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Fraunhofer FOKUS
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The EU-Services Directive – Point of Single Contact

Framework Architecture and Technical Solutions

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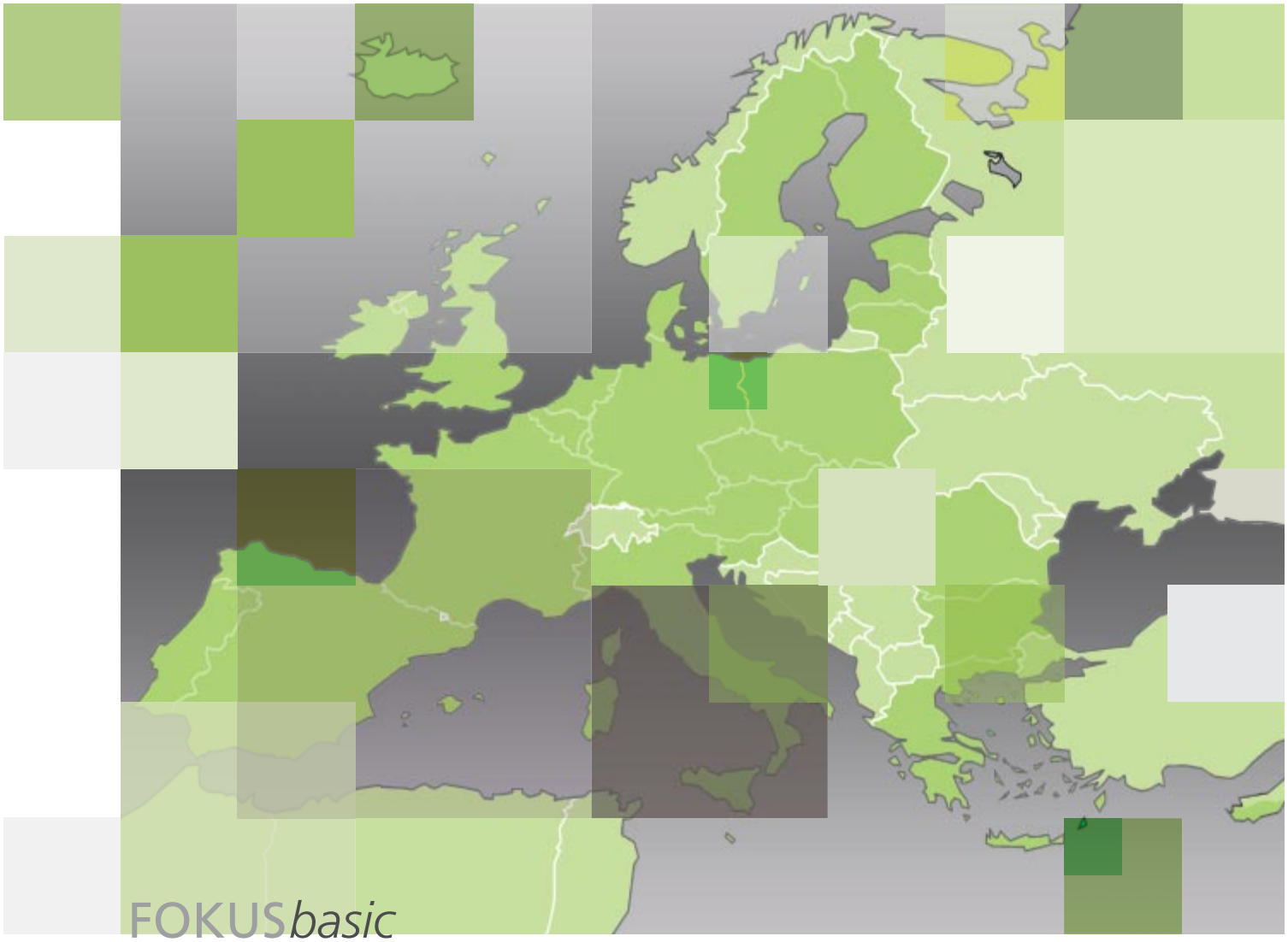

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Design Options, Requirements and Architectural Considerations and Approaches to Points of Single Contact in Accordance with the EU Services Directive

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1 Preface

Substantial changes will take place in the public sector in all EU member states due to the EU Services Directive which must be implemented in national law by December 2009. The "Points of Single Contact" are particularly important in this context, because they will make contact with public administration considerably easier.

There are various design options available for setting up points of single contact. They will become apparent when the requirements and architectural models needed to realise this project are confirmed. This working paper brings the initial research findings of the two projects as of February 2008 together, presenting design options, requirements and architectural considerations for setting up points of single contact as envisaged by the Fraunhofer Institute FOKUS in Berlin (Germany).

This working paper which was first presented for the CeBIT 2008 fair in German should serve as a starting point for making the realisation of a services directive architecture more concrete and for implementing points of single contact. It should be finalised in the following months, particularly as political guidelines for the implementation must be adhered to and knowledge is still being gathered through the realisation of prototypes with FOKUS partners.

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2 Towards the Implementation of the EU Services Directive

The EU Services Directive (Directive 2006/123/EG), which was passed in December 2006, should simplify access to the services market in all member states of the European Union and eliminate existing bureaucratic barriers for service providers, thus promoting cross-border services within Europe.

The directive must become national law in all EU states by December 2009. In order to achieve this, the governments and administrations of the member states have to complete a multitude of tasks associated with comprehensive modifications to business and administrative law. As part of "One Stop Government" it is necessary to set up Points of Single Contact (Article 6) for service providers and to accompany them in all administrative processes during the entire life cycle from the cradle to the grave: from the start up of services activities and during the course of these services activities right through to liquidation. These points of single contact should keep service providers from other EU member states informed about all relevant guidelines and responsibilities and also help with the processing of procedures and formalities in the public sector (Article 7). It is assumed that points of single contact in many member states will not only be assigned to foreign service providers: this service will also be offered to national businesses for politico-economic reasons.

Furthermore, public authorities at all administrative levels must ensure that the administrative procedures affected by the EU Services Directive can be electronically transacted (Article 8). The authorisation procedures and formalities (Article 13) must be simplified so that applications can be processed promptly and within a predetermined and publicised timeframe. This time period only commences once the required documents have been submitted in their entirety. This will noticeably speed up procedures and put the administrative departments in particular under the pressure of a time limit. If an application is not processed within the time limit, authorisation is granted. Furthermore, with the internal market information system (IMI), administrative assistance between the member states (Articles 28 and 29) should be guaranteed in electronic form. A legislation screening, in which all governments are required to scrutinise the available rules, procedures and formalities (Article 5) in relation to the directive in terms of necessity, simplicity and optimisation should, in addition, have an enduring effect by contributing to the dismantling of bureaucracy.

Points of single contact and electronic processing will make a considerable contribution to the simplification of structures, processes and formalities. A thorough implementation of the relevant one-stop government concepts will have a noticeable effect on the entire public sector in all member states (at the national, regional and local level) which will, in turn, influence the entire area of application of European services businesses. This paper will present the concept of points of single contact, cover topics such as the vision for these points in relation to the EU Services Directive, the technical design options and the necessary requirements for an architectural framework.

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3 Understanding Points of Single Contact

3.1 The Current State of the Implementation Process

The interpretation and recognition of points of single contact, which were first mentioned in the directive's suggestions, has been intensively monitored by academics and discussed in the administrative-political sphere since 2005. The Speyer report (Ziekow et al. 2006) on design possibilities and requirements for "points of single contact" laid down the appropriate foundations. The federal and state committee for the service provider economy relied on these results when laying down the foundations for the requirements for "points of single contact" (BLAD 2007) in Germany and allowed them to influence their target specifications. According to the federal responsibility arrangement for the Federal Republic of Germany, responsibility for the establishment and definition of points of single contact lies principally with the states, which are approaching this in an independent manner and which, at the end of 2007, have not yet reached any conclusive decisions with regards to localisation or design.

Discussions about how to design points of single contact are occurring in different ways in the various EU member states. The respective national lawmakers are interpreting the EU Services Directive according to their own agendas and their legal framework within national law. The EU Commission produced a handbook (European Commission 2007) for the implementation of the EU Services Directive in autumn 2007. Nonetheless, within the European Union some of the ideas for the design of points of single contact are quite dissimilar. This stems back to the various players who have been entrusted with implementing this and their visions as well as their financial and personnel capacities.

From an organisational and technical viewpoint, before the design options can be considered by taking the German activities into account and before an architectural model can be created based on these considerations, the vision for points of single contact should be made concrete in terms of the directive from an academic viewpoint and be embedded in existing models. This is important, because all administrative theoretical models and information technology models associated with the service directive are extremely significant for the approaching implementation.

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3.2 A Vision for Points of Single Contact

The European Internal Market for services should improve with the EU Services Directive, as it will simplify access to the other member states' markets for service providers and promote cross-border provision of services. The term "provider" is very wide ranging and broadly used (with a few exceptions: finance services, transport services, health services, audio-visual services, gambling, social services, security services and taxation) and includes every self employed, regular, paid activity including business, sales, trades and freelance work in particular. Bureaucratic obstacles which hinder the freedom and establishment of services should be eliminated with the realisation process.

Until now, if a service provider wanted to provide services in another member state this may have required multiple administrative paths dependent on the sphere of service activity. As a rule, departments and public authorities are only responsible for very specific tasks and for specific regions. The division of administration into material and localised responsibilities leads to multiple collections and redundant saving of data both from service providers and about services providers. This causes additional work and sometimes creates inconsistent databases. This fragmentation within the public sector creates additional time and energy expenditure. Effort, energy and money are required to overcome this problem. For many service providers a lot of things are unclear, such as which processes and formalities are actually necessary for their services activities and which government departments they must track down for explanations, notifications, authorisations, enrolments and registrations. They do not know the reasons behind the fragmented responsibilities and are not at all interested in existing responsibilities and administrative constraints. Thus service providers have to work with different contacts. They must submit their requests several times. Due to a lack of transparency, the applicants often have to coordinate between the various branches themselves. This quickly leads to frustration and misunderstandings. (*von Lucke* 2008, p. 43).

This kind of process can be very tedious and drawn out and work as a barrier to the market. Ultimately, this can make working in foreign countries a very complex undertaking, in which prior knowledge does not help and nothing can be achieved quickly. Wrong decisions which go unrecognised and difficulties which occur due to a lack of knowledge or oversight can endanger expansion or even threaten their existence or mean a step towards bankruptcy. These kinds of situations are not in the interest of European economic policy.

With the establishment of points of single contact, the member states should ensure that service providers can carry out all procedures and formalities related to the start up and carrying out of services activities through a point of single contact by the end of 2009. This should support service providers in bringing their services to other member states by acting as advisor, pilot and mediator of basic information, by preparing, receiving and forwarding procedural correspondence and making it understandable by taking over coordination tasks such as sharing information about changes and notifying them of compulsory notifications that are relevant for the authorisation process. (DLAB 2007,p. 5-8).

Although service providers are free to do as they wish and approach the public authorities responsible for these tasks, with a point of single contact they could minimise their administrative contacts and thereby concentrate on their services activities.

The vision for points of single contact reaches beyond regional and national administrative barriers and responsibilities. Points of single contact must be in the position to help the service providers with information and their procedural correspondence with administration authorities outside their local area of responsibility. Thus a point of single contact should also be in the position to communicate with public authorities in other administrative districts, federal states and member states and to obtain information from them. In addition, service providers do not only wish to be informed about the public sector's portfolio which has been tailored to their needs. They also wish to be informed about existing advisory, support and qualification services from business, chambers, banks and other organisations.

3.3 Integration in Administration Portal Models

In the context of reflections on administration portals (*von Lucke* 2008, p.177-282), the basic approach complies with the model of a target group portal for service providers or a business event portal for service providers. The needs of the service providers themselves are the focus here. Their requirements differ considerably, depending on whether they have a good grasp of administrative jargon, on which area of services they would like to work in and if it has to do with starting out or continuing an activity. Consequently, it is possible to differentiate between different sub-target groups that exist amongst the services providers themselves.

In this context the term "portal" does not merely mean "web based portal". In the following, "portals" should be seen as easy to use, secure and personalisable access systems through which the user, dependent on their respective access authorisation, can gain access to information, applications, processes and people that are available on the systems made available through the portal. Access to the portal can take place via various media and access channels in accordance with the "multi channel principle" (*von Lucke* 2008, p. 112-113).

In this ideal situation, portals are not restricted to internet technologies. In theory, access could be available via other communications technologies and channels. Reference is made here to the importance of the electronic channel and the data transfer which takes place over TCP/IP based networks. Integrated portals are used worldwide in the internet. Mediators of voice based telephony, personal and written channels can access this portal at any time and insert services and applications for their own use. This network of distribution channels enables multi-channel management, allowing all distribution channels to be of a similar quality. (*von Lucke* 2008, p. 113).

3.4 Integration in the One-Stop Paradigm

The one-stop paradigm and the concept of one-stop government are concealed behind the basic approach to the point of single contact. The "one-stop paradigm", a concept familiar to the services industry, adheres to the principal of the provision of services with the aim of reducing the necessary contacts for the processing of a business matter and, where it makes sense, to reduce them to a minimum of contacts and in the ideal situation to a single contact. (*Aichholzer/Schmutzer* 1999, p. 22). In doing so it should be irrelevant if a customer stops by personally, calls on the telephone, sends a fax, makes contact via the internet or uses another medium. Customers no longer need to seek the relevant information centre themselves, nor must they ring back later if they have further questions or continually resubmit documents. Instead, the services proposal will be comfortable, user friendly and designed specifically for customers. Although this approach can be implemented in various ways, it is always oriented towards the concept of the unique contact. In theory, customers should be able to complete their requests without any disruptions and in a single transaction. When it comes to telephone enquiries all queries should be handled during a single phone call where possible. For personal customer support, points of contact in the form of customer service agencies should be set up. Each customer would have access to a contact person or a contact team which would take care of them personally and answer any queries they might have. (FBC 1997, p. 5; *Österle* 2000, p. 46 and *von Lucke* 2008, p. 43).

3.5 Integration in One-Stop Government

These considerations can be taken on by the public sector at a basic level. Here too it would be possible to reduce the number of contacts for citizens and businesses when it comes to administrative matters and offer administrative services from one source. The concept of bundling administrative tasks in one place and in one procedure will be subsumed by the term "One-Stop Government" (OSG: Figure 1) irrespective of whether they have been effectively produced or if they were created by more than one organisation (Kaftan 2003, p. 68). With OSG the aim is to integrate various administrative services via one point of contact, irrespective of which administrative agency belongs to which government ("Integrated Service Delivery"; Kubicek/Hagen 1998, p. 209). A horizontal network between a local authority's administrative offices and a vertical network between the federal government, state governments and local governments, as well as the possible integration of private partners is conceivable. These points of single contact ("One Shop"/"One Centre") or this "Single Window" in the course of a procedure should be easy to reach for citizens and businesses ("One Convenient Location"), and in a real or virtual place where possible ("One Point of Contact"). A contact person ("One Face to the Customer") enters various data which is necessary for contact with the administration agency. Based on these entries, they can either offer citizens specific public services out of one hand which are suitable for their target group ("One to Many") or are tailored to their individual situation ("One to One"). No data mismatches, dead time or disconnections should occur during the mutual dialogue, thus in the ideal scenario a singular contact ("one stop"

in the real sense of the phrase) should be sufficient for quick and conclusive processing. (cf. Kubicek/Hagen 2000, p. 8 , Wimmer 2001, p. 6, Wulf 2002, p. 28, Lenk/Wimmer 2002, p. 17 and Franz 2003, p. 36.). A wide spectrum of configuration possibilities exists for all of these processes. Thus OSG proposals can be developed for specific target groups or to suit current topics. The temporal and spatial opening up of these proposals allows for greater flexibility. In an ideal scenario, a comprehensive proposal would be available and on call any time and anywhere. (von Lucke 2008, p. 44).

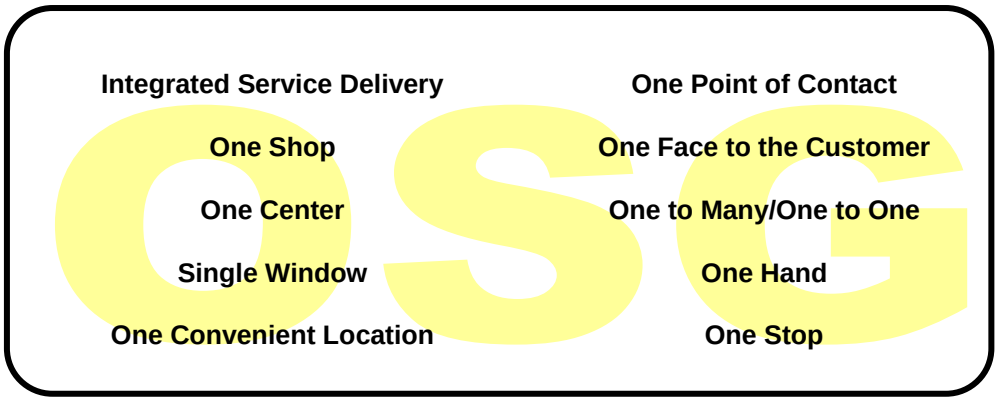

Figure 1: One-Stop Government Concepts

Source: *von Lucke* 2008, p. 44.

3.6 Integration in the Front Office and Back Office Models

The concept of a point of single contact is also suitable for the "front office" and "back office" models, into which the existing public administration structures can be broken up. A strict separation can be conducted between the front office used for citizens and client contacts and the back office for actual processing and for services. Traditionally, as the public authorities were the providers of administrative services, they also distributed them. Each public authority has its own distribution channels. As a rule this is done with counter services as well as information and consulting services. Call centers and internet platforms are also used to some extent. Processes are divided in order to separate front and back offices' production processes (administrative work and decisions) and distribution. The boundaries of the front office and back office can be easily demarcated, and this stems primarily from their local and organisational separation. (*Daum* 2002, p. 152 and 156-157; *Mehlich* 2002, p. 87-89; *Frick/Hokkeler* 2002, p. 18; *von Lucke* 2008, p. 47).

Front offices are responsible for the distribution of public sector services. They often even do this for several public authorities in the background (back office). This requires the integration of various public services. Front offices will become the main contact point for citizens and businesses, setting up direct contact between them and administration authorities. True interaction between citizens and administrative authorities occurs at counters and front desks. Applicants will receive advice from employees who have been specially trained in customer services. They will help to fill out forms and accept these forms directly from

the applicants. They can enter data directly into the system which can then be compared to the existing information in the database and they can perform other cross checks. The employees can also complete administrative procedures to some extent. If the existing areas of responsibility continue with points of single contact and the EU Services Directive, front offices will simply keep in touch with the applicant and contact them if there are further queries and requests that have to be verified. When these administrative procedures have been completed, the authorised front office person will inform the applicant of the decision or hand over the administrative office's final product. With this model it should be possible to overcome typical bureaucratic restrictions such as the spatial or organisational limitations inherent in the administrative arena. (*Daum* 2002, p. 153-155 and *von Lucke* 2008, p. 48-49).

This division would decrease the level of in depth performance in back offices. Departments and government offices would therefore be relieved of the burden of traffic created by the general public. This division would allow employees to work undisturbed. This means that public consultation hours in the back offices must no longer be kept, and phone calls or visits from applicants will no longer tear employees away from their work rhythms. Front office employees will only ask their expert back office colleagues for help when a query cannot be immediately solved. Complex enquiries that are passed on by the front office for further processing will reach the experts through official channels. Administrative departments in the back office can fully concentrate on their core tasks with the help of these organisational structures. (*Ewert* 2002, p. 63 and *von Lucke* 2008, p. 49-50).

Front offices, on the other hand, are aimed directly at satisfying citizens' and clients' needs. Separation into front and back offices has further advantages. Front offices create close contact with citizens. They can recognise weaknesses in administrative organisations, make changes to entitlement and sense citizens' dissatisfaction at an early stage. Armed with this knowledge, they can react in a quick and flexible manner. This knowledge of the general public's needs and the needs of businesses makes a kind of holistic support possible. Costs for distribution and service provision can also be reduced. The use of common distribution channels by several offices could enable potential savings and synergy effects. This means their own distribution channels with administrative offices, information and consulting services, field teams, fax and telephone services as well as electronic services need not be developed, operated and financed. Instead, a government agency would share offices and staff and make them available for distribution with other administrative facilities. Of course, it must be ensured that the front offices and consequently the points of single contact are in a position to advise citizens and look after them adequately. (*von Lucke* 2008, p. 50).

Preparations for the vision leading towards the creation of points of single contact who will be integrated in administrative portal models, one-stop government and front office and back office models will have a powerful influence on which of the organisational and technical design options will play a role in the 27 national implementations in the European Union.

4 Determining the Organisational Design Options

Every EU member state must ensure that by the end of 2009, in accordance with Article 6 of the EU Services Directive, service providers can use points of single contact (PSC) for specific procedures and formalities. These points could be expanded in stages in the following years. There are several options available for the organisational design of points of single contact, and they will be explored here later. If any decisions concerning implementation became apparent in Germany by the end of 2007, it will be indicated.

With the Speyer Report (Ziekow et al. 2006), the term "Einheitlicher Ansprechpartner", (unique partner for contacts – official German translation for "Point of Single Contact") has been jurisprudentially established in Germany. The idea that the term really means a "**Point of Single Contact**" with a multi channel administrative portal or a high performance portal for the public sector, an approach which could be expanded by local agents for telephone, written and personal channels, has had no success in Germany. On the contrary, in the Netherlands and in Great Britain this term was greatly deliberated. In the debate about the German term, reference is made to the fact that the word "partner" refers to people or personal contacts. The term "Stelle" (location) which is sometimes used, even refers to an institution which has to be set up. Public servants educated in the industrial age therefore see in the German term "einheitlicher Ansprechpartner" above all an institution in which people will work and which might be supported by (web based) portals. In the initial period it is all about establishing such an institution including work and operational processes. As it matures technically, the planned IT systems might increasingly take on responsibility for tasks and therefore staff can be decreased. To implement this in terms of the directive's requirements exclusively in electronic form appears to them, however, to be a utopian vision. In an architectural framework both approaches must be taken into consideration. On the one hand institutions assigned as points of single contact should be fully supported by information technology. On the other hand it should also be possible to prepare and present the complete range of tasks electronically, as with high performance portals. Local agents might use these portals as a shared service, to introduce their own telephonic (call centre) and personal (business advisory agency) channels, for example.

There are no guidelines in the Services Directive as to **how many** points of single contact must be established. Dependent on the geographic size of the federal state, the administrative structure and the number of its citizens, there are various options for the **geographical placement of points of single contact** which will affect the numbers. With a national placement there would be one or a few, with a subnational placement there would be a few, with a regional placement on the rural and urban district level there would be many and with a municipal placement on a community level there would be a great number of points of single contact. In addition, if there should be private or public-private points of contact, their numbers would increase, dependent on

how much private investors invest. Reliable estimates could not be made for Germany by the end of 2007. In any case there will be more than one point of single contact as according to German law the states are responsible for setting up points of single contact, not the federal government. The federal government as a potential **responsible owner** has until now not carried out any activities whatsoever in terms of setting up federal points of single contact or the corresponding high performance portal. The federal and state commission for the service provider economy deems five models to be suitable for placement in Germany. Points of Single Contact can be situated as part of the state administration in intermediate state authorities (intermediate state authority model) or in an autonomous agency (new: agency model) or as part of a county or city authority (county model), as part of chambers and professional guilds (all chamber model or business chamber model) or by chambers and county authorities together (cooperation model). Within a government the work of the point of single contact can be transferred to business development, business administration, top level management, the citizen's office, call centres, IT providers or it can be established as an autonomous institution. The German public administration deems the community level approach unsuitable. Private sector models are currently not desirable because authoritative duties must be carried out. (BLAD 2007b). However, private sector investors are currently considering if they can position themselves as points of single contact in accordance with the directive or as first service providers. The decision depends on whether there will be a market and whether they can rely on a functioning public sector network of points of single contact which has introduced common shared services (consolidated and centralised service processes) available on the market. When designing the architectural framework the high number of individual points of contact and the fact that all models will be realized simultaneously must be taken into consideration.

PSC model	Number	Number refers to:
Agency model	16	German Länder (states)
Intermediate state model	33	Districts and states without districts
County model	428	City states, counties and urban districts
All chamber model	234	Chamber relevant professions
Business chamber model	135	81 IHK and 54 HwK
Cooperation model	662	Counties, urban districts and chambers
Open model	~ 2000	States, districts, communities & private initiatives

Table 1: Estimate of the number of possible points of single contact in the case of a country wide implementation in Germany.

The competence of points of single contact opens up design options. As far as the points of single contact target group is concerned, the directive was originally solely created for service providers within the European Union who wanted to carry out their services activities in another member state (a minimal solution with a modest level of demand). As this would result in discrimination against domestic service providers, the opportunity to use a point of single contact should also be available to domestic businesses in Germany from 2010. By the same token, foreign companies from countries outside the European Union should profit from this opportunity. According to data from the German

Federal Bureau of Statistics, in 2006 there were 881 791 business opening registrations of which 742 610 were registrations of new businesses and 710 181 business closing registrations with 573 383 tasks. The percentage of Germans who founded one person companies in 2006 was 82.3 %. A second design option could entail points of single contact being responsible either for all service providers or limiting their activities to specially chosen branches or professional guilds. Such an approach would be attractive for branches, associations or professional guilds, particularly if it were to be set up on a national level.

With regard to **procedures, formalities and permits** for the start up and running of a service business, all relevant business events (Deutschland Online 2006) occurring over a service provider's entire life-cycle really must be included. Besides providing basic information and summaries, this mainly includes explanations, registrations, applications for licenses, applications for enrolment in registers, business rolls or databases, registration by professional guilds or professional organisations and procedures for recognising qualifications and health and safety laws. In accordance with the 9thth consideration of the Services Directive, the directive will not support demands concerning traffic rules, urban development or land use rules, town planning and regional planning, construction standards or administrative sanctions which have been imposed because of non compliance. Nor will the directive administer or be concerned with services activities. Instead, service providers must regulate and carry out their own activities in exactly the same way as private individuals. The directive also does not apply to taxation. The list of areas not taken into consideration include finance services, traffic services, health services, social services and the work of notaries and bailiffs (Article 2 of the Services Directive). Nevertheless, as pointed out in the holistic vision that we have outlined, points of single contact should be in the position to network with these public facilities when they are providing public services for service providers. If points of single contact are to provide a truly comprehensive range of services, they must consider the whole lifespan of a service provider's activities from start to finish and not just concentrate on the public sector. They must also feature public services provided by business and the third sector. Because of the German administration's tangible desire to reduce complexity, it can be assumed that public points of single contact will only offer a limited range of services in the near future. In particular, it is currently still unclear in legal terms if local planning departments and the national social security services are allowed to be accessible via points of single contact. Points of single contact from the private sector would probably be able to develop a comprehensive range of services aimed at the service provider target group much quicker and thus be able to stake their claim in the market. When considering the design possibilities for the architectural framework, all areas of administration as well as selected business and third sector facilities with their public services and responsibilities must be taken into consideration, even if they will not be immediately integrated into the planned process chains.

If private service providers are banned from being active points of single contact by the administration, they could become supervising operations managers in a similar way to an **"EA Light"** (point of single contact light) and operate with a limited portfolio. They would primarily cater to the needs of their clients

and above all provide them with legal information relevant to service providers. Furthermore they could advise them in simple, clear language, check their applications and documents to see if they are complete and forward them on to a point of single contact, whilst maintaining all deadlines that must be met by the procedural bodies. The concept for an EA Light must be developed in a separate architectural framework. This, however, opens up an opportunity for refinancing centrally provided components.

The **spectrum of tasks** that points of single contact must provide is specified in the directive. They should support service providers when they provide their services in other member states by preparing and arranging basic information in a manner which can be easily understood and by receiving and forwarding procedural correspondence; in essence by taking on coordination tasks and notifications of changes and receiving and forwarding compulsory permit registrations. (DLAB 2007, p. 5-8). They should take on the role of advisor, guide and mediator, monitor deadlines and carry out status checks where possible. However, under the current terms of the law they are not allowed to make any binding decisions. Yet during the implementation process and beyond, the European Union member states are free to assign the points of single contact with more tasks.

As all points of single contact must establish communications with all public authorities that are involved with the administrative procedures necessary for the set up or course of services activities, they should be able to electronically communicate at a basic level with all public authorities at every administrative level. To limit this contact to a single regional authority, carefully selected regional authorities or just one member state does not make much sense when state and nationwide applications for permits must also be dealt with. This means that each point of single contact must actually be linked up with all administrational institutions in a network. In addition, points of single contact must be networked with each other in case, for instance, they would like to place service providers in contact with the responsible point of single contact in another state or another nation.

Spatial or geographical responsibility tends to play an important role in the discussion about the potential number of points of single contact. In the industrial age, spatial or geographical responsibility areas were measured by distance so that a citizen's journey for their official business would take a maximum of one day by stagecoach. Spatial or geographical responsibilities are measured differently in the information age where geographical distances only play a minor role. Thus it is realistic to assume that service providers will establish electronic and telephone communications with points of single contact in Germany from their country of origin. Statewide and nationwide responsibilities will quickly become realistic options if the same service output can be offered via portals or via call centres. The discussion in Germany is still being influenced by the experiences of the industrial age. Many decision makers still cannot imagine how complex knowledge of the responsibilities within a nation could be centrally bundled. It would be more pragmatic for them to introduce points of single contact with local responsibilities and with an acceptable number of players. National and supranational approaches across all levels of administration can be realized with a directory based responsibility finder if a serious

attempt to construct one is made. A national approach, several subnational approaches and various local approaches for creating the architecture should be considered.

As points of single contact are primarily designed for service providers from abroad, a proposal for **multilingual** capabilities must be taken into consideration. As German is the language used for administration and business in Germany, some administrative departments will only be satisfied with a "one language" public service. However, foreign service providers expect a multilingual public service. This could take place by preparing multilingual directories, articles and films that are made available to all points of single contact as part of a shared service. English and French would be the first languages to be incorporated, followed by the 23 official languages of the EU. Other languages such as Russian, Turkish, Serbian and Croatian should be incorporated as well as other relevant languages. Under these circumstances, it would be a clever move to start with telephone translation services modelled on Call NY 311, a service that deals with more than 150 languages and is able to set up a teleconference which can be accessed for 1.40 USD per minute. The architecture requires that entire directories, databases, registers and other miscellaneous information should be designed to be multilingual from the start. In addition to this it is important to find ways to integrate a telephone translation service into points of single contacts' processes. It is important to consider how a European alliance can be formed so that electronic notification letters, documents and papers issued by public authorities can either be examined centrally to check for validity or verified using an intelligent interface which can provide information about their contents in various languages.

There are various design options available for **collect charges,** which would enable points of single contact to pay administrative fees and charges on request. Possible models include pre-paid, direct and post paid approaches and they can be implemented alongside other e-payment options. Within a technical architectural framework all three approaches must be taken into consideration.

At the end of 2007 there were still a wide range of design possibilities and options for creating the application period and the deadline by which an approval has to be granted. Where reasonable, the public administration will set deadlines which will not put government offices under too much pressure. Process optimisation and electronic processes could potentially speed up the process, so that dependent on the procedure the time period leading to authorisation and approval could be reduced to three months, one month, one week, one work day or even one hour. For every administrative achievement taken into account, a separate deadline should be able to be set in the architecture. Furthermore, two different models for deadlines must be taken into account in the scenarios. In the overall deadline model, in terms of the vision outlined, the time period starts after receiving the complete set of documents and the grace period runs throughout all procedures. With the multi deadline model, separate deadlines are determined for each administrative procedure, and each grace period commences when the complete set of documents is received by the appropriate authority. If the point of single contact or the responsible public institution wants to extend the deadline or grant authori-

sation shortly before the end of the grace period they should be allowed to reach this decision independently.

The organisational design options outlined here and the assessment of the current situation in Germany shows that at the end of 2007 the scope for design and the range of design options available was still wide open. In the upcoming months, decision makers on the national, state and local level as well as investors from the private sector will assess the organisational options and models and make decisions about geographic placement and establishing points of single contact.

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5 Determining Design Options for Technical Approaches

Some potential technical design options for the IT implementation of points of single contact in terms of the EU Services Directive can be inferred from the above reflections on the topic.

A main option would be to create **alliances for the technical implementation** of points of single contact and the necessary infrastructural components. In this way points of single contact could work together on a technical level in a national alliance or several state-wide alliances. A collaboration such as this would particularly make sense in the area of shared services, as this would help to avoid uncoordinated development work occurring simultaneously in different locations and also help to avoid repetition. An alternative for self confident decision makers would be to carry out an implementation without seeking collaboration on a technical level. Both multiple alliances and autonomous players should be taken into consideration when contemplating an architectural model. Emphasis should be placed on those components, where a singular collective national approach makes sense.

As **Shared Service Providers**, national and state level administrations including their IT providers, local authorities, chambers and professional associations as well private IT providers must be taken into account.

When approving suitable shared services, the differences between services for points of single contact, services for back office government offices and services for service providers are essential.

Some thought must be given to a common **high performance portal,** particularly in the context of shared services for points of single contact, as it could supply a services portfolio for points of single contact on a national level. The point of single contact approach is, after all, comparable to the model of an administration-wide portal for service providers that would help to facilitate comprehensive knowledge management of the entire public sector. A shared high performance portal would allow every interested party in the public sector and also private investors to set up and run such a point of single contact with comparatively little effort. The portal provider would receive a fee for setting up such a workplace portal that could also be used for handling personal and telephone contacts with service providers. Such a high performance portal must cover all relevant areas in terms of content. Thus knowledge management, case management, process management and further common basic components should be accessible via the portal. At first glance this seems ambitious when considering that this must be realized on a nationwide level. However, if in the first phase compulsory standards and data structures are accepted and guidelines are introduced in which particular information is prepared, refined and made available to the expected quality standards, then by using a portal this data and information can be integrated virtually and used while accepting local sovereignty.

The fundamental **knowledge management system** (KMS) should provide information and a knowledge base. In the point of single contact context, knowledge management can be seen as a method for generating, distributing and using the knowledge necessary for the activities outlined above. The aim is to come up with concepts for expanding knowledge, abilities and expertise with the agent's help and to help them think things through, trade and solve everyday problems. The KMS should be set up to be organisationally separate and independent from the points of single contact. In a network the basic question is whether such a service should be set up for the entire network. Alternatively, each regional authority could set up its own KMS. This opens up more possibilities for the design. Options include a central KMS, a peer-to-peer KMS, a distributed KMS, a double KMS, a DVDV distributed KMS and a decentralised KMS. (*von Lucke* 2007, p. 16-27 and *von Lucke/Ziesing* 2007, p. 9-10). There are additional synergy effects relating to the citizens' hotline D115, as a comprehensive knowledge management system must also be developed for a nationwide voice portal. Therefore it makes sense, insofar as it is possible, to rely on services from existing KMS providers or to initiate setting up such services for the public sector. This is, however, a complex and strategically important plan that could be realised in different ways due to the existing multiple levels. When contemplating the current situation in Germany, the fact that there may be 16 knowledge management systems across state and municipal levels in the future that may possibly be incorporated into a federal knowledge management system must be considered. Its contents will be made up of telephone directories, directory based responsibility finders (with public services directories, facility directories, regional authority directories and responsibility directories) and procedural specifications and FAQ lists that are already part of the administrative portals in some of the states and municipalities.

Case management systems (as referred to in *von Lucke/Ziesing* 2007, p. 10) deal with the system used for contact management and with management of related cases. Scope, the question of access possibilities and rights and positioning must be considered when it is designed. The functions must be selected with a view to the complexity of the case management system. Management of contacts with the service providers is a basic function. This enables points of single contact to help businesses quickly as they have access to previous requests and to the personal core data which is required again and again. This function is typically depicted via a Customer Relationship Management System (CRM) and Citizen Relationship Management (CiRM) (*von Lucke* 2008, p. 349-351).

Another important function is individual case management which is mostly implemented using tickets. A ticket is usually issued when contact has been established with a telephone call and is usually closed when the case is closed. Tickets are issued by and in CRM/CiRM. They are necessary for following up requests. Tickets allow case related information, tasks and preliminary results to be passed on to other contacts such as government back offices. Through them service providers can take requests and make current notifications of status, bringing them to a level at which they can be worked on. Tickets are especially used to answer unsolved or open questions if further information is required or non available contacts must be reached.

In addition to its basic functions, a case management system can also carry out authentication and authorisation tasks which identify callers and users as well as approving procedures and processes. Authorisations must be accompanied by an electronic signature to make them legally binding. A range of further areas of application are based on these functions and provide needs based services such as single sign on in the point of single contact network, personalisation with intelligent personal core data administration, tailor made general processes, personalisable forms, payment functions as well as proactive tips for applying for particular public services.

With data protection, conformal compliant case management access options and rights to the service provider's data can be controlled. If this cannot be realized, contact persons in a multilevel administration network would be in the position to create extensive data profiles on citizens and businesses. Due to the large quantity of personal data in case management and in the government back office's IT systems as well as the national and state data protection laws, particularly in relation to area specific data protection rules, potential abuses must be prevented by setting up clear guidelines at the concept stage: the service providers need guaranteed confidentiality.

There are eight options available for positioning case management. When using the approach of the document safe and citizens' portal, citizens and businesses are responsible for their own case management. They manage their own data, documents and cases thereby granting the administrative departments and points of single contact access rights. This approach helps with the data protection problem, but it does mean less control of data for evaluation purposes. Secondly, case management can be assigned to the individual points of single contact, which would run a local solution. Thirdly, case management can be implemented for the entire network of points of single contact. The problem of the transferability of tickets and the individual's data to other partners in the networks and other government back offices still needs to be solved. Fourthly, case management could be appointed as a centralised CRM to the provider of the WMS of the network. Fifthly, it is conceivable that every local WMS could be complemented by localised case management. This must be further investigated to see if it is economically viable. Sixthly, case management for the entire network could be delegated to an independent provider. Transferring these tasks to the Federal Commissioner for Data Protection and Freedom of Information would be an interesting option. Seventhly, it is also conceivable that every point of single contact could entrust an independent provider with case management. Eighthly, as with traditional files, documents and procedures, case management could remain at the responsible public institutions and authorities. Substitution and integration of case management systems that are located in government departments can prove difficult and therefore there tend to be many obstacles blocking this path. (*von Lucke* 2007, 42-45 and (*von Lucke/Ziesing* 2007, p. 10).

Basic components that all points of single contact require and that are currently available or could be made available as shared services include database services, directory services, content management services, archival services, collaborative services, e-payment services, signature services, identity services, auditing services and virtual mail services (with delivery services). Using

these components, the directories and collected information required for knowledge management can be prepared and locally supplied, published and evaluated. Collaborations can also be carried out online and transactions can be finalised this way. Services which could inspect documents, certificates, identity cards and permits to see if they are appropriate, valid and complete would be particularly useful, especially if they could do this in other languages. Consequently, basic services which can integrate paper and faxed documents into an electronic workflow and ensure long term audit-proof archiving will also be needed. As long as multilingualism is not carried out via multilingual service centre agents, translation services are recommended as an option through which translators can facilitate discussions via teleconferences and are paid for their services dependent on time. Shared services should also be made available for points of single contact so that they can set up their own portal.

Responsible Public Institutions	**Number**	**Number refers to:**
Business office	~5300	German Registry Offices
Regulatory office	~5300	German Registry Offices
Registry office	5283	Official number by the DOL Registry Project
Health authorities	446	City states, counties and urban districts
Environmental authorities	446	City states, counties and urban districts
Business development authorities	446	City states, counties and urban districts
Vehicle authorities	440	Official number by the DOL Vehicle Project
Foreigner offices	428	City states, counties and urban districts
Business supervisory authorities	428	City states, counties and urban districts
Statistical authorities	14+1	State authorities & Federal Bureau of Statistics
Chamber of Industry and Commerce	80+1	Chambers plus DIHK
Craft Chamber	38+1	Chambers plus ZDH
Chamber of Lawyers	28+1	Chambers plus federal chambers
Chamber of Notaries	21+1	Chambers plus federal chambers
Chamber of Tax advisors	21+1	Chambers plus federal chambers
Chamber of Engineers	16+1	Chambers plus federal chambers
Chamber of Architects	16+1	Chambers plus federal chambers
Chamber of Public Accountants	6+1	Chambers plus federal chambers
Chamber of Patent Agents	1	Chambers
(Housing authorities)	~1000	City states, counties and urban districts
(Tax offices)	679	State tax offices
(Job agency)	660	Job agency's administrative offices
(Local job centres)	178	Local job centres
(Accident insurance)	50	Professional insurance societies
(Public health insurance funds)	196	Insurance providers
(Private health insurance funds)	47	Insurance providers
(District courts)	294	District courts
(Notaries)	9000	Full-time notaries and attorney notaries

Table 2: The estimated number of back office responsible public institutions

In the **shared services** context **government back offices** (Table 2) should consider administrative IT-procedures, processes and communications compo-

nents. Administrative IT procedures and back office processes are accessible via interfaces or portals and thus open to points of single contact. This makes sense, for example, when gathering information for inquiries and complaints, for booking appointments, for callback requests, for filing applications, for forwarding information, for status information enquiries and for procedures which are already underway. Processes and process blocks can be connected to new process and value-added chains. Based on process analysis for example, they can be tightened and put into a new order so that there are less procedural steps and they can accrue and be carried out at the same time so that procedures can be simplified or cease to apply. It is hoped that the services directive can act as a catalyst for e-government. When a services directive total architecture is designed, it must be able to deal with the processes of all players, integrate them into the entire network and shoulder specific demands on the availability of the entire volume of processes.

Shared services could also be set up **for service providers** in the EU Services Directive context. To locate the appropriate point of single contact a **national EA entry portal** should be set up **which could,** for instance be integrated into a federation of **European EA entry portals**. Its task would be to present the point of single contact responsible for the individual service provider and other interested groups. Such a portal, which must be based on a directory of points of single contact (as part of a network of directory based responsibility finders) should be available worldwide on the internet. Possible contractors are the points of single contact themselves, a collective association of interested parties or the German Federal Ministry for Technology and the Economy, which should have an interest in setting up a national overview. In addition, it is important to consider how and with which content a point of single contact can be integrated into the public business development portals, administration portals and government portals (national, state, district, city, municipality) in which it holds regional responsibility. In addition, register portals should be considered for those registers, and this is to be set up according to Article 22 (information about the service providers and their services). The development must be carefully considered together with the further conceptual development of company registers, skilled trade registers, and other existing service receiver registers so that doubling up of work and redundancies in data collection and data management can be avoided.

The set up of an **electronic document safe for service providers** must be considered too. An electronic document safe is a virtual locker for storage, management and sending and receiving electronic documents on a server especially designed for this purpose. The server is exclusively controlled by citizens or businesses and is completely independent from the locker's supplier and also independent from state institutions or other third parties. The electronic safe's basic functionality ensures that the user of the safe can open, save, send, forward, print, download, upload, delete, search, sort and comment on any electronic units of data as well as check for possible viruses and legally binding signatures. Its integrated email functionality, ability to manage appointments, expiries and time stamps and connect saved objects to existing applications is also useful. (*von Lucke/Goergen* 2007, p. 10-13 and *von Lucke* 2008, p. 361-366).

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6 Regulations and EU Services Directive Requirements for an Architectural Framework for Points of Single Contact

An architectural framework for future points of single contact is being created based on EU Services Directive requirements. When considering the possibilities, it can be taken for granted that there will not be just one point of single contact for Germany. Instead, in all probability these tasks will be carried out by various players. In the 16 German states a unique implementation model is unlikely. Therefore it is important that the technical architectural framework can integrate all outlined approaches and satisfy their requirements. Such an architecture includes both an architectural framework for individual points of single contact and one for a federation of points of single contact. The design of concrete process and value added chains for general processes should be based on this.

A range of functional requirements stem from the Services Directive itself. On top of this there are, particularly in the area of security, a range of non-functional services that stem partly from the SD itself, partly from legal provisions from the partner countries and partly from technical and operational reasons related to IT. There is a detailed table displaying these requirements in Chapter 11.

The architectural framework for a point of single contact consists of the following components for service providers, points of single contact, responsible public sector offices, knowledge management and basic services as shown in Figure 2.

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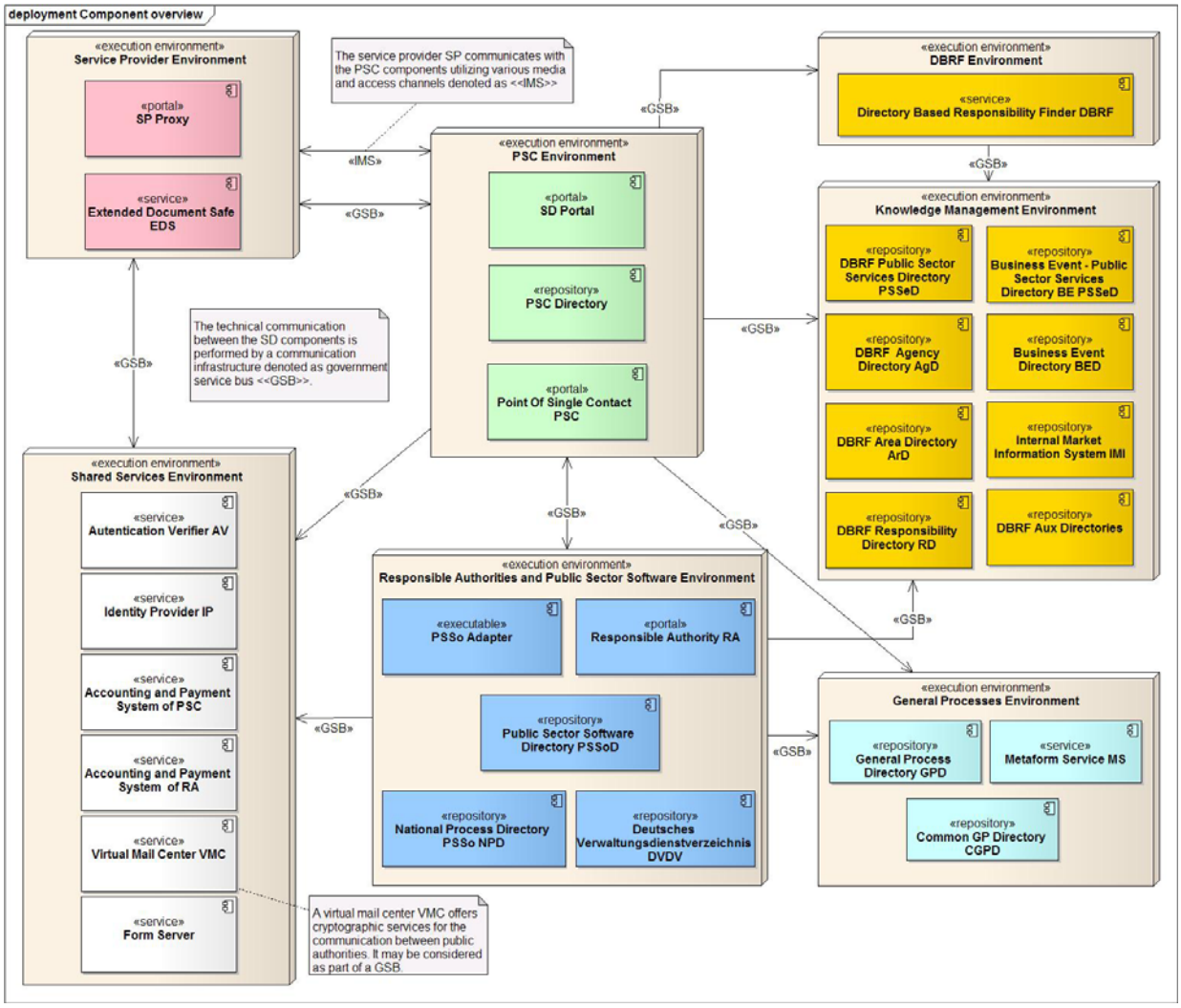

Figure 2: Architectural Framework for a Point of Single Contact

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6.1 Components for the Service Provider as an Applicant

The service provider (DL/SP), who looks to the point of single contact, acts as an external player ("**Antragsteller DL**"; Service Provider Applicant in German). An external representative (provider, lawyer, notary or EA light) could work for them and represent the applicant. The applicant or their external representative has access to the component "**DL Proxy**", which could be a multi-channel target group portal for service providers.

The "**DL Proxy**" (Service Provider Proxy) represents the service provider applicant as a conceptual construct for the entire system. This takes place partially through interactive queries aimed directly at the service provider applicant and partially via letters of authorisation giving permission to act in predetermined areas of action that have been agreed upon by the service provider applicant. The "DL Proxy" deals with queries from points of single contact (Einheitlicher Ansprechpartner EA/PSC) and the appropriate authorities (Zuständige Behörden ZB/RA) by enabling communication via interfaces. A DL Proxy might be realized as a portal. Information about specific applicant data stored in the document safe can be accessed via a dedicated interface Query DL Proxy. This information will be held in an associated repository Information DL.

The component "**Information DL**" (Service Provider Information) contains personal or business related information about the applicant which the applicant can self-manage. This information can be general information such as name, address and contact details, but it can also be identity verification details pertaining to the service provider's application. Information required for identification and authentication is also located here. Precise plans concerning technical implementations should not be published here.

An electronic "**Dokumentensafe DS**" (Document Safe) should only be responsible for storing electronic documents securely in the narrowest sense and nothing else.

An "**Erweiterter Dokumentensafe EDS**" (Extended Document Safe) includes safe functions but it is also responsible for management of the safe. This embraces the safekeeping and forwarding of applications, records, documents and copies of identity cards as well as receiving information, notifications and official letters on behalf of the safe's owner.

6.2 Components for the Point of Single Contact

The "**DLR Portal**" (Services Directive Portal/SD Portal) is a national point of single contact entry portal, thus it is the point of entry to all points of single contact in a nation. It could make information available about public sector services for service providers and facilitate the search for the responsible point of single contact and the responsible authorities. The information needed for this task can be found using the relevant services of directory based responsibility finders (Verzeichnisbasierte Zuständigkeitsfinder VZF/RF). The DLR portal is responsible for bundling information from directory based responsibility finders

regarding public sector services and relevant institutions for service providers (Antragsteller DL). It could also be integrated into an international cluster of national point of single contact entry portals.

The "**Einheitlicher Ansprechpartner EA**" (Point of Single Contact EA/PSC) is one of the central components of the overall architecture. It represents the functionality of a government authority or institution "point of single contact". For this reason it is modelled in a more detailed manner than the other components. It informs and gives advice, coordinates workflows, supervises documents which have been submitted to see if they are complete and forwards them on to the responsible authorities and informs the applicant of any results in the interim. At least in the start up phase, a lot of these activities will be carried out manually, and without the decision making support of computer systems. All points of single contact have to be added to the agency directory (VZF/RF Einrichtungsverzeichnis) of the directory based responsibility finder (verzeichnisbasierter Zuständigkeitsfinder VZF/RF). All applications must be delegated to the responsible point of single contact for processing. Should there be a comprehensive are of responsibility for points of single contact, as a rule the point contacted first will take on the processing of the application. The grace period starts after the point of single contact has checked over the documents sent in with the application for completeness. For payments to the responsible authority, a point of single contact must have a payment platform (Rechnungswesen EA/PSC). The applicant's identity and permissions must also be verified by an authentication verifier (Authentisierungsprüfer AP). In addition, the points must have access to the register of business sector specific general processes (Generalprozesse GR)**,** to the register of electronic public sector software (responsibility directory or the German Public Sector Software Directory (Deutsches Verwaltungsdiensteverzeichnis - DVDV) and to the directory based responsibility finder in order to find the responsible institution. A sensible solution would be to set up directory based responsibility finders (verzeichnisbasierte Zuständigkeitsfinder VZF/RF) in order to reduce the number of manual queries about responsibilities. A point of single contact proxy (EA Proxy) need not be installed because the points must be reachable around the clock.

The **Portal EA** (Point of Single Contact Portal in German) is based on the high performance portal approach. This belongs to the type of agency portal with multiple views which could provide workplaces for a point of single contact's employees. It is ready for use directly and electronically on the internet for service providers. Agents from other channels (call centres, personal contacts, mobile teams) can also use this multi-channel portal to provide services. The portal primarily provides the applicant (Dienstleistungserbringer DL/SP) with considerable functionality: it offers general information about public sector services and responsible institutions. Ideally is would also receive applications and documents in electronic form. In addition it monitors the processing of applications including queries, status information, sent out notices and bill payments. Therefore three core components relating to the supply of information, preparation of applications and the processing of applications for a point of single contact can be identified:

The **EA – Informationsbereitstellung** module (Point of Single Contact - Provision of Information) is responsible for presenting decentralised and authorised

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public sector service documentation (VL Information) suited to the service provider's requirements. This component is assigned to knowledge management.

The **EA – Antragsstellung** module (Point of Single Contact - Preparation of Applications) collects the data needed to create the application with the support of a metaform. The responsible administrative authorities depend on this data to handle the applications. At the same time the module checks the documents that have been submitted for completeness as far as this is possible. As a result of this the module is assigned to case management.

The **EA – Antragsabwicklung** module (Point of Single Contact - Processing of Applications) deals with the processing of overall processes (Generalprozesses GP) by initiating and managing the responsible authorities' processes. (Zuständige Behörde ZB/RA) It is allocated in a process design environment. The module will also be assigned to case management.

All points of single contact should be added to the institution directory of the directory based responsibility finder (VZF/RF). If such a directory does not exist yet, an **EA Verzeichnis** (Point of Single Contact Directory) should be set up in the meantime as an autonomous register in which all existing points of single contact should be registered as institutions. As with all directories there are interfaces available for registration and queries.

6.3 Components for General Processes

Generalprozesse GP (General Processes in German) bring together workflows which are necessary from a point of single contact's viewpoint for processing the service providers' respective requests. A general process consists of several public sector services dependent on the requests made by service providers. Each public sector service is provided by public sector software, from a direct decision made by decision makers or in a hybrid form. General processes can be expanded with additional processes where it makes sense to use supplementary services. As long as general processes have not yet been defined or can be expanded in a dynamic manner, they should be created or expanded by using an ad-hoc workflow. This approach appears to make sense in case points of single contacts' employees wish to define their own workflows to complement general processes in order to protect themselves or to respond to current requirements.

GP Information handles readable descriptions of general processes for people. These descriptions which belong to the knowledge management sphere have been created for service providers (Dienstleistungserbringer DL/SP) and the points of single contacts' employees. Preparation includes written documentation of the procedures necessary for processing the appropriate requests in their entirety.

The **GP Prozessbeschreibung** (Description of Processes) handles the descriptions of general processes in a machine readable format so that they can be

used automatically. In the future these descriptions will be created neutrally and be vendor independent.

The **Generalprozessverzeichnis GV** (General Process Directory) is the chief information storage area for general processes (Generalprozesse GP). It is a repository which contains additional information (GP Information and GP Prozessbeschreibung) for every general process.

An **EA-übergreifendes Generalprozessverzeichnis EGV** (Common General Process Directory for Points of Single Contact) would make sense if general processes needed to be transferred between points of single contact.

Metaformulare (Metaforms in German) make the processing of general processes easier as they collect all the necessary data needed by public sector software (Fachverfahren FV/PSSo) in order to file an application from service providers. As soon as metaforms tailored to general processes have been introduced, once collected the core data for the applicant can be stored and transmitted together with actual data to the public sector software.

The **Metaformular-Dienst MD** (Metaform Service) facilitates the saving of metaforms as well as access to them and their parts. So far no conclusions have been drawn in terms of technical solutions for the service. It has not yet been determined if self contained forms can be generated, if access will occur via references to distributed parts from existing forms or if these parts should be relocated as a copy in a new form.

The **Metaformularverzeichnis MV** (Metaform Directory) is the repository for a point of single contact's metaforms. Access is only possible via the relevant service capsules.

6.4 Components for Responsible Public Authorities

The component **Zuständige Behörde ZB** (Responsible Authority ZB/RA) stands for the public authorities responsible for proceedings pertaining to the EU Services Directive. It can be assumed that many public institutions can be integrated into a general process (Generalprozess GP) but by themselves they can only provide very specific public services. Every authority and thereby every responsible public institution (zuständige Behörde ZB/RA) has its own public institution portal. In addition they can register themselves in the VZF agency directory (VZF Einrichtungsverzeichnis) by providing their contact data and in the VZF responsibility directory (VZF Zuständigkeitsverzeichnis) by providing details about their responsibilities (material and location) as well as the public sector software they are providing. Contact details concerning their public sector software must also be added in to the Deutschen Verwaltungsdienste-verzeichnis (DVDV) as long as this is available. Each responsible institution should also have an appropriate accounting and payment system (Rechnungswesen ZB) and a Virtuelle Poststelle VPS. Furthermore they must have technical adapters for their public sector software.

6.5 Components for Public Sector Services

Public Sector Services (**Verwaltungsleistungen VL/PSSe**) are services provided by public authorities or their affiliated institutions. Public sector services are included in the VZF public sector service directory.

The component **VL Information** (Public Sector Services Information in German) deals with documented procedures by providing information about public sector services that people can easily understand. These preparations which are part of knowledge management are primarily designed to provide information for service providers. They can also provide additional information for points of single contacts' employees. Every public authority could prepare the VL Information independently for their own public sector services. Considering the large number of public sector services provided by public authorities, a shared service model seems to make sense. This could be realised on the county, regional, state or national level, for example. The core text and supplementary model (SEM, *von Lucke* 2007b) is a conceivable approach to national content sharing or a content syndication service provider.

The component **VL Prozessbeschreibungen** (Public Sector Services Process Descriptions) contains the process descriptions needed for providing public sector services. They deal with the written documentation of single processes. The description must be saved in a machine readable format so that it can be used to implement processes automatically. In the future these process descriptions will be technically neutral and vendor independent. Mapping in different process description languages and their vendor specific implementation should be possible.

6.6 Components for Administrative Procedures

Every **Fachverfahren FV** (Public Sector Software FV/PSSo) is accessible via a specific services interface. As a rule it is represented by both hardware and software. Public sector software is used to provide one or more public sector services (Verwaltungsleistungen VL/PSSe) with technical support. Fachverfahren are therefore not always restricted to providing just one public sector service. An adaptation to the services directive's conventions takes place by means of a special façade (FV Fassade).

The **FV Adapter** (Public Sector Software Adapter in German) encapsulates existing public sector software by means of a façade and makes the procedures' functionality available through a services directive standardised protocol for points of single contact. The FV adapter's components are modelled in a detailed manner in a similar way to the points of single contacts' components.

The **FV Fassade** (Public Sector Software Façade) implements the services directive specific protocol for points of single contact in the public sector

software's services interface. Supported functions include functions for starting up public sector services, for examining applications, for following up missing data and documents, for issuing official letters, for terminating public sector software including compensation measures, questions about status and migration actions (interruption, packing, transport, unpacking, proceeding).

The appropriate **FV Formular** (Form for Public Sector Software) for starting the application defines the application data needed for carrying out administrative procedures using the responsible public authority. Some of this information can be entered in the form in advance by the responsible authority. FV Formulare can be stored on a forms server.

FV Information (Public Sector Software Information) consists of documented procedures and information about public sector software which is readable for people. These presentations, which are a part of knowledge management, are primarily designed for employees of points of single contact so that they can use and develop the software and optimise workflows.

In contrast**,** the process descriptions for each process of each public sector software are stored in the **FV Prozessbeschreibungen** (Public Sector Software Process Descriptions). These descriptions are the written documentation of the single processes which, in their entirety, make up the public sector software. The presentation must be stored in a machine-readable format so that it can be used for automatic processing. In the future these process descriptions will be technically neutral and vendor independent. It should be possible to use presentations in different process description languages and process them in their vendor specific implementation. These process descriptions could serve as a starting point for process optimisation.

All public sector software process descriptions carried out by an authority are stored in the public authority's special local process directory (**Prozess-verzeichnis einer Behörde FV PVB**). Such a process repository would be necessary in order to grant access to processes using an enterprise service bus or an authority's government service bus.

A possible national process directory (**Nationales Prozessverzeichnis FV NPV**) that bundles existing process directories from public authorities in the form of a repository could take over an orientation function for all authorities at every level of administration. Such an approach can only be formulated when there is a national public sector services directory (Leistungsverzeichnis) and the existing public sector software is recorded in a responsibility directory or a similar directory.

All information about the electronic (or otherwise) accessibility of public sector software is collected and prepared in a public sector software directory (**Fach-verfahrensverzeichnis FVV)**. This information is required when calling up public sector software in a general process in an automated manner. In addition, information about the relevant government fees must be stored here. According to current calculations, this directory will either be the German Public Sector Software Directory (Deutsches Verwaltungsdiensteverzeichnis - DVDV) whose concept must be further developed or comparable entries in the

responsibility directory either of a national directory based responsibility finder or a national federation of directory based responsibility finders.

The **Deutsche Verwaltungsdiensteverzeichnis** (DVDV: German Public Sector Software Directory), is a national directory service in which the connection parameters of selected public sector online services are stored. It functions as a central registrar for German public authorities' online services. It will be operated and further developed collectively by the German Federal Agency for Information Technology and by public IT providers.

6.7 Components for Knowledge Management

The **Binnenmarktinformationssystem IMI (Internal Market Information System)** facilitates communication between responsible authorities in the internal market. Five components should be developed for this. The **Competent Authorities Database** contains meta-information about responsible authorities (Zuständige Behörden ZB) in the European Union. The **Structured Information Exchange for Services** prepares correspondence between the authorities in the form of structured information. The **Administration Cooperation Database (ADMINCO)** contains contact information for government and administration. **Language Support** takes care of automatically translating correspondence in the respective official language. **Data Protection and Security** components take care of data protection and data security (*Šedová* 2005).

The directory based responsibility finder (**verzeichnisbasierter Zuständigkeitsfinder VZF/RF)** is one of the most important components. It enables the DLR portal and the points of single contact (Einheitliche Ansprechpartner EA/PSC) to find the institution which is materially and locally responsible, based on predetermined parameters. This is a service which has access to stored information about responsibility in the VZF agency directory, the VZF public sector service directory, the VZF area directory and the VZF responsibility directory. The service evaluates the information and presents the results on an inquiry interface. These directories are designed to operate as open directories in an ideal scenario. They can be accessed directly. The contents must be examined and refreshed at regular intervals in order to ensure that they are complete and up-to-date.

For now the question as to whether the finder should be a localised directory based responsibility finder spanning all levels of administration, a national directory based responsibility finder spanning all levels of administration or consist of a national federation of directory based responsibility finders should remain open. The interfaces for all three approaches must be identical. The question as to whether a directory based responsibility finder should be made available centrally as a shared service or if every point of single contact should develop its own local responsibility finder should also remain open. The internal market information system IMI will have a Competent Authorities Database which has so far been declared as an agency directory.

This database is actually equivalent to a responsibility finder and should therefore be developed in the medium term into a directory based responsibility finder (VZF) on the European level.

The **VZF - Einrichtungsverzeichnis** (VZF - Agency Directory in German) is a directory of public authorities as well as business and institutions of the third sector providing public services. The responsible authorities (zuständige Behörden ZB/RA) that are affected by the services directive represent a subset of these institutions. As it makes little sense to separate these groups into a separate directory, they should be included in the national directory based responsibility finder. Every public office should register their contact data in the agency directory and their areas of responsibility and their software in the responsibility directory. Notifications of the software must also be available in the DVDV (German Public Sector Software Directory). The fact that an accepted unique national identifier for all public authorities and institutions spanning all administrative levels is currently missing might be a problem in Germany. Therefore a solution must be found.

The **VZF - Leistungsverzeichnis** (VZF - Public Sector Services Directory) is primarily there to identify public sector services. It initiates the classifying of material responsibilities. This direction needs information which can be clearly interpreted in order to identify public sector services. With the public sector services directory public sector services information (VL Information) and technical process descriptions (VL Prozessbeschreibungen) can be developed and stored systematically. The fact that there is currently no accepted unique national identifier for public sector services that spans all administrative levels and that there is no common naming ontology in Germany seems to be a problem, and a solution must be found for this problem.

The **VZF - Gebietskörperschaftsverzeichnis** (VZF - Area Directory) makes information available for mapping localised responsibilities. The approach needs area information which can be clearly interpreted in order to identify the area as well as the different levels of government. In Germany there are already two national standards determined by the eight digit AGS (Amtlicher Gemeindeschlüssel - official community code) and the twelve digit RS (Regionalschlüssel - regional code). However, they must be developed further for localised responsibilities (particularly city states and large cities) and in the international context (European public authorities as well as German embassies and consulates).

The **VZF - Zuständigkeitsverzeichnis** (VZF - Responsibility Directory in German) is a directory in which the connections between agencies, public sector services (material responsibility) and areas (localised responsibility) are stored. Each entry of a "responsibility" can contain further information. This particularly pertains to non standard responsibilities (A-K and L-Z, residential streets, breeds of dogs, etc.) and to the supported public sector software.

Services for businesses can be organised into so called "**Business Events**" according to the life event principal. These are events or phases that occur once or recur in the life of a business and particularly demand activities by businesses or their employees. This particularly concerns events that mean important leaps in the development of a business and phases that are part of a reorganisation

of a company's organisational structure or a reengineering of its business processes. Business events as a main category can be divided into business episodes to form subcategories. Business events can be designed in a most complex manner to incorporate multiple business episodes and their associated players by taking various eventualities into account (*von Lucke* 2008, p. 226).

The Business Event Directory (**Geschäftslagenverzeichnis)** is a directory in which business events and their allocated business episodes are registered. It is not needed for a directory based responsibility finder. However, it can help to find public sector services and responsibilities for business events. Therefore a Business Event - Public Sector Services Directory (**Geschäftslagen-Verwaltungsleistungen-Verzeichnis**) should be created in which the connections between business events and public sector services can be stored.

6.8 Components for Basic Services

The **Authentisierungsprüfer AP** (Authentication Verifier) works as an authorisation inspector by checking if the user is authorised. The component has to verify the service provider's rights as an applicant (Antragsteller DL/SP), the employees of the responsible authorities (zuständige Behörden ZB/RA) and the point of single contact's employees' (Einheitlicher Ansprechpartner EA/PSC) access rights. Their access rights must be verified before unlocking access to specific information. The authentication verifier gains access to the appropriate information via identity providers' service interfaces. If all portals are clustered in a services directive portal federation and made secure using standards such as WS Security, single sign on could be realised in the network. It can be assumed that authentication will not be necessary for common information inquiries using the national entry portal for points of single contact (DLR Portal) and agency portals for points of single contact (Portal EA).

Identitäts-Provider IP (Identity Providers) are in charge of technical and organisational identity management tasks in terms of shared services.

The component **Rechnungswesen EA** (accounting and payment system for a point of single contact) will be modelled so that it can be used by points of single contact to issue invoices and collect payments from service providers for the responsible authorities. Suitable strategies for handling any accounts and bill payments made by the applicant to the responsible authorities via a point of single contact must be must be explored further. The question of which methods of payment should be permitted must also be explored in detail.

The component **Rechnungswesen ZB** (accounting and payment system for the responsible authorities) will be modelled so that it can be used by the responsible authorities to create fee notification letters (for invoices), for payment collection procedures and for refunds to be issued to service providers. It is part of the responsible authorities' treasury (zuständige Behörde ZB/RA). The interaction between the accounting and payment systems of points of single contact (Rechnungswesen EA) must be worked out in further detail.

Furthermore, it is conceivable that **further directories, registers and collections of information** could be set up if this seems necessary for the larger discussion about implementing IT solutions for the EU Services Directive. There is room to redefine and improve these directories and collections, but for now they will be used as place holders.

Formularserver (Form Servers) manage forms throughout their entire lifecycle. Form servers should therefore contain services for forms as well as containing the appropriate forms themselves. When metaforms are used, the metaform service (Metaformular-Dienst MD) and the appropriate metaform repository (MR) will also be operated via the form server.

The **Virtuelle Poststelle** (VPS: Virtual Mail Center in German) provides cryptographic services for communication between public authorities via secure and non-secure networks. This basic service is a system that can encrypt and sign outgoing messages, decode specific encoded messages and verify the signatures of specific messages. Therefore it must be able to deal with signatures that have been issued in other member states.

6.9 Reflections on the technical Architecture

In the EU Services Directive context it is evident that from a federal and legal political perspective that tasks and responsibilities in Germany could be shared by several institutions which are independent of each other. As a result, working with divided data and systems becomes inevitable. The Service Oriented Architecture (SOA) approach is equipped to carry out this implementation. This approach allows cooperative administrative structures to be established and specialised applications to be integrated in a platform independent manner. This primarily concerns a platform independent description of processes and their realisation in a heterogeneous IT infrastructure – this is known as the "e-Government Bus".

When dealing with DL Proxy, Dokumentensafe, DLR Portal, Einheitlicher Ansprechpartner EA, Portal EA, FV Information, FV Prozessbeschreibung, nationales Prozessverzeichnis FV NPV, GP Information, GP Prozessbeschreibung, EA-übergreifendes Generalprozessverzeichnis EGV, VL Information, VL Prozessbeschreibung, Authentisierungsprüfer AP, Identitäts-Provider IP, Rechnungswesen EA, Rechnungswesen ZB, Formularserver, Virtuelle Poststelle and verzeichnisbasierter Zuständigkeitsfinder VZF (including public sector services, agency, area, and responsibility directories) components, the possibility of making them available in the form of shared services must be considered. Planning, building, running and developing these components will always be associated with considerable expenditure. A more economic approach with cost saving benefits would be to work together in a cluster or to rely on private providers. This assumes that the appropriate services are available on the market and that there is sufficient demand for them. Otherwise all points of single contact might be forced to come up with own concepts for designing, building and running components.

The modelling of General Processes should be afforded a particularly high priority in this context. From the service provider's subjective view replication and completeness of process chains are crucial. In contrast, the establishment of knowledge management involving the responsible public authority could be dealt with in stages.

The architectural framework for an alliance of points of single contact is composed of a variety of points of single contact in their various forms, the responsible authorities (zuständige Behörden ZB/RA) in the background, the service providers (Dienstleistungserbringer DL/SP) and the above mentioned shared services.

The EA light component (Point of Single Contact Light) could be introduced in this context. It represents the functionalities of a private player who acts as a point of single contact for service providers and also uses the point of single contact cluster's shared services as much as possible, even though they are not accepted as a public sector point of single contact by law. This component is also based on the high performance portal approach. These lightweight points of single contact offer three functionalities for the service provider applicant. Firstly they provide general information about public sector services and responsible institutions. Secondly, they are responsible for providing support by helping with the creation of formal and correct applications. Thirdly they take care of the handling of applications including all enquiries, status information, notifications of dispatches and bill payments on behalf of the service providers. They then give the documents to a point of single contact. They might choose between the point of single contact in charge of the application and the point of single contact who will be most suited for the job, for example, the one who is able to process this quickly or will gain permission once the deadline has expired.

The complete set of documents needed for a service provider's request can be deposited with EA light and the specially chosen point of single contact.

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7 Main Use Cases

In the following chapter several essential workflows occurring within a Services Directive architecture will be described in the form of use cases from the viewpoints of the four fundamental roles of Service Provider DL/SP (applicant), clerk working for a Point of Single Contact (EA/PSC), clerk working for a Responsible Authority (ZB/RA) and Public Sector Software Providers (FV/PSSo). As soon as the processes can be automated these tasks and roles can be taken over by IT supported components.

7.1 Submit Application

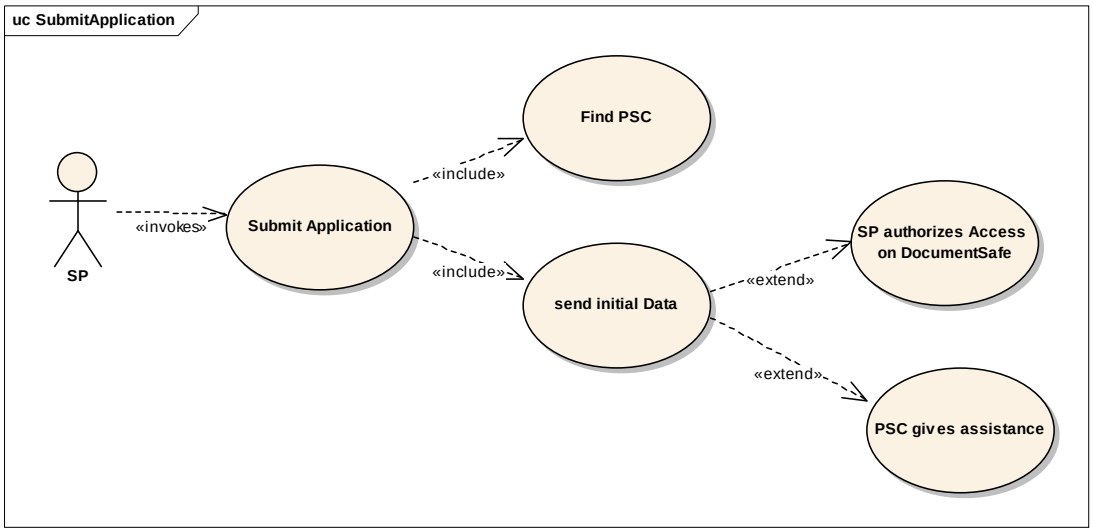

Figure 3: Use Case "Submit Application by DL/SP"

1	**Submit application**
	The service provider DL/SP submits an application relevant to the EU-SD with the EA/PSC or the ZB/RA.
2	**Find point of single contact**
	The service provider DL/SP finds the applicable EA/PSC relating to their planned activities and regional preferences.
3	**Transmit initial application**
	The service provider DL/SP submits the information required for the planned activity and authenticates the data with their digital signature where necessary.
4	**EA/PSC gives assistance**
	The DL/SP is stuck in the process of filling out the application form. The EA/PSC helps to prepare the form for submission.
5	**SP authorizes access to document safe**
	The DL/SP authorizes the EA/PSC to retrieve documents from its private document store and profile information to simplify the application process.

Table 3: Use Cases for the Submission of an Application

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7.2 Administer Application

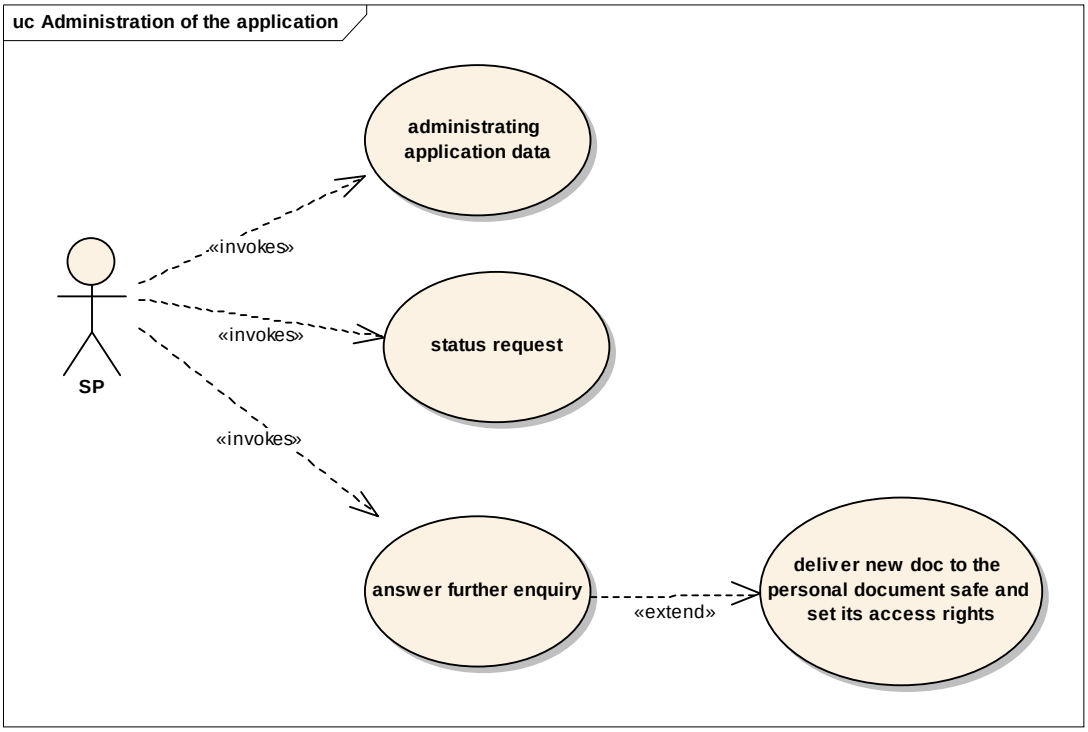

Figure 4: Use Case "Administer Application by DL/SP"

1	**Administrating the application data**
	The DL/SP executes the items in the list of his SD-applications.
2	**Answer further enquiry**
	The DL/SP answers a further enquiry from the EA/PSC by using the EA/PSC's portal.
3	**Status request**
	The DL/SP requests the status of an application by using the EA/PSC's portal.
4	**Deliver a new document into the personal document safe and set its access rights**
	The DL/SP loads a signed document up into his document safe because he will use it in several applications.

Table 4: Use Cases for the Administration of an Application

7.3 Process Application by RA

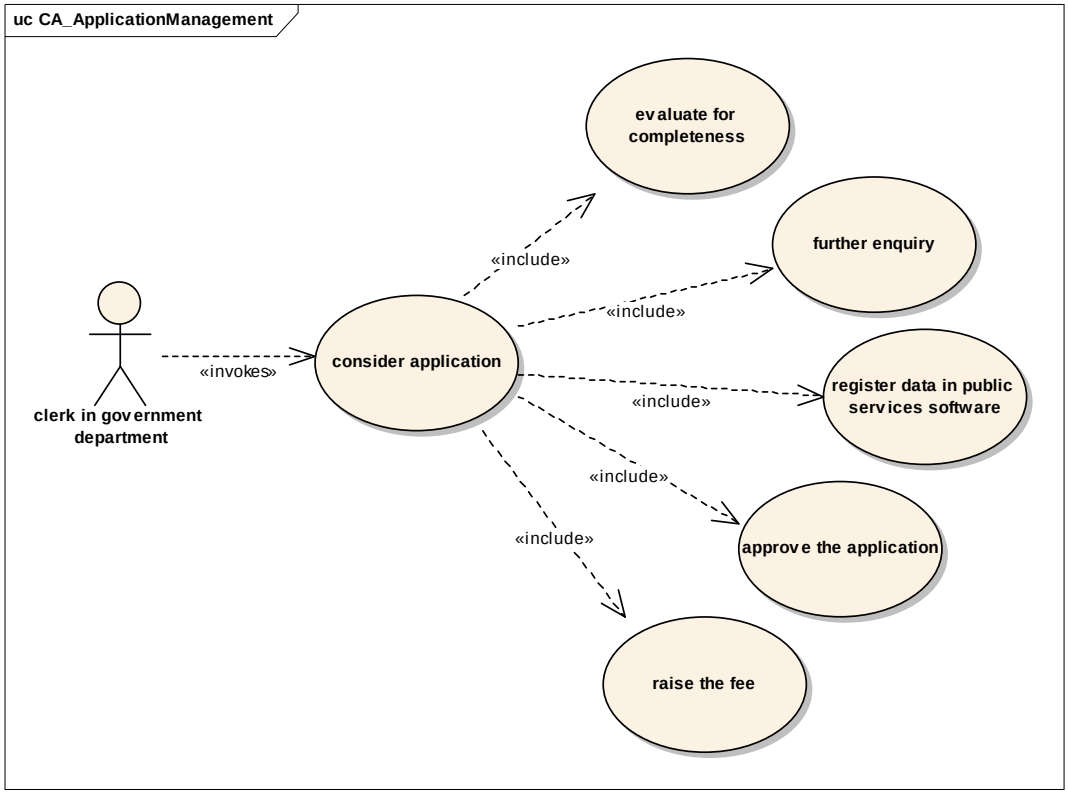

Figure 5: Use Case "Process Application by ZB/RA"

1	**Process an application**
	The clerk from the responsible authority ZB/RA processes an application.
2	**Evaluate for completeness**
	The application data are checked for completeness.
3	**Register data in public services software**
	The application data are registered and/or examined and worked on in the public services software FV/PSSo.
4	**Further enquiry**
	Missing information is requested by EA/PSC and/or ZB/RA from DL/SP.
5	**Raise the fee**
	In accordance with the regulation of charges the appropriate fee is raised.
6	**Approve the application**
	The request is granted depending on the circumstances.

Table 5: Use Cases for the Processing of an Application by the ZB/RA

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7.4 Process Application by PSC

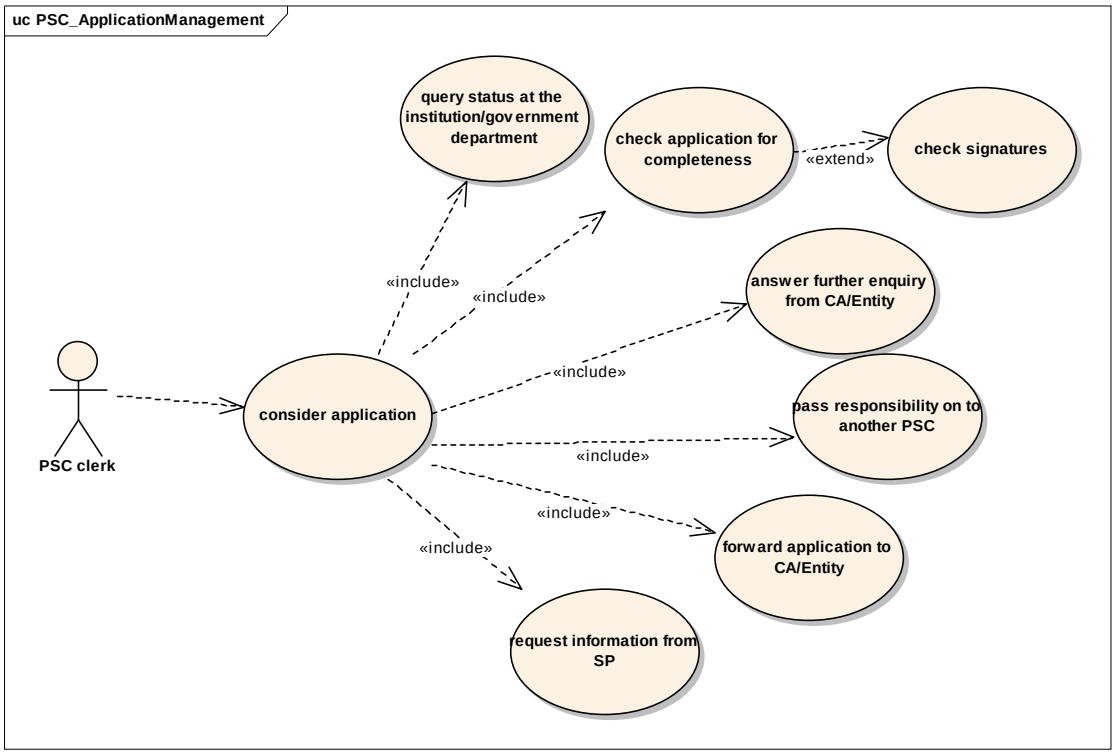

Figure 6: Use Case "Application Processing by EA/PSC"

1	**Process application**
	The EA/PSC processes an incoming application.
2	**Check application for completeness**
	The EA/PSC checks the completeness of the information that was submitted by the DL/SP, based on their knowledge of the criteria used.
3	**Check signatures**
	The EA/PSC checks signatures if necessary for the application.
4	**Forward application to ZB/RA**
	The EA/PSC forwards the application data to ZB/RAs for further processing.
5	**Request information from DL/SP**
	If the service provider didn't provide sufficient information for his/her application to be considered the EA/PSC will request further information from the DL/SP.

6	**Answer further enquiry from ZB/RA**
	The EA/PSC answers the further enquiry requests from the ZB/RA based on information that they have from the DL/SP.
7	**Request status from ZB/RA**
	The EA/PSC evaluates the status of the application querying the ZB/RAs involved in processing the application.
8	**Pass responsibility on to another EA/PSC**
	For organizational reasons the EA/PSC cannot process the application until the end. The DL/SP does not have to go through the application process once again if positive answers are received from the ZB/RAs. In this case the EA/PSC must hand over all associated data to a second EA/PSC.

Table 6: Use Cases for the Processing of an Application by the EA/PSC

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7.5 Change PSSo Application

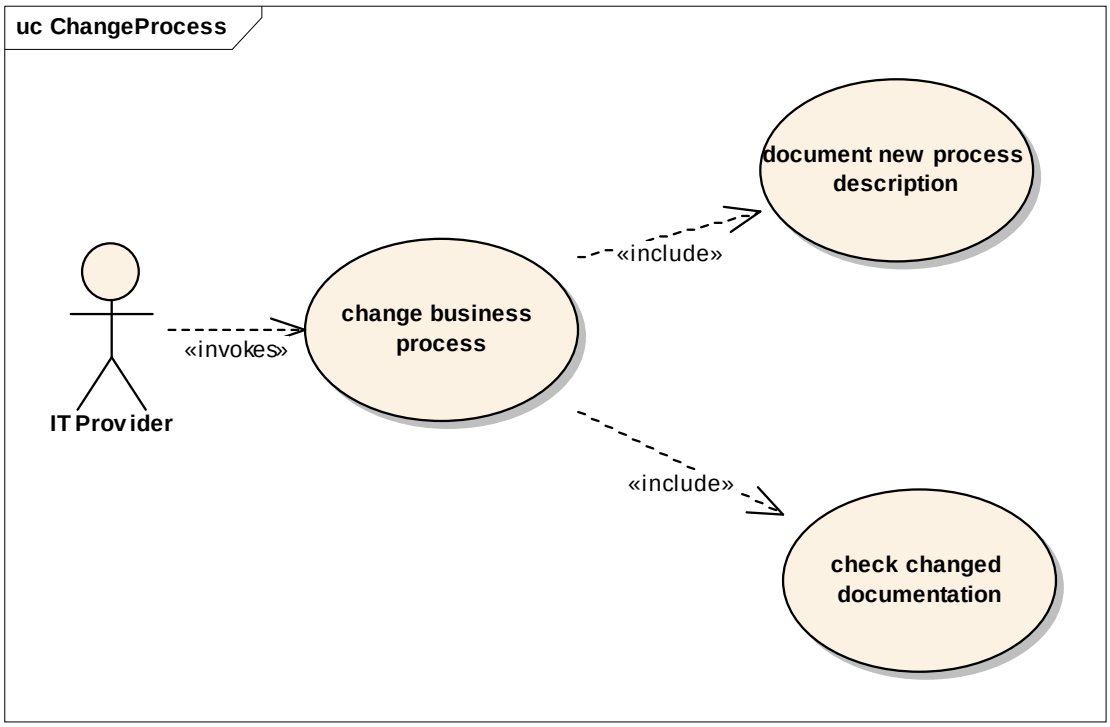

Figure 7: Use Case "Change PSSo Application"

1	**Change PSSo Application**
	For organizational reasons the workflow for the application processing in a ZB/RA must change to a date T. The new description of the PSSO application is present. The IT provider implements it as a new process.
2	**Document new process description**
	The changed description of the PSSo application is documented as a new process. The old process description is marked invalid after the date T.
3	**Check changed documentation**
	The IT provider examines whether the changed PSSo appears on the web pages of the authority and whether the documentation of the old process flow is marked invalid after the date T.

Table 7: Use Cases for the Modification of a PSSo Application

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8 Example Scenarios

8.1 Overview

In the following, a subset of the use cases introduced above will be elaborated from a service provider's viewpoint as sequence charts showing the relationship between the functional components of the Services Directive architecture. In Figure 2 (Part I) a range of component groups has been identified which contain the core components of the functional architecture of the Services Directive.

- Group "Service Providers (DL/SP)"
- Group "Points of Single Contact (EA/PSC)"
- Group "Responsible Authorities (ZB/RA)", "Public Sector Software (FV/PSSo)", "Public Sector Services (VL/PSSe)"
- Group "Directory-based Responsibility Finders (VZF/RF)"
- Group "Knowledge Management"
- Group "General Processes (GPs)"
- Group "Shared Services"

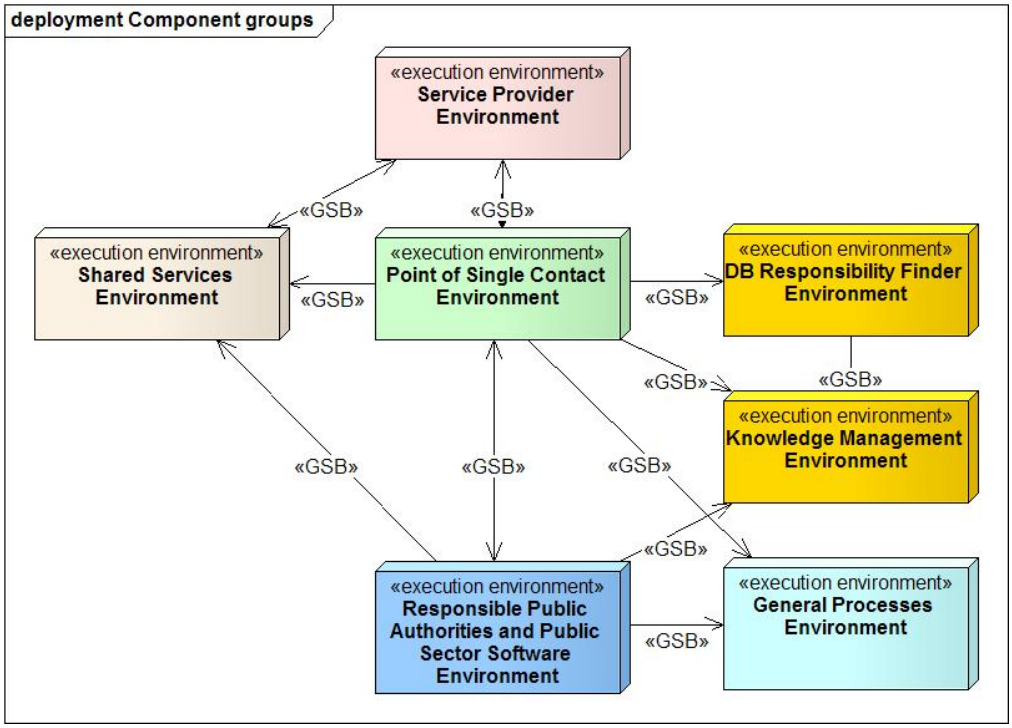

Figure 8: Groups of Functional Components

In the simplified overview in Figure 8 it can be seen that bidirectional communication relations are existing between the first three groups. The next three

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groups are providing fundamental information while the last group provides common infrastructure services. The main tasks that are necessary to implement the Services Directive are namely to

- prepare and provide basic information for the Service Providers DL/SPs,
- support the Service Providers DL/SPs when they prepare and submit applications and to find the responsible public authorities (ZB/RPA) as well as to
- support collaboration between Service Providers DL/SPs and responsible authorities (ZB/RA) during the processing of applications.

This is carried out in mutual dialogs between Service Providers DL/SPs, Points of Single Contact EA/PSCs and Public Sector Software Providers (FV/PSSo). Necessary information/knowledge stored in the directories can be accessed directly and / or through the Directory-based Responsibility Finder (VZF/RF). In the following section the three tasks' workflows are elaborated as examples using *sequence diagrams.* For this reason the descriptions of the components concerned in the workflows, EA/PSC and FV/PSSo adapters, are explained in more detail, see Figure 9.

8.2 Refined Models of Selected SD Components

Components provide further *services* via so-called *ports*.[1] A port embodies components' service related interaction with their environment. Furthermore, supported and required interfaces are used that are defined through relevant operations and attributes. The implementation of these services occurs inside the components either directly and / or in sub-components known as *parts*. Requests made to an external port are delegated to one of the parts' provided interfaces. The parts are connected to required interfaces using an analogue mechanism. This approach enables the components' externally observable behaviour to be strictly separated from their internal implementation.

Figure 9 shows an example of such a refined model depicting the protocol between the point of single contact EA/PSC and the public sector software adaptor (FV/PSSo Adapter). The graphic reflects the textual descriptions that are shown in the first part of this document and shows the complementary *static* relationship between the identified components. Furthermore, it serves as a basis for the following sequence diagrams, which highlight the dynamic relationship between the components in the chosen example scenarios.

The interactions and protocols between the ports are generally binding within the Services Directive's framework. In contrast, the interactions and protocols

[1] A short description of the UML terms used can be found in chapter 12 in the UML glossary.

between the ports and parts are examples for an implementation of the components, depending on design, algorithms and implementation techniques chosen by the developers. In the sequence diagrams described in the following the interactions between components can therefore be seen as mandatory, whereas the interactions within the components, if depicted at all, can be seen as exemplary showing how to implement the complete functionality of the components.

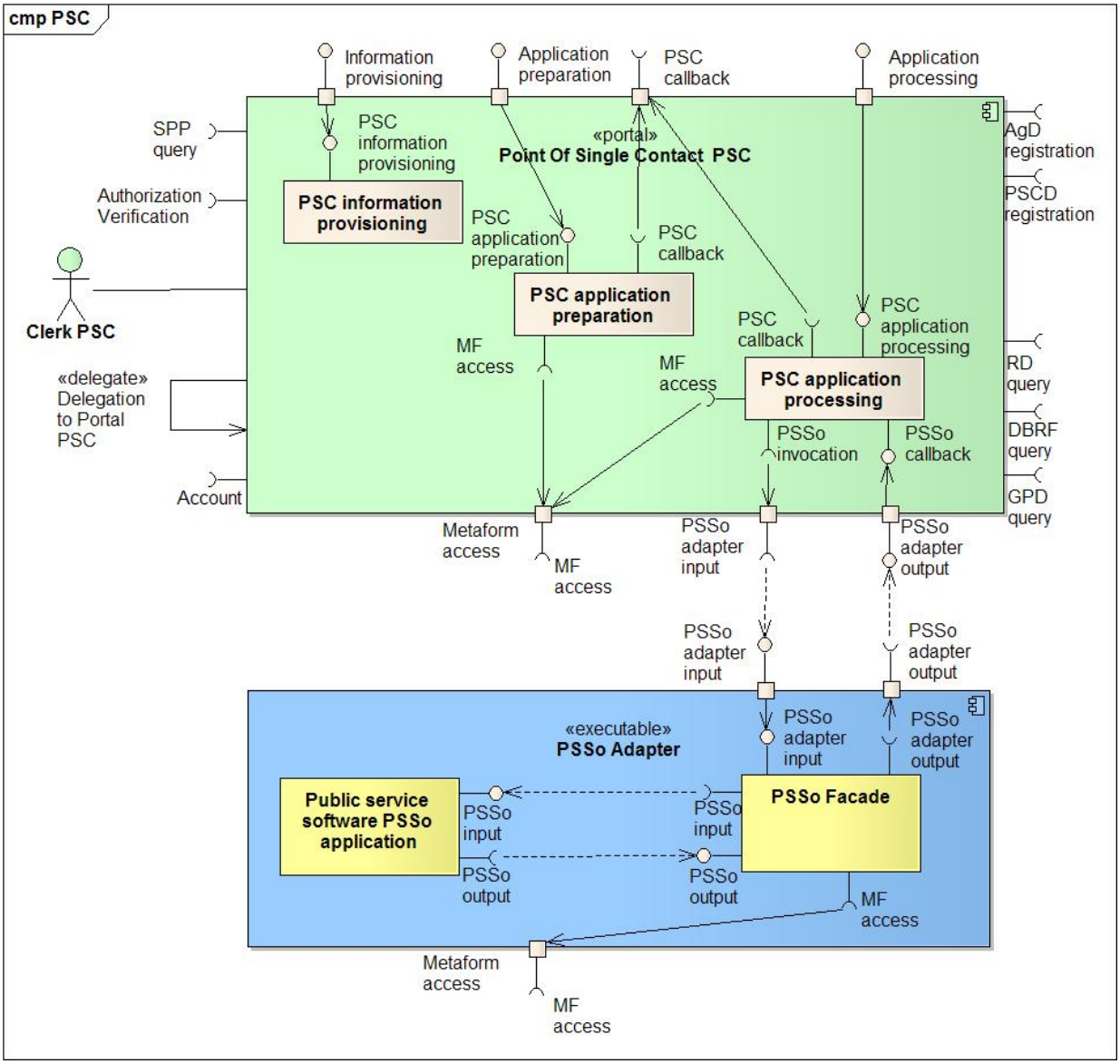

Figure 9: Detailed Model of the EA/PSC and PSSo Components

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Until now the entire field of *knowledge management* has been structurally specified so that *enquiry, registration* and *administration* can be identified as generic interfaces for the components. Relationships between the various directories' contents are represented using associations. For example, one can recognise that a national process directory FV-NPV/PSSo-NPD exists, which has relationships with all of the government department related process directories FV-PVB/PSSoD. The refinement of relationships between knowledge management's components on the one hand as well as the specifications for possible implementations of individual directories occurs in separate documents.

The *shared services,* which have been identified until now, make services available which provide partially functional and partially non-functional features. *Accounting* can be examined as an example of a functional service. It is clear that such a functionality is necessary for an IT implementation of an PSC. No specifications are necessary for this implementation as long as these services are solely used within a Point of Single Contact EA/PSC or a Responsible Authority (ZB/RA). As long as there are special requirements for a component wide and institution wide accounting system, appropriate interfaces and protocols must be developed.

The *Virtual Mail Centre (VPS/VMC)* can be seen as an example of a non-functional service. The en/decryption and signature of exchanged messages is one of the tasks that must be fulfilled as part of the Services Directive. Many Services Directive components would probably not use this functionality directly but would use the appropriate features from a run time environment such as the *Government Service Bus* (GSB) inside service oriented architectures instead. Shared services for *identification, authentication and authorisation* are quite similar. It must still be determined if there will be an explicit security service for the IT implementation of the Services Directive, if security will be implemented through a run time environment (GSB) and if a Services Directive specific federated security solution should be strived for.

8.3 Descriptions of Scenarios

In the following the three scenarios *information retrieval, submitting an application* and *processing an application* will be described using UML sequence diagrams. The interactions between various components as well as parts of a component will be presented as an example. In the diagram *fragments* from type *alt* (alternatives)*, opt (*optional), *loop* (loop)*, par* (parallel activities) and *ref* (interaction reference) are used. Fragments from type *alt* allow activities which are yet to be carried out to be chosen from a variety of predetermined alternatives, *opt* allows optional activities to be specified, *loop* describes activities carried out repeatedly, *par* describes activities carried out simultaneously and *ref* refers to other sequence diagrams so that the same workflows only need to be specified once.

8.3.1 Information Retrieval in Services Directive Portals

In the simplest case the applicant, in this case the Service Provider DL/SP, wants to retrieve basic information about his intended application. In this case he uses the Services Directive (SD) portal as depicted in Figure 10, which delegates the query to the Directory Based Responsibility Finder (VZF/DBRF) and presents the requested information to the DL/SP.

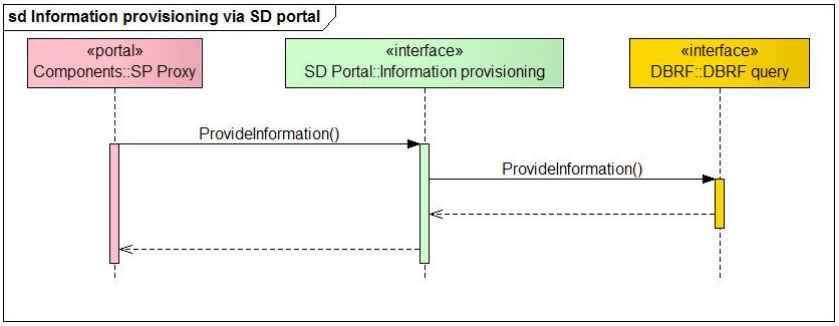

Figure 10: Provision of Information

8.3.2 Information Retrieval and Preparation of an Application

To extend on the first scenario the Service Provider (DL/SP) would like to submit his application and fill out the accompanying form. In addition, utilizing the currently available information (general process for the applied project) and the Service Provider's personal data, the SD portal together with the Directory Based Responsibility Finder (VZF/DBRF) determine an appropriate Point of Single Contact EA/PSC and forward the application draft to the EA/PSC.

DL/SP completes the application, possibly using additional information and support from EA/PSC and VZF/DBRF. As soon as DL/SP considers the application to be complete, the *application submission* phase starts.

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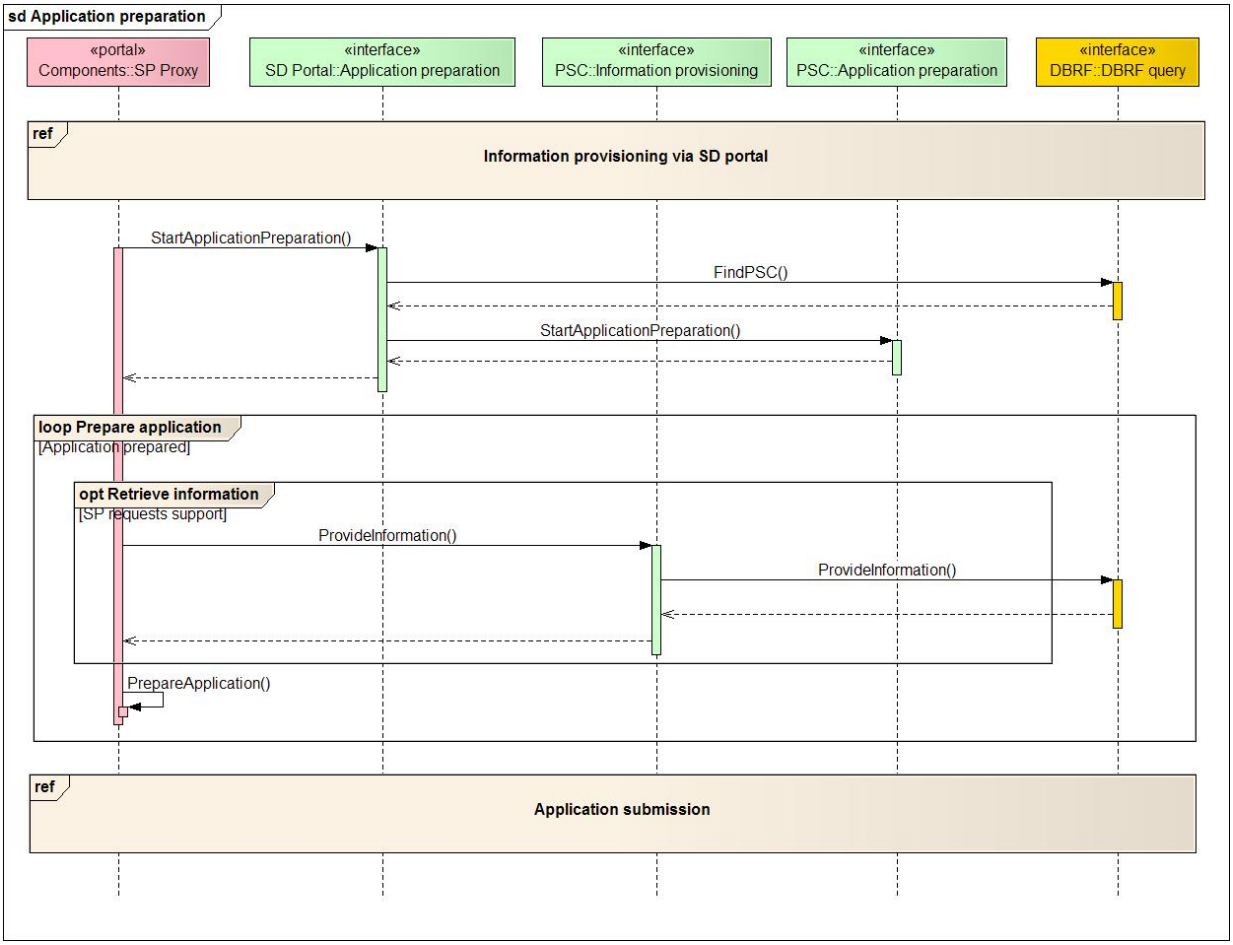

Figure 11: Preparation of an Application

8.3.3 Submission of an Application

After the application has been delivered to the EA/PSC it will be validated. Currently it has not yet been determined if validation is automated or carried out by a clerk of the EA/PSC. Validation can be modelled as an internal activity of the appropriate sub-components. In the case of an error-prone application the service provider (DL/SP) will be informed.

As soon as the application has been recognised as valid the applicant DL/SP gets a notification about the receipt of the application and the estimated costs. After the payment is collected an associated transaction in the EA/PSC is initiated and the Service Provider (DL/SP) gets a notification about the expected date of the statement of approval and the already paid administration fees. Subsequently the metaform corresponding to the associated General Process GP will be generated and stored. This form contains all known and required information gathered up until this point and the necessary information and data about the Service Provider (DL/SP) and his request.

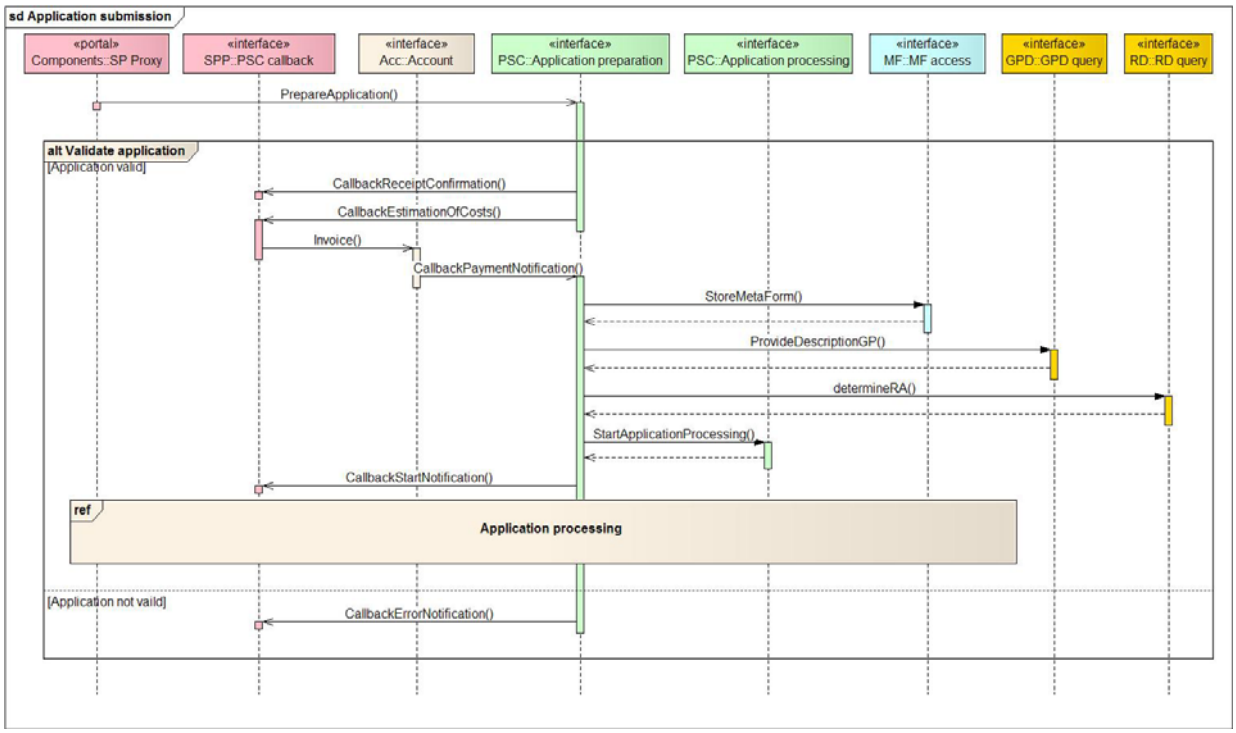

Figure 12: Submitting an Application

The machine processable General Process GP descriptions, generally speaking a workflow specification, are determined and technically instanciated with the addresses from the Responsible Public Authorities (ZB/RPA) and the Public Sector Software (FV/PSSo) applications carried out there. Again it has not been decided if General Processes GP will be fully automated or if they will be carried out and controlled by the EA/PSC's clerks. This decision is depending on the implementation of the EA/PSC and the type of general process. After the successful setup of the general process the control will be delegated to the EA/PSC's sub-component responsible for processing of applications.

In case of an invalid application appropriate information will be send back to the DL/SP.

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8.3.4 Processing of an Application

Application processing can be broken down into two main phases. Initially the Public Sector Software (FV/PSSo) applications are started according to the general processes' (GP) requirements. The example in Figure 13 shows the simultaneous start of all applications.

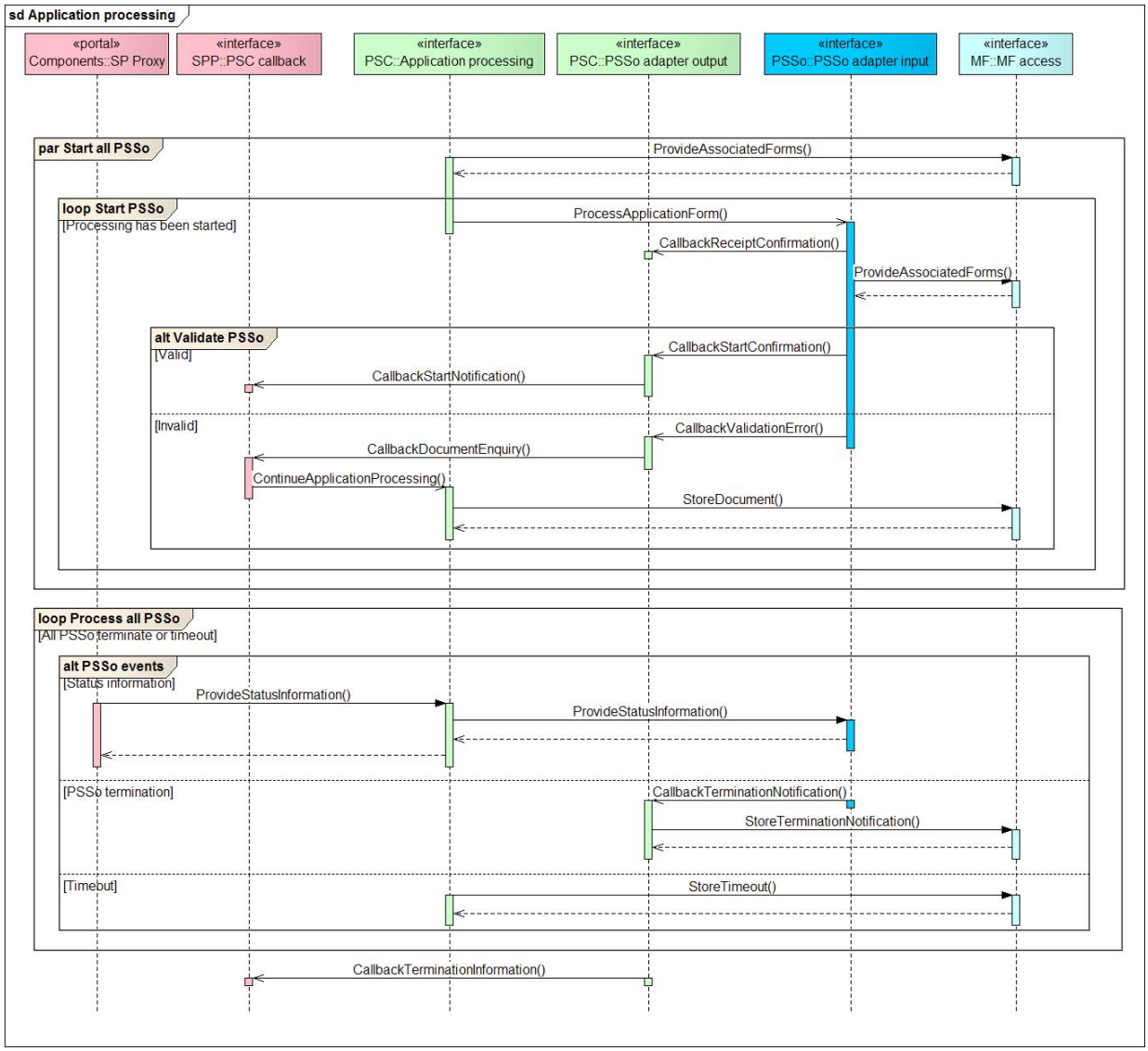


Figure 13: Processing an Application

In practice a further extreme is the sequential execution of all FV/PSSo applications; more complex logical and chronological dependencies between the FV/PSSo applications are imaginable.

An implementation of a Point of Single Contact (EA/PSC) should support to download, start, execute and monitor general processes in a dynamic way. This can be done fully automated or be carried out with the support of PSC's clerks.

In the second phase the FV/PSSo processes that have already been started can request further information and data, send notifications and invoices and/or be asked about their current status. The sequence diagram shows examples of such procedures in both phases.

During the processing of the application the partial components "PSC – application processing" communicate with the Public Sector Software's façade. The PSSo-Façade supports the Services Directive specific protocol between PSCs and PSSo-Adapters and forwards incoming requests to the PSSo applications of the Responsible Authorities ZB/RA. The protocol itself is independent of specific PSSo applications. It supports functions such as:

- Start PSSo application (EA/PSC-> FV/PSSo)
- Abort PSSo application (EA/PSC -> FV/PSSo)
- Inform about the status of the PSSo application (EA/PSC -> FV/PSSo)
- Enquire further data (FV/PSSo -> EA/PSC)
- Forward the approval/notification (FV/PSSo -> EA/PSC)

The required information is passed to the FV/PSSo application via references to or copies of parts of the metaforms. In the start phase the application is examined locally to check if it is complete. In the case of incomplete applications the missing information is enquired and stored in the metaform. In the second phase three situations are described and used as examples. Triggered by a service provider DL/SP or a EA/PSC the status of FV/PSSo application can be monitored. The FV/PSSo application can be aborted and an approval/notification can be sent, which is saved and stored by the EA/PSC. Thirdly, the execution of an application can be aborted if the deadline expires. This situation is also logged and recorded.

As soon as the EA/PSC receives confirmation from all FV/PSSo applications that are part of the general process GP or as soon as the deadline for authorisation has expired, the service provider DL/SP should be informed of the final status of his application.

8.4 Evaluating the Scenarios

The three scenarios described above utilizing sequence diagrams show an example of the protocols between the components of a functional Services Directive architecture identified and described in the first part of this paper. The partitioning of a Services Directive system into optional and mandatory function blocks and sub-components is justified by use of the formalised diagrams. It must, however, be emphasised that the models shown do not yet have mandatory specifications for their implementation. Components which have been specified up to this point and which have static and dynamic relationships

can function first and foremost as a basis from which further required interfaces can be specified and technology specific implementations can occur. Chapter 9 gives examples for such a technical refinement. In addition the functional architecture presented so far can be used to check other architectural approaches and implementations considering their completeness and potential interoperability with different implementations of the Services Directive.

The use of UML as a description language allows a formally established functional Services Directive architecture to be defined by its mandatory and optional components as well as its static and dynamic relationships. However, in order to implement parts of the architecture using workflow technologies either mapping of UML artefacts in workflow languages must occur and/or an alternative specification must be provided using such languages. As with high probability workflow languages will be used to specify general processes, such a language will be used to give a second example of the possible interaction between EA/PSCs, FV/PSSo-Adapters, and selected general processes. The "Business Process Modeling Notation (BPMN)" (OMG 2006) language, developed by the "Business Process Management Initiative" (BPMI) and maintained by the "Object Management Group" (OMG) will be used for this purpose.

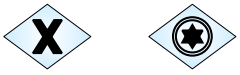
8.5 Process Descriptions Using BPMN

Figure 9 shows a possible refinement of the EA/PSC and FV/PSSo-Adapters in partial components as well as the static relationships between both components. Figure 13 shows an example of an implementation of protocols between both components used for processing applications and the corresponding internal behaviour of these components. In the following these processes will be specified using BPMN instead of UML sequence diagrams. This notation is less technical, at least in parts, and provides a compact presentation of the desired functionalities. However, to understand it, the symbols used and their basic meaning must be known.

- Processes or BPMN *pools* can be identified using the following symbol:

- *Activities* are displayed using the rounded rectangle. This can refer to interactions, references to sub-processes [+] or sub-processes themselves.

- Branching points are described as *BPMN gates* and are displayed using a diamond. The following examples denote a data driven and an event driven branching point:



- Processes have start *events*. They can receive messages, react to errors and be terminated using end events:

- The control flow between activities is shown using solid arrows and the exchange of messages between processes is shown using dotted arrows.

The behaviour of a sub-component "PSC - application processing" shown in Figure 14 can be seen as a possible realisation of application processing. An application can be processed, its status can be monitored, general processes which have already can be started or terminated, PSSo applications can be revoked (compensated) and active general processes can be aborted. The setup of general processes is therefore a complex task comprising the independent and simultaneous start of all sub-activities (FV/PSSo applications). The steps necessary to start each PSSo application are described in the referenced process "Start general process" which can be examined in closer detail in Figure 16. Monitoring or requests to abort the GP are possible at any time. For monitoring simple conditions (ready, active, interrupted, aborted) have been introduced to describe the status of a general processes as a whole as well as the status of the single PSSo applications. It is possible to monitor in a detailed manner if required. The subprocess "Return notification" gathers all notifications/ approvals from the individual FV/PSSo applications independently and sends a summary notification referring to the application to the service provider (DL/SP).

The behaviour of the general process in case of errors during automated as well as during manual processing of applications via an EA/PSC can be specified in BPMN in a detailed manner. Thereby simple error situations can be differentiated from an explicitly requested to abort the application processing on the one hand as well as by the requests to compensate all steps carried out in the processing of the application until this point. If the execution of a general process shows transactional characteristics then such mechanisms should be both mandatory and necessary and must be considered when specifying processes.

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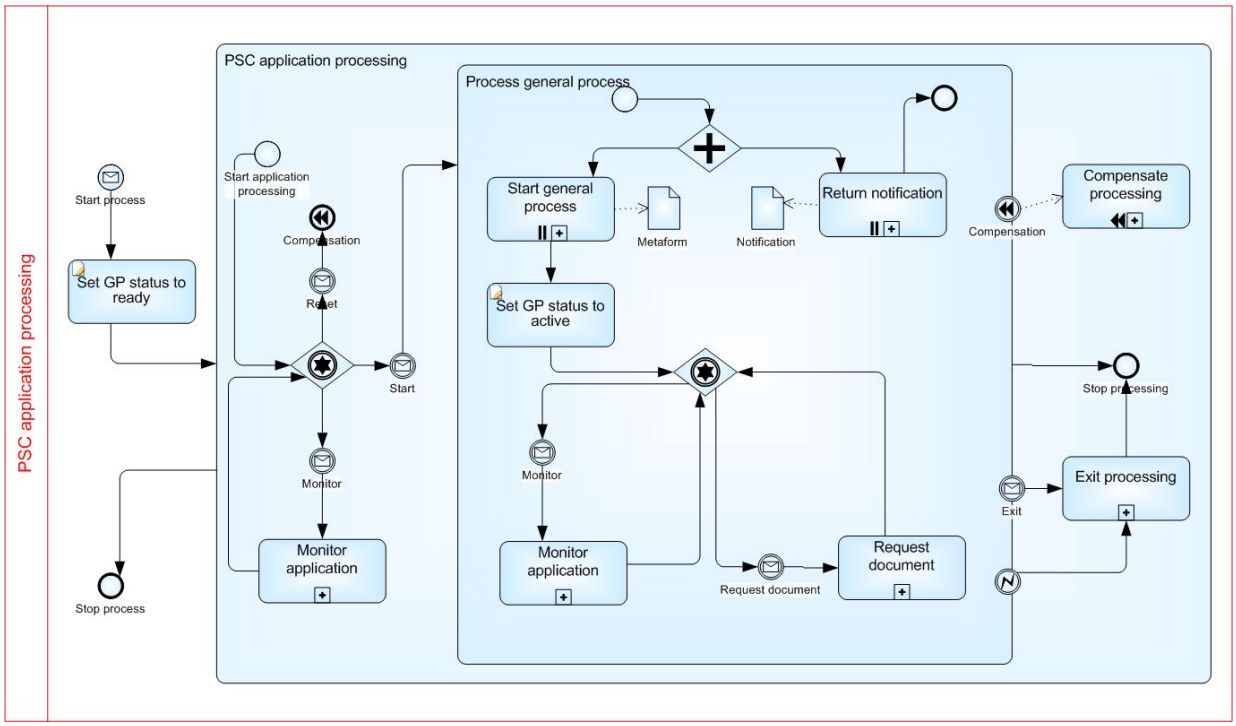

Figure 14: Processing an Application in a PSC

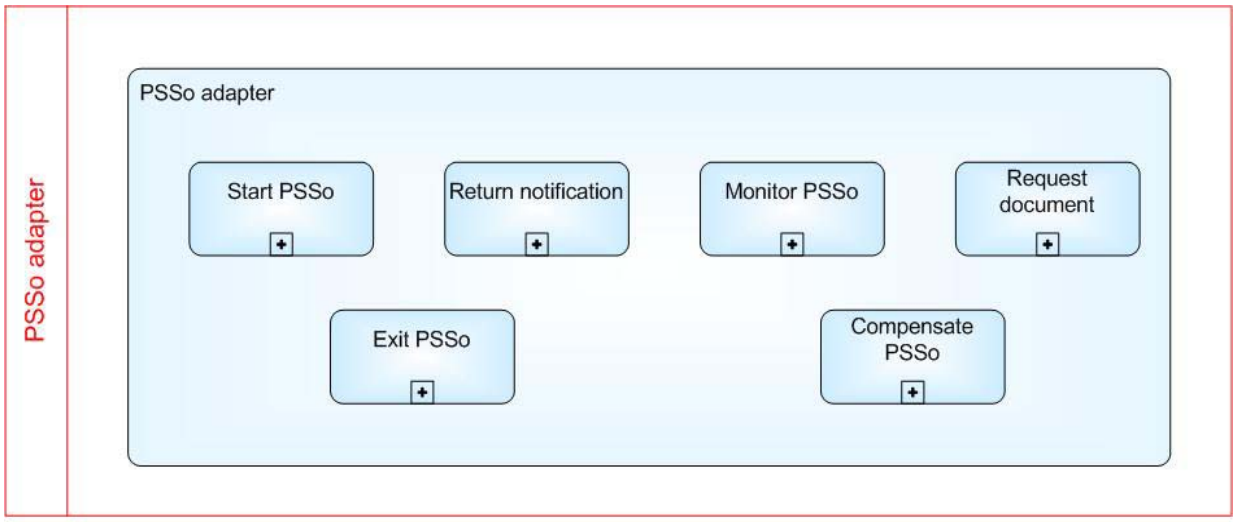

Figure 15: Processing an Application in a PSSo Adapter

Corresponding to the typical client descriptions of EA/PSC processes, Figure 15 depicts typical behaviour of a PSSo server. The depicted tasks represent the specific actions of the server side sub-processes.

The sub-processes can be refined, as shown in Figure 16. It can be seen how a message is sent to the FV/PSSo-Adapter at the start of application processing and waits for the receipt. In the case of a correct application the DL/SP is informed and in the case of an incomplete application more documents/data will be enquired. These process descriptions correspond to parts of the

sequence diagram in Figure 13 and would be described in UML itself using an activity diagram. However, BPMN has the advantage that WS-BPEL templates can be generated from the models using a standardised mapping, which can be refined into an executable WS-BPEL (OASIS 2007) specification.

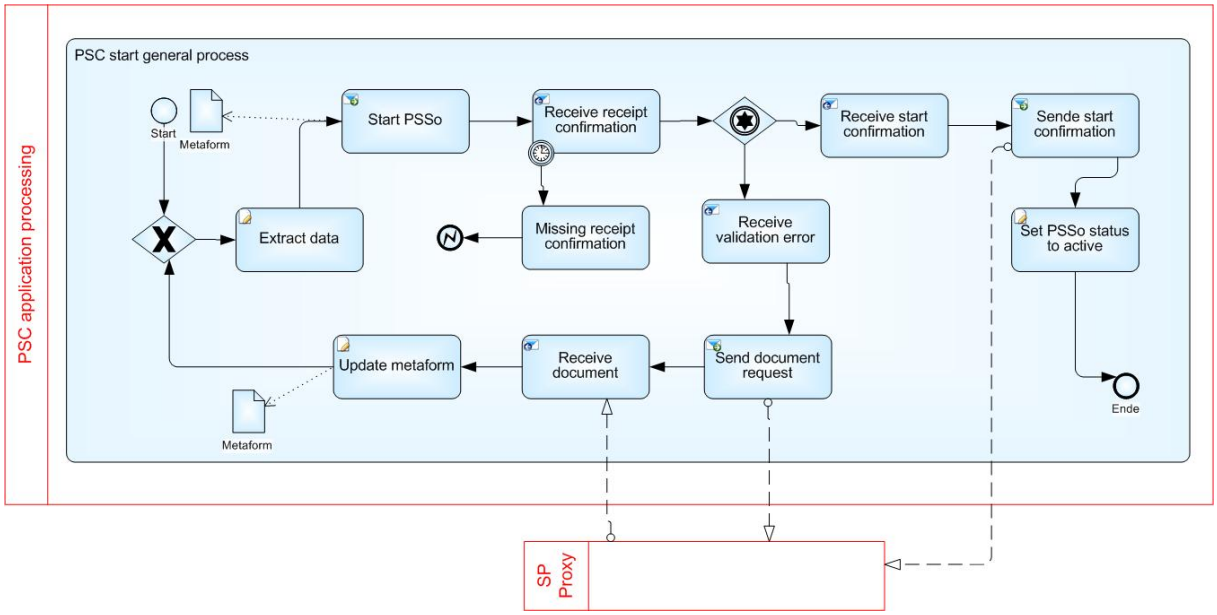

Figure 16: Starting Application Processing in a PSC

The corresponding implementation of the PSSo-Adapter is shown in Figure 17. The process of sending receipts, validating applications and their possible follow up actions are described here.

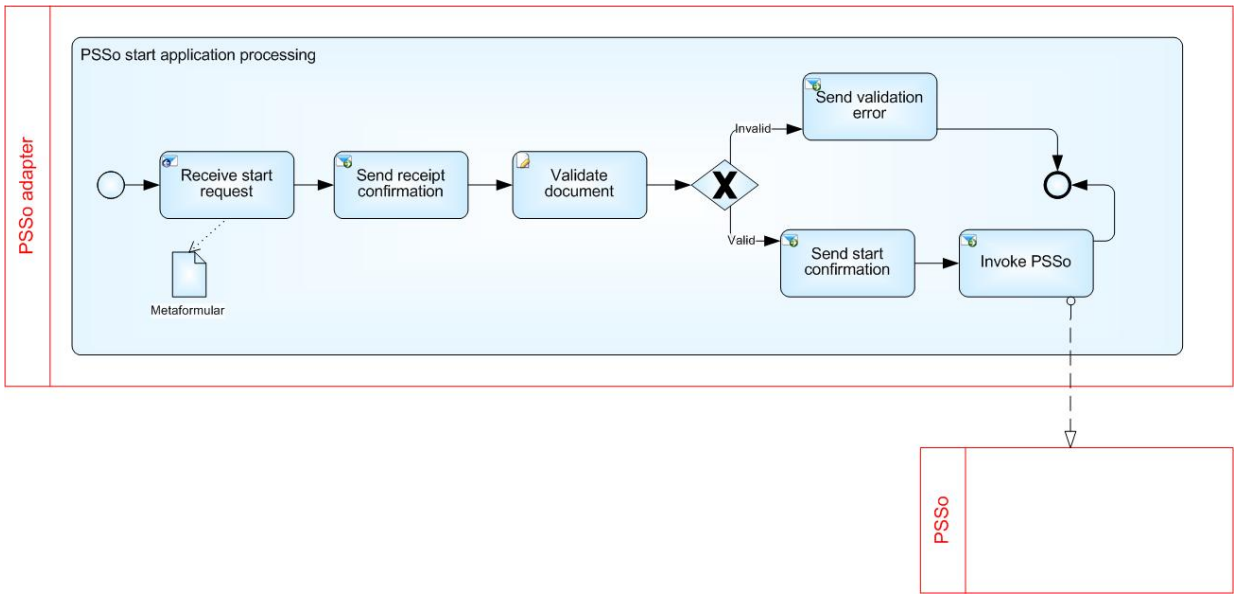

Figure 17: Starting Application Processing in a PSSo Adapter

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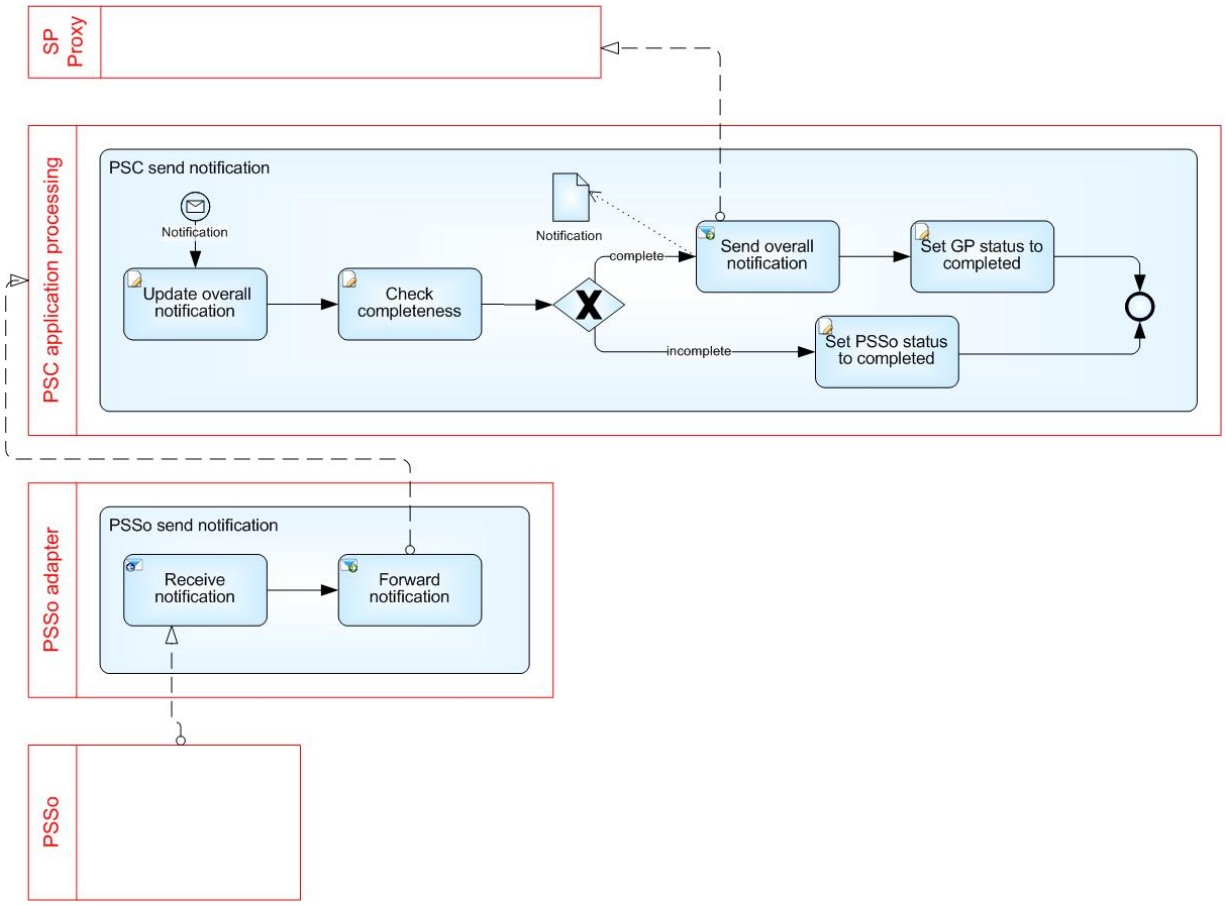

Figure 18: Delivery of Approvals

The complete choreography of the backward delivery of the PSSo's approvals and notifications to the EA/PSC is depicted in Figure 18. This example shows interactions between several processes. If it is mapped to WS-BPEL, one template for the EA/PSC and one for the PSSo-Adapter will be generated.

8.5.1 A Sample General Process

Thus far we have not explored the possibilities for describing general processes. In the following we will use the example of registering a business. Six Responsible Authorities (ZB/RA) have been incorporated into the process. Each one of these RAs supports special PSSo applications, which can be activated over associated facades and their approvals or notifications can be transmitted via associated facades. Thus Figure 19 shows all activities, PSSo applications and approvals that simultaneously define the general process for the registration of a business.

In case of complex general processes associated choreographies have to be defined and to be mapped to the generic processes introduced above. In this context it must be noted that activities called "start PSSo xyz" in Figure 16 and

Figure 17 are implemented using these generic processes. The backwards transmission of notifications is a comparable procedure.

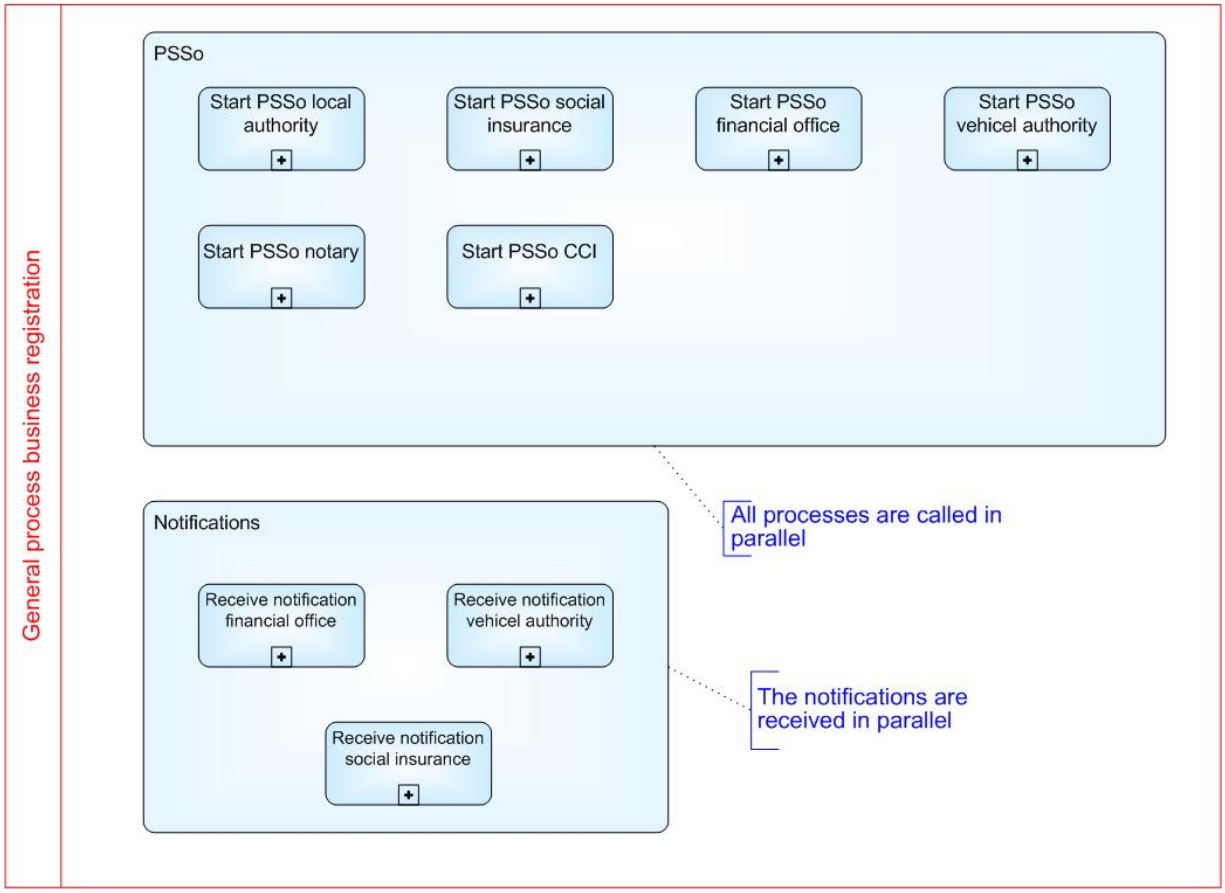

Figure 19: Business registration processes

To conclude, Figure 20 shows the choreography of registering a business solely using BPMN pools, although each pool exactly represents a responsible authority and is divided into subdivisions. In terms of general processes this subdividing is only partially relevant. For machine processable process descriptions only the PSSo's technical addresses are needed; detailed information on the responsible authorities is of more interest to DL/SPs.

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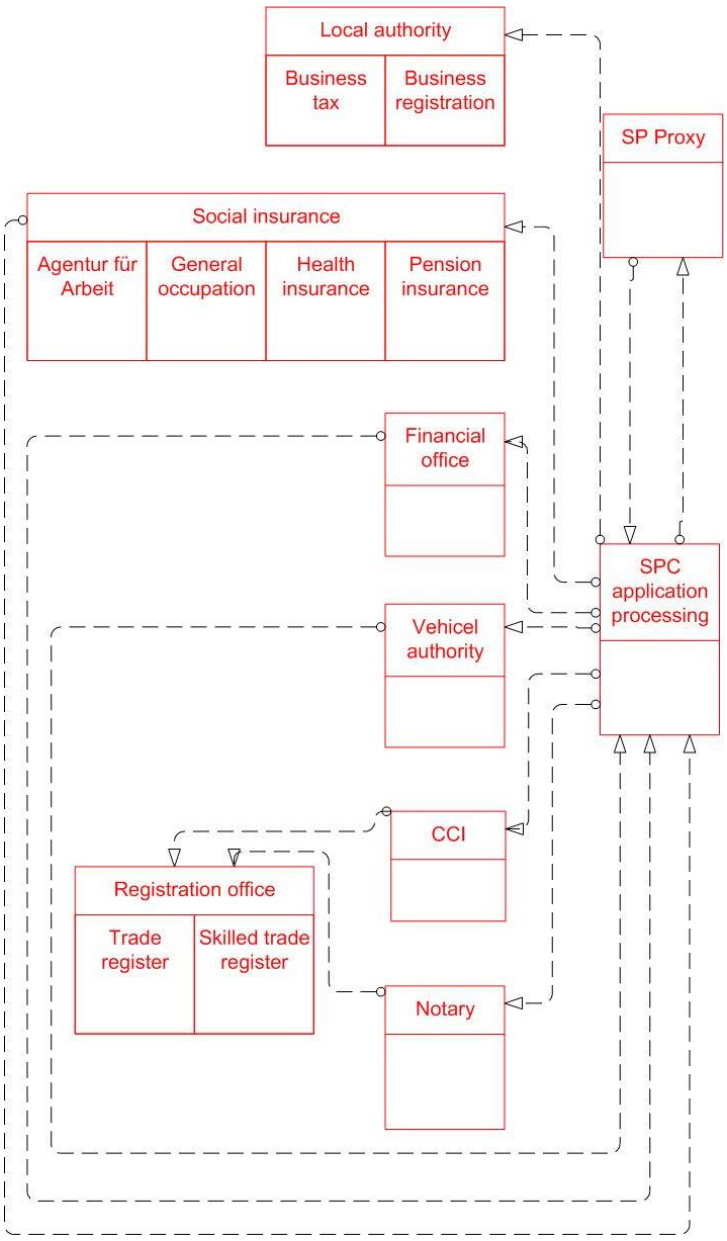

Figure 20: Choreography of a Business Registration

9 Suggestions for Technical Implementation

9.1 Observations on Technical Implementations

The reflections so far have brought together the functional and non-functional requirements (for a summary and overview see Chapter 11) needed for the implementation of the Services Directive architecture. Technical components apparent in every implementation of a Services Directive architecture are identified in this chapter. The non-functional requirements are mapped on to the infrastructure's (run time environment's) shared services where possible. These services are not being specially developed for the implementation of the Services Directive: they are existing solutions which can be customised and integrated.

The use cases outlined in chapter 7 and the sample scenarios outlined in chapter 8 show how functional components communicate with each other. In addition they provide tips for internal realisation. The specifications corresponding to the component descriptions are of a purely functional nature and provide no details in terms of signatures and technologies or products used for an implementation. The aim is more to identify functional interfaces between the components that can guarantee interoperability between various different implementations of the Services Directive and which can be specified in a detailed manner and potentially used for standardisation in the Services Directive context.

The suggestions for a technical implementation introduced in this chapter concentrate on the utilization of a portal model as described in part I of this white paper. Such portals can be implemented using different technologies like Microsoft WebLets or Java Portlets following the JSR 168 specification, which allow portable portal components to be developed and deployed on various products supporting the particular standard. Communication between the components themselves is specified and realised using web services technologies.

A validation and if necessary a revision of the functional and technical approaches is intended using the results of the prototype realisations being planned. Furthermore, experience gained is being used to develop a technology neutral specification of Services Directive components, thereby creating a link between the functional and technical architecture that will identify and precisely describe the binding reference points between the Services Directive components. In the current version of the document the functional architecture can be understood to be a top down approach, assigning functional components whose features have been derived from the service directive. The technical implementation uses a bottom up approach that combines functional components with technical components for the specially chosen implementation technology and decomposes functional components into several technical implementation components.

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A consistent identification of the relevant components from a functional and technical viewpoint is part of the evaluation of the experiences gained from the prototype realisations.

In the upcoming practical implementation one will have to find ways and means to overcome the existing organisational, technical, semantic and syntactic heterogeneity between existing partial solutions and new Services Directive components, which are still being developed. In a federated environment such as this only those regulations and technical protocols that are compulsory for the interoperability of components will be enforceable. Algorithmic and technological implementations of singular components will always remain their operator's responsibility.

In such a situation it would be necessary to examine every realisation of a functionally necessary component for its conformity to the indispensable, functional and non-functional properties. Machine checkable and automation criteria must be formulated that demonstrate, for instance, that an institution really operates a point of single contact that supports a general process or public sector software applications for the service directive specified protocols, that a responsibility finder delivers the necessary information from the service directive, that access to documents and applications adequately fulfils all security requirements or that the mandatory possibilities for identification, authentication, and authorisation for applicants and agents are available. Infrastructures such as a "Government Service Bus" will have to prove that neither messages nor data go missing or can be falsified. Necessary syntactic and semantic mappings between data structures or documents must be carried out according to Services Directive guidelines.

Such checks required conformity tests to be defined and carried out and it might be necessary to set up certification centres for specially chosen Services Directive components. The requirements to be met in order to implement the Services Directive in terms of conforming to Service Directive components will thus be described more precisely in a separate study.

9.2 Design Component Model

9.2.1 Overview

Blueprints are being developed by different industrial partners in the context of the implementation of the EU Services Directive in Germany . These blueprints permit a technical implementation of the necessary processes. Apart from their functional and non-functional aspects they must be valued according to how well they fit into heterogeneous system landscapes. Working interoperability using open standards is the emphasis of the proposal presented here. The proposal is implemented consistently with different SOA platform vendors in order to demonstrate that the model actually works.

Two fundamental premises form the basis of these EU-SD implementations:

- The maximum discharge of the responsible authorities ZB/RA regarding their IT tasks, which are to be permanently decided upon from an EU-SD viewpoint, for instance process modeling
- Flexibility in relation to changes of legal and organizational regulations and their dependencies

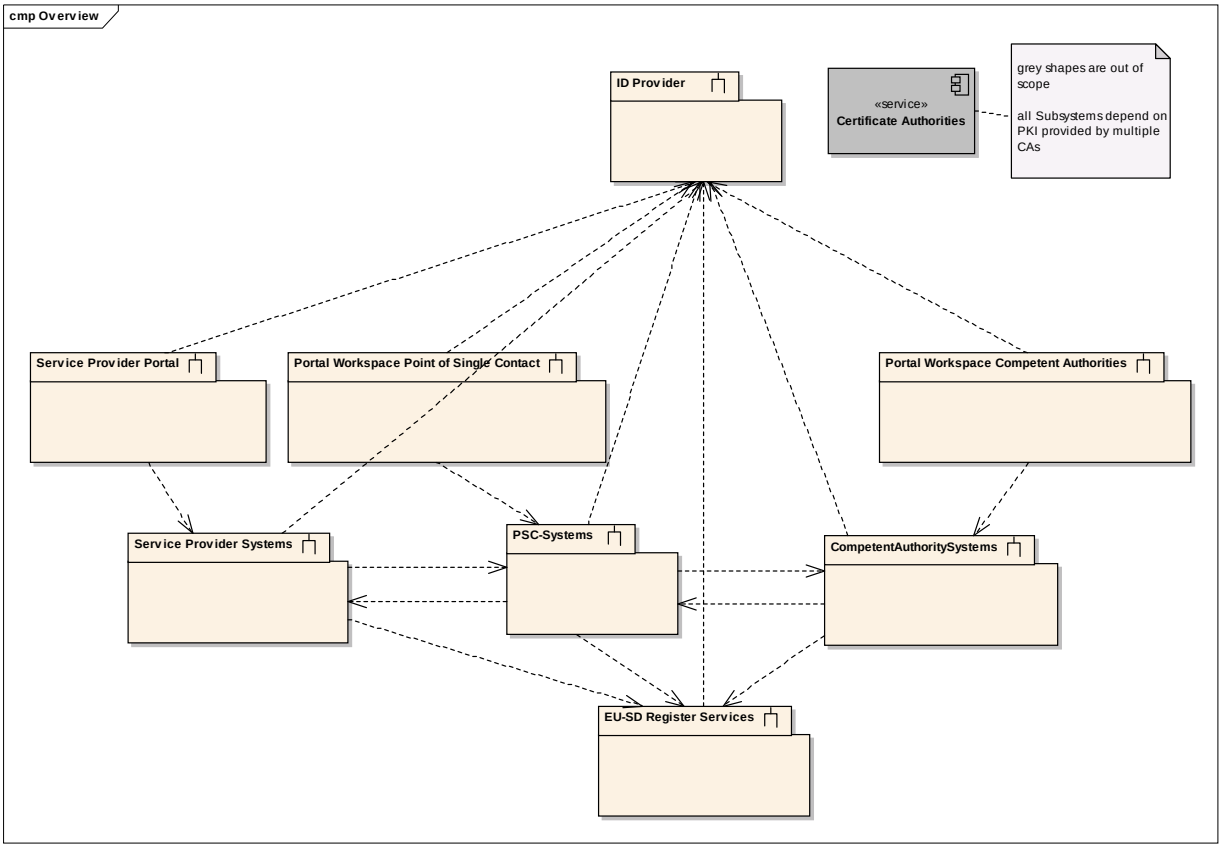

Figure 21: Overview of Component Model Packages

Here is a diagram showing a rough description of the components as UML components. All grey shaded components lie out of scope. The broken arrows

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mark dependencies. The interaction of the components can be pursued by selected examples in sequence charts (Chapter 9.5).

Figure 21 contains an overview of the packages demonstrating that all components depend directly on ID-services. Identities and the secure business exchange play the central role in the European Union SD context. All systems depend therefore on mechanisms, which authorize access to information and authenticate user identities. In particular federated identities are needed which requires positions of trust to operate in different circles of trust.

Below from left to the right the systems of the Service Provider DL/SP, the Point of Single Contact EA/PSC and the Responsible Authority ZB/RA are represented. They have been divided into the presentation layer (the portal and/or the work-space in a portal) and into the backend systems behind it. This representation even permits the ZB/RA and the EA/PSC to work on the same portal with different views. The DL/SP usually works with another portal provider. They prove their identity here and show that they possibly belong to another circle of trust.

The mutual dependence between DL/SP, EA/PSC and ZB/RA is very visible. Interoperability needs standardized technical communication between the parties here. This communication is implemented via the interfaces at the ESB "SD_ProcessControl" (EA/PSC and ZB/RA) as well as "CallbackSP" (DL/SP).

The central register services represent the basis shown in the lower part of the graphic, which can be seen in further detail in Chapter 9.4.

9.2.2 Service Providers

The Service Provider works in the portal (Figure 24) which contains a portal component for contacting the responsible EA/PSC depending on its planned project, the desired region and its business-situation (SD_ContactFinder). It receives DL Proxy notifications and status information about its current application procedures. The component SD_Worklist presents this information in a clear manner. Over the worklist the DL/SP can navigate out directly to the portal of the EA/PSC or ZB/RA where the application runs. However it cannot process the request directly in its worklist.

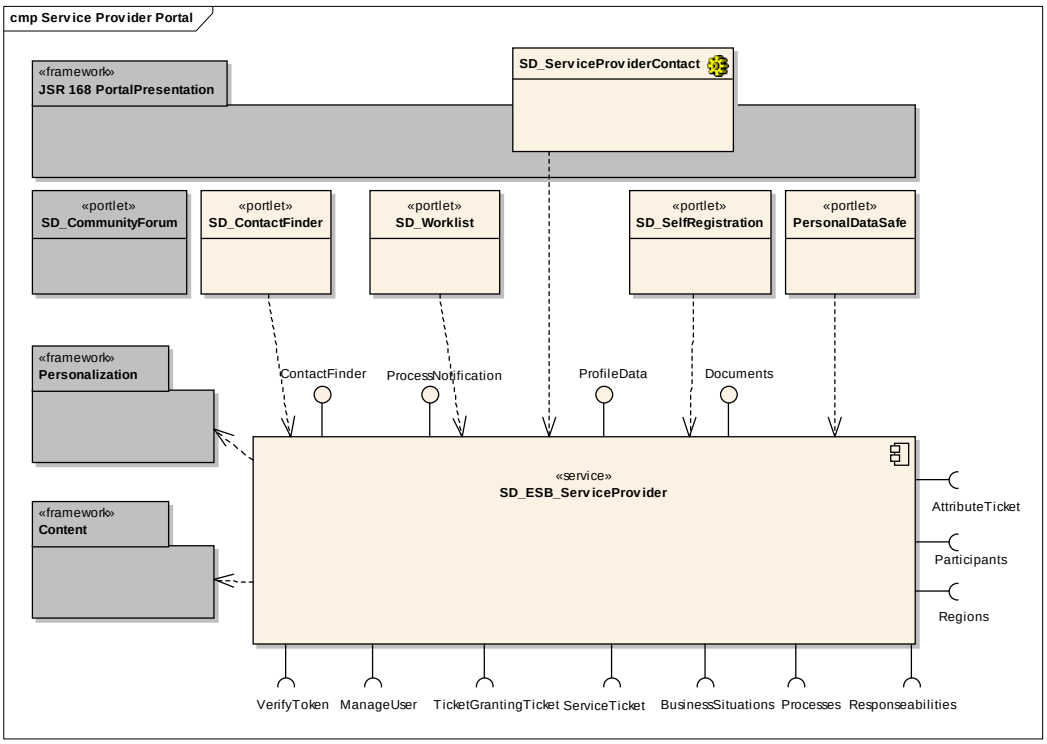

Figure 22: Service Provider Portal

The component SD_SelfRegistration enables registration with a valid email address and the activation of the resulting account without any administrative help. This should be organizationally linked with an official identification, in order to carry out possible transactions on a safe basis.

The web page SD_ServiceProviderContact contains the DL/SP's necessary contact data, which is required according to EU-SD regulations and adjusted periodically with the data of the central register services.

The functional component "Electronic Document Safe" EDS is mapped here to the technical component "Personnel DataSafe". With its help the documents and data can be adjusted, changed, read, deleted and detailed access-rights can be set.

All portal components have access to backend functionalities and central register services by using web-services deployed on the Enterprise Service Bus.

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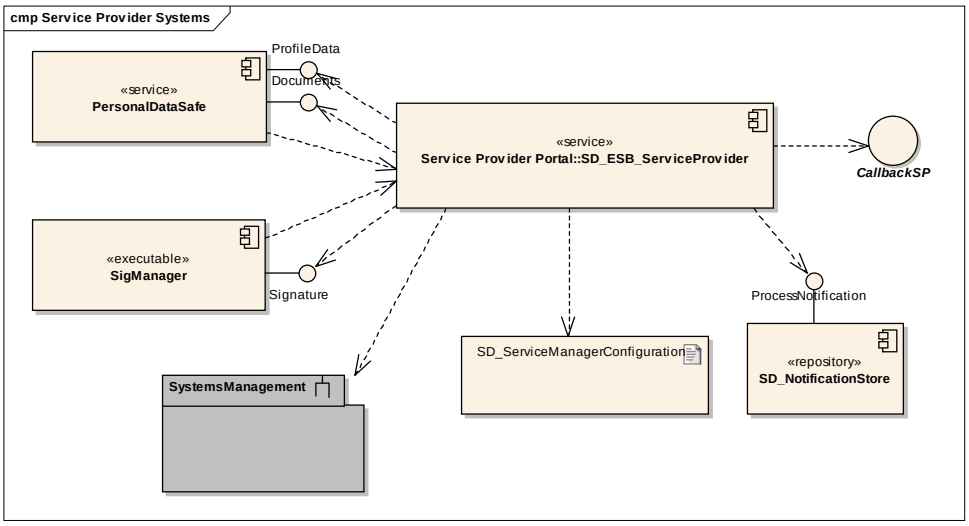

Figure 23: DL/SP Backend-Systems

Components that have to be established by portal providers for the EU-SD include the "Personal Data Safe", the „SigManager" to sign and verify signatures and the „SD_NotificationStore" which stores the notifications that have arrived. The portal provider is supposed to operate reasonable system management to ensure a secure environment.

9.2.3 Point of Single Contact

Some of the components described by the DL/SP appear with the EA/PSC and at the responsible authorities ZB/RA. Here they have the same meaning, so they need not be explained further here.

The EA/PSC must make the most resources available from the three parties. In addition to the SP's components there are, as seen in Figure 24, "SD_PSC_KnowledgeManagement" components that are available for the clerks of the EA/PSC and the DL/SP who place their requests with the EA/PSC. The general processes that the EA/PSC provides are described in detail here.

Furthermore it is possible to file and work on the application via the "SD_Application" portal component. This component is in turn available for both EA/PSC clerks and the SD equally. The DL/SP can specify the initial data for its application here and answer any queries. Data entry takes place as an iterative process depending on the data that it knows via its "personal data store", the data essential to its chosen general process and the data that are still essential dependent on the data entry. The EA/PSC can also change process data via the portal component and thus answer a responsible authority's (ZB/RA's) further enquiries. Furthermore with a process transfer to another EA/PSC it can extract all of the data from the process, in order to input data once more using the "SD Application" EA/PSC components. Status enquiries will also take place using this portal component.

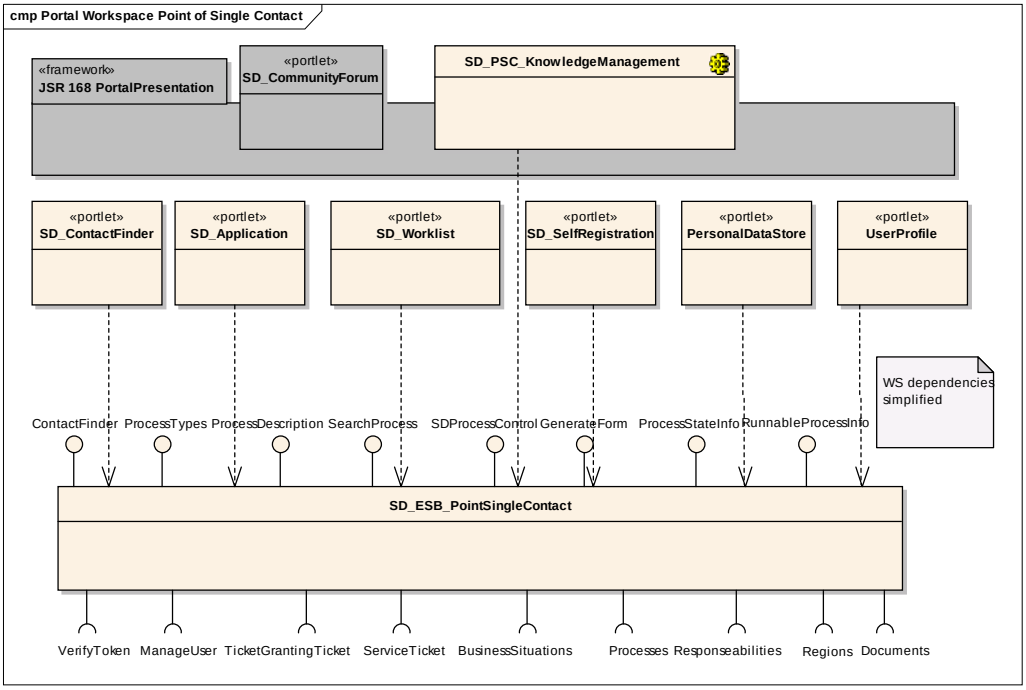

Figure 24: Portal view of the Point of Single Contact PSC.

Status enquiries are answered in such a way that as a rule complex business processes are graphically represented with a low status (three to five). This makes the process transparent. This is technically so simple that a Service Provider DL/SP can deduce, without any knowledge of the process, how to assess the processes' progress. Based on the technical status, the DL/SP Service Pro-vider can expect complex data to be presented in a clear and simple manner. In order to implement this the components "SOA Governance", "SD_ProcessTypeManager" and "SD_ProcessManager" are installed in such a way, as seen iin Figure 25, as to use the processes documented by the process modelling in order to generate a simple image of the present process status using the process status and modelling. This is then shown using the portal component "SD-Application".

The iterative information retrieval of the necessary data is responsible for the integration of the "SD_FormGenerator", "SD_UserManagement", "SD_SessionManagement" and "SD_ProcessTypeManager" components. The latter uses a regulator to determine the necessary data.

The infrastructure's main component is the "BPM-Engine", which is modelled in the Point of Single Contact PSC's general processes. The process status is written using an "SD_ProcessManager" in a database in order to quickly search for processes according to further criteria and to provide status information. The BPM-Engine is responsible for implementing the status model, which will be explored in Chapter 9.3.1.

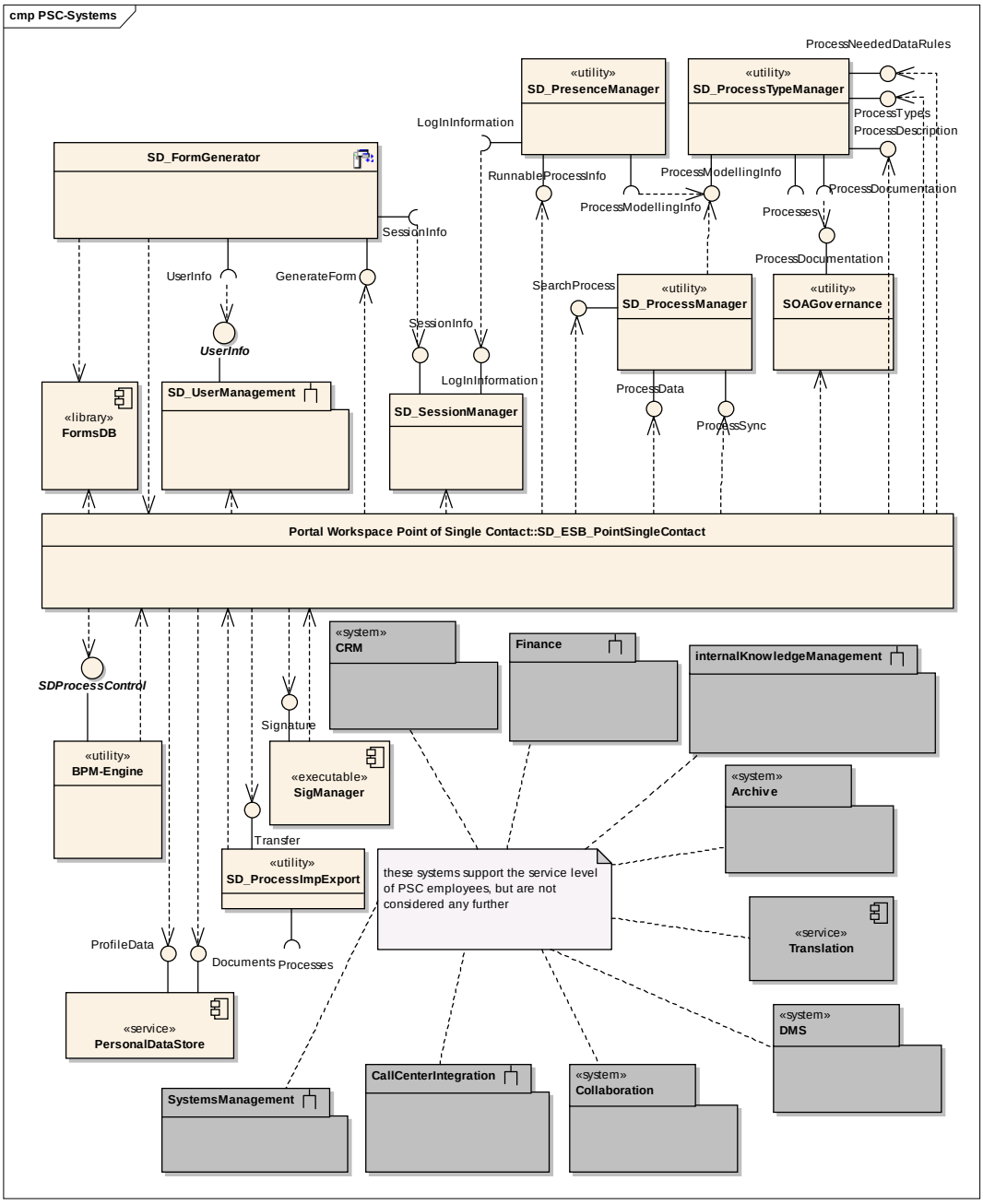

Figure 25: The EA/PSC Point of Single Contact's Backend Systems

The „SD_ProcessImpExport" components are another utility. They work to hand over a general process to another EA/PSC, who then takes over this process. XML transformations are carried out in process registers with diagram entries. The centralised register service's process interface is also used with the Enterprise Service Bus.

Further systems such as "CallCenterIntegration", an IMS system or other similar systems will probably be available from the Point of Single Contact EA/PSC. Their existence cannot, however, be assumed.

9.2.4 Responsible Authorities and Institutions

The ZB/RA could work with a portal in the portrayed model that is operated for them by an external contractor. The employees could finish their work as before, they would need to simply document the corresponding activities in the "SD_Worklist" components and insert notifications as attachments. The integration of these PSSo applications in the process that is the use of embedded data from Service Providers DL/SP has clear advantages over this system. Many of the Public Sector Software's vendors have not yet set up Web Service interfaces that provide integration into a SOA. Until this occurs working with an external portal will remain of interest. Otherwise the same architecture can be used if the Portal/ESB is operated by the government departments.

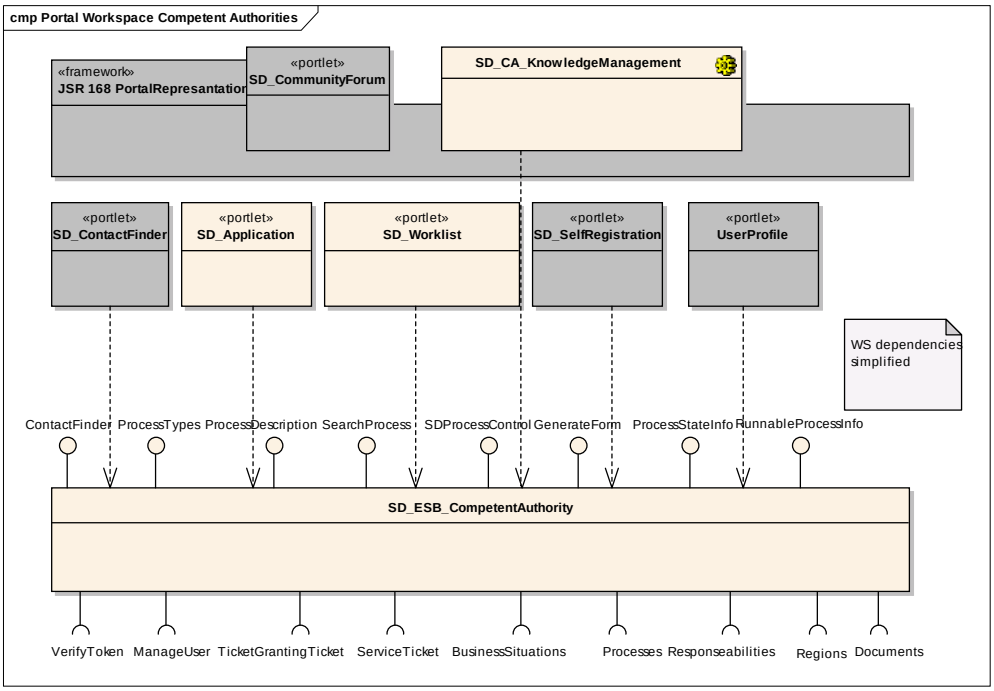

Figure 26: Portal View of the Responsible Authority

In the backend the system of the responsible authority ZB/RA has the choice of applied Point of Single Contact EA/PSC components. In particular the components can be used by various public institutions simultaneously as long as they are connected to an ESB and a portal. Municipal and regional unions are therefore technically very cheap to operate.

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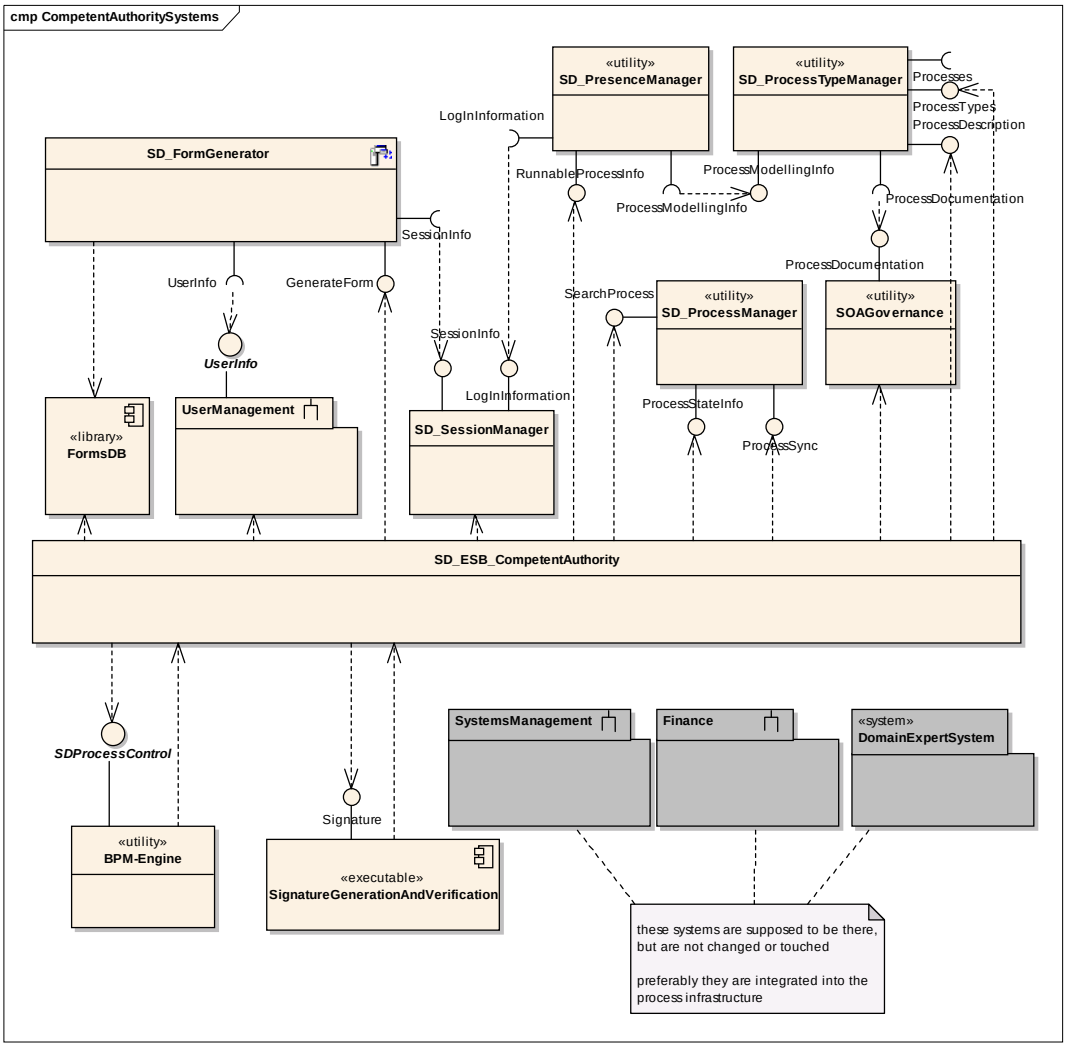

Figure 27: The Backend System of a Responsible Authority

9.3 Main Service Interfaces

One of the integral criteria for interoperability between points of single contact (EA/PSC) and responsible authorities (ZB/RA) is the implementation of identical WS interfaces. They contain the exchange pattern (Message Exchange Pattern MEP) as well the XML message definitions. Eight basic variations are standardised as MEPS in the WDSL 2.0 specification and they deal with errors amongst other things. The pattern http://www.w3.org/2006/01/wsdl/in-out that is available in WSDL 1.1, too, is used a basis for the implementation. Communication is based on the following status model:

9.3.1 Process Status Models

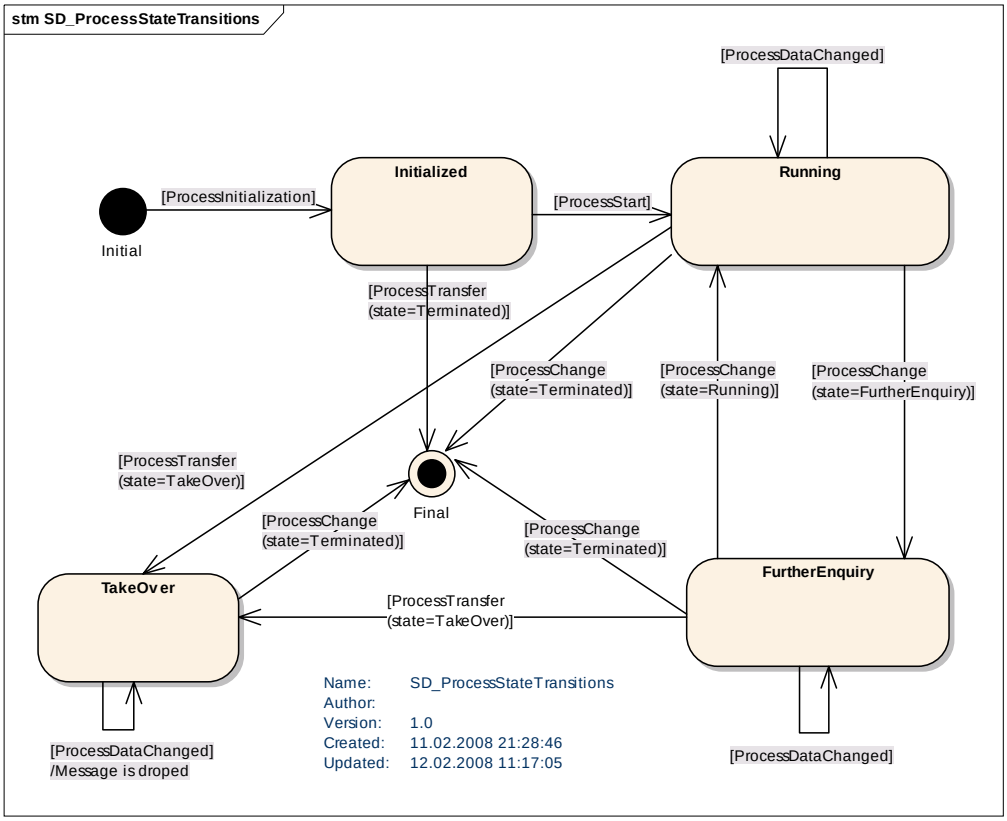

Figure 28: Implemented status und messages with status transfer

Initially the process is generated using a "ProcessInitialization" message. In doing so a correlation ID is provided that allows the called up system to allocate all following calls to the sender. When the receiver does not have a process type an error message will be generated: this is not shown here. A Correlation ID will be given so that the caller can also assign asynchronous queries to the called. The initial process data comes with the message "ProcessStart". As soon as this occurs the process is shifted into the "running" status. Data can be changed here which develops through amendments by the points of single contact EA/PSC or by responsible authorities ZB/RA. If there is a query in the control flow parts of the processes the entire process goes to status queries. However, data changes are accepted in this state. In "TakeOver" status any data changes will be declined and quit with errors on the caller. From there it is only possible to terminate the process.

In addition to the messages listed here message process types are implemented in order to dynamically query process types that support the points of single contact EA/PSC and responsible public authorities ZB/RA.

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9.3.2 Point of Single Contact EA/PSC

The Point of Single Contact EA/PSC provides the folllowing interfaces:

- ProcessInitialization
- ProcessStart
- ProcessChange
- ProcessDataChange
- ProcessTypes
- ProcessTransfer

9.3.3 Responsible Authorities ZB/RA

The Responsible Authorities ZB/RA provides the following interfaces:

- ProcessInitialization
- ProcessStart
- ProcessChange
- ProcessDataChange
- ProcessTypes

9.3.4 Registers

The main register services enable CRUD operations (create, retrieve, update, delete) on all registers. They are especially needed to internally calibrate the distributed register installations with each other. There are other interfaces such as findCA() und findContact() that are specially designed for "ContactFinder" components.

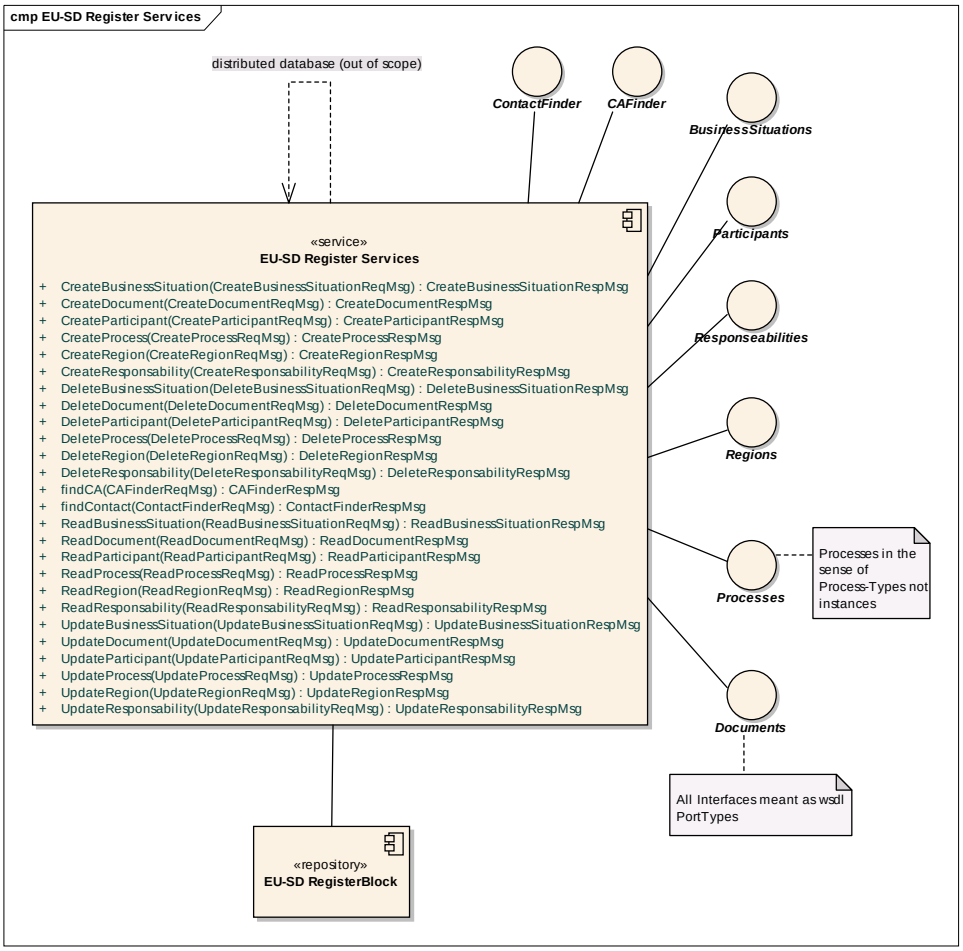

Figure 29: Main Register with its Interfaces

9.4 Data Models for Main Register Services

The aim behind this architecture and its implementation as a prototype is to design a system that can be incorporated into heterogeneous system environments in the best way possible and that highlights the advantages of standardising the communication between service providers DL/SP, points of single contact EA/PSCs and responsible authorities ZB/RA. Furthermore, the implications of platform independence in terms of process modelling will be examined. Modelling of register databases is a component of a functioning prototype, but this will not be examined further in this paper. On the one hand the modelling will be capsuled via services interfaces. On the other hand it can be assumed that it has to do with a distributed heterogeneous system over time, which is allocated through various carriers, different databases and finally through various different physical data models. The services interfaces are simply being put under the scrutiny of standardisation and are agreeing to the corresponding Service Level Agreements SLAs.

The implementation of services using various database products leaves a trail of various physical data models, so it does not make much sense to show the internal data modelling here. Instead we will examine the logical modelling of specially chosen part aspects.

9.4.1 Technical Data Types

In general, technical data types are defined in Germany using XÖV data conference. The most comprehensive results from a standardisation are surely OSCI XMeld; it is currently in Version 1.3.3. This standardisation is oriented towards language and expertise for German needs. Therefore it should adhere to proven German standards. The architecture of an EU Services Directive implementation must however be oriented towards the European framework, beginning with multilingual capabilities through to the structuring of basic types. Thus it has been recommended that like the "Decorator" patterns that have already been defined for the XÖV core component's technical data types necessary for the EU Services Directive as well as the necessary data types that are already used in standards such as XMeld be taken on by a basic package "SD_CoreDataTypes" so that the additional attributes, translations and the like can be completed therein.

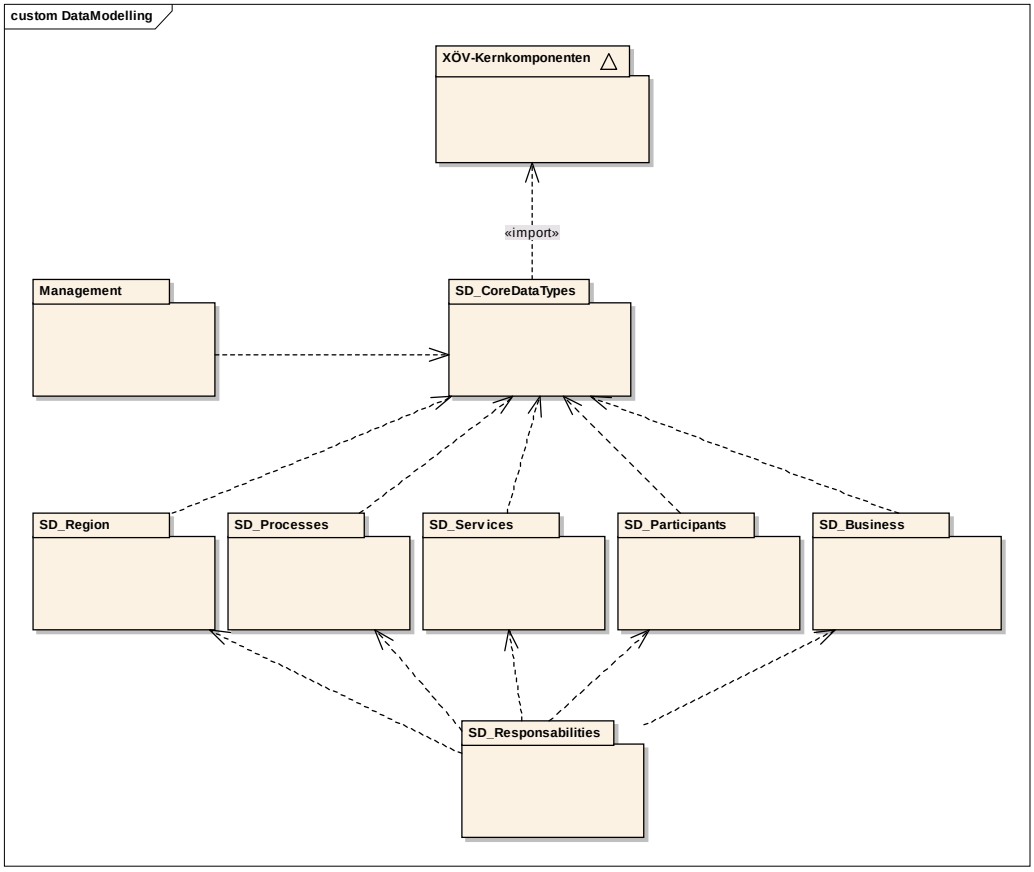

Figure 30: Basic Packages in the Framework of the EU Services Directive Model

Alongside management (access rights, maintenance) the packages dependent on this make up the main technical categories that the EU Services Directive is aiming for.

9.4.2 Process Mapping

It is often presumed that the same administrative services carry the same processes chains with them and that the differences could be intercepted by parameterisation. This seems to be an architectural principal that contradicts maximum flexibility in terms of changes to legal and organisational frameworks. We assume that there will soon be regional clearly laid out process modelling for the same administrative services that could, however, be selectively different.

These differences would vary in new ensuing process modelling that could possibly carry changed process data. In order to transport these ensuing processes and interweave them again, process mapping is required. The data modelling of these processes with points of single contact EA/PSC and responsible authorities ZB/RA need controls to enable the process transfer of processes between points of single contact EA/PSC (and if necessary also between responsible authorities ZB/RA.

It is self-evident and can be assumed that the processes carry their data with them in XML forms. The schemata used for this are cultivated in data models together with the transfer rules (XSLT) for XML documents with different process types. There is a hierarchical tree structure for this. In addition it is envisaged that the ensuing process models can then make mapping available for the father.

9.4.3 Process Responsibilities

Process responsibilities, that are the responsibilities for the processes relating to a public sector service VL/PSSe, are needed to appoint these responsibilities to a process responsible position. A framework is needed for this.

1. A responsible authority ZB/RA process' responsibilities PR for a process P are the outcome of process data PD, whereas they incorporate the **possible combinations of partial components from M_P, M_R, und M_B** . M_P stands for the portion of the participant's relevant data for process responsibility identification (participant: service provider DL/SP). M_R stands for the portion of regional selectable entry points for a service provider. M_B stands for the portion of attributes (business data) that are linked to the services activities that are to be undertaken. This includes every change to process data PD that takes place during the process activity and this must also potentially be considered. If the applicant moves during the process, can this have an influence on responsibility for the applicant? The number of possibilities is so large that not every combination can be stored through a clear-cut acquisition of rules.

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2. Boundaries: facts that do not lie in the PD process data's domain (whether through error-prone process modelling or because this was not conceivable when the modelling occurred) could possibly lead to changes in areas of responsibility in the responsible authority ZB/RA. These will be intercepted during the implementation as it is possible for processes to be handed over to service providers DL/SP in a neutral way. Therefore it is not modelled here.

3. The architecture must allow future divisions of labour between public administrations to be mapped using PD attributes that are yet to be created and evaluated. Today there are examples of cases of divisions of labour based on the applicant's surname. In the future divisions of labour can be based on motor vehicles based on cubic capacity, on fuel consumption or on fuel type in connection with the vehicle's weight, even if the data modelling for this is as yet unknown.

Thus the definition of rules facilitates the process data PD so that the process responsibility can be determined. The order in which these rules will take effect can be allocated. The elapsed time of new groupings of criteria can thus be arranged, determining who is responsible for the process. Additional mechanisms must be introduced in order to keep the period of time for queries to a minimum.

9.5 Implications of Process Modelling

Alongside process interfaces and the profiling of Security/WS-Trust/WS-Federation standards, a convention for process modelling is required. When processes are handed over from one EA/PSC to another it is important to ensure that the process has no negative ramifications in terms of external services (public sector services from responsible authorities ZB/RA) and that procedures are repeated as little as possible.

A process is carried over by exporting process data through a point of single contact EA/PSC (see Chapter 9.6.6). The point of single contact EA/PSC will prepare a ProcessStartReqMsg containing converted data. Usually the previously configured control flow will start and possibly incorporate already contacted ZB/RAs once more. Therefore checks should be inserted into the appropriate sites and the process data appropriately flagged, thus showing if the responsible authorities ZB/RA have already been queried.

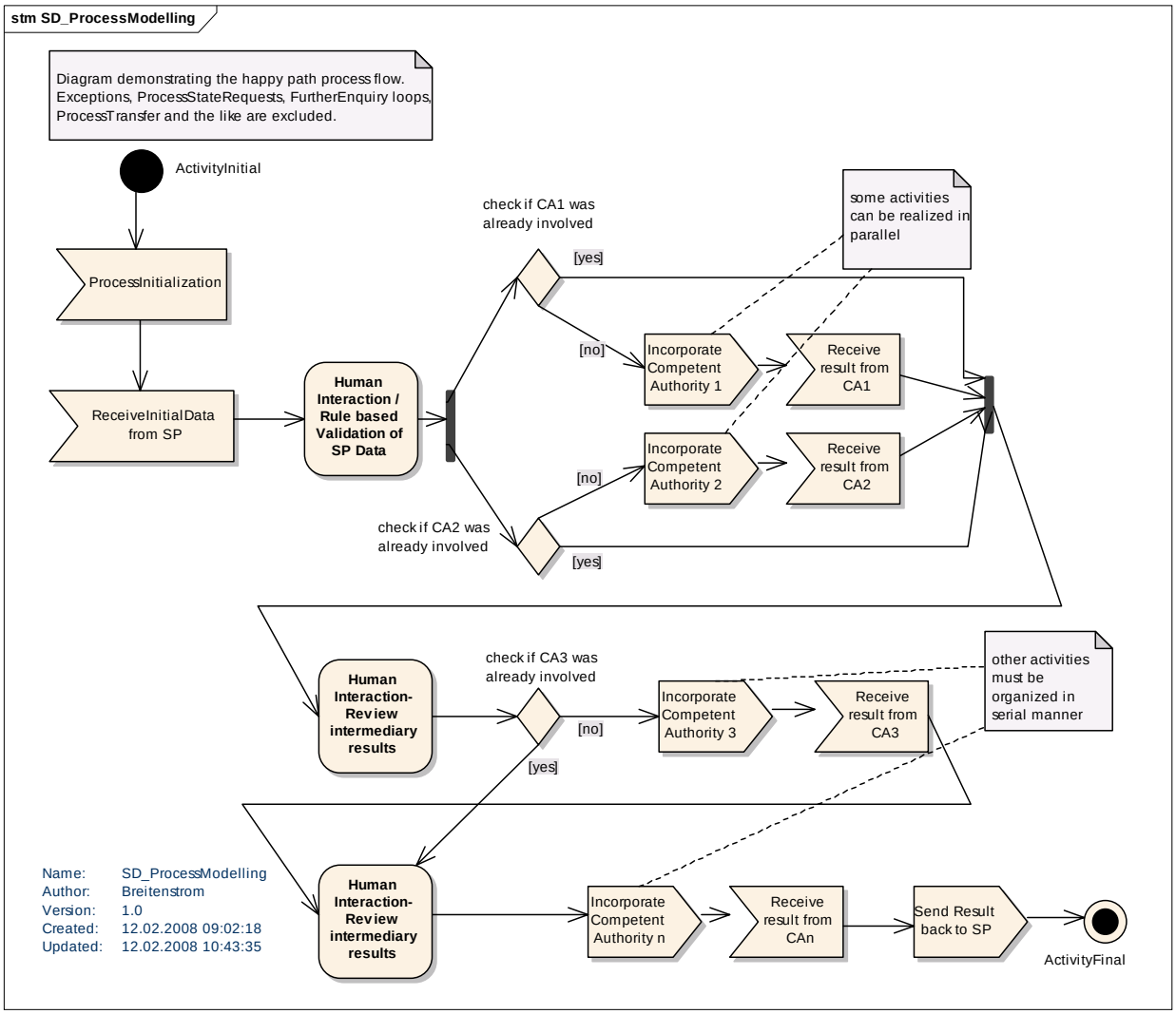

Figure 31: A Typical Process Workflow for a General Process

In order to create the process status information, the appropriate status information must be posted to the SD_Process_Manager after every activity, which is not shown in Figure 31.

9.6 Selected Communications Workflows

In order to test how the components work together, a range of different communications workflows for use cases with the components used by UML sequence diagrams are shown. While the sequence diagrams depicted in chapter 8.3 are focussing on the message exchange between the functional components the sequence diagrams depicted in this chapter are comprising the internal behaviour of the components.

9.6.1 Find PSC

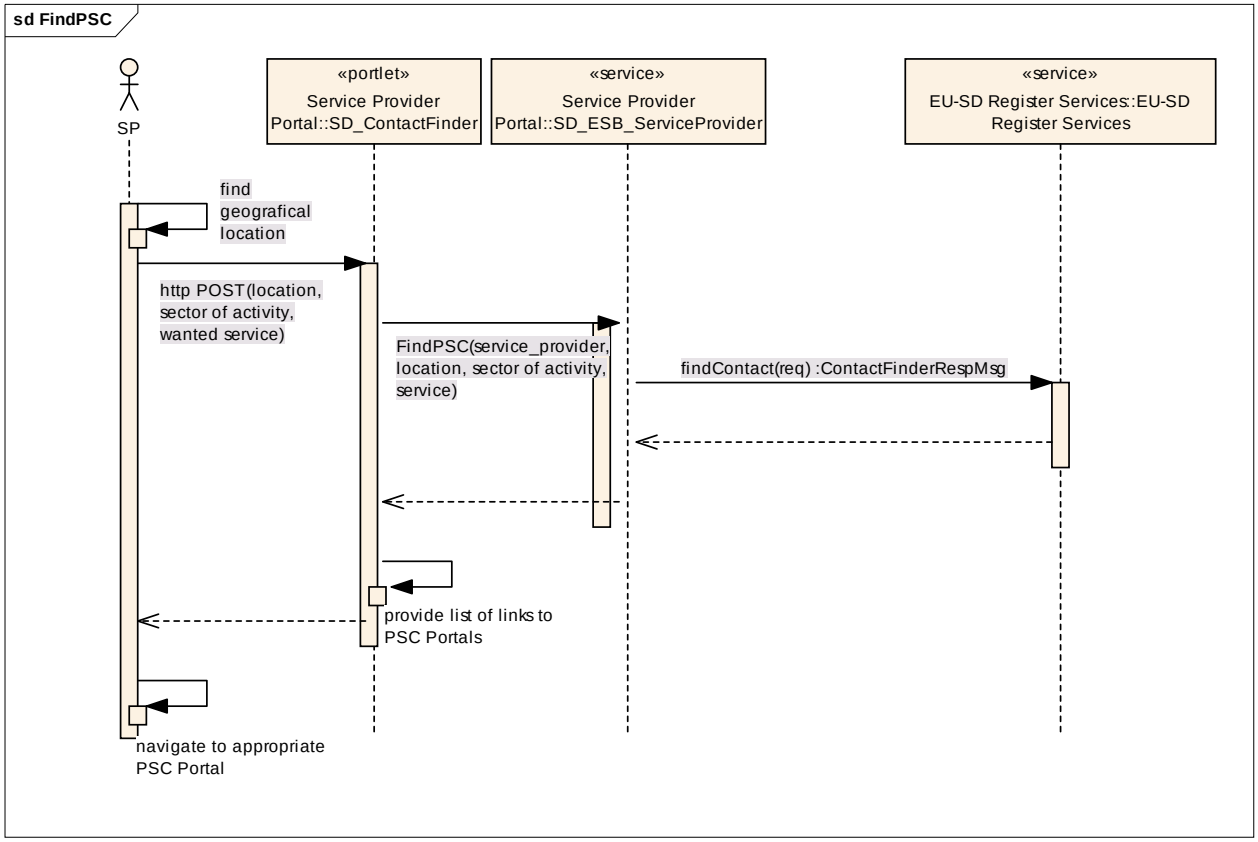

Figure 32: Communications Workflow "Find PSC"

In this example (Figure 32) the service provider must find access to a point of single contact EA/PSC that will look after them starting from its portal. It can be assumed that the portal component "SD_ContactFinder" can choose from a range of points of single contact responsible for that area to connect to, or can nominate all appropriate points of single contact.

9.6.2 Submit Application

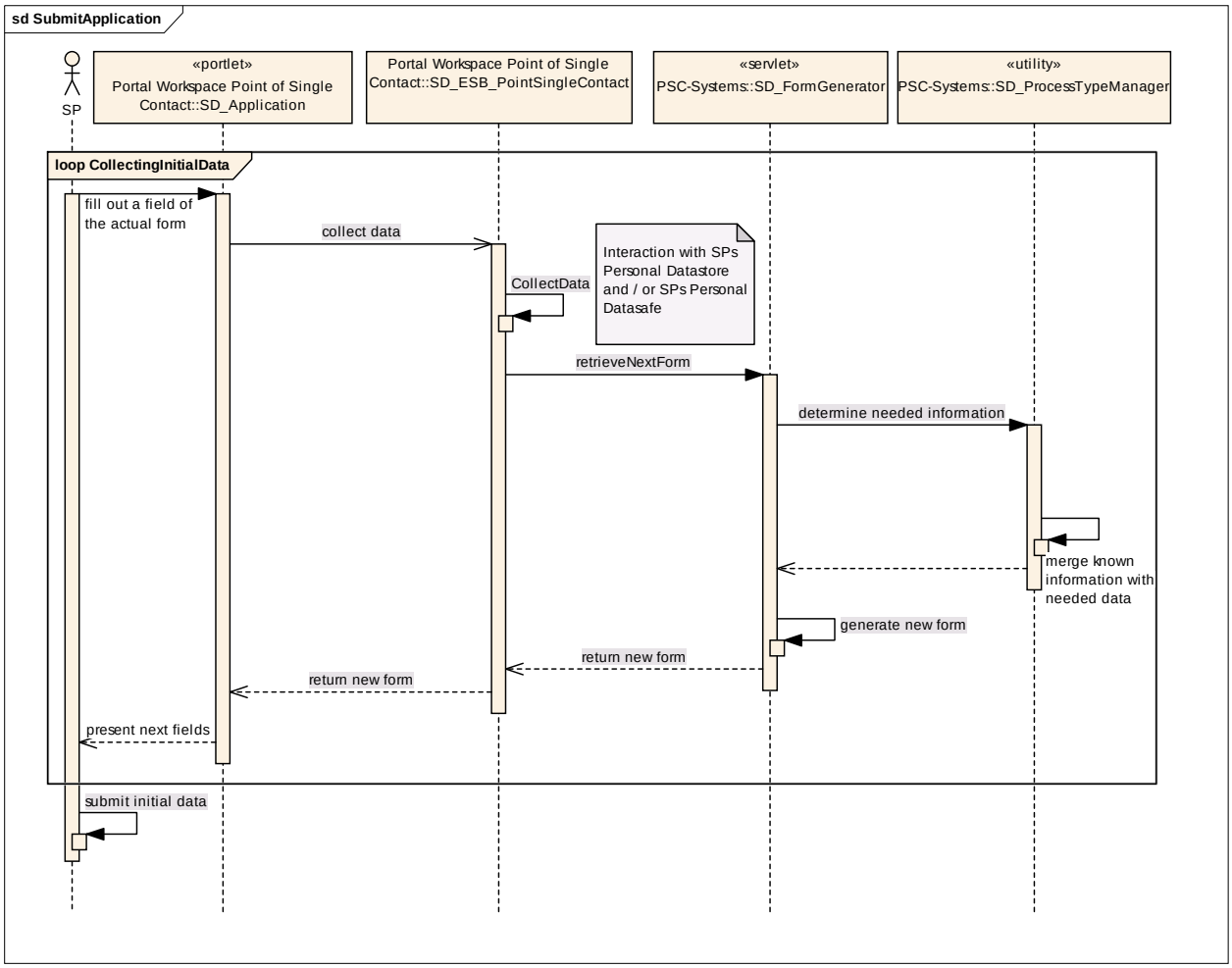

Figure 33: Communications Workflow "Submit Initial Application Data"

In this use case (Figure 33) the way the components work together to create dynamic forms can be seen, and the DL/SP can enter all necessary data this way.

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9.6.3 Enquire Status

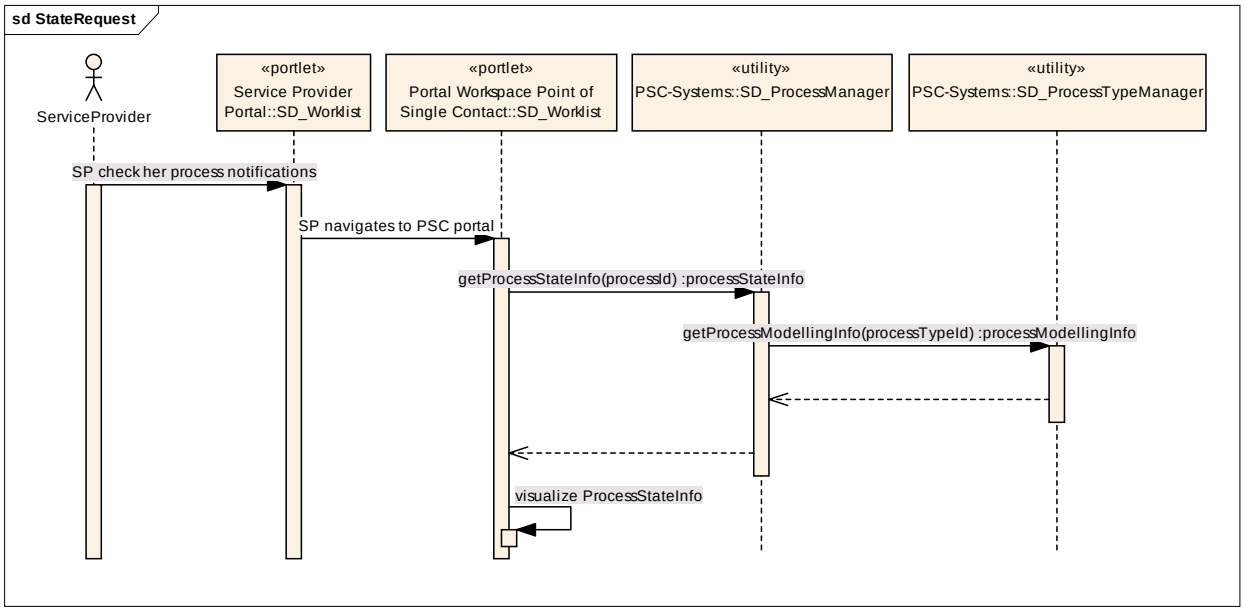

Figure 34: Communications Workflow "Status Enquiry"

A status request (Figure 34) occurs via the EA/PSC portal (Portal PSC) and is indicated by the process identification. The status information graphics are made using process types.

9.6.4 Enquire Further Data

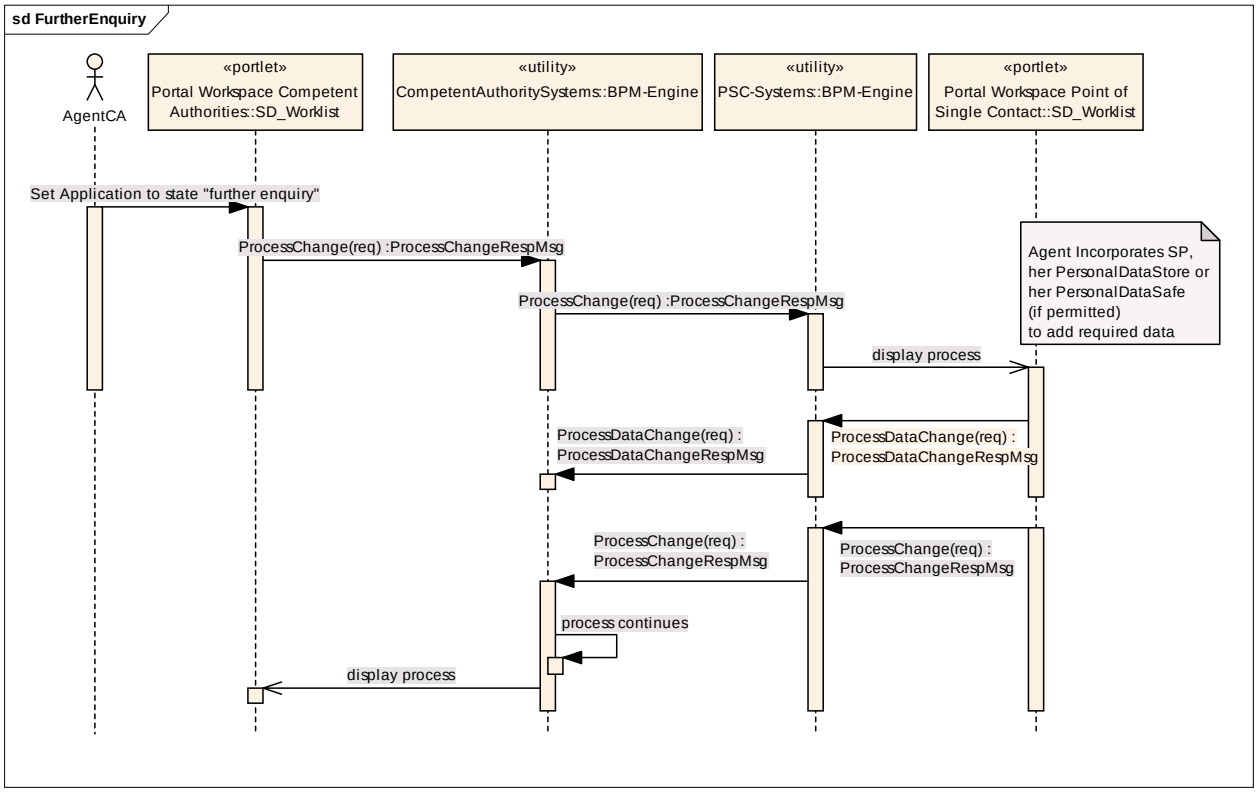

Figure 35: Communications Workflow "Further Data Enquiry"

The responsible authority ZB/RA makes an enquiry (Figure 35) that will be forwarded on to the service provider DL/SP by the point of single contact EA/PSC. This occurs via both the responsible authority's and the point of single contact's BPM Engines.

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9.6.5 Change PSSo Application

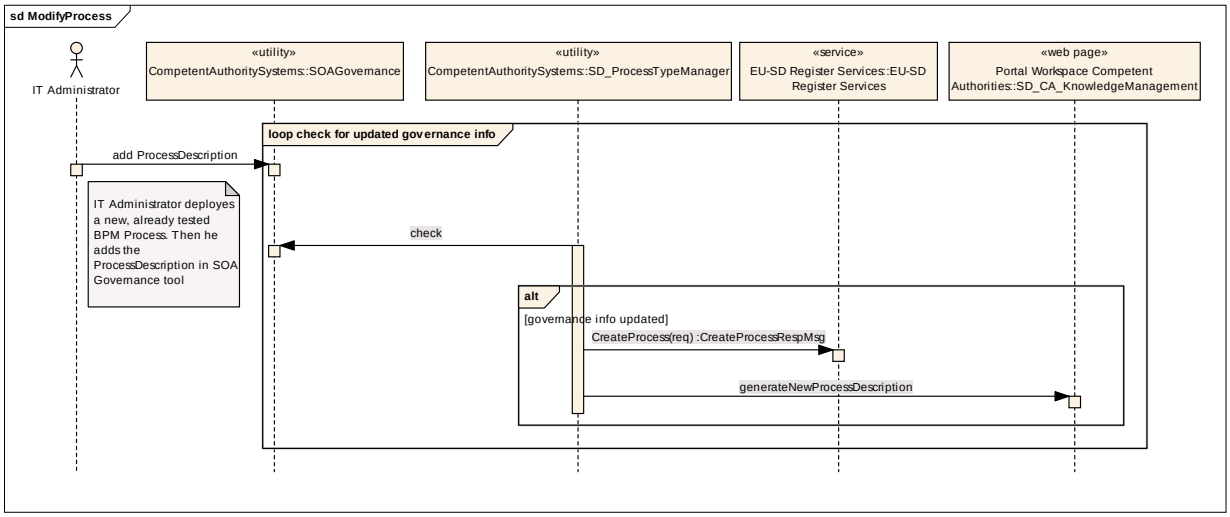

Figure 36: Communications Workflow "Change PSSo Application"

The "SD_ProcessTypeManager" components wait for changes to the process descriptions and this process is ongoing. As soon as a new process document exists (Figure 36) the process is incorporated into the main register and this updates the website. This ensures that process descriptions always correspond to what has been incorporated into the SOA Governance Tool.

9.6.6 Forward General Process

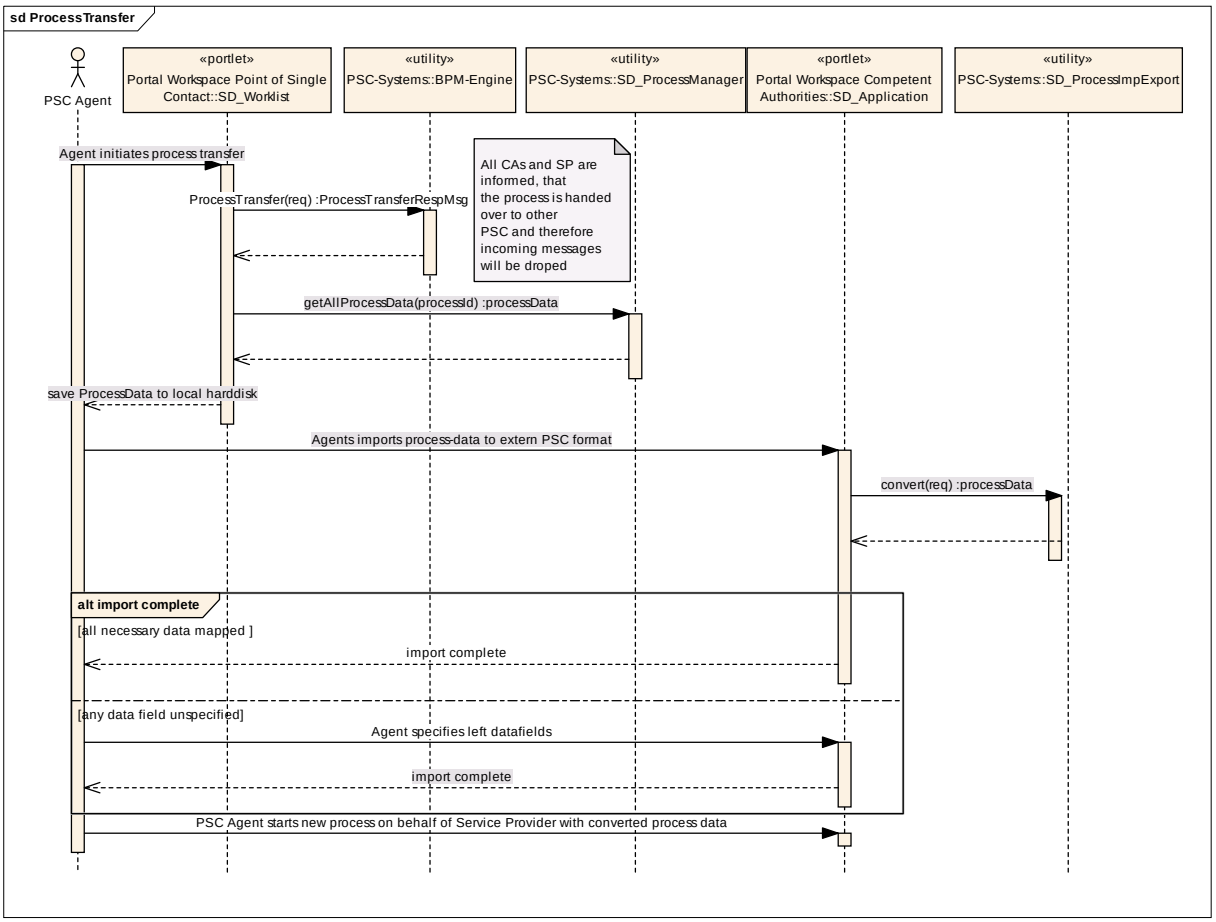

Figure 37: Communications Workflow "Forward ongoing EA/PSC process'

Figure 37 shows how an ongoing process that perhaps uses a completely different SOA platform is handed over to another EA/PSC and implemented. The main prerequisite is that the process data can remain in XML format. This shows the exceptions that occur during operations. However, it is fairly often the case that the architecture designed for this needs to uncover this type of scenario.

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9.6.7 Access Document Safe

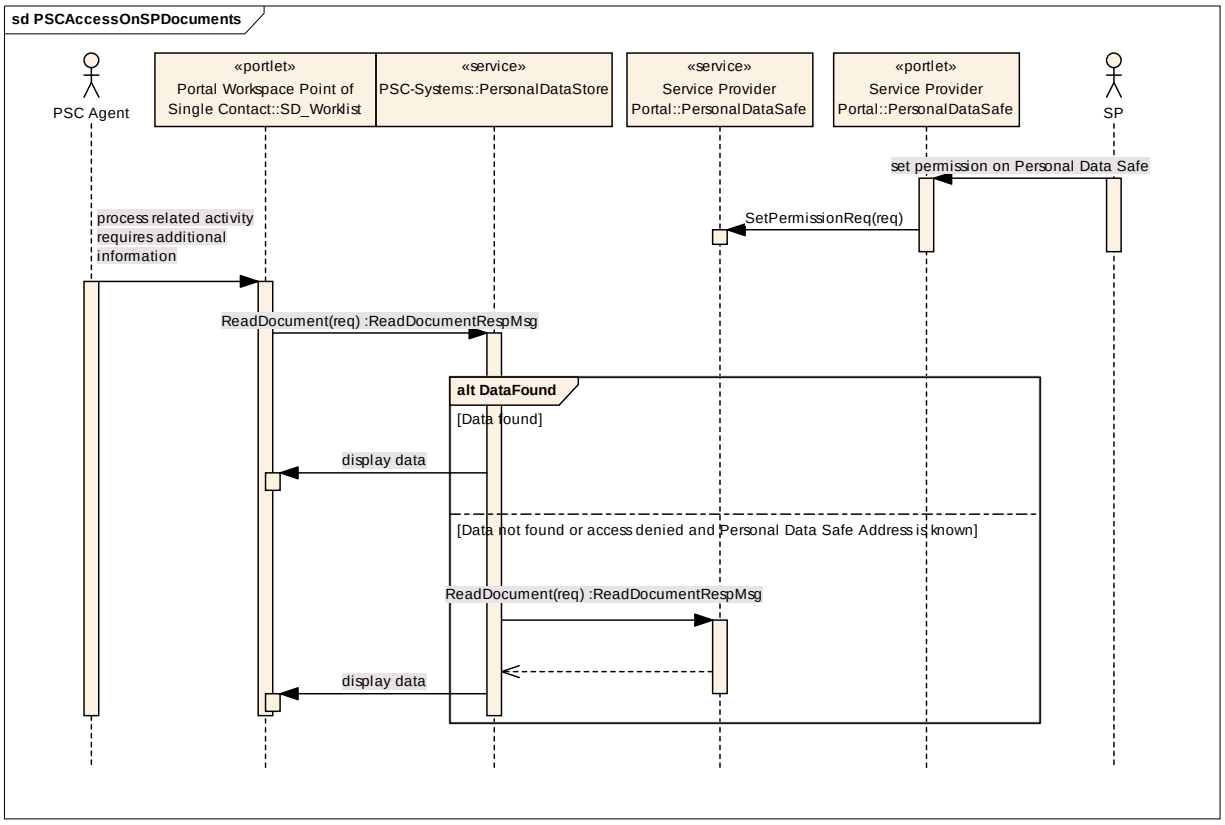

Figure 38: Communications Workflow "Access Data Safe"

Figure 38 shows how the process of getting a copy of data out of the document safe of the service provider DL/SP is designed.

This process can be carried out on many levels. The service provider DL/SP can maintain his data in a personal data storage unit for the point of single contact. If they take the opportunity to use several points of single contact, then he would spread his data across several PSCs. Therefore they would rather store the data in their own document safe and grant clearance to PSC's. This process only incorporates points of single contact's (PSC's) data storage units. If all the necessary data cannot be found there the service provider's data storage unit will be contacted directly.

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11 Specification Requirements

11.1 Functional Requirements

Name	State and Priority	Description
REQ_Auswahl_EA_ZB	State: Proposed Priority: Medium	It must be possible for the DL/SP to identify and contact the relevant "points of single contact" (EA/PSC) in a given Member State using a web-based procedure.
REQ_Behörden Informationen	State: Proposed Priority: Medium	Information about contacts, procedures and formalities applicable to service providers, access to public registers and databases, associations and organizations, interpretation of requirements must be multilingual. It must be assured that the information provided reflects the current deployment of the business process with the service provider.
REQ_DL Portal	State: Proposed Priority: Medium	It must be possible for the DL/SP to administer its applications over a web portal in a visible way. Possible information and further inquiries from EA/PSCs and ZB/RAs are transmitted via service interfaces. They accumulate here. Initiating of applications occurs in the EA/PSC portal or in the RA portal.
REQ_Dokumente	State: Proposed Priority: Medium	The information about the meaning of the documents (certifications, certificates etc.) and their equivalences must be accessible publicly, on a web page.
REQ_Dokumentensafe	State: Proposed Priority: Medium	It must be possible for the DL/SP to store re-usable information in electronic form in an electronic document safe which is available online. The operations needed are to create, to read, to change and delete (CRUD). The document-safe must guarantee unchangeableness and privacy of the information. The DL/SP must be able to decide alone and exclusively who has access to the information stored in the document-safe. For other persons to access the information, this must be able to be released and the following data must be indicated: - information details - identification of person (optional) - Role of the person / EU-SD participant - process (optional). Authentication scheme required

Name	State and Priority	Description
		As an authentication-scheme at least username/password must be selectable.
REQ_EA Portal	State: Proposed Priority: Medium	The EA/PSCs must provide web-portals that are usable to initiate general processes, to start and work on processes, to process status inquiries and to get information regarding procedures and formalities (description of process, information) that are supported by the EA/PSC. The EA/PSC's employees must be able to manage all communication in the SD procedure over a suitable user surface in a process orientated way.
REQ_EA Services	State: Proposed Priority: Medium	The EA/PSC must provide service interfaces over which the ZB/RA or other EA/PSCs can work on their running processes or place status inquiries.
REQ_Fristen	State: Proposed Priority: Medium	Process modeling with periods: The process modeling must consider in detail: 1. If a certain time period is exceeded whilst working on a request this can mean - dependent on the type of process – automatic permission or the automatic refusal of the request. 2. The period of completion of the request begins to run if the ZB/RA, which works on the request, confirms that all DL/SP information which can be taught for the treatment of the request is present. 3. When a ZB/RA receives a request it has to examine it immediately for completeness. If the information is not complete, the SP/DL is to be informed. Otherwise the SP/DL is to be informed about the beginning of the treatment, whereby the time stamp of the commencement of a term must be part of the information. 4. If during processing of the request it turns out that further information from the DL/SP is to be taught, the clock is stopped, i.e. the period is extended until the time all required information has been entered and is complete. 5. If a general process consists of several processes that are handled simultaneously there has to be a separate period count for each of the processes and the DL/SP must be informed of its beginning/end.

Name	State and Priority	Description
REQ_Informationen_ DL_WebSite	State: Proposed Priority: Medium	The service receivers must be able to see the their current on a website. (firm, data, accessibility via address, telephone, email address). It must be guaranteed that this data is up to date. Consumers are to also receive information on the valid requirements at DL/SPs in other member states, get pleas, relief organizations (step by step guide). These entities are distributed across the commission to the other member states.
REQ_Rechnungswesen _EA	State: OutOfScope Priority: High	The EA/PSC must be able to arrange calculations and/or credit notes at DL/SPs and ZB/RAs.
REQ_Rechnungswesen _ZB	State: OutOfScope Priority: Medium	Authorities must be able to arrange calculations and credit notes at EA/PSCs and DL/SPs
REQ_Selbst Registrierung	State: Proposed Priority: Medium	The portals should make self-registration with a user account possible. Participation in SD processes must be possible only after successful activation of the user account. The activation of the user account is supposed to be organizationally linked with an official identification (typical example: police person identification).
REQ_Verzeichnis_ Inhalte	State: Proposed Priority: Medium	The following data must be stored in the public register services: - area municipality - agencies - responsibilities - public sector services - business situations - processes - public sector software This data must be able to be maintained by technical and system administrators over Web and service interfaces. Based on the applicant's data and their project it must be possible on to determine: - which administrative achievements are necessary for their project - which general processes correspond to the project - which ZB/RAs and EA/PSCs to contact. It must be possible to retrieve acting roles and persons from the EA/PSC from a general process in order to use this information in the SD process. It must be possible to retrieve acting roles and persons from the competent authority using their accounts from an administrative achievement or a public service software in order to

Name	State and Priority	Description
		use this in the SD process (e.g. access via the document safe).
REQ_Verzeichnis_ Pflege	State: Proposed Priority: Medium	The components used in the SD procedure - EA/PSC directory - EA/PSC spreading general process directory - public sector software directory - general process directory - business situation – public sector services directory - business situation directory - national process directory as well as the responsibility directories must be connected and updateable in such a manner that inconsistencies between the data are avoided. The actualization of existing entries in the directories must be achieved in a way that current processes a) are not to be affected, b) are to be migrated or c) can take on the changes without problem.
REQ_ZB_Portal	State: Proposed Priority: Medium	The ZB/RAs must provide portals that DL/SPs can use to initiate processes, to start and work on processes, to process status inquiries and to get information regarding procedures and formalities (description of process information) that are supported by the ZB/RA. The ZB/RA's employees must be able to manage all communication in the SD procedure over a suitable user surface in a process orientated way.
REQ_ZB_Services	State: Proposed Priority: Medium	The ZB/RA must provide service interfaces over which the DL/SP or the EA/PSC is able to initiate processes, to work on running processes and to place process status inquiries.

Table 8: Functional Requirements

11.2 Non-functional Requirements

11.2.1 Look and Feel

Name	State and Priority	Description
REQ_Antrag-stellung	State: Proposed Priority: Medium	The web-based user dialog for placing the application has to incorporate the administrative achievements, the DL/SP information as well as the coupling of several administrative achievements with general processes in such a manner that the user can submit an application in a few steps. The user behavior on these web pages should be analyzed statistically in order to improve organization and online assistance.
REQ_Ermittlung EA/ZB	State: Proposed Priority: Medium	The web-based user dialog for the determination of EA/PSC and/or the ZB/RA has to incorporate information about possible regions, possible business situations, existing entities and their competencies, possible administrative achievements and their coupling with general processes in such a manner that the user can achieve their goal in a few steps. The user behavior on these web pages should be monitored in order to make improvements to organization and online assistance
REQ_Mehr-sprachigkeit	State: Proposed Priority: Medium	The information delivered by the register services must be delivered in one of the official languages of the EU, which can be assigned to the service user.

Table 9: Look and Feel

11.2.2 Usability

Name	State and Priority	Description
REQ_Elektronische Abwicklung	State: Proposed Priority: Medium	All procedures must be able to be completed from a distance and electronically via the EA/PSC or at the ZB/RA.

Table 10: Usability (comprehensibility, ability to learn, operability)

11.2.3 Operational and Environmental Conditions

Name	State and Priority	Description
REQ_Verschiedene_ Betriebs-umgebungen	State: Proposed Priority: Medium	Architecture must permit cooperation between participants using different SOA platforms, ID-Providers and ZB/RAs.

Table 11: Operational und Environmental Conditions

11.2.4 Cultural and Political Requirements

Name	State and Priority	Description
REQ_IMI	State: Proposed Priority: Medium	The technical conversion of the SD procedure is to include the Internal Market System requirements: - information exchange in different languages - determination of the competent and responsible authority Legal assistance between authorities and public institutions should be possible.

Table 12: Cultural and Political Requirements

11.2.5 Performance and Efficiency

Name	State and Priority	Description
REQ_Antwortzeiten ZentraleDienste	State: Proposed Priority: Medium	The response times of the central services such as ID Providers or the directory services must lie below 1 second, measured directly at the service.
REQ_Kommuni-kation	State: Proposed Priority: Medium	The communication between DL/SP, EA/PSC and ZB/RA is to be optimized in such a way that the latency on the web-application used for "human interaction" process steps is on average below 5 seconds (broadband access to the internet is presupposed).

Table 13: Performance and Efficiency

11.2.6 Portability and Interoperability

Name	State and Priority	Description
REQ_COT	State: Out Of Scope Priority: High	It is to be assumed that within the European Union there will be multiple circles of trust. The IDPs must make mutual positions of trust possible.

Table 14: Portability and Interoperability

11.2.7 Legal Requirements

Name	State and Priority	Description
REQ_Verhaltens-kodizes	State: Proposed Priority: Medium	Codes of conduct from professional associations, organizations and federations were compiled, must be electronically accessible from a distance.

Table 15: Legal Requirements

11.2.8 Security requirements

Name	State and Priority	Description
REQ_Authenti-fizierung	State: Proposed Priority: Medium	The authentication of the employees of the EA/PSC, ZB/RA and DL/SP and all parties involved in the DLR process plays a central role in the reliability of the SD procedure's implementation. Therefore the participants must be authenticated by procedures that meet the protection level "high".

Table 16: Security Requirements (privacy, data integrity, availability)

11.2.9 Maintenance and Alteration Capability

Name	State and Priority	Description
REQ_Aktualisierung _Prozessdescription	State: Proposed Priority: Medium	If processes in the ZB/RA or with the EA/PSC change the entries in the directories must be updated automatically.
REQ_Service_ Virtualisierung	State: Proposed Priority: Medium	The central register services should be loosely coupled distributed systems operated by different service providers.

Table 17: Maintenance, Alteration Capability (transparency, stability, controllability)

11.2.10Reliability

Name	State and Priority	Description
REQ_Verfügbarkeit	State: Proposed Priority: Medium	The central services and the directories must be operable and available 24/7 with publicized service times.

Table 18: Reliability (system-maturity, restorability, fault tolerance)

12 UML Glossary

The UML glossary contains general descriptions of the UML constructs used for modelling alongside the "official" descriptions from the (OMG 2007) standard. It allows the interested reader to gain further insight into the modelling elements used.

A **component** is a modular part of a system, whose behaviour is defined by its provided and required interfaces; the internal workings of the component should be invisible and its usage environment-independent. A component can be composed of multiple classes, or components pieced together. As smaller components come together to create bigger components, the eventual system can be modeled, building-block style.

UML: A modular part of a system that encapsulates its contents and whose manifestation is replaceable within its environment. A component defines its behavior in terms of provided and required interfaces. As such, a component serves as a type, whose conformance is defined by these provided and required interfaces (encompassing both their static as well as dynamic semantics).

An **interface** is a specification of behaviour (or contract) that implementers agree to meet. By implementing an interface, classes are guaranteed to support a required behaviour, which enables the system to treat non-related elements in the same way.

UML: An interface is a kind of classifier that represents a declaration of a set of coherent public features and obligations. In a sense, an interface specifies a kind of contract which must be fulfilled by any instance of a classifier that realizes the interface. The obligations that may be associated with an interface are in the form of various kinds of constraints (such as pre- and post-conditions) or protocol specifications, which may impose ordering restrictions on interactions through the interface.

Ports define the interaction between a classifier and its environment. Interfaces are used to detail this interaction. Any connector to a port must provide the required interface, if defined. Ports can appear on either a contained part, a class, or on the boundary of a composite structure.

UML: A port is a structural feature of a classifier that specifies a distinct interaction point between that classifier and its environment or between the (behavior of the) classifier and its internal parts. Ports are connected to properties of the classifier by connectors through which requests can be made

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to invoke the behavioral features of a classifier. A port may specify the services a classifier provides (offers) to its environment as well as the services that a classifier expects (requires) of its environment.

Parts are run-time instances of classes or interfaces. Parts are used to express composite structures or modeling patterns that can be invoked by various objects to accomplish a specific purpose. When illustrating the composition of structures, parts can be embedded as properties of other parts.

UML: Part: a subset of a particular class which exhibits a subset of features possessed by the class Associations: A synonym for association end often referring to a subset of classifier instances that are participating in the association.

An **actor** is a user of the system; *user* can mean a human user, a machine, or even another system. Anything that interacts with the system from the outside or system boundary is termed an actor. Actors are typically associated with use cases.

UML: An actor models a type of role played by an entity that interacts with the subject (e.g. by exchanging signals and data), but which is external to the subject. Actors may represent roles played by human users, external hardware, or other subjects. Note that an actor does not necessarily represent a specific physical entity but merely a particular facet (i.e. "role") of some entity that is relevant to the specification of its associated use cases.

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This white paper is the result of research by Fraunhofer FOKUS' e-Government laboratory. It brings together collective experience gained through development work, facilitating a dialogue. We would be happy to receive any contributions from administrations and other bodies, vendors, associations and research institutions that could help improve this white paper.

Please email your contributions to the authors.

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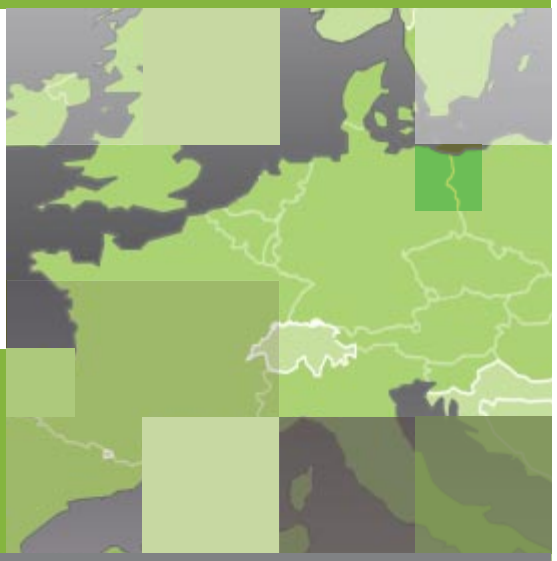

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