditional systems are able to operate over services such as VPN, but these services come with the hassle of setting them up not found in a cloud-based solution provided through web-browsers.

In addition to being easily available anywhere and through a range of devices, a growing amount of SaaS providers are also providing dedicated mobile applications. Visma Severa is an example of this, providing a mobile application that can be used for entering and tracking work hours through a mobile phone (Visma Severa 2013c.).

This mobility is especially valuable for professional services companies such as the ones served by PSA-systems. This leads from the fact that their business isn't tied down to a certain location as is the case with manufacturing, and when providing services such as consulting the employees often operate outside of the office. An example of this is Semat Group, a company using a cloud-based document management system provided by ValueFrame. Semat Group's business consists of providing customer with

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project management resources and expertise, and most of their staff works outside of the office both within Finland and abroad. According to the testimony by Heikki Laaksonen, a project manager of the company, a cloud-based solution is natural for them as it allows the tools to be constantly available and usable regardless of where the work is being done. (ValueFrame a)

A further advantage provided by the cloud-based solutions is the fact that by moving the development and possible customization to be handled by the provider of the system, the controls required for these functions become unnecessary, and can be hidden from the end-users of the system. While at first glance the reduced amount of controls might seem like a disadvantage, and in some ways is for the company itself, for the end-users it becomes an advantage as they do not need these controls for their everyday activities. This fact is well put by Brian et al (2012) in the already often referred SATW white paper, when they talk about the general characteristics of cloud computing,

> CC follows IT's evolutionary logic, or the achievement of ever-greater complexity and to continually improve information hiding or "transparency engineering."Moore's Law lies at the core of IT developments, a growing maturity of hiding unnecessary information, in parallel with CC development, enables the possibility of controlling systems with increasingly abstract policies. For service users, this not only means that any unnecessary details will be hidden, but also that the parameters needed for the core business become easier to control.

Additionally, since the development is no longer the concern of the company utilizing the service, the need not concern themselves with following the day-to-day advancements happening with IT technologies. Obviously some observation is still required in order to realise if the provider of the solution is falling behind others, but the need to have detailed understanding of how to implement emerging technologies is eliminated. Furthermore the delivery model of cloud-based solutions allows for continuous updating, and new functionality can thus be added continuously without the need to run cumbersome and disruptive update projects within the company. This is talked about by Jason Corsello (2009) in his Center of Excellence research paper, where he dis-

cusses human capital management (HCM) systems. The following Figure 4. is from the paper in question.

EXHIBIT 2 ERP Customers by Current HCM Release

Source: estimate, Knowledge Infusion, 2009
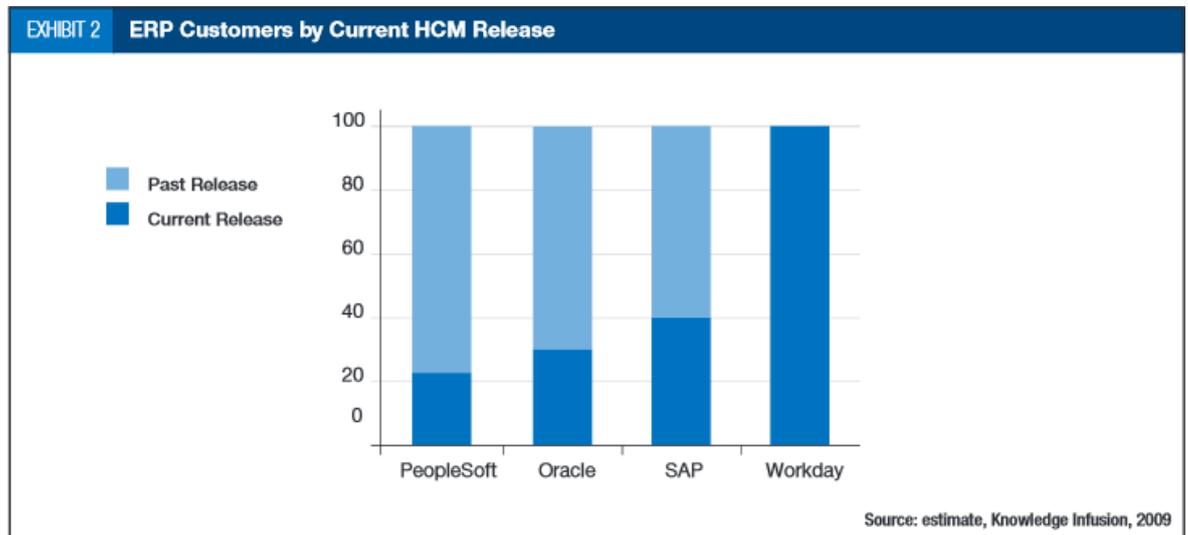
Figure 4. ERP Customers by Current HCM Release (Knowledge Infusion 2009 in Corsello 2009)

As pointed out in Figure 4., recent research suggests that for three traditional ERP vendors, including SAP and Oracle, the deployment of the latest releases is less than 50%, while with a cloud-based system such as Workday the customers are always utilizing the latest release.

3.4   Business related advantages

The final type of advantages is the one that directly support the business and the needs of the company. The first of these is the final facet of being able to externalize IT functions, and thus joins reduced costs and lower one-time investments as advantages derived from it. This facet is the fact that by externalizing IT functions, the company can better focus on their core business, already referred to in the earlier quote on how cloud-computing simplifies using IT. This advantage automatically follows the fact that by not having to consider how IT needs to be produced internally, the managers responsible for analyzing and communicating these needs to IT can instead spend more of their attention on their respective business functions.

In addition allowing companies to use their resources on their core business, the adaptation of cloud-based solutions is also much less disruptive for the business itself. What is meant by this is the fact that by offering ready-made solutions SaaS vendors are able to provide shorter implementation projects. While steps such as the training of staff and transfer of existing data must still be taken, the average implementation of cloud-based solutions still beats on-premise ERP solutions by miles. This is proven by the study made by the Aberdeen Group, already referred earlier on the duration to achieve a return on investment, in which the quoted average time to get a SaaS solution running was quoted at 6,95 months, while for an on-premise solution the same average was 11,02 months. The same study even points out how SaaS ERP implementations stick to their budget better than traditional project. (Castellina 2012)

After such an implementation project has been undertaken, the company has to be able respond to changing business needs and situation, in which case the flexibility offered by cloud-based solution provides an additional advantage. This has already been referred to with the fact it allows companies to pay for what they use instead of what they might need, which is indeed the main advantage especially when the needed capability is below what was expected. When exceeding the predictions made by the company on the moment of acquisition however, cloud-based solutions allow for extra capacity to be added on faster than with traditional systems. This is made possible by the same pay for what you use logic referred to earlier, which means that increased capacity doesn't require additional hardware investments and their installation, and instead means just increasing the number of users or space paid for. New business functions will obviously still require new systems or additional functionalities to existing systems, but simple growth of existing business will no longer be as disruptive as it would be with the need to acquire and add in additional infrastructure.

Finally, against common conception, cloud-based solutions are often more secure than systems run by companies internally. An example of this is shown in the same Aberdeen Group study referred to earlier, where they quote the results of an earlier report. This is shown in Figure 5.
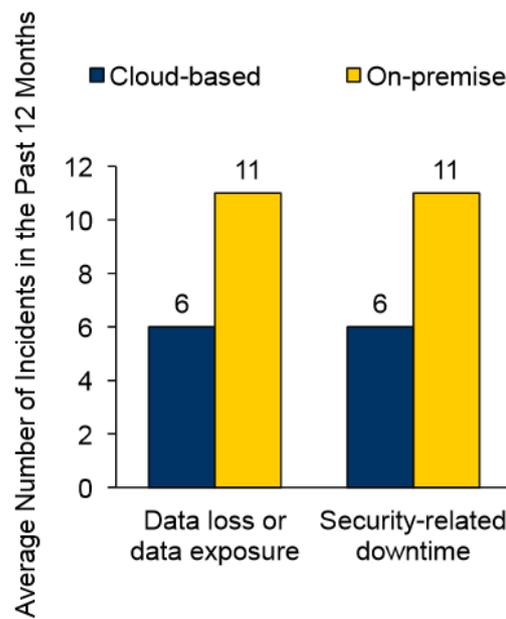
Figure 5. More secure, More stable (Aberdeen Group 2010 in Castellina 2012)

As can be seen from Figure 5., the on-premise solutions average 11 incidents of data loss or exposure as well as a same number of security-related downtime in 12 months. For cloud-based solutions on the other hand this number was on average 6 times, almost half of that of the on-premise solutions. (Castellina 2012)

Security in the cloud however is not an inherent quality of a cloud-based service, and is rather an advantage gained from the same economies of scale that drive down costs of providing them. By collecting all of the servers and infrastructure into one place, the providers are able to use more resources in security than the companies individually could. This means that SaaS providers can utilize security that is better or more high-levelled than the companies could for themselves. Security is still the responsibility of the provider however, and as such a provider with no expertise might indeed produce a system that is less secure than the company's existing system or less secure than the on-premise alternatives. As such the end user of the system must make sure when selecting their system that what is provided is indeed secure. (Joha & Janssen 2012b.)

Cloud-based systems do however have other security related threats, which will be discuseed below in the next chapter.

4 Disadvantages and risks of cloud-based systems

As there are concrete advantages to a cloud-based system, so are there concrete disadvantages. Of these already cleared was the misconception that cloud-based systems are somehow less secure than traditional on-premise systems, as it was shown that security depends on the provider rather than being an inherent attribute of the cloud and even that cloud providers can invest more in security than individual companies. This however is not the only disadvantage perceivable in cloud-based systems, and the other disadvantages are not similarly based mostly on misperception.

This chapter will cover four topics like the advantages section, but as the disadvantages are more one-dimensional than the advantages, all of these topics will be shorter. The first of these are the disadvantages of being online-based, followed by the aforementioned additional places for threats in SaaS solutions. After this come the disadvantages of reduced customizability and integrability, finally followed by data-related risks and concerns.

4.1 Disadvantages of being purely online

The first and most obvious of the disadvantages of being cloud-based is the fact the services are only available through an internet connection. While this is the source of the great mobility of cloud-based systems and a defining characteristic for them, it is also their most profound disadvantage. Should there ever be a situation where a company loses its internet connection or an employee working remotely their home connection, the entire system becomes inaccessible. With a business critical system such as a PSA system, containing customer information, project data, and the tools for invoicing, this inaccessibility can quickly become a serious issue, and as such even the risk of such an outage warrants serious consideration.

In addition for having to consider complete outage, there also has to be consideration on how much latency the company can accept in their services, and what sort of limits the available bandwidth puts on the operation of services available through an internet connection. This is why both of these concern's are on Giuseppe Ercolani's (2013) list

of cloud-related concerns a company has to give a weight to when considering a SaaS solution.

On top of these concerns it's not only the customer's side that has to be taken into consideration, as a bottleneck can also emerge in the backside of the application, on the servers it's operating on. According to technical report from Berkley University less expensive 1 gigabit Ethernet cables are universally used on the level of individual servers for cost benefits, and this fact can create bottlenecks for certain processing patterns thus affecting performance. What this means in layman terms is that while the company's own computers and networks are completely fine, the provider's equipment is slowing down the system. Thus a company considering a cloud-based solution has to think of both their own bandwidth and latency requirements as well as what the infrastructure provided by the supplier can provide on the backend. (Armbrust et al 2009.)

4.2   Increased security threats

As has been discussed earlier, the security of cloud-based systems in and of itself isn't worse or better than that of traditional on-premise systems, but is instead tied to the capabilities of the company delivering the solution. The fact that the entire service is provided over an internet connection rather than a connection happening within the company's local network however means that there are additional levels of threats present.

While this thesis will not cover the technical side of these threats and how cloud providers might avert them, it is still good to understand on a general level what they are and what aspect of the cloud they affect. A good overview of them is given by Dimitrios Zissis and Dimitrios Lekkas (2012) in their paper Addressing cloud computing security issues. They divide the security requirements into three levels, an application, virtual, and physical level, and then list the threats for each. Of these the physical level shares its threats with an on-premise solution, and as such they will not be covered here. The threats to the application and virtual level, meaning all of the systems and other software running between the applications and the hardware, are listed in Table 1. below.

Table 1. Threats to the application and virtual levels of a cloud solution. Information in the table from a larger table from the Zissis & Lekkas (2012) paper Addressing cloud computing security issues.

Application level	Virtual level
Interception	Programming flaws
Modification of data at rest and transit	Software modification
Data interruption (deletion)	Software interruption (deletion)
Privacy breach	Impersonation
-	Defacement
-	Connection flooding
-	DDoS
-	Disrupting communications
Shared (Threat to both the application and virtual level)	
Impersonation	
Session hijacking	
Traffic flow analysis	
Exposure in network	

As can be seen from Table 1., on the application level the threats listed by Zissis and Lekkas (2012) consist of things such as communications between the user and the server being intercepted, interrupted, or modified by third parties. Further threats which the application level shares with the virtual level include someone impersonating a user or even hi-jacking their session. All of these basically mean that even if the system's availability to the client is not affected, the business data being handled and transferred between the server and the client is not secure. Of the threats listed the last two being realised means that an unauthorised person would gain access to the company's system, and as such it is obviously imperative that providers take steps to prevent this from happening.

On the virtual level Zissis and Lekkas (2012) list things such as disrupting communications, DDoS attacks, and connection flooding in addition to the threats mentioned

above, meaning that the additional threats on this level result in the slowdown or complete inaccessibility of the services being offered. The result of this would be the same as from the company itself suffering from a bad connection or losing it altogether, and as was mentioned above with business critical systems even short outages can quickly become an issue. Thus it is no less important that providers take these threats seriously as well.

Although the points brought up above paint a threatening picture of the security of cloud-based solutions, it is good to keep in mind that for each of them there are countermeasures that can be taken. This further reinforces the point brought up above about security being tied to the providers instead cloud-based solutions as a concept, and as such makes it extremely important for companies to do research on what sort of steps these providers have taken with their solution before adopting one. For those interested in these measures which fall outside the scope of the thesis, the further parts of the Zissis and Lekkas paper referenced above provide an excellent starting point.

4.3   Reduced customizability and integrability

While the being able to get a cloud-based solution into use fast, getting constant updates without having to worry about implementation, and having lower costs are all great benefits, they do not come without their downside. This downside is the fact that when compared to traditional on-premise solutions, cloud-based systems are rather rigid in their functionality and not nearly as customizable to the customer's specific needs. As so many things with the cloud, this is a result of taking advantage of economies of scale, this time leading to a disadvantage instead of an advantage.

On the advantage side of things being able to offer the same source-code to multiple customers means that there is only one version to take into consideration when developing, and as such like having to make customer specific modifications don't hinder development or create extra costs. This however leads to the fact that when a customer wants or needs these modifications, they can't get them, not without high costs anyway. This fact is mentioned by Brian et al (2012) in the SATW white paper when listing

the advantages and disadvantages of SaaS over software ownership, listing the disadvantage as "Lower adaptation possibilities as standardization is given"

Providers of cloud-based solutions try to avoid this disadvantage by making sure the solution provided itself allows for a degree of customization, and as such fits a larger range of functionality criteria. An example can be found from the pricing of aforementioned PSA-system provider PlanMill, seen in attachment 1., where different levels consist of a varying amount of functions, with extra functions costing an additional subscription fee (PlanMill). This allows the customer to have a degree of customization, but ultimately means that there is still only one set of source code to develop.

What this rigidity means for the customer in the end is that extra attention has to be paid when considering what functionality is really required from a new system, as modifying existing functionality afterwards is likely impossible. This is why customization is listed as another factor in Giuseppe Ercolani's (2012) cloud-related concerns to be weighted.

In addition to the lack of customizability, Brian et al (2012) also list the lower integrability of SaaS solutions as one of their disadvantages. When one considers on-premise systems, making custom integrations between different systems is possible, if costly, as the company has direct access to the data and applications stored and run from their servers. With cloud-based systems this is a different matter altogether, as the servers aren't directly accessible by the customer companies, and neither can they make modifications to the code of the application. Instead most cloud-based solutions, such as the PSA-system analyzed later, offer a certain number of existing integration possibilities, but in addition to those it is obvious that integrations into new systems will not be developed based on the requests and needs of a single customer.

This part of the disadvantage is slowly being erased by interface technologies such as REST however. An example of this is the REST functionality launched by ValueFrame at the end of summer 2013, which provides the ability to both read data out of

ValueFrame's system and write data into it. According to ValueFrame this can for example be used to create customer lists onto a company's website, which is the type of one-customer-only interface that would normally not be available. (ValueFrame b)

4.4   Data-storage related disadvantages and risks

The final category of disadvantages and risks relating to cloud-based solutions is the one that arises from the fact that the data of a company utilizing a cloud-based solution is not stored on a server owned by them, as well as from the fact that this data is not directly accessible to the company.

The first and foremost of this category's risks is the question of who owns the data stored in the cloud, a critical definition when talking about data such as customer and project information stored in PSA-systems. It is obviously important for all companies that the rights to such data are not handed over to outside parties, as the loss of it would be a dire event for the business. This risk is however rather simply alleviated; as all that is required that these facts are defined in the contracts made between company and provider. In relation to this Marston et al (2011) note that "The parties to a contract should pay particular attention to their rights and obligations related to notifications of breaches in security, data transfers, creation of derivative works, change of control, and access to data by law enforcement entities". The question of whether or not writing a contract that takes into account all possibilities is another thing however, and is largely dependent on the complexity of the service offered.

A second risk that relates to data-storage is the fact a company employing a cloud-based solution cannot always be sure of where their data is located. For some companies this matter can just be a matter of preference, wanting to keep their information within the borders of the same country, but others are legally obligated to store their data within their country's borders. Things are further complicated by the fact that the information on cloud-based solutions is available anywhere instead of being tied down in a location such as the company office, meaning not only is it a question of storage but also of access. These facts discussed by Eric K. Clemons in his paper on managing the risks of cloud computing, where he gives examples ambiguity of current legislation

on these matters, and points out a further cloud-related risk in business to business litigation. (Clemons)

Mr. Clemons talks about how it is possible with cloud-based solutions for the customer company to be in one country, the provider in another, and finally the data being stored in a third, and how this brings with it multiple questions on how the matters will be settled if there is a disagreement. Once again however, both of these risks can be mitigated with a good contract, evident from Mr. Clemons' final conclusion in the report,

> A good outsourcing contract is probably even more important in the cloud computing environment than it is for traditional outsourcing. Given the magnitude of the losses that can occur due to loss of intellectual property or breach of security, it's also essential that the contract protect the client's rights to litigate in a forum that is likely to be fair and unbiased, and likely provide fair and accurate valuation of any losses.
> (Clemons)

Finally, the risk of not having direct access to the server a company's data is stored on is the fact that there might be no easy way for the company to obtain it in the eventuality they want to stop using the service. The same risk arises from possibilities such as the service provider going bankrupt or the customer company not being able to meet their contractual obligations, mainly payment for the service. Once again however, this risk can be alleviated by making sure these eventualities are covered by the contract between the service provider and the customer company. This is yet another fact referred to by Mr. Clemons when talking about the security of cloud contracts, pointing out that while the contract clause regulating what happens to the data is important, it is often ignored in outsourcing contracts (Clemons).

5 Core functionality of a PSA-system

As the final theory before moving on to the actual PSA-system, this part of the thesis will cover the basic functions that should generally be found in every one of them. This portion will be based on an article at the website of The ERP Software & Accounting Software Industry Forum and a supporting portion listing the actual modules included in a PSA-system.

A short introduction into what this type of system a PSA-system actually is and why they are utilized can be found in the same article, which describes it as follows:

> Professional Services Automation (PSA) software is designed to manage, automate and measure operational effectiveness and performance in key areas such as project delivery, resource utilization, project quality and financial results. By more closely managing key factors such as resource allocation, project plan achievement and cash flow generation, greater project delivery is achieved, surprises and operating costs are reduced, billing cycles are accelerated and bottom line profitability performance is enhanced.
> (The ERP Software & Accounting Software Industry Forum)

From this we can see that they are systems built around initiating, supervising and finally billing projects, and especially around improving effectiveness in every step of this process

The aforementioned article lists the modules found in PSA-systems as the following:
- Sales Force Automation (SFA)
- Quote and sales order processing
- Project office management
- Project collaboration and workspace
- Resource management
- Change management
- Project Accounting (aka Job Costing)
- Time and billing
- Invoicing and collections

− Project profitability reporting

This thesis will divide the modules into five subchapters, with each subchapter besides the third containing an explanation of one module's functionality. Each subchapter will also include explanations into the benefits brought by each module. Put together these five subchapters will form a description of the functionality in PSA-systems in general.

As for the content of the third subchapter, it will combine Project office management, Project collaboration and workspace, Resource management, Change management, Project accounting, and Project profitability reporting into one. The reason for this is that they all fall under the umbrella of Project management, which is the name of the subchapter as well. An additional change is limiting the Time and billing module into only Time and expense entry, as the overlap with Invoicing and collections is better placed in with the Invoicing module.

5.1   Sales force automation

Sales force automation or SFA for short, is defined by Raj Agnihotri and Adam Rapp (2010, 4) in their book Effective Sales Force Automation and Customer Relationship Management as follows: "The application of technology to support regular sales functions and includes tools that are employed by users to perform administrative or other repetitive tasks." Thus it is indeed a module for automation, but rather than automating the sales process itself, the module is used to reduce the amount of repetition in it. The use of sales force automation thus maximizes the time the salespeople have for other activities, such as actually contacting customers.

As for the functionality the module actually contains, or should contain, an article by Andrew Harry (2013) divides it into five key features: Task Management, Lead Management, Marketing Tools, Forecasting, and Reporting. Of these the first, Task Management, Harry defines as the ability to schedule, assign and track tasks from start to finish. These tasks he says can be grouped together in order to form lists of tasks that need to be completed in order to process a sale or achieve some other larger goal. It is easy to see the benefit in this, as a standardized group of tasks that need to be com-

pleted with each sale makes for a more standardized sales process and eliminates the need for post-its, e-mail or other tools to keep track of what's happening with each individual sale.

The second, Lead Management, is defined by Harry (2013) as the ability to use sales force automation to monitor the progress of leads and opportunities. He also mentions how a SFA system, which in case of a PSA-system works as a module in a larger system, needs to assist the salesperson with managing their current opportunities. Like with Task management, the benefit of a standardized pipeline here is great, especially in order to make sure more valuable leads don't get lost in a mass of others.

The third feature, Marketing Tools, is a smaller part of SFA with Harry (2013) only making a suggestion of offering even some simple tools to the salespeople. The main part of this feature is what happens outside of the system, as integrating marketing tools to a sales module means the respective departments are brought together. This brings common benefits to both parties just through increased communication, not to mention individual benefits such as the marketing department being able to see the effects of their efforts in sales as mentioned by Harry.

The final two features, Forecasting and Reporting are both really reporting, with forecasting being a special case as it uses the numbers entered to look into the future to see how many leads are expected to materialize into sales. The benefits brought by these are really rather obvious, as they bring the oversight needed to steer sales operations. What a SFA module does in addition is the fact that these reports should be built in to it, and thus demand no hassle with excel or other additional tools or systems.

5.2   Quote and sales order processing

Quote and sales order processing are traditionally parts of a larger sales and distribution module in systems such as SAP and Microsoft's various ERP systems. This type of larger module includes basically all the same basic functionality as the Quote and sales order processing module that should be included in PSA-systems, but goes quite a lot further with things such as order fulfilling and so forth. An example of this is how

Microsoft Dynamics GP 2013 can be used to determine how quantity shortages will be handled for individual items, documents or batches (Microsoft 2013). The reason this type of functionality is not included in the smaller module of PSA-systems is the fact that things such as inventory exist only to define what sorts of services the company offers.

This is because of the nature of the professional service industry; "inventory" consists of the expertise of the company's employees rather than physical products. Thus it is measured by resourcing instead, a module discussed later, thus eliminating the need for inventory management, order fulfilling, and shipment.

Other than this the same principles in functionality apply in what should be included in a quote and sales order processing: quotes and orders should be connectable to their individual customers, the pipeline a quote goes through in order to become an order should be standardized and their statuses should be traceable. An additional benefit in PSA-systems is the fact that sales orders usually provide the base information for a project, and can thus be easily converted into them. This also allows a company to track which order spawned which project.

5.3 Project management

After the sales department has done its job and the quote and sales order have been written, it is time for the actual professional services to begin. The way these are generally handled is through projects, and thus it is not hard to see that the project management functionalities lie at the heart of each PSA-system.

As was mentioned before, this part of the chapter will cover the modules Project office management, Project collaboration and workspace, Change management, Project accounting, and Project profitability reporting. It is however important to note that especially with smaller systems, such as ValueFrame PSA Pro covered later in the thesis, these are usually combined into one or more larger modules instead of each one being presented individually.

The ERP Software & Accounting Software Industry Forum article referred to at the start of the article divides the functionality offered by these modules into three tools or capabilities: Project office administration, Project management and Project accounting (The ERP Software & Accounting Software Industry Forum). Left out of these is Project profitability reporting, which while important, doesn't really have a good definition for what it should contain. Each company has its own key performance figures it wants to follow more closely than others, and as such it can't really be said what sort of reports each PSA-system should contain. What can be said however is the fact that there should be some sort of project reporting in every system.

The first of these, Project office administration, basically covers the first two modules: Project office management and Project collaboration and workspace. The article refers to it containing the functionality to manage the project components and the means to deliver them, referring to things such as the project plans and activities as well as the project team (The ERP Software & Accounting Software Industry Forum). Looking at the software built around this functionality, the usual features include ways to create and share tasks and other project content, tools for communication and ways to follow the progress of the project. In addition there is obviously always the ability to create projects.

An example is a system called Teambox, listing their main features as the creation and management of tasks, filing and sharing of documents, and communication both in real time and through discussions under the project in question (Teambox). It is not hard to see the benefits in this, as the tasks are stored in once place, allowing them to be managed easily, as well as making sure the teams tackling the projects are all getting their information from a centralized source. This means that no one ever gets dropped out of the loop like might happen if changes were communicated with e-mail or memos.

The second part, which while it is called Project management is not to be confused to the name of this subchapter, contains the Resource management and Change management modules. In addition to these, the The ERP Software & Accounting Software

Industry Forum article also mentions how this tool is used to manage the project information and delivery method, meaning that the Project office administration discussed above really only handles the content of a project while this tool handles everything else related (The ERP Software & Accounting Software Industry Forum). Resource management as a module is not too complicated, and should just contain the features that allow the user to resource the team members reserved to the tasks they can handle and to make sure no one has too much or too little work. Change management on the other hand might need a short explanation to be understood in this context.

While one might think it refers to managing change in an organisation, for example in the case of a software project the process of adopting a new system in the customer's organisation, this is not the case here. Here it refers to the definition it is given for example in the PMO and Project Management Dictionary of Project Management Hut (2013), which is given as "the formal process where changes to the project are introduced and approved." Thus here it means features that make sure the project doesn't grow uncontrollably, in its simplest form just limiting who can create tasks. All in all these project management tools do much the same as the project office administration ones do: they make managing projects easier and help the project managers keep a better handle on things.

Finally, Project accounting refers to the tools used to handle the financial side of projects. Once again the The ERP Software & Accounting Software Industry Forum article has a good definition of what has to be contained in this tool, listing things such as billing type, billing methods, billing schedules, and revenue recognition method. All in all it can be said that a PSA-system should be able to handle the financial side of a project along with its content and other information. The benefits from this are the fact that, once again, all of the project's information is in one place, and that it means that project information doesn't have to be moved into another system before the billing rate and other information such as the billing dates can be set. It also means that this information can be used as a basis for reporting, allowing forecasts about the profitability or the lack there of to be made as the project goes on.

5.4   Time and billing

Time and billing, as with sales order processing, is a rather common part of ERP-systems, and unlike sales order processing actually differs very little in PSA-systems when compared to other types of system. It is however a more crucial part of PSA-systems than it is of other systems, as time works as the basis of most invoices in professional service companies. This was mentioned with sales order processing when talking about how there isn't usually any physical inventory sold in these companies. Thus it is imperative for a PSA-system to include some type of time entry functions.

To see what sort of features should be included in this module, we can look at the features offered by a PSA system built around this module. An example of this is Time&Space by TimeWatch which is even advertised as being chosen over run of the mill PSA solutions by their customers. The features they offer that aren't handled by other modules include Time Recording, Expenses Recording, and Reporting. An essential part of the Time Recording and Expenses Recording features is the fact that even in Time&Space they always relate to a project. (Timewatch 2013)

What this means is that generating invoices based on recorded hours and expenses is easy and can be done for a select customer and project. It also means that the rates charged from a client can be set according to the project, thus customizing the charged rate according to the complexity of the tasks of the project.

An additional benefit of having the time and billing module built into a PSA-system is the fact that the information can be taken directly into the invoicing module, making the generation of invoices that much easier. In addition the data is stored with other project related data such as baseline estimates of project schedules, and as such are available for reporting. This is a crucial benefit especially if a company tends to have fixed rate contracts, as it allows them to see if their rates are too low or too high when compared to the hours committed to each project.

5.5   Invoicing and collections

Once a project has been completed and the last of the time and expenses has been written down, it is time for the last stop in a project's life-cycle: invoicing. In reality this is not the only case as projects, especially longer ones, can be charged on during the course of the project on specific milestones. In addition some services can be offered on a constant basis, such as accounting services or payroll, in which case monthly or other kind of recurring payment is necessary. All of these possible cases put together, as well as some other requirements, build the essential features of an invoicing module.

To see what sort of features are included in an invoicing module, we can look at a cloud-based system dedicated to invoicing. An example such a system is FreshBooks (2013), a cloud-based accounting solution for small business owners. This specific system happens to offer additional functionality such as client credit that is not really a part of the project-based professional services, and as such only the features relevant are introduced. These are the following:

- Customizable invoices
- Recurring invoices
- Late payment reminders
- Support for multiple currencies
- Ability to modify the tax
- Ability to track payments
- Late payment fees

For the first of these, customizable invoices, is the first and most obvious benefit is the fact that you can brand your invoices with a company logo, but that is not the only benefit gained. Different clients will want different information in their invoices, with one of the usual ones being the level of detail hours being billed are presented. Thus being able to customize your invoices to fit client needs is priceless. The other two that have to do with modifying the invoice, modifying tax and support for multiple currencies on the other hand have less glorious uses, but are all the more important. Being able to modify the currency saves companies operating in multiple countries the effort

needed to convert invoices to other currencies by hand. For these same companies the ability to modify the tax to fit the taxing policy of each country is a pure necessity, and being able to change it by hand means the company won't have to contact the supplier every time the tax legislation changes.

Of the other ones recurring invoices was already mentioned in the possible ways a company might have to do invoices, and is also a necessity for these companies rather than a strict benefit. For the companies that haven't yet used this form of billing on the other hand, it opens up new venues.

Finally, the three features not yet covered form the basis for following up invoices. The ability to track payments is once again more of a necessity rather than a benefit. When connected to project milestones however, it allows companies to easily track when portions of the project have been paid for by the customer. The other two features, reminders and late payment fees on the other hand offer the functionality needed when things don't go smoothly. While no company hopes they'll have the need to use these tools, they are nonetheless important to have.

6   ValueFrame PSA Pro

Now that the advantages and disadvantages of the cloud have been presented along with the core functionality one can look to find in a PSA-system, it is time to look at a system combining these two. This system is ValueFrame PSA Pro for this thesis, produced by a Finnish company sharing the same name: ValueFrame Oy. As a short introduction to the background of the system and company, according to their website ValueFrame was founded in 2001 when they noticed there didn't exist a fitting tool for the ERP needs of small and medium sized professional services companies (ValueFrame c.).

ValueFrame was selected as the company to be analyzed in this thesis because of their size in the Finnish market: having the second most client companies at 300, second only to Visma Severa based on research done for this thesis in Finnish PSA-systems (ValueFrame d). The reason this system was selected was because it is the largest purely Finnish PSA-system, as Visma Severa is owned by the Visma Group, a Norweigian company.

The method of examining the system will be the following: First the chapter will go through how the advantages and disadvantages listed above are addressed on the company's website and in other public sources, after which the functionality/features of the system are examined as they are presented in a trial for the actual system and compared to the core functionality of PSA-systems.

6.1   Addressing of the advantages and disadvantages of the cloud

Looking at the website of ValueFrame and the presentations that are available of their products online, it doesn't seem they discuss the nature of the platform they're offering they're product on much. If the reader wants to read more about SaaS than the short coverage provided, the site's offer is a link to Wikipedia. This lack of coverage can however have a good reason. As was said in the introduction, companies should consider the business needs of the company and the functions needed to serve them before moving on to consider what type of platform these are provided on, and thus it

makes sense to offer wider coverage on what the system can do rather than just highlight the platform. Still, a customer with the information provided by this thesis won't really see much of how ValueFrame utilizes the cloud in the content of their website.

This however isn't to say cloud-computing or SaaS isn't mentioned on ValueFrame's website at all, on the contrary most of the advantages are mentioned in name, but they aren't discussed in any depth or in the sense of how they're utilized. The most notable absence is the fact that pricing isn't discussed on their site at all, with talk about costs and other financial benefits only receiving brief coverage. From the lack of pricing it can be reasoned ValueFrame determines the prices individually based on the customer's needs and situation, and while this doesn't mean their prices are higher or lower than any of the competitors, it does reduce transparency into the costs of their system and what they generally are.

Some of the advantages related to costs and other financial benefits are briefly covered, mentioning how customers can benefit from having no hardware costs, how SaaS comes with a lower start cost, and how the costs each month are predictable (ValueFrame c). Also mentioned is the lack of costs from having to support a system (ValueFrame e). As a final mention of costs and financial benefits, ValueFrame does offer a benefit calculator which can be used to calculate the benefits of using the system, but judging from the values entered into it the calculator doesn't take into account any of the benefits of being cloud-based.

For the advantages related to ease of use and operation, ValueFrame's site ensures that the system is usable anywhere and anytime as well as that the customer doesn't require IT expertise for the system (ValueFrame c). This is also repeated in telling the system is browser-based (ValueFrame g). Beyond this the site does offer a part on mobile syncronization, which is related to mobility if anything, but fails to mention how this takes advantage of the fact the system is in the cloud.

Finally, for the business related advantages the site does mention the average implementation project duration of ValueFrame to be a couple of weeks (ValueFrame

f). Similarily it is said a customer benefit from the solution being a SaaS solution is the fact that the implementation is quick (ValueFrame c). Nowhere is the scalability of the system discussed beyond the offered functionality, thus not telling whether or not it is easy for the solution to grow beside the company. Security however is mentioned, but not beyond saying that the system is secure because of back-up copies, thus leaving all of the added security threats unaddressed (ValueFrame c).

For the disadvantages, not suprisingly the risks arising from being dependent on a constant internet connection are not discussed, but neither are they alleviated. The site does talk about customer satisfaction and so forth, but doesn't mention up-time numbers or other similar statistics to address concerns arising from this. On the same note, it was already mentioned how security was mentioned in the form of back-up copies, but threats arising from the fact the user is constantly online and communicating with a server outside of their own network aren't taken up or the answers to it covered anywhere on the site.

Integration and customizability is the high point of addressing disadvantages, as unlike other advantages or disadvantages they're discussed rather extensively. It is explained that customers can purchase the combination of parts or modules that they feel is right for their business, and futhermore how they can be taken into use in a phased way (ValueFrame f). While it isn't mentioned that the lack of customizability can be a concern for cloud-based systems, the fact is still addressed on its own. Integration on the other hand receives even deeper coverage, with no less than 17 accounting systems listed as integratable with ValueFrame (ValueFrame h). In addition the same page lists 5 examples of other types of systems integratable with ValueFrame, as well as the REST interface discussed earlier in the thesis and a data warehouse solution offered (ValueFrame h). If all of this wasn't enough, the consulting services offered by ValueFrame list one of the topics as integrations into other systems (ValueFrame i).

Finally, as for data-related concerns, the front page of ValueFrame's website assures that they're 100% Finnish but the site doesn't provide further information on this. Looking at the site of Protacon Group, mentioned on ValueFrame's own website, we

can find out that they take care of producing code, supporting the solution, and handling maintenance (Protacon Group). Looking around on Protacon's site one can find out that they do indeed have databases in Finland, but nowhere is it mentioned where exactly ValueFrame's data is being stored, even on a country level. No data ownership related matters are discussed on either site, but this is perhaps to be expected as such matters would be discussed when an actual contract is being written.

All in all ValueFrame's material doesn't totally ignore the fact they're a software-as-a-service company, but they certainly don't cover it in great depth either. Thus company looking to find out more about how ValueFrame and their supplier Protacon Group utilize the cloud in ValueFrame PSA Pro and how they are prepared for the risks it brings would really need to bring these points up in the discussions with the company.

All in all the fact that ValueFrame PSA Pro is cloud-based is readily apparent from ValueFrame's website, but what this means isn't really discussed.

6.2   Functionality offered by ValueFrame PSA Pro

As mentioned above, this subchapter will go through the functionality offered by ValueFrame PSA Pro (PSA Pro from now on) as they appear in the system and compare to the core functionality of PSA-systems as they appear in the previous chapters. While reading this subchapter it is imperative to keep in mind that it is indeed based on a trial of the system, and as such does not offer everything that is available for the system. On the other hand though, it can be expected that no functionality ValueFrame sees as integral to the operation of the system would be left out of it.

To start off with, PSA Pro opens with a front page containing an assortment of widgets offering a quick view into some of the essential day-to-day activities performed in the system as well as into the key figures of the business. This can be seen below in Figure 6.
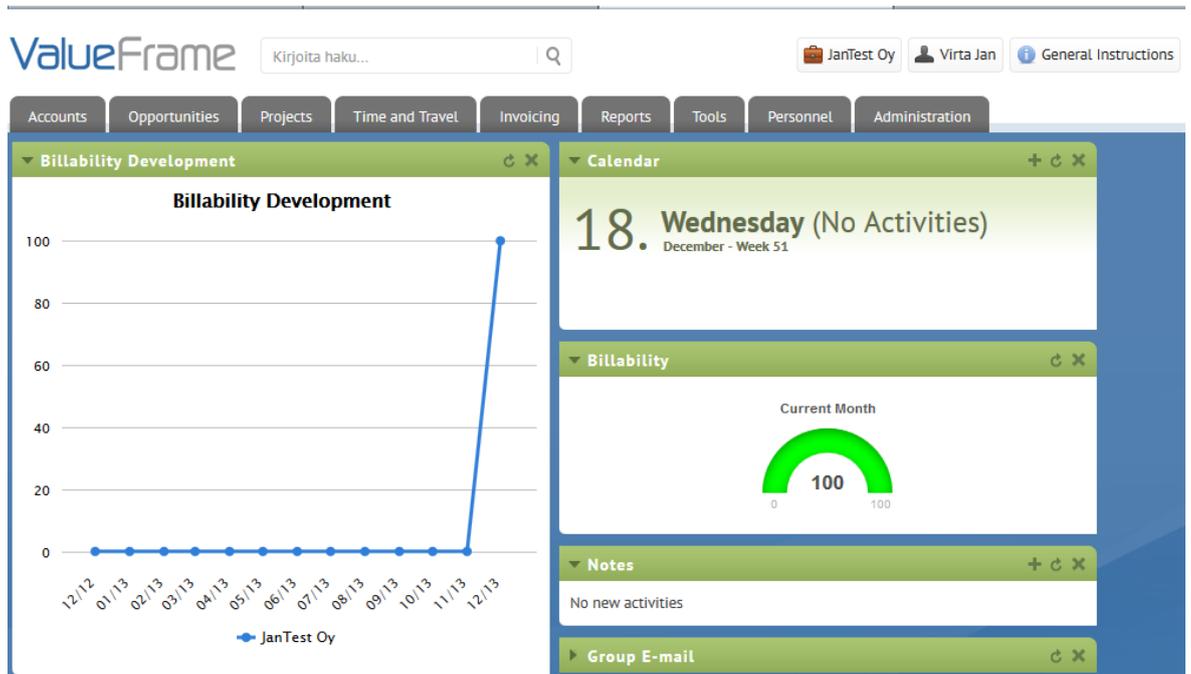
Figure 6. The front page of ValueFrame PSA Pro

Seen in Figure 6. are the widgets the trial offers, a graph on the billability development of the company, a calendar containing the user's events, billability for the current month as well as a group e-mail and note widget. Seen on the top right corner is the name of the user's company as it is listed in PSA Pro and the name of the user, which also functions as a link to the user's own information. Outside if the picture are links to the instructions of the whole system, the widget settings, and the logout button.

While the front page itself doesn't serve any specific core function listed for PSA-systems, it is still a rather nice window into the current situation of the company and the user's own future events. It can also be said that the graphs are a nod in the direction of reporting functions that one should look for in PSA-systems.

Figure 6. also shows the different modules or parts of the system as the tabs above the widgets, and from here on out these modules will be covered in the order they are presented in the picture from left to right.

6.2.1 Accounts

The leftmost of these tabs is the Accounts module. This module handles all the functions that have to do with customer accounts and their contacts including creation, search, viewing, and so forth.

The search and creation of accounts and contacts goes pretty much as one might expect: search can be done with any combination of word-based search and other search criteria, while creation consists of adding the basic information of the account such as name, address and so forth. The first nod towards core functionality is made during creation however, as each account can be given an employee that is responsible for them, a contribution towards sales force automation, and an account must always be given a price list they follow, a contribution towards invoicing functionality. The second important thing is that the search can be limited according to status, thus allowing it to function as a calling list: another contribution towards SFA.

For other functionality offered by the Accounts module, we can look at the actual account page, seen below in figure 7.

Figure 7. The summary of an account in ValueFrame PSA Pro

Listed in the overview, seen right in Figure 7., are the most important facts about the account, including the account status mention above. Below that are the contacts of the account, the opportunities planned or sent, the projects, and finally all the activities related to the account. An important thing to note is that all of the headers of these lists contain shortcuts into creating new object, for example the opportunity list into new creating a new opportunity, which means that not only is all of the account's information listed under the account, but one can also create new content straight from the account page. This is not all however, as all objects seen here, and everywhere else in PSA Pro, contain the possibility to perform on operations on the object in the same way as if you were on the object's own page. As an example one can either send an opportunity or send e-mail regarding an opportunity right from the account overview. Both of these are a huge contribution to SFA, in relation to opportunities and activities especially.

The tab on the left in figure 7. contains the rest of the accounts pages. The first of these below the selected one contains the basic information of the account, modifiable just like it was when the account was being created. The three after that contain the account's contacts, activities, and opportunities. The features present on these pages not present in the account overview are the ability to attach existing contacts to the account on the contacts page, and a total of all of the account's opportunities per opportunity status on the opportunities page.

Below this, under a new headline, are the billing details of the account, containing selections for things such as the price list for the account, sales tax settings, billing addresses for both paper and electronic invoices. It also contains the settings for the accounting of the revenues related to the billing of the account. All in the entire billing page is a major contribution towards the invoicing functionality required from a PSA-system, as it provides the possibility for a changeable sales tax. The second page under this headline contains all of the invoices for the account. As mentioned before, one can perform a bunch of operations to an invoice from here directly, but they will be explained later together with the other invoicing functions.

Finally, the last account page contains a profitability calculation for the account. This takes into account the sales and purchases made in the projects under the account, and then calculates the profitability for the work done, the work invoiced, and the work resourced for the account. The page also contains a list of all account projects, allowing the user to see the same calculation for any account project.

As for the contacts, a contact basically inherits a bunch of an account's details in addition to having their own basic information. They can be attached to an opportunity as an account contact, to a project as the person ordering the work, or to an activity just like employees. After this attachment has been made, these objects are listed in the contact's own page just like they are in an account's overview. Other than this however they don't really contain many additional features. The most interesting is the fact that a contact doesn't have to be tied to just one account, a contribution towards SFA functionality as sales people can just add existing contacts to accounts when needed, thus

avoiding duplicates and extra work. In addition to this they can be marked to be ignored when sending marketing.

6.2.2 Opportunities

Like the Accounts module, the Opportunities module unsurprisingly contains the features for searching and creating new opportunities. Also included is a report on opportunity rows, which is offers the same view as looking at a account's opportunities, but across the entire system. As the information entered during the creation of an opportunity is the same as the information an opportunity has after being created, it is skipped like with account creation. Seen below in figure 8. is the basic page for a opportunity in PSA Pro.

Figure 8. The general information of an opportunity in ValueFrame PSA Pro

On the right side of figure 8. can be seen the information that is defined for an opportunity during creation. The most important parts of this information are the account the opportunity is directed at, the status of the opportunity (statuses are definable by the user company), important dates for the opportunity, and the person responsible for the opportunity. This last bit ensures the opportunity isn't left hanging, a function defined in the core functionality. In addition it is possible to give a percentage for the

chance the opportunity will get accepted and to copy opportunities, thus allowing existing opportunities to work as templates. All in all these contribute well towards SFA and sales order processing functionality defined in the theory.

On the tab seen left on figure 8. are the rest of the opportunity's pages, containing a page for the details/product rows of the opportunity, a page for the documents attached to the opportunity, and finally a page for the activities related to the opportunity. Of these the details of each opportunity are based on a selected price list's items, and thus if one wants to free-hand on an opportunity one must add an item for that purpose into at least one of those lists. On the documents page it is also possible to add a template for the opportunity to follow from an RTF-document.

All in all however PSA Pro fulfils almost all the core functionality for sales order processing by having the ability to define clear path from lead to sales order to project and by allowing the opportunity to be connected to both accounts and contacts. The one thing missing, at least from the trial, is the ability to create new projects from an opportunity or attach existing projects to them. The process works the other way around, as opportunities can be created from a project's page, but this seems a bit backwards. If an opportunity is created individually, it cannot be connected to a project in which case an important link is lost.

6.2.3   Projects

The projects module consists of the functions for creating projects, searching for projects, and searching for subprojects. The project and subproject search don't need to be looked at, but for once the view used to create projects differs quite radically from what a project looks like after it's been created. This view, which admittedly can still be accessed after a project has been created, can be seen below in figure 9.

Figure 9. Project and subproject creation in ValueFrame PSA Pro

Going through figure 9. from top to bottom, the first box seen in the picture contains
the project's basic information including among other this it's number, the project's
name, the project manager, project duration, and the price list used for the project. The
box also contains two other tabs, first of which can be used for estimating the hours
and costs of the project, as well as to place limits for when alerts should be sent. These
estimates and alerts can be placed both for the whole project as well as for one month.
The second one can be used to add billing information to the project should it differ
from the account's regular information, including setting the project as tax free. All in
all even just this one box covers a bunch of core functionality from both project man-
agement and invoicing.

Below this the next box is for creating subprojects. Subprojects in PSA Pro have
somewhat less information than their parent projects, but still include basic stuff such
as a name, duration, project manager, and status. It is also possible to set a price list
that differs from the actual project's one for a subproject and to set the same kinds of
alerts as for actual projects. The two bits of information subprojects have that actual
projects don't are the fact that they can be given a business area and that they have a
billing type. Thus subprojects can be used to define revenue based on business area

regardless of what project they belong to, and they are the object that defines whether invoicing is based on hours of work done or a fixed figure.

Another important feature about subprojects is the fact that they work as the basis of resourcing, which is done in the next box seen in figure 9. People cannot be resourced directly into projects, at least not in the trial, and as such subprojects must be used for this. When resourcing one selects the person he or she wants to resource, and then gives them a desired amount of tasks for which a duration and amount of work in hours are assigned. These are then used as a basis for seeing how much time is reserved for each subproject when recording time. Aside from directing work in this way, resourcing can also be used as a basis for reporting, as was seen in the account's profitability report.

Each subproject also has its own page, but this page doesn't contain any real additional functionality besides some billing settings. These include the settings on how travelling expenses are paid and whether or not work done on the subproject is paid work. In addition the subproject page does list the invoices created from the subproject and the activities tied to it, as well as provide the same profitability report that can be calculated for an account or a project.

Looking back at figure 9., the two boxes under resourcing are used to add purchases and additional sales to the project. Both of these are always directed at one subproject, and are given a date, sales tax, and so forth. For purchases the user also defines whether or not the purchase is still a planned one or if it has been realized as well as if it will be invoiced, and for sales whether or not the sale is ready for invoicing.

This covers the functionality offered when creating a project, which means we can move on to figure 10.: a project's page in PSA Pro.

Figure 10. The summary of a project in ValueFrame PSA Pro.

As can be seen from figure 10., the project overview page looks much like the overview page of a account. The main difference is the fact that it also contains graphs on the current situation of the project, some key figures, as well as more lists of objects related to it. Of these the first is a graph that can be used to follow both resourced and realized hours as well as the financial health of the project within the desired timeframe. After this there are in order:

– The account contacts of the project
– The opportunities it is related to (which were discussed earlier)
– The subprojects of the project
– An overview of the project's total hours planned, actual hours, and total sales
– The invoices made from the project
– Activities related to the project
– Project memos, which are not a part of the trial

As with the accounts, each list that contains objects also allows the creation of new ones, such as the list of opportunities allowing the creation of new opportunities and the list of subprojects the creation of new subprojects. The other pages under the project, seen in the tab on the left, cover much of the same information given when the project is being created and as such don't need to be discussed further. The only ones worth mentioning especially are the two reports at the bottom of the tab, profit sheet

and project follow-up, which can be used to generate an overview into the project, and the two billing pages right above them. The first billing page, third from the bottom in the tab contains a list of all the invoices related to the project, while the fourth from the bottom can be used to search unbilled items that are related to the project and generate invoices from them, thus allowing a more specialized billing approach than just using the Invoicing module discussed later.

All in all the project management functionalities in PSA Pro are quite extensive. Project plans can be tracked in an organized fashion, resourcing is very functional and the tasks the resourcing is broken down to function well for providing instruction on what each employee is to do. In addition both projects and subprojects offer great invoicing functionality as well.

6.2.4   Time and travel

The time and travel module is divided into four tabs: time sheet, weekly time sheet, travel expense form, and expense form. Figure 11. shown below shows the time sheet of PSA Pro.

Figure 11. Time tracking using the Time Sheet in ValueFrame PSA Pro

As can be seen from figure 11., the time sheet is fairly simple. On the left is a calendar from which the date desired can be selected, while in the centre is the actual time sheet

form. Time tracking in PSA Pro works by selecting a subproject, giving the wage type and phase as needed, writing down the hours and a short explanation, and finally adding any other invoicable that go along with the time tracked. Of these only the subproject, time, and explanation are necessary. Time can be written down on one day as many times as necessary, allowing work to be listed on multiple subprojects within one day. On figure 11. one can also see a row for the time already entered into the sheet, which shows the buttons for modifying, accepting, or deleting the row. Above that one can also see the ability to change user which managers can use to check and accept tracked time written down by the regular users.

The weekly time sheet works much the same way. On it the user selects a week and a subproject, and can then use the form to write down the time worked on that subproject for each day of that week. This form also allows the user to select work phase, which means if an employee worked on several phases each can, and has to, be written on its own row.

Writing down travelling expenses and other expenses works a bit differently from the two time sheets. A travel expense form in PSA Pro can contain cost entries in addition to travel expenses, but an expense form cannot anything but cost entries. Thus figure 12. shown below has a saved travel expense form that contains cost entires in addition to travel expense entries.

Figure 12. A saved travel expense form in ValueFrame PSA Pro

A travel expense's basic information is quite simple in PSA Pro. The top five settings seen in figure 12. list the employee travelling (which is not changeable after the expense is saved), a number/date, the subproject it is related to, a short description, and finally a setting on whether or not it will be billed from the account tied to the subproject. Below this are travel expense rows, then a breakdown of the total travel expenses, after which the cost entry rows are presented and a breakdown of the total is given.

After expense forms are saved they can be check by managers, accepted by them or deleted as necessary, and finally marked as paid when accounting catches up to accepted form. It is also possible to print an expense straight from the page in the system.

All in all the time and expense functions of PSA Pro are quite robust, but still simple to use. Combined with the price list and reporting facts covered under the project and account portions they certainly fulfil the core requirements set for time and billing in the theory of this thesis.

6.2.5 Invoicing

The invoicing module of PSA Pro, such as it is, is perhaps the part of the system that has the least core functionality. This isn't to say it isn't functional, but quite a few essentials are missing at least in the trial. Of these the first is customizable invoices in the graphical sense, as nowhere in the system or instructions is setting templates or modifying the invoice layout discussed. Other than this PSA Pro doesn't seem to support multiple currencies, there is no status to track the state of payments, and the tools for handling late payments are quite limited. What is meant by this final point is the fact that is the fact that one can't generate a reminder from an invoice but it is possible to change the title of an invoice and add a row to an invoice to mark it as a reminder and to add a late payment fee.

The other core functionality left over however is fulfilled. This includes the information shown on an invoice that is fully customizable, invoices can also be generated monthly based on recurring sales on projects, and the tax of an invoice is freely modifiable in multiple places even before generation.

As for how the invoicing in the system actually works, an invoices life starts from a search/create invoice function that is used to pinpoint all the projects and subproject with something to invoice. This function can further limit the result to for example all the projects that have unbilled sales for a specific timeframe. After this has been done, PSA Pro displays the list, from which the invoice generation can be done one project or subproject at a time.

Regardless of whether or not the bill is being generated for a project or a subproject, the next step is defining which sales and time tracked is being billed, how the time and sales being invoiced are to be grouped, and for the time selected whether or not it is somehow combined to the invoice. Once this is done and the invoice is generated, the user can actually modify the content of the invoice. This is done using the view presented in figure 13. below. The same view is used for modifying invoices as well.

Figure 13. Creating a new invoice in ValueFrame PSA Pro

The topmost part of the form shown in figure 13. is used to define the address and other mailing information for the invoice, below which the basic information of the invoice is defined. This includes the used invoice number range, invoice date and due date, language used, overdue interest, and so forth. Finally, the invoice line items that were picked for the invoice before generation can be modified if need be. PSA Pro does allow previewing of invoices, which happens using generated pdf-files. Once the invoice looks good, it is finally saved which marks the line items as invoiced and allows the user to open the invoice as a pdf much like the preview.

The second part of the invoicing module is an invoice catalog/search that can be targeted for example based on account. Through the resulting rows, which are basically the same as the invoice rows listen under a project or subproject, a user can refund an invoice, which allows one to either just refund or refund and return the rows as unbilled in case there was just a mistake and the content will actually be billed for. In addition an invoice and its rows can be modified, single invoice line items can be removed and returned to unbilled status, and various attachment or other lists can be viewed. It is also possible to see the pdf of just one invoice or if so desired print them en masse by selecting and printing the results of a search.

6.2.6 Reports

The last module really dealing with any core functionality defined in the theory is Reports, containing all the reports available in the trial outside of the ones provided on the account's, project's and subproject's sites and the opportunity module. The content of these reports and their purpose will be explained, but no pictures will be presented of them as that is not necessary to introduce them.

The reports are divided into four categories with two reports each. The first category is time tracking reports, consisting of a time sheet summary and time sheet balances. The first of these can be used to see how employees for the user company or companies have tracked their hours, showing whether or not an employee has entered any time on

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a specific day and if he or she has how much. The latter report on the other hand calculates how many hours employees should have worked in a specified timeframe, lists how many hours they actually have worked in the timeframe, calculates the difference, and shows the overall balance of each user.

The second report category is travel and cost expenses reports, first of which is simply called travel expense report. This report can be used to see the travel expenses entered into PSA Pro by a specific person within a specific timeframe and after this accept and mark them as paid as needed. It can also be used to navigate to the actual travel expense to see the rows and other information, and to see whether or not a travel expense has been invoiced and if so when. The second report, travel expense summary, can be used for just that: to generate a summary of the expenses entered within a specified timeframe. It can also be targeted on a specific project or subproject.

The third category, project management, starts off with a report called subproject hours by employee. This report can be used to see the time tracked for each subproject. The report can be targeted for example on a specific project manager's projects, a specific account's projects, or even on specific subprojects. The other report is a profitability report, it too settable to a specific timeframe. In addition it can be narrowed down to specific project managers.

Finally, the fourth category covers management reports, consisting of a employee billability and sales forecast report. The first of these can be used to see how the hours tracked by each employee split between billable and non-billable work, while the second does exactly what its name suggests: shows a sales prediction for the timeframe defined. This last report is also the only actual report in the trial version of PSA Pro that comes with a graph.

All in all these reports, combined with the account, project, and subproject ones are quite adequate for the needs of a small company at least, and as such it can be said ValueFrame offers the core functionalities required of PSA-systems when it comes to reporting.

6.2.7 Tools and Personnel

Moving on to the second last part of this chapter, this part will introduce the Tools and Personnel modules starting off with the Tools. This module only contains one feature: a calendar presented below in figure 14.
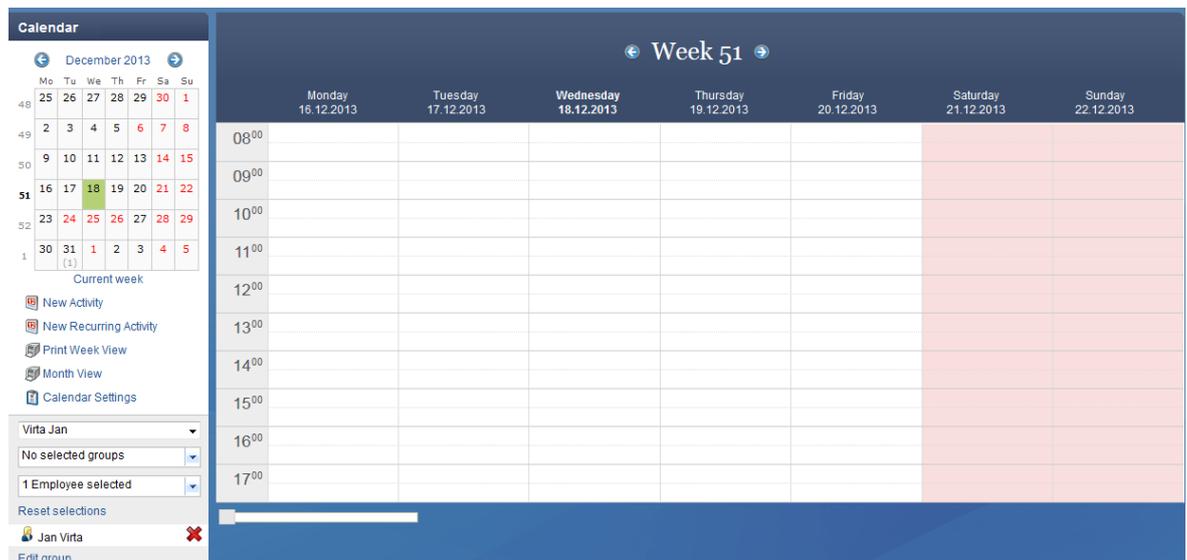
Figure 14. Calendar in the Tools module of ValueFrame PSA Pro

As can be seen from figure 14., the calendar provided by PSA Pro is fairly standard. It allows the creation of new activities, both single time and recurring, as well as allows a user to view the activities of other users as long as they aren't private. The main strength of the calendar comes from the fact it can be directly connected to a variety of other objects in the system, a feature which has been discussed for example with both opportunities and projects. Other users can also be easily attached to activities along-side contacts, in which case the event also appears in their calendar, and PSA Pro supports both e-mail and SMS message reminders even without the need for extra integrations.

The Employees module on the other hand handles almost all of the user information management related features of PSA Pro, having an employee list which contains all the active users in the system, a list of passive employees, and the features for creating new employees and modifying the information of existing ones. As for what informa-

tion can be tracked for employees, the basic things such as name, address, e-mail, and phone number are covered on one page. The only information that really related to PSA Pro at all in this page is group e-mail settings, the username, and the language of the system set for the user.

The private information of each user is kept on a separate page, containing things such as social security number and bank account numbers. This page also defines the employee's company in the system and the status of the account (passive or active). In addition there is one additional page which the user can use to change their password, and the administrators of the system can use to lock or unlock the account.

6.2.8 Adminstration

The administration of the system doesn't really fall into the scope of what is covered in this thesis, so this final part of this chapter will only cover the settings determined in this module briefly.

The first category under administration is Price Lists and Products that can be used to maintain the price lists of the company, and to create new ones. It is also used to maintain other settings related to pricing. The second category is Accounts and Contacts that can be used to maintain account statuses and types. After this it is Opportunities, which is used to maintain opportunity statuses and status groups, as well as opportunity types and reasons for lost opportunities.

Fourth is Project Management, which is the second or third largest setting group. It covers project statuses, status groups, and number ranges for projects, statuses and status groups for subprojects, wage types and phases for time sheets, and finally expense report cost types for expense reports. After this are the settings for Calendar, consisting of activity types and activity type groups, followed by Billing, containing invoice number ranges, invoicing periods, billing types, and VAT rates.

The second last part of administration is General Settings which only contains the functionality to add new companies to the system and modify the information of exist-

ing ones. What this refers to is the companies actually using the system, such as a parent company and several branches. Basic information about the company can be stored for each, but only the name is necessary. In addition most of the information entered into invoices by default when they are generated is determined here, as is the default price list.

Finally, the last part of administration is the User Groups. This part is used to determine who can do what in PSA Pro, such as who has the rights to accept travel expenses, who can create new customers, and who can create invoices. This part of the system is extremely complicated, and as such will not be covered in any further detail than this.

7 Conclusions

As was mentioned earlier in the thesis, a study by Microsoft (2012) predicts that the adoptation of cloud-based solutions in the companies employing 2 to 10 people is going to triple in the next three years, with the same trend continuing in companies employing more people: doubling in the next 3 years for companies employing 11 to 25 people, and so forth. Thus it really is imperative for all companies to at least have a look into how they might utilize cloud-based systems in order to avoid falling behind competitors that do pay attention to this new technology.

Similarly, the benefits offered by PSA-systems are significant enough in wide enough an array of functions that a company that is not yet employing a system, or even using a system with less functionality, should at least consider utilizing one to drive growth in their business.

For these reasons and more, the results listed in the chapters above are significat, further enhanced by the fact that they meet the goals and purpose set for their content in the introduction.

For the advantages and disadvantages provided by using cloud-based systems it has been shown through the research done in this thesis that concrete points exist in both sides of the argument. For each advantage gained there is a disadvantage that has to be met with either contractual obligations from the provider of the system or in the implementation of the system's software and hardware infrastructure. All in all the advantages discovered are perhaps a bit more varied than the disadvantages, while the disadvantages all have more immediate effects on the business than the advantages.

The main result these chapter provide when compared to existing research is the fact that it both gathers the advantages and disadvantages into one place and provides in-depth coverage, a combination not found often if at all in existing research.

The functionalities covered by the PSA chapter of the thesis on the other hand provide more of a general introduction to professional services automation in general, and don't thus provide any new discoveries or combinations. Nevertheless it serves the goals set for it well, as it provides the basis for the analysing the PSA-system examined after it. Furthermore, it works as a guide into PSA-systems for the companies looking to purchase a new system in order to fulfill their needs, which serves the overall goal of this thesis.

Finally, looking at how a real-life combination of cloud-computing and a PSA-system worked, the results were satifying from the side of the PSA-system, but left a lot to be desired the cloud side of things. The PSA-system analyzed offered most of the functionality listed in the theory, only straying in any major way in the invoicing parts, but communication on how the advantages and disadvantages of the cloud materialize in the system and in providing it was extremely limited on the company's website and other publicly accessible information. Nonetheless, the results of the analysis brough fruit, an example of this combination is presented well in the chapters above, ready to be looked at by any company interested in it.

All in all, as the writer of this thesis I feel it has met with the goals set for it in its project plan admirably, and that all of the questions asked in the methodology chapter of the thesis have been answered.

7.1   Further research

While the thesis addresses the advantages and disadvantages of the cloud to the extent they need to be addresses, there still exists a lot that has to be researched in relation to this new technology. Matters such as how the cloud competes with infrastructure and systems owned by a company over a period of tens of years is one of these topics, as is how well the advantages and disadvantages listed in this thesis materialize into benefits or losses across different industries. The need for research to be done with the cloud is at this point still extremely large as the technology is fairly new, with the matters covered here only a drop (albeit a big drop from the business point of view) in the ocean.

As for PSA-systems, a further topic for research could be the adoption rates among different professional services industries, as could research what types of systems are in direct or indirect competition with professional services automation and how their functionalities differ. Both of these topics serve the interests of the companies looking to purchase a new system, and are thus useful from the business point of view. The most obvious one however is a comparison between PSA-systems to see what type of functionality is highlighted the most in them.

7.2 Personal learnings

The writing of this thesis has been an interesting experience for me, as cloud-computing has been a matter of fascination for me for a year or more now. Similarly I've always wanted to work in the professional services business, and thus when I learned about a system that focused in the needs I knew I had to find out more. All in all I feel that I more now than I did before through the writing of this thesis, gaining a deeper understanding especially of cloud-based systems.

I had originally thought only of the most obvious advantages and disadvantages; cost and mobility as well as security and the need for a constant internet connection, but the more is research the fact, the more I realized that there are other benefits and risks, more deeply tied to the fact that the party utilizing the cloud is a business with a wider range of needs than an individual. I feel that especially these business related advantages and risks are something I can leverage in my working life, explaining to accounts and colleagues alike what lies under the surface when it comes to the cloud and software-as-a-service.

On the learnings outside of the content written in this thesis I've also learnt how I still have a lot to work on when it comes to following a schedule and to pacing my work, and would like to extend a special thanks to my thesis supervisor for being patient with me and my work.

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Attachments

Attachement 1. Products of PlanMill Cloud (PlanMill)

ITEMS/CLOUD SOLUTIONS		CRM	PROJECT	PSA	ERP
Subscriptions fee (user/month)		20 €	25 €	35 €	50 €
Free upgrade & backups		☑	☑	☑	☑
Pre-packaged business process parameters		☑	☑	☑	☑
Pre-packaged reports & indicators (200+)		☑	☑	☑	☑
KEY FEATURES/ DEMOS		CRM	PROJECT	PSA	ERP
Actions	⦿	☑	☑	☑	☑
Accounts & contacts	⦿	☑	☑	☑	☑
Campaigns	⦿	☑	-	☑	☑
Calendar	⦿	☑	☑	☑	☑
Contracts	⦿	✚	✚	✚	☑
Documents & forums	⦿	☑	☑	☑	☑
Requests [1]	⦿	☑	☑	☑	☑
Email Capture (Incoming)	⦿	✚	✚	✚	✚
Opportunities	⦿	☑	✚	☑	☑
Products [2]	⦿	✚	✚	✚	☑
Sales Orders (Quote & sales order mgmt)	⦿	✚	✚	✚	☑
Indicators & reports	⦿	☑	☑	☑	☑
Project portfolio management (PPM)	⦿	-	☑	☑	☑
Project & task management [2]	⦿	-	☑	☑	☑
Connector for MS Project (Import/Export)		-	☑	☑	☑
Users & teams	⦿	☑	☑	☑	☑
Competences [3]	⦿	-	✚	☑	☑
Absences	⦿	✚	✚	✚	✚
Appraisals (Career Discussion)	⦿	✚	✚	✚	✚
Time Sheet	⦿	-	☑	☑	☑
Timer	⦿	-	✚	✚	☑
Time card	⦿	-	✚	✚	☑
Expenses	⦿	-	☑	☑	☑
Work schedules [4]	⦿	-	☑	☑	☑
Finances (Invoicing)	⦿	-	-	☑	☑
E-Invoice (Finvoice & printing services) [5]	⦿	-	-	☑	☑
Financial system connector (Export) [6]		-	-	✚	✚
Multi-company & multi-currency		✚	✚	✚	☑
Administration (Basics)	⦿	☑	☑	☑	☑
Mobile access (View only) [7]	⦿	☑	☑	☑	☑
Mobile Pro access (Create & Edit)	⦿	✚	✚	✚	✚
Community Wiki (Powered by Atlassian Confluense)	⦿	✚	✚	✚	✚
Google SSO (Single sign-on)	⦿	✚	✚	✚	✚
Open API (Application Programming Interface) [8]		☑	☑	☑	☑
Data Services	⦿	✚	✚	✚	✚

Note: ☑ = Included in base user subscription fee   ✚ = Additional subscription fee apply