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OpenGIS® GeoRM Role Model

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i. Preface

This document is intended to introduce additional, well defined terms into the OGC discussion on Rights Management. Previous OGC discussions, which resulted in the GeoDRM Reference Model, were in many ways detailed but at the same time could not satisfy the need for a consistent overall operation model.

The approach used in this document tends to offer a coarse grain level, but in a consistent way, showing subjects (roles), verbs (processes) and objects (architecture, roles) and their relationships based on the known and successful roaming operation model.

ii. Document terms and definitions

The used business terms are derived from the telecommunication (GSM) and Internet (ICANN, denic) industries.

iii. Submitting organizations

The following organizations submitted this document to the Open Geospatial Consortium Inc.

- Beuth Hochschule für Technik Berlin (BHT Berlin)

iv. Document contributor contact points

All questions regarding this document should be directed to the editor or the contributors:

Name	Organization
Prof. Dr. Roland M. Wagner (RMW)	Hochschule für Technik Berlin

v. Revision history

Date	Release	Editor	Primary clauses modified	Description
2009-09-09		RMW		
2009-10-10	0.3.0	Carl Reed	Various	Prepare the document for publication as a DP

vi. Changes to the OGC Abstract Specification

The OpenGIS® Abstract Specification GeoDRM Reference Model (06-004r3) requires changes to accommodate the business legal and technical contents of this document.

Geospatial Digital Rights Management Reference Model (GeoDRM RM) (06-004r3).

The following is a list of the required changes:

a) Update of figure 12 corresponding terms in the text and structure.

b) Update of figure 13 with the corresponding terms in the text and structure.

c) Corresponding terms in the complete reference model

d) Introduction of clear structure subjects (roles), verbs (processes) and objects (data and services)

vii. Future work

The definition of roles corresponds to the definition of subjects in the SDI model. It is a first step.

The definition of processes corresponds to the definition of verbs. The definition of data and services correspond to the definition of objects. The definition of processes and related data and services is part of future work.

Foreword

The topic “Rights Management” is a collective term. The term encompasses business and implementation (technical) issues like (e-)contracting or e-commerce with licensing, access control and other function. These functions are embedded into different legal and technical relationships between different roles following different responsibilities. Some elements can be represented with digital means; some elements can also be processes with digital means. Other elements like terms-of-use, e.g. “for commercial or private use” cannot be processes by electronic means. Cross organizational agreement is needed to categorize these elements and reference them uniquely. On a coarse grain level, Rights Management can be sorted into

- Business Model related and
- Implementation Model related

elements groups. Additional more fine grain sub models like role model, process model and architecture model are needed to bridge the interdependent Business Model and Implementation Model. These models are shown in an overview in the introduction.

Technical implementation support business models with electronic means. On the other side modern business models need to consider technical components for an efficient design.

The understanding of these interdependencies is a key point in understanding rights management

The experience since the formation of the OGC GeoRM Working Group in 2004 showed that an obvious lack of SDI business models exists. A major issue is the movement from single provider platforms to infrastructure and multiple provider platforms, offering large seamless technical and commercial coverage.

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Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

Introduction

Rights management has many (inter-) dependencies. A reference model is needed to structure the concepts and to allow exchange of concepts between business and implementation related experts. In variance from the RMODP model approach, the GDI.NRW Reference model separated subjects, verbs and objects in an obvious form. This separation is very intuitive, because our native language uses the same approach. The RM-ODP is not able to support this intuitive approach. This model was introduced in the OGC GeoRM WG in 2005 (TC UN New York).

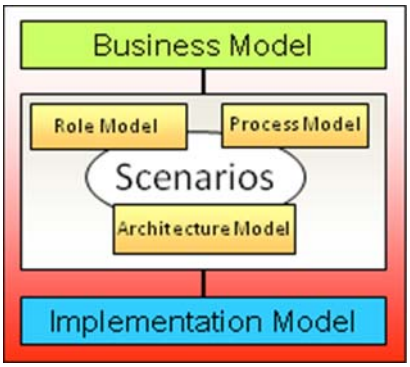

Figure 1 — GDI.NRW Reference model with a clear separation between subjects (roles), verbs (processes) and objects (architecture components)

The main models, the business model and the technical implementation model are related via the sub models actor model, process model and architecture model. Scenarios are used to design and exercise these models.

Similar to a natural language grammar, roles can be considered as “subjects” within these models. Processes can be considered as the “verbs”. Architecture components and other passive roles can be considered as objects.

The current version of this document contributes to the Role Model. Future work will focuses on the other models.

OpenGIS® GeoRM Role Model

1 Scope

The scope of this document is the update and the definition of GeoRM roles as a sub model of the GDI.NRW reference model (process model and architecture model). Key relationships are defined between these roles.

The definitions of these roles are results of the GeoRM Game (Frankfurt) and also subject in the EU ESDIN project.

2 Compliance

TBD.

3 Normative references

TBD.

4 Terms and definitions

4.1 Application End User

This role represents a known or unknown application specific end user, e.g. an employee or an Internet user in a real estate application.

NOTE This role is legally related to an Application Service Provider

NOTE This role is technically related to an Application Service Provider

4.2 Application Service Provider (ASP)

Application specific provider with may use some spatial data and services to augment the domain specific application, e.g. a real estate portal provider

NOTE This role is legally related to Application End User, Application Software Supplier and SDI Service Customer.

4.3 Application Software Supplier

A domain specific software supplier offering domain software to Application Service Provider. This role may import an SDI API offered by an SDI Software Supplier to augment the application specific application, e.g. a real estate portal with maps

NOTE This role is legally related to SDI Service Customer

NOTE This role is technically related to SDI Software Supplier

4.4 SDI Service Customer

Commercial customer of SDI Services; in most cases the role and the Application Service Provider are part of the same legal body, e.g. a real estate company.

NOTE This role is legally related to SDI Service Provider

4.5 SDI Service Provider

The commercial, technically and legal responsible role offering SDI Services to SDI Service Customers. The role defines a product.

This role may assign or outsource responsibilities to sub roles within internal departments or third party companies acting on behalf. This business network is established by the SDI Service Provider.

This role is also member in an SDI Node by establishing a relationship to a SDI Committee.

To augment the offered coverage, an instance of this role as roaming contracts to other instances of this role.

NOTE This role is legally related to SDI Service Customer and SDI Committee, other partner SDI Service Providers, together with sub roles IPR Owner, Advertiser, Account Sales, Account Manager, Delivery and SDI Software Provider.

4.6 IPR Owner

This role owns the resource.

NOTE This role is legally related to SDI Service Provider

4.7 SDI Software Supplier

Software supplier creating SDI software, e.g. web services and SDI API

NOTE This role is legally related to SDI Software Supplier, Application Software Supplier

NOTE This role is technically related to Application Software Supplier

4.8 Advertiser

Operates a product catalogue with a product description (meta data).

NOTE This role is legally related to SDI Service Provider

NOTE This role is technically related to Account Sales and other Advertiser instances acting on behal of other SDI Service Providers

4.9 Account Sales

This role offers the products of its SDI Service Provider to SDI Service Customers. It establishes new contract including parties, licenses, pricing, access credentials on behalf of the provider. It moves new established contracts to the assigned Account Manager.

NOTE This role is legally related to SDI Service Provider.

NOTE This role is technically related to SDI Service Customer, Advertiser and Account Manager.

4.10 Account Manager

This role maintains SDI Service customer accounts. An account includes functions for access control, licensing and pricing (prepaid and postpaid).

Parts of the elements of these accounts may be updated by SDI customer, e.g. telephone number.

A Delivery role may ask for valid accounts prior delivery and report delivery.

In a roaming context with partner providers, an instance of an Account Manager of a partner SDI Service Provider may ask for valid accounts prior delivery and report delivery.

NOTE This role is legally related to SDI Service Provider.

NOTE This role is technically related to Account Sales, Delivery and instances of Account Manager acting on behalf of partner SDI Service Providers.

4.11 Delivery

This role has the responsibility to store, to run and to deliver spatial data and functions to SDI Customers.

NOTE This role is legally related to SDI Service Provider.

NOTE This role is technically related to Account Manager, SDI API of SDI Software Supplier.

4.12 SDI Committee

Because most SDI Service Provider can offer only limited geographic and thematic extends, multiple providers establish a SDI Committee, which is responsible for the operation of a SDI node. Supra SDI Service Provider issues are assigned to be managed by the SDI committee. To balance interest, SDI Service Providers may be members of the SDI committee.

It may assign operational responsibilities to a SDI Agency.

To augment coverage, an instance of a SDI Committee establishes a contract with another SDI Committee.

NOTE This role is legally related to SDI Service Provider and other instances of SDI Committee.

4.13 SDI Node

A node is a network element to ensure large and consistent coverage for SDI Customers.

NOTE A node is legally related to SDI Committee

NOTE A node is technically related to all Services, e.g. IDs.

4.14 SDI API

This API encapsulates the functionality of distributed SDI Services including the publish-find-agree-bind workflow to a single outlet. The component may need access credentials for rights management.

NOTE The API is created and maintained by SDI Software Provider and therefore legally related to this role.

NOTE The API is technically related to application software and to SDI service specifications.

5 Conventions

5.1 Abbreviated terms

API	Application Program Interface

GeoRM Geospatial Rights Management

5.2 Roaming Model

A roaming infrastructure shares services and customers while balancing the interest of all players. Therefore this model is used for this design.

5.3 Used parts of other documents

This document is based and continues the development of the chapter 8.1, “8.1 Overview: Roles and Responsibilities” of the Geospatial Digital Rights Management Reference Model (GeoDRM RM) (06-004r3).

6 Roles as subjects in GeoRM

Roles are the subjects within the shown models. A role is associated with different responsibilities. Multiple roles can be taken by a (legal) institution. Roles have a legal and/or technical relationship to each other. This relationship is defined in the process model and the technical support in an architecture. There are key relationships between key roles and supporting relationships between them and supporting roles.

Some roles are based on the OGC GeoDRM reference model (2004), which were refined.

6.1 Key Roles and relationships

The key roles are SDI Service Customer, SDI Service Provider and SDI Committee in a roaming / multi provider scenario.

A SDI Service Customer is a role, which institution has an interest to procure SDI Services. An SDI Service Provider is a role, which offers SDI Services and is fully responsible for the service from a legal and commercial point of view. In a roaming/multi provider scenario there are supra provider related issues to organize to ensure seamless technical and business cross provider supply for customers. These issues are administrated by a SDI committee. The symbols are shown in the figure below.

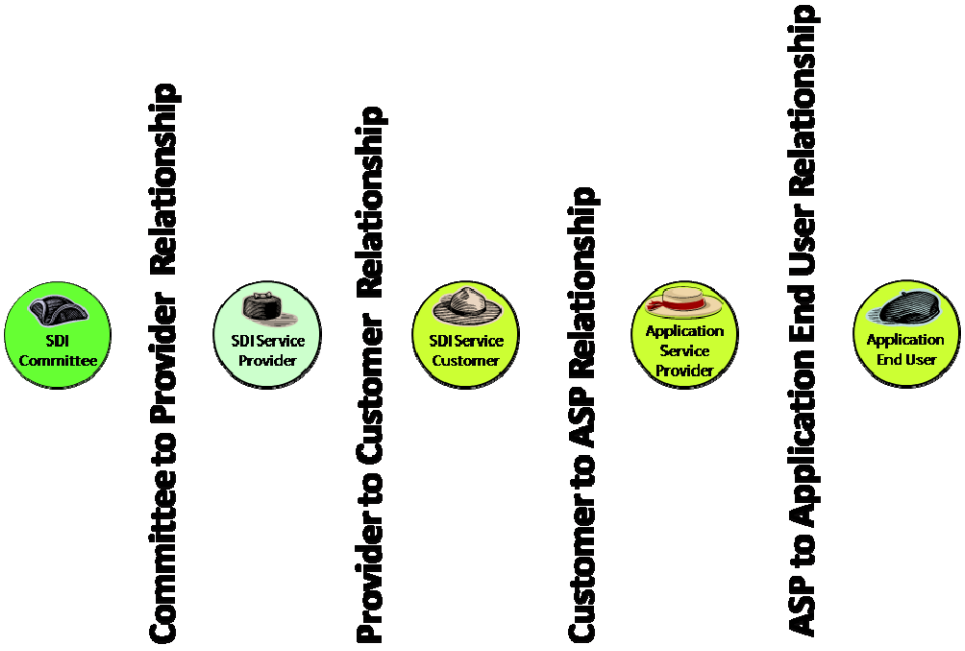

Figure 2 — Key relationships

6.2 Multiple role instances and relationships

To enlarge coverage, a SDI Service Provider agrees with another instance of a SDI Service Provider in a roaming agreement. In this case the home provider turns into an implicit trader, although the technical connection is between customer and foreign provider direct and therefore quicker.

To enlarge also the coverage between different SDI nodes, administrated by a single SDI Committee, SDI committees agree with each other in a contract to cooperate. In many network examples, like the administration of the different parts (domains) of the Internets, a hierarchic organization approach was taken. A root committee enfolds all participating top level domains, which might have additional sub domains.

Of course these agreements between providers and committees might also be ended at any time. The related networks will be disconnected.

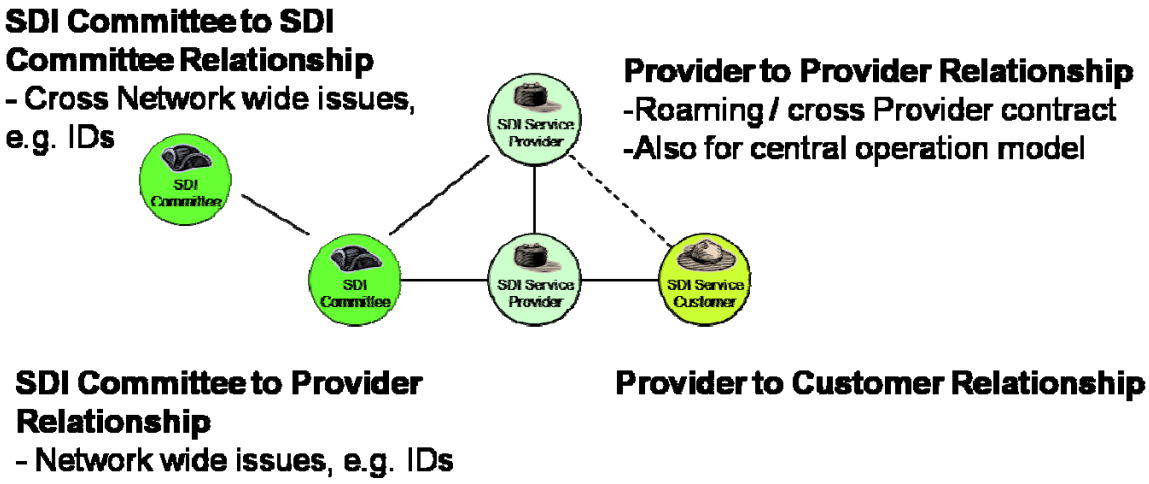

Figure 3 — Key relationships with multiple instances

6.3 All Roles and Relationship

The key roles aggregated many responsibilities. Supporting or sub roles can be identified. Although currently not modeled some supporting roles can be re-used by different key roles.

Usually a SDI Service Customer acts on behalf an Application Service Provider (ASP) to service application specific services. In most cases, the geo information percentage compared to the overall offer is quite small. Also very often the application does exist already for a time and will be spatial enabled later. An example for an application is a real estate portal, which was spatial enabled later to show maps of the real estate objects instead of postal addresses. The role Application End User is in most cases not known by the SDI Service Provider. The figure below illustrates the roles. The role Application Software Supplier is neglected in this paper.

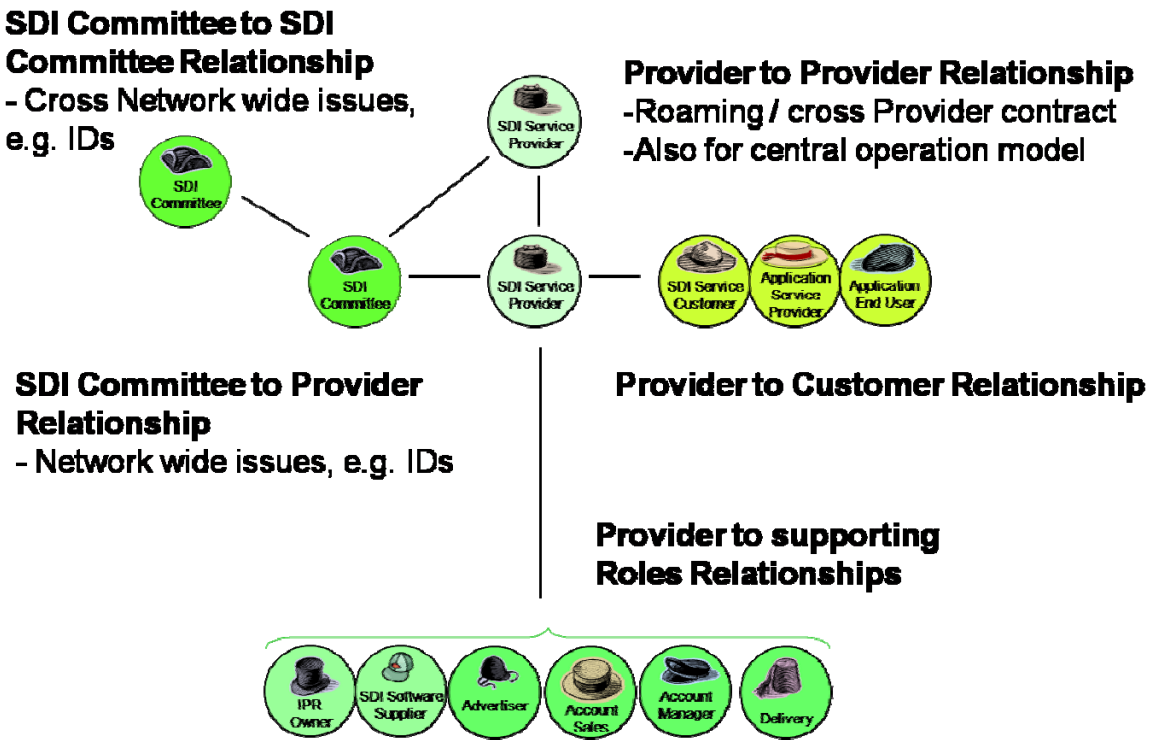

Figure 4 — Key relationships with SDI Service Provider's sub roles

To support the SDI Provider in the business processes, additional roles can be identified. An IPR Owner owns the intellectual property rights of the data. An Advertise distributes product description (meta data) via a catalogue. An Account Sales offers contracts to potential SDI Service Customers. An Account Manager keeps track of the usage. A Delivery delivers the requested product. All supporting roles act on behalf of the SDI Service Provider.

Annex A
(informative)

Process and Architecture Model

Because of interdependencies between business and implementation model and the sub models role-, process- and architecture model, this annex should show some assumptions. These are input for further discussions.

A.1 Process Model

This figure shows the relationship between roles and the major business process publish-find-agree-bind.

The interaction between roles in processes can be illustrated with the figure below. The shown processes below correspond to the listed processes 15, 16, 17 and 19, 20 und 21 introduced in the annex figures. The „find" phase corresponds to 15 for a (human) SDI Service Customers. The "agree/establish" phase corresponds to 16 for a (human) SDI Service Customers and "agree/maintain" for 17 also for a human customer. In the usage product group phase, the application of the Application Service Provider requests the SDI API. This API calls the "find" phase (19) as a machine and connects to with the "bind" phase to the Delivery (21).

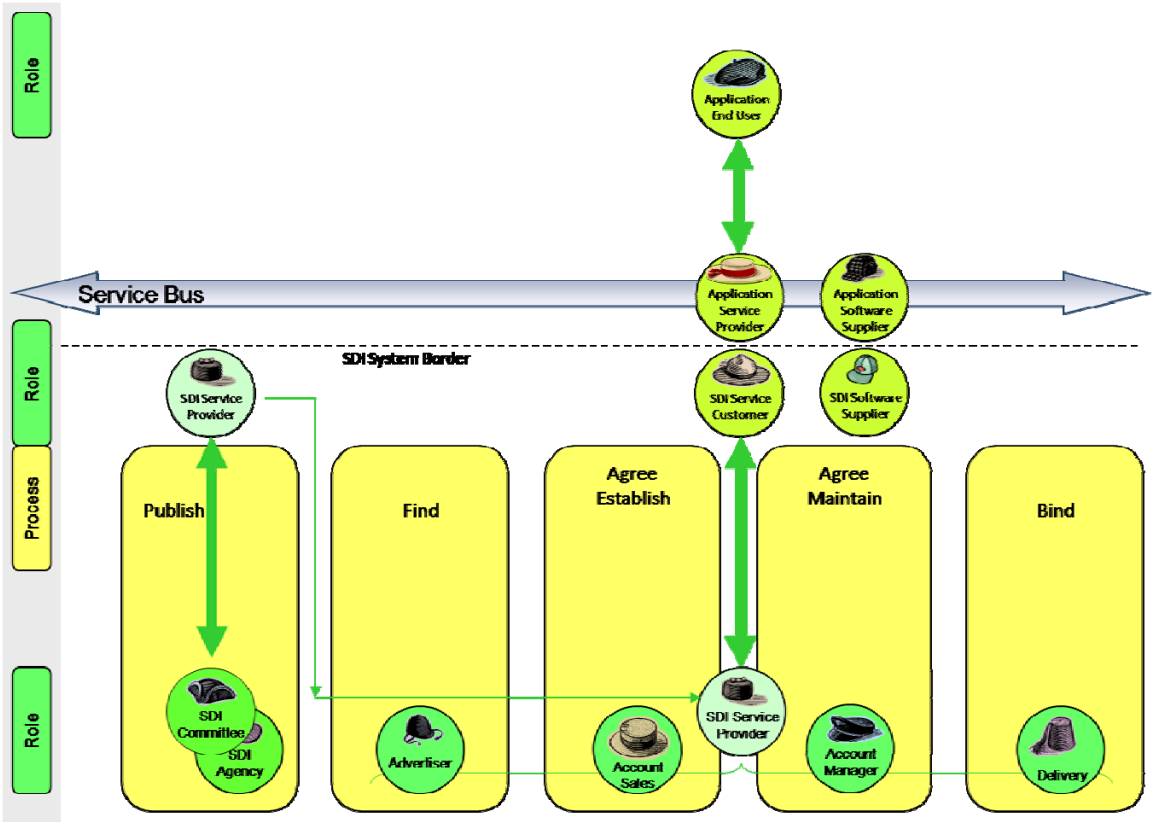

Figure A.1 — Roles and major business process

Although the publish-find-agree-bind major business process is well known, it is only a very coarse grain model. The following figures shows coarse grain models for the establishment, frequent usage, maintenance and liquidation of an SDI node. If some processes should be automated, a fine grain process model is needed to define request – response pairs for service implementation specifications.

The figure below shows the establishment processes of a SDI node.

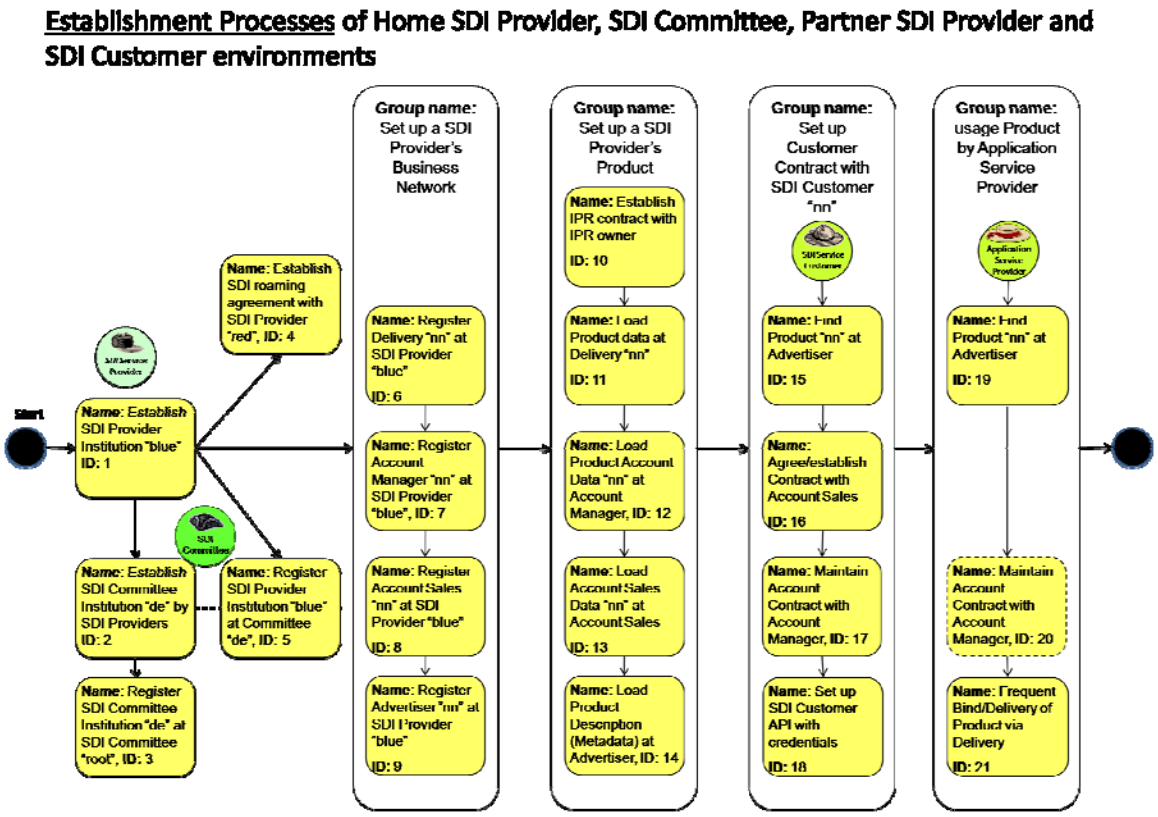

Figure A.2 — SDI node establishment processes

After the establishment of the relationships on a framework contract level, frequent usage is possible. These frequent usage processes can reference to the established contracts and are therefore only a subset to ensure valid data and services, e.g. a different service instance due to a different geographic bounding box request. The catalogue acts as a dynamic “routing services” considering (geographic extend) demand, established contracts, home and foreign SDI Service Providers, product types, e.g. INSPIRE annex and service definitions.

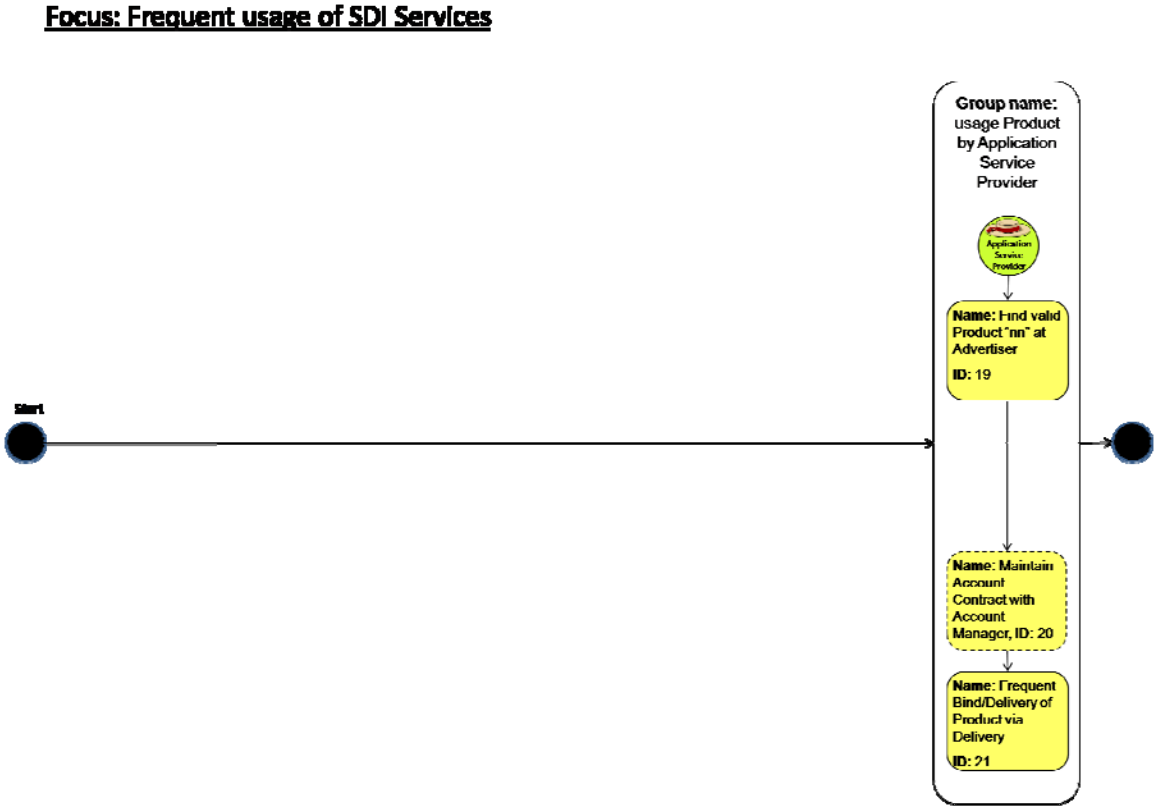

Figure A.3 — Frequent usage processes

A maintenance process is needed to update elements.

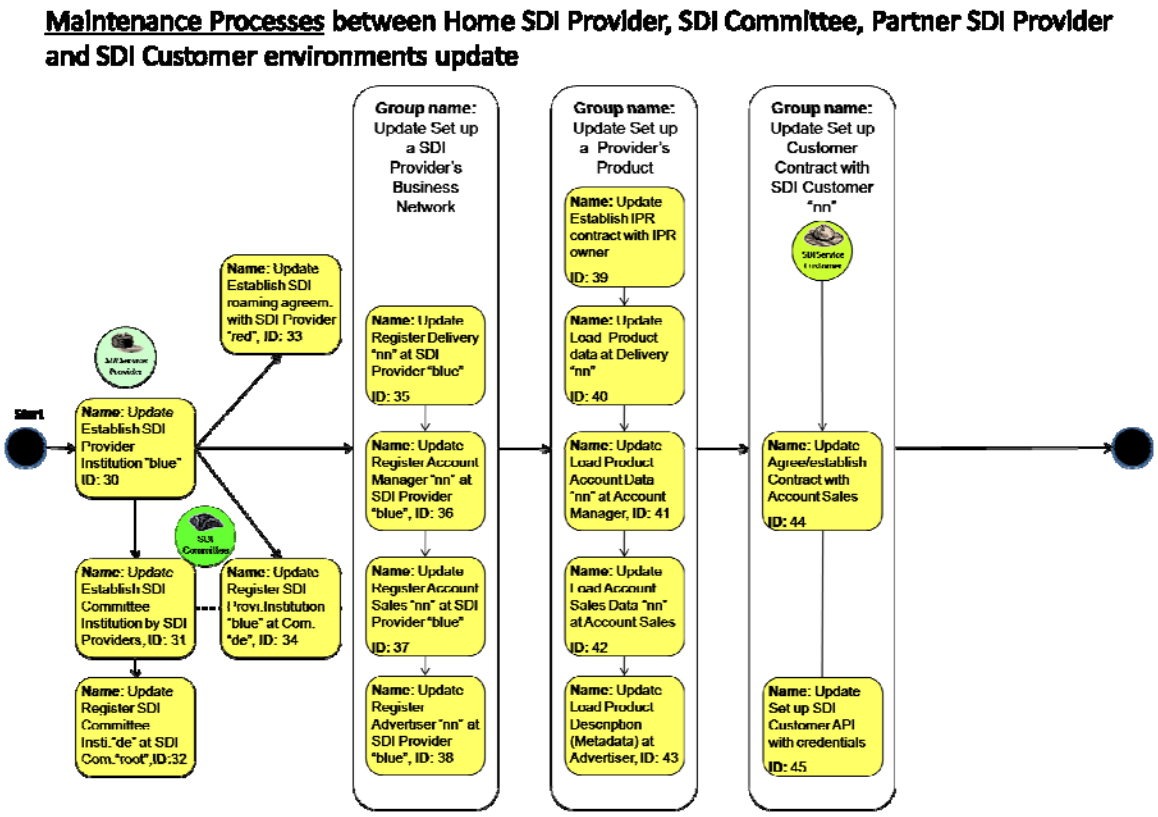

Figure A.4 — Maintenance processes

A controlled liquidation process is needed for a defined end. Parts of that process are needed, if products are not offered any more or SDI Service Provider would like to change the SDI node.

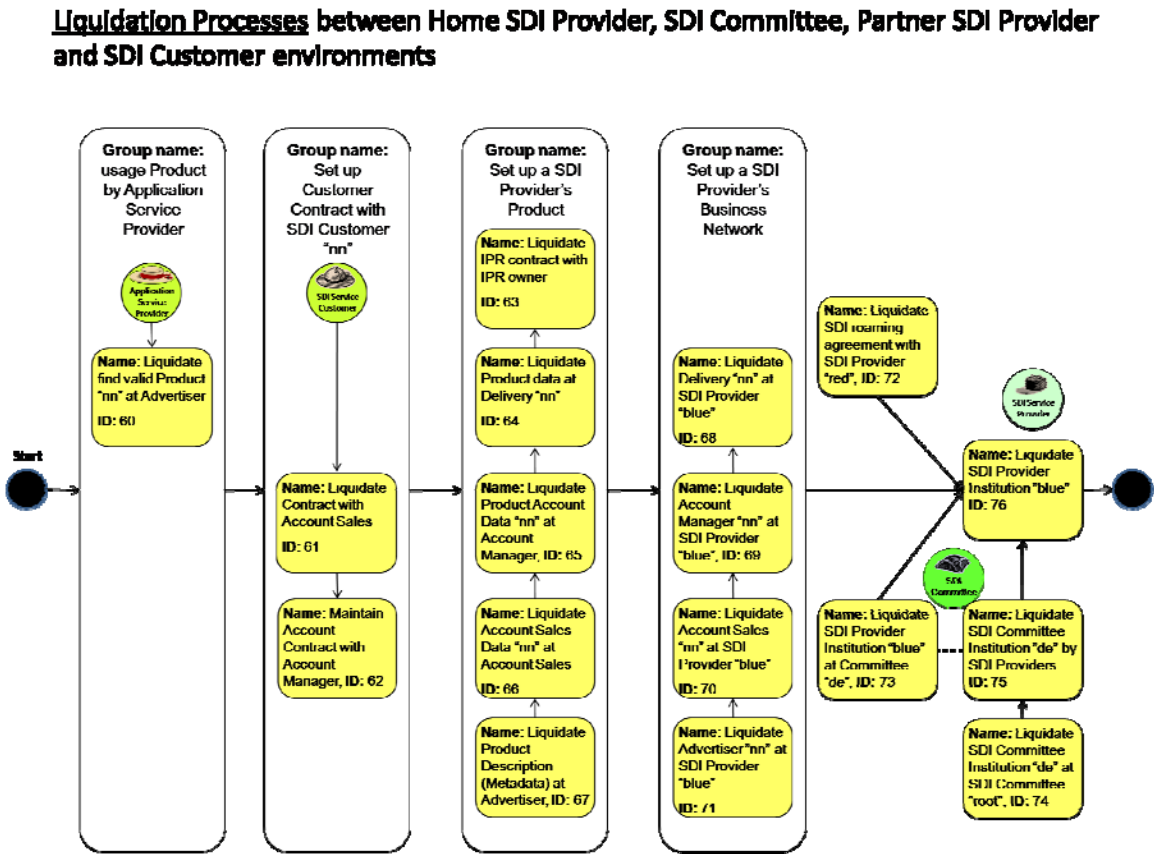

Figure A.5 — Liquidation Processes

A.2 Architecture

Some parts of the processes may be automated. Electronic components or web services execute the processes on behalf of the roles. Electronic components support a process.

Based on the INSPIRE architecture [1] the figure below depicts the identified components.

The shown processes below correspond to the listed processes 15, 16, 17 and 19, 20 und 21 introduced in paragraph A.1. The “find” phase corresponds to 15 for a (human) SDI Service Customers. The “agree/establish” phase corresponds to 16 for a (human) SDI Service Customers and “agree/maintain” for 17 also for a human customer. In the usage product group phase, the application of the Application Service Provider requests the SDI API. This API calls the “find” phase (19) as a machine and connects to with the “bind” phase to the Delivery (21).

The architecture has three major tiers: the application tier, the SDI API tier (both operated by the Application Service Provider / SDI Service Client) and the service tier operated by a SDI Service Provider or the assigned supporting roles. The “service bus” shows the boards between the different tiers. Each roles acting in a phase is supported by a client and service component with corresponding data. The names of these components should as a general rule correspond to the role names. Due to history reasons there are exceptions.

A **Registry Client** supports with its input data the registration process for a role, e.g. SDI Service Provider (or SDI Committee). The Registry Service supports with its (later updated) data the same process for a SDI Committee (or another, higher SDI Committee).

The **SDI API** is a package and enfolds sub APIs. The **application**, e.g. a real estate portal, uses spatial data for some steps, e.g. to show a map for the real estate object.

The automated predefined process 19 “Find valid Product at Advertise” uses a **Discovery Client,** which is roaming enabled. The roaming capability is just to add the ProviderID of the home provider as an additional constrain into the search query for a valid delivery instance for the product. This is possible without any implementation changes of the INSPIRE Discovery IR. The result can contain a list of valid delivery services for the home SDI Service Provider, for partner SDI Service Provider (roaming Partner) and for unknown (mean uncontracted) SDI Provider. The information about the ProviderID needs to be stored at the client (SDI API) site. Potentially also the rights management key can be add to the request.

The Discovery Service is defined as in the INSPIRE Discovery Service IR. The discovery data (metadata) is as defined in the INSPIRE Metadata IR, but contains also information about home and partner provider. This concrete form needs to be agreed on ESDIN or SDI Committee or higher level.

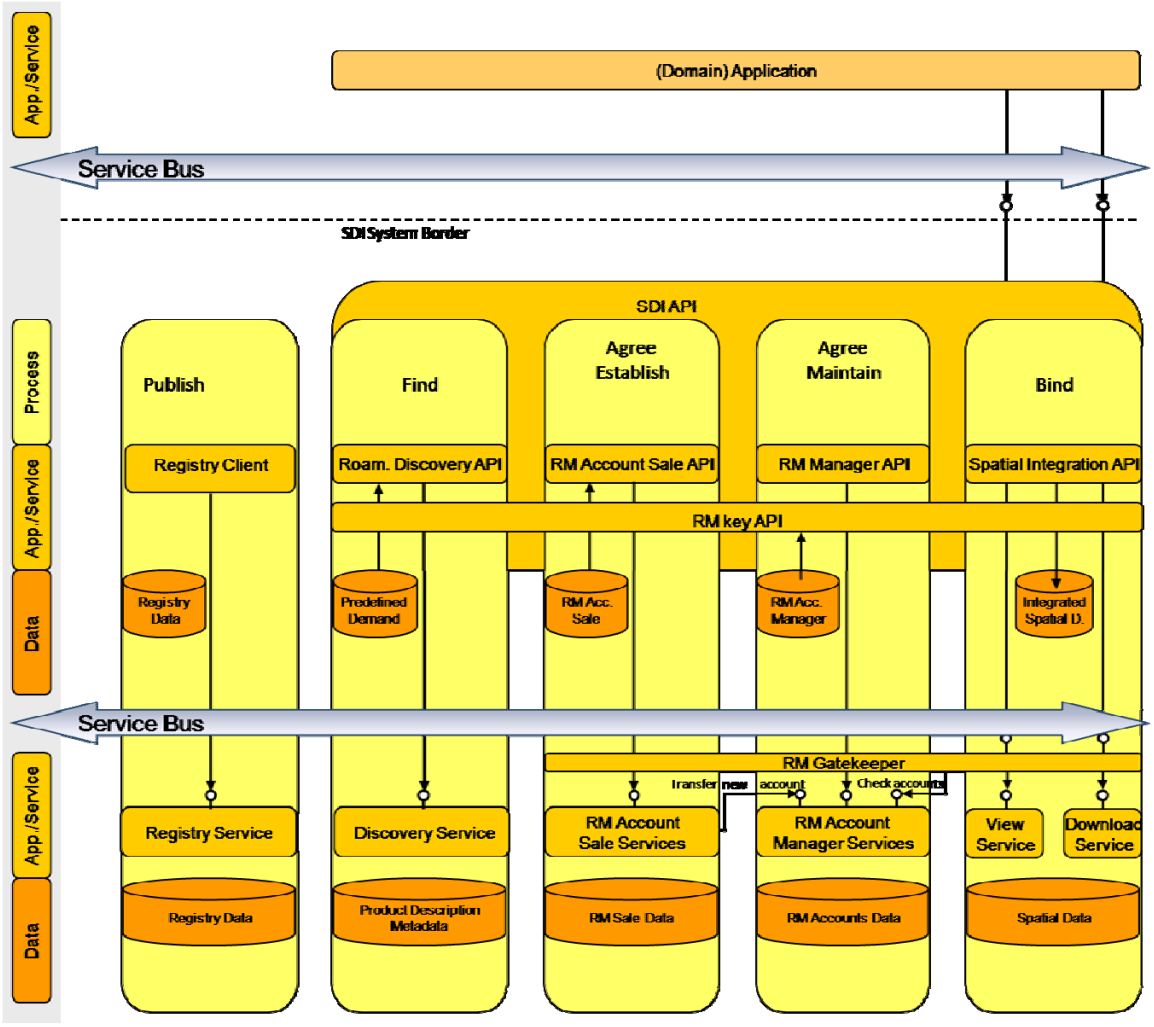

Figure A.6 — RM Architecture (INSPIRE based)

The processes “Find Product at Advertiser” (15), “Agree/establish Contract with Account Sales” (16) and potentially also the “Maintain Account Contract with Account Manager” (17) processes may also be deployed as non-spatial services, e.g. in a regular or capable e-commerce system, depending on the requirements, e.g. prepaid and regular basic fees.

The process group 15-17 “Group name**:** Set up Customer Contract with SDI Customer” can be considered as establishing a framework contract, like a subscription. The process group “usage Product by Application Service Provider” is the frequent usage, which may cause usage fees.

The overloading of the processes shown in the figure above is caused, because usually all infrastructures have two main accounting elements:

- Fixed fees, permanent fee to cover the permanent maintenance of an infrastructure
- Usage fees, to balance the usage

The **RM Account Sale Client API and Service** offer functionally to get a product offer, to configure an offer with SDI Service Customer input and to conclude the offer as a contract. The contract is stored on both sides on the SDI Service Client site and on the Account Sale site acting on behalf of the SDI Service Provider. A contract contains the parties, the SDI Customer institution and the SDI Provider institution, the license as usage conditions, the pricing model, the references for the discovery service and the delivery service and also the RM keys.

The result of the contract is a new account, which can be transferred to the Account Manager (Service) for maintenance and usage checks (Interface 1).

The **RM Account Manager (Service)** maintains the accounts (licensing, pricing and access control together with other contract data. A SDI Service Client may check his accounts any time (Interface 2). In the case of prepaid and a low amount of money, he may be transferred to the Account Sales together with the established contractID to load more money to the account. Another interface (Interface 3) is used by the RM Gatekeeper (see below) to check the accounts for delivery. To enable roaming / cross-contractual /multi-provider scenarios, also an interface (Interface 4) between home RM Account Manager (Service) and foreign RM Account Manager (Service) is needed. The attribute “foreign” means a partner provider not an unknown provider.

A **RM Gatekeeper (Service)** is used to receive incoming requests and to ask the RM Account Manager (Service) for approval according with the accounts. Also an anonymous account might be possible.

View and **Download Service**s are used to store and to deliver the product data. Also functionality services (OGC term: process service) can be offered and operated by a Delivery.

The Spatial Integration API is used to integrated different distributed data and services. It uses the response of the discovery query as “routing information in a network” to get valid services. Because thematic knowledge might be a precondition for integration, this API is set into the bind / delivery phase in process phase 21. If possible a caching mechanism would enhance the performance.

A.3 All sub models in a single view

The figure below shows an overview between roles, major process and architecture components (INSPIRE terms).

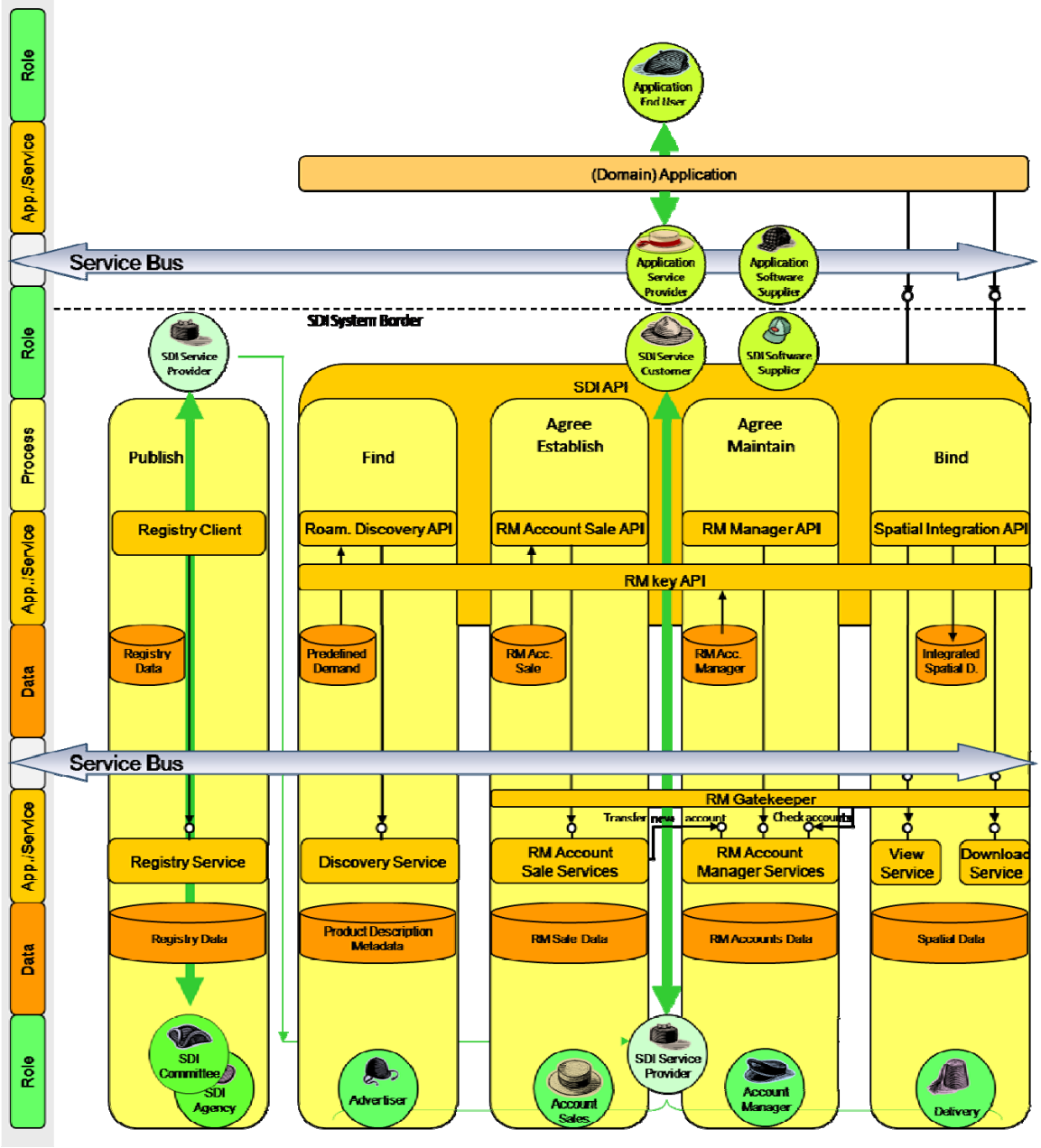

Figure A.7 — Roles, major Processes and Architecture

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[1] EU INSPIRE Architecture, INSPIRE DT Network Services, 2008.

http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/network/D3_5_INSPIRE_NS_Architecture_v3-0.pdf