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1 Introduction

1.1 Background

This document is a product of the eEurope Smart Card Charter¹. It is the fourth part of the “Global Interoperability Framework for Identification, Authentication and electronic Signature (IAS) with Smart Cards for Internet Application”.

The Smart Card Charter identified the issues and an outline action plan for their resolution in order that smart cards can help to fulfil the expectations of citizens within the information society. At the end of 2000, the Charter published the Common Requirements², a document containing the action plans and deliverables of the 12 Smart Card Charter Trailblazer working groups. The action plan addresses both the citizens’ needs and those of the business community in terms of business cases, multi-functionality and interoperability of systems and infrastructure, and the provision of trust in all aspects of service delivery. The overall outcome of these action plans is being consolidated in a set of Smart Card Charter Common Specifications to be concluded at the end of 2002 and launched early in 2003.

As a part of these common specifications, a Global Interoperability Framework (GIF) for Identification, Authentication and Electronic Signature (IAS) has been developed. Its aim is to facilitate interoperability between the various IAS schemes emerging in Europe and more widely throughout the world.

The very starting point of GIF can be summarised with the image of smart cards as “The Your Reliable Key to e-services”.

Defining the Global Interoperability Framework has been conducted in a step-by-step approach:

GIF Part 1: Contextual and conceptual modelling

an in-depth modelling of the smart card, its environment and interoperability issues with regards to identification, authentication and electronic signature;

GIF Part 2: Requirements for IAS functional interoperability a list of functional requirements and interoperability prerequisites to be used together with Part 1 for establishing a set of specifications for interoperability at IAS level;

GIF Part 3: Recommendation for IOP specifications

guidance for enabling, implementing and operating IAS inter-operability;

GIF Part 4: Deployment strategies for generic IAS (i.e. this document)

an overview of business plan elements, organisation issues, and system development processes for mass deployment strategies based on the concept of generic IAS.

The framework uses a simplified four-tiered system inspired by established software and system engineering methodologies (TINA-C, UML).

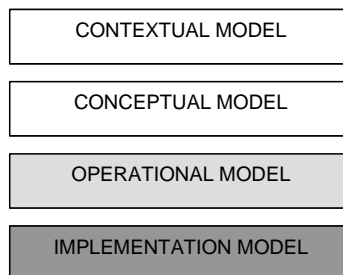


Figure 1: Four tiers in the methodology

¹ See <http://europe-smartcards.org/>

² See the document “eEurope Smart Cards Common Requirements: Executive summary”. Available on the website

Mapping the framework with the methodology

The mapping of the four parts of the framework with this four-tiered methodology may be interpreted as follows:

- GIF Part 1 and GIF Part 4 address respectively background and deployment from the perspective of the first two tiers of the methodology (context and concepts).
- GIF Part 2 presents the functional requirements to be taken into account when defining the operational and implementation models by deriving them from the context and concepts defined in GIF Part 1 and some strategic decisions/assumptions
- GIF Part 3 presents operational and implementation models.

| | Part#1 | Part#2 | Part#3 | Part#4 |
|----------------|--------|--------|--------|--------|
| Context | | | | |
| Concept | | | | |
| Operations | | | | |
| Implementation | | | | |

Figure 2: GIF Parts and the 4-Tier methodology

1.2 Scope of GIF Part 4

This part of the GIF (GIF part 4) addresses the subject of IAS/IOP deployment strategy. In fact, it provides the necessary concepts and methods for answering the question: "How to create a smart card community that is able to add e-services by offering them a common interoperable IAS?"

This document will cover two kind of situation:

- Establishing the smart card community wanting to be interoperable with other smart card communities based on IAS;
- Transforming an existing smart card community into one with interoperability capabilities.

The basic assumption is always that the smart card community is established according to the GIF models, as presented in the previous parts

This document provides:

- In clause 2, the basic concepts for the deployment strategy
- In clause 3, the method for developing a deployment strategy by drafting and agreeing upon two documents:
 - Mission document
 - Strategy document
- In chapter 4, the deployment conditions

This document has been drafted for the following intended readers:

- Those which are card issuing oriented, i.e. active in smart card communities (= card base operating):
 - o Policy and decision makers involved in (the preparation of) mass deployment of PKI and smart cards as 'Your Reliable Key' to e-services
 - o Project leaders and others involved in the (potential) exploitation of a smart card base (of a smart card community)
 - o Consultants, coaching/advising smart card communities in getting started and developing the potentials.
- Those which are service providing oriented, i.e. active in e-(service) communities

- o Entrepreneurs exploiting e-services, considering to open the service with “Your reliable key” (IAS / IOP with smart cards)
- o Project leaders and others involved in the (potential) exploitation of an e-service
- o Consultants, coaching/advising e-service communities in getting started and developing the potentials

1.3 Definitions and acronyms

1.3.1 Definitions

This section complement the definition section included in GIF Part 1,2 and 3. Therefore, only definitions that are new to the GIF have been introduced in this section.

| | |
|----------------------|--|
| Action research | <p>‘Action research’ is a basic method for developing, accepting and disseminating new knowledge. This research has the following elements:</p> <ul style="list-style-type: none"> • Study and solve problems direct in reality (no lab experiments) • Deploy repeated cycles of: problem definition, planning, action and evaluation • Direct to changing the thinking and acting of people involved in a problem • Orient the knowledge to the problem and to the (‘social’) system that has to handle the problem. |
| Deployment strategy | A set of concepts and methods which are fit to establish a smart card community, develop the systems for IOP / IAS, connect E-services to IAS, and organise IOP between smart card communities (and its e-services). |
| Knowledge management | “Concept of reference for organising the smart card community and e-service community activities as an ‘e-company’ (based on IT, networks, e-services, etc) |
| Value chain | <p>A chain of business activities, oriented to the added value of every element in the chain. The sources of value can be:</p> <ul style="list-style-type: none"> • Reducing complexity, creating higher scales etc. (in order to get cost leadership) • Innovation / to gain the premium that the customer is prepared to pay, often oriented to niches (in order to get differentiation leadership) • Perception of value as seen by the customer. <p>Michel Porter states, and the practice of many companies proves it, that a company has to be excellent in one of these approaches, and not try to combine them.</p> |
| Smart factory | “A shop or a centre where basic products are offered as a workbench to those entrepreneurs that are developing consumer oriented business cases by prototypes, pilots and small-scale exploitations of dedicated services”. |

1.3.2 Acronyms

This section complement the acronyms section included in GIF Part 1, and 3. Therefore, only acronyms that are new to the GIF have been introduced in this section.

| | |
|-----|---|
| YRK | Your Reliable Key to e-Services (synonymous for EID on smart card, as proposed by Euclid-project) |
|-----|---|

2 The basic concepts

2.1 Introduction

Organising interoperability for e-services based on identification, strong authentication and qualified signatures means implementing/transforming a **smart card community** in such a way that the number of e-services offered to the card holders can be extended.

The following concepts will serve as basis for the proposed deployment strategy:

- A general organisation concept
The community as a knowledge based organisation, distinct from the traditional organisation approach
- A business strategy for value creation
The value chain, which gives the basis to the creation of business cases
- A Business development / marketing concept
The smart factory concept, which helps to handle the traditional vicious circle in smart card projects:
 - o Does infrastructure push the content business
 - o Does content pull the infrastructure business

One other concept is less specific for the deployment/transformation of a smart card community. It is however presented in the appendix. Action research is presented as the learning concept (adaptation ability)

2.2 Knowledge Management

2.2.1 The concept

The knowledge management concept is defined as a “Concept of reference for organising the smart card community and e-service community activities as an ‘e-company’ (based on IT, networks, e-services, etc).”

The fact that knowledge can be represented virtually all times and everywhere challenges to new visions on how to organise the knowledge-oriented company.

For explaining this, we refer to traditional organisation concepts. They are build around handling ‘goods flows’, and have often a kind of fixed hierarchical organisation shape:

- Most of the people in traditional (industry oriented) organisations are involved in production and distribution of goods.
- The layer above is involved in managing the operational goods flow (defining and deploying targets, planning, budgets, etc,
- The top layer is involved in the long-term development (market objectives, investments, product/merchandise policy etc.).

Procedures are relatively heavy and the typical shape of this type organisation the triangle, because the basis (production) absorbs most of the resources.

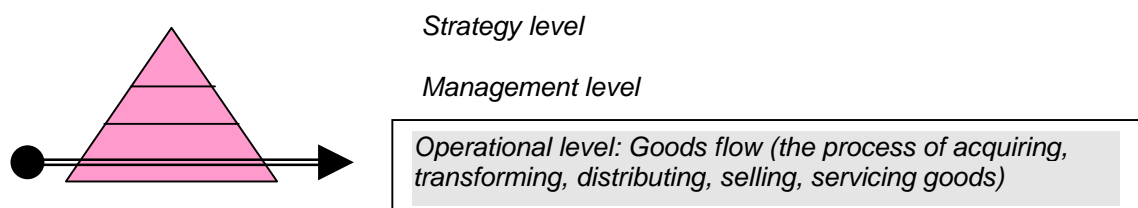


Figure 3: Presentation of a ‘traditional’ company organisation

When transferring the “goods flow” into the “flow of knowledge” (represented in data, information, graphics), a more dynamic and less hierarchic approach can be reached which better helps answering the question “How to activate brains and avoid the inertness of bodies”.

The required functions are not any more represented in a strict hierarchy. The involvement of the steering and control functions differs per period and per activity.

The knowledge flow is represented below by a curved arrow that involves the following units:

- The business unit of the e-service (e-service community):
- The operations (use of the infrastructure)
- The services (use of the smart card and the certificates)

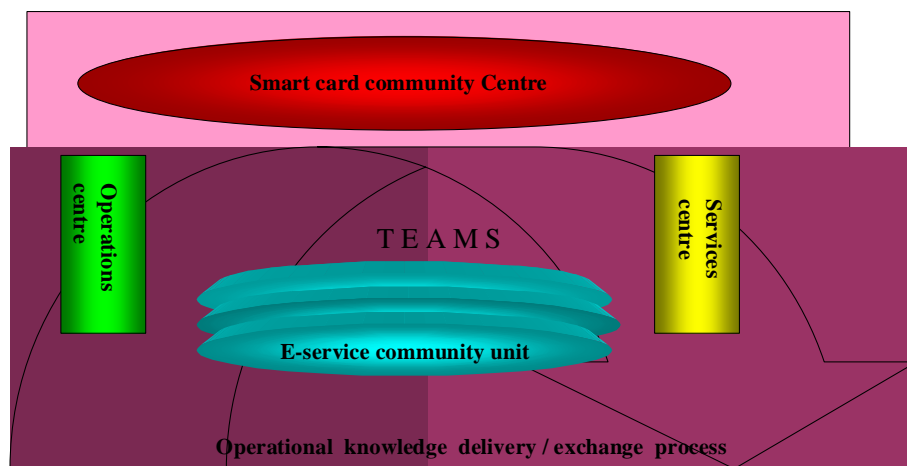


Figure 4: Presentation of a knowledge company organisation

All stakeholders are involved in this operational process, via the bodies of the knowledge organisation. The mapping between the roles and the bodies in the knowledge organisation process is as follows

| Roles | Community centre | Operations centre | Service centre | Business unit (e-service community) |
|-----------------------|------------------|-------------------|----------------|-------------------------------------|
| Card issuer | X | | X | |
| Certificate authority | X | 0 | 0 | |
| Access provider | X | X | | |
| Service provider | X | | | X |
| Content provider | X | | | X |
| Card holder | | X | X | X |

0 = or / or

Table 1: Mapping knowledge organisation entities / role model

2.2.2 Applying the concept to a SCC

The concepts of *knowledge management* is well suited to organise the smart card community because data, information and graphics are the ‘flows’ that must be processed, and not the physical goods flow.

In the text below, we are inspired by ‘Value based knowledge management’ as used by KPMG³.

³ Rene Tissen, Daniel Andriessen, Frank Lekanne Deprez, “Value-based knowledge management, creating the 21st century company: knowledge intense, people rich” Addison, Wesley, Longman Nederland BV, 1998, 255 pages, isbn 90 69879291, nugi 684.

Based on the definition and models as introduced in GIF part 1, the following knowledge organisation subjects must be covered:

- Mission / direction / strategy.
This relates to the smart card community, because in GIF it is the responsibility of the smart card community to create the conditions (card base, common IAS application, infrastructure, business orientation, contracts) for the e-services.
- Business / market presence
This relates to the e-services, because in GIF it is the responsibility of the e-service provider to exploit the service towards the consumer or cardholder
- Systems for production of the services and anticipation
This relates to the infrastructure, to deliver the requested knowledge, and prepared for the ability to quick response to new market developments and customer preferences.
- Operational processes
This relates to the front office environment of the e-service providers for the users

In a knowledge-based organisation, these subjects do not have the 'triangular' shape any more. They are handled by dynamically interacting teams, with by times paying more attention in direction defining than operations. Operations can react very quickly in the knowledge-based environment.

These teams are action oriented and work over the different bodies mentioned above. General types of tasks to be handled in teams are:

- The teams for 'combine and connect'
- The teams for 'sense and respond'
- The team for 'create and produce'

Individuals in the team share a learning attitude

The smart card community centre tie all the teams together, based on the strategic direction and operational involvement:

- Communicate
- Co-ordinate
- Control

Respecting the roles and responsibilities as defined in GIF parts 1 and 2, most probably the bodies that are introduced in section 2.2.1 will cover the following organisation areas, in order to act as a knowledge organisation towards customers and third parties:

- The smart card community centre - an executive management, stakeholders management, financial holding
- The e-service community units – a business unit for each e service
- The operations centre – a back office for infrastructure and technical management
- The services centre – a consumer front office, including help desk

In conclusion: The smart card community is a knowledge-based organisation where the teams bear and develop the shared knowledge and which must create trust and reward the use and sharing of (valuable) knowledge.

2.2.3 Applying the concept to the deployment strategy for a SCC

The knowledge-oriented strategy of a smart card community is steered by two axes:

- The card penetration, which is comparable with the channel strategy in traditional companies (see Figure 5, horizontal axes). This is the strategy part for which the smart card community is responsible. In traditional terms this concerns the number and quality of the outlets to the customers. In 'knowledge organisation', this is the extension of the infrastructure. In fact it is the sum of dedicated terminals and kiosks plus the number of relations to the Internet oriented tools to access the e-services.
- The value of the services, which is comparable to the merchandise strategy (concerning products and or services) in traditional organisations (see Figure 5, vertical axes). This is the strategy part for which the e-services communities are responsible.

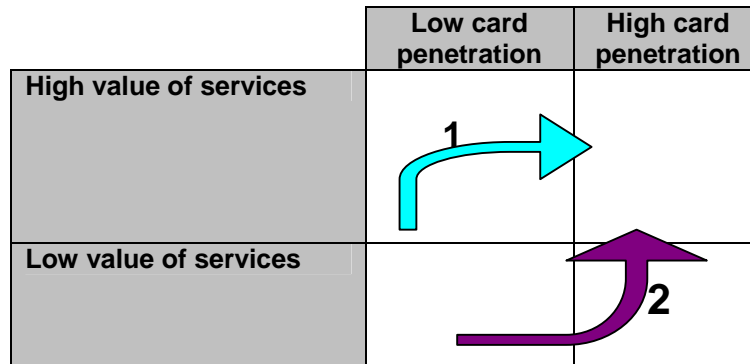


Figure 5: optimising the value creation process

Applying the concepts of Michel Porter, the strategy choices for winning strategies for value creation are:

- Exploiting high value dedicated services in for dedicated target groups, i.e. differentiation strategy (see Figure 5, from lower left to upper left position)
- Exploiting cost effective services for larger markets, i.e. cost leadership strategy (see Figure 5, from lower left to lower right position)
- Aggressive channel strategy after having introduced and established brands for well accepted and cost effective e-Services (see Figure 5, to the upper right position)

The ultimate goal of the business strategy is to reach the high right position in Figure 5.

The smart card community strategy concerns the card penetration and the infrastructure offered in the target groups. It reflects the classical problem:

- Does the smart card community creates first the card base and infrastructure, and add / invite the e-services later (curve # 1 in Figure 5), or
- Does the smart card community focuses primarily in finding the successful e-services, and follow with the expansion of the card base and infrastructure (curve # 2 in Figure 5)
In that case the strategy is much oriented to establishing a 'brand' of all the offered e-services.

The business case is in finding anyhow the right mix between card base and infrastructure on the one hand and the (number of) e-services using the card base on the other. The main method to balance this dynamically is the 'value chain' as explained below.

2.3 Creating a Value chain

2.3.1 The concept

For determining and tuning the business strategy the concept of the value chain is very useful.

The 'strategic fight' of any company should concentrate on:

- Position against competition (ultimately to make competition moderate)
- Good margins (cost leadership or leadership in value as perceived by the customer)
- Risks in “mega” –forces: market entrance, technology substitution, shifts in the base of suppliers and/or customers.

When a stable business situation is reached (moderate competition, good margins, controlled risks), then the strategy should focus on the (expansion in) the (distribution) channels.

One of the most successful tools to create the business strategy is the Michel Porters’ “value chain”. It helps stopping thinking in isolated specialised functions in a company and focuses the business organisation on the total process of value creation for the customer.

The sources of value can be:

- Reducing complexity, creating higher scales etc. (in order to get cost leadership)
- Innovation / to gain the premium that the customer is prepared to pay, often oriented to niches (in order to get differentiation leadership)
- Perception of value as seen by the customer.

Michel Porter states, and the practice of many companies proves it, that a company has to be excellent in one of these approaches, and not try to combine them.

Two typical examples could help in understanding the ‘value chain’ concept:

- Bringing the purchase prices down, say by higher volumes per order, could create extra value in a ‘supply chain’. When this action causes extra costs further in the chain (higher stock keeping costs, more waste, or extra services) then the contribution to the total value is limited, or could even be negative. Bringing down the prices of the purchased goods, is not enough, the total cost in the chain must be brought down. Information of the costs in the total chain must be shared, and used to measure the performance (and give the right incentive to in this case the purchaser).
- The production of goods could create extra value by anticipating service requirements that can be cashed later in the chain. Example: In modern cars plugs for electronic diagnosis systems are build in; these higher costs in the production are more than compensated by lower maintenance costs later in the life cycle of the car. Information of the user benefits in the total chain must be shared, and used to assess the production costs.

The value chain is build up from ‘elements’. Each element is oriented to a phase in the real value creation or production process, has a clear supply side (input) and a demand side (output). The value is always derived from the effectiveness for the demander - and ultimately the customer - for the whole chain. It is important that all elements in the chain maximise their contribution to the total value of the chain. Each element has to perform to the best benchmarks that are available. The consequence is that all activities that ‘under perform’ could be done better by other parties and should be ‘out-sourced’.

2.3.2 Applying the concept to a SCC

How does a value chain for a smart card community look like? The research company OVUM introduced a value chain for smart card centric services which divides the value creation process as follows:

1. Basic smart card services (smart cards, infrastructure)
2. Trust services (strong authentication, qualified electronic signature)
3. Electronic services (generic e-services, individualised/ interactive services)

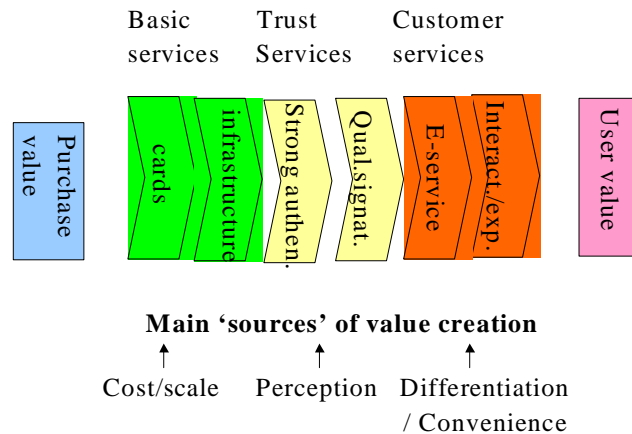


Figure 6: Value chain for generic IAS smart cards and services

- Basic services**
 Traditionally the value chain was limited to smart cards and infrastructure. The issuer does not offer to the card holder any choice in the application or e-service. The application is ultimately aimed at providing benefits to the card issuer, for its own benefit (e.g. payment, social protection or health insurance identification and entitlement, loyalty programmes). The value creation chain is mostly oriented to cost reduction for the card issuer and “creating more value” in this chain often means “lowering the cost of the smart card and the infrastructure by standardising and enlarging the scales”.
- Trust services** (i.e. Generic identification and authentication and electronic signature)
 These services are currently often directed to special services with a limited amount of users, e.g. e-Market networks (purchasing, b2b ordering, etc.), closed subscriber groups, secure internal company (tele-) networks, secure e-mailing. They are indeed rather expensive and targets environments with high interests and high risks. Mobile telecom is the only segment where some trust services (with the SIM-card) are applied on a large scale, but they are limited to identification without strong authentication or qualified signatures. In ALL other segments with low priced security products (via the internet), the offer and the acceptance seem to be fragmented. Therefore, “creating more value” in this context requires “disconnecting the trust services from the basic services” (e.g. on the basis of interfaces to OPEN standards).
- High-end Customer services**
 These services come at the end of the chain and are therefore expensive to implement. In a large number of situations, this is a solid barrier to their deployment! Currently, they are to be paid either by the customer (i.e. the card holder) or a card issuer which has a solid business case (e.g. governments). Therefore, similarly to the previous case, “creating more value” in this context requires “disconnecting the customer services from the trust services” (e.g. on the basis of interfaces to OPEN standards). This would indeed open the door for sharing costs between all those who offers e-services to the same card holders.

From the IAS point of view, there are no requirements to the application of standards in the e-Services. But when the total chain is using Internet oriented tools, it creates more opportunities to create value.

The mapping of the value chain elements with the GIF roles is as follows:

| Roles | Value creation element |
|-----------------------|--|
| Card issuer | Cards |
| Access provider | Infrastructure |
| Certificate Authority | Strong authentication, Qualified electronic signature |
| Service provider | e-services |
| Content provider | Interactive experts services |
| Administrator | None |
| Card holder | User value |

Table 2: Mapping value chain elements / roles model

Applying the statement of Michel Porter about the deployment of ‘one type of leadership in one company’, leads to the conclusion that indeed the responsibilities in the different roles should be separated, at least in three clusters, as shown in the next table.

| Type of service | Service chain | Basis of value |
|------------------------|-----------------------|---------------------------------|
| Basic services | Smart cards | Cost reduction |
| | Infrastructure | Cost reduction |
| Trust services | Strong authentication | (Perceived) trust |
| | Qualified signature | (Perceived) trust |
| e-services | High level services | Service value for customer |
| | Experts interaction + | Service value for customer |
| Total | User value | Summarised service value |

Table 3: Value chain for card based IAS /IOP services

2.3.3 Applying the concept to a SCC built around IAS/IOP

When using the value chain as a method to increase the user value by extending the e-services and the card base, the following statements are to be made:

1. Without customer appreciated e-services, smart card centric services have relatively low customer value. Or positively formulated: Relatively, the most substantial user value is created by the e-services, and not by the card itself. For smart card oriented services all strategies are open:
 - o Large scale / cheap services, competing on cost leadership
 - o Small scale / dedicated services, competing on differentiation leadership
 - o Brand / image oriented services, competing on perception
2. Parties involved in card issuing and card access providing are probably not the best to maximise the user value by services. Their contribution in optimising the value creation is oriented to the cost reduction strategy:
 - o Quality / cost ratio's by large scales
 - o Cost sharing.
3. For the acceptance of high level services in a networked environment, the perception of ‘trust’ by the customers is essential. Quality and independence from commercial interests for this part of the chain could be the key. The applied technology must be perceived as superior, and / or generally accepted.
4. The stakeholders have to follow their own strategy to maximise their contribution to the maximum user value, based on collective parameters of the final value for the user. It is important that the measures are shared.
5. The conditions that the parties have to fulfil in organising themselves in a value chain for smart card centric e-services are:
 - o Technical (standards, interfaces, handling common data flows)

- o Business (cost sharing, branding, business growing strategy)
- o Organisational (legal entities, responsibilities, common systems) with last but not least accepted common performance indicators.

2.4 Smart factory

2.4.1 The concept

For the business development in the smart card community, a new concept has to be used. The concept of 'smart factory' can be defined as:

"A shop or a centre where basic products are offered as a workbench to those entrepreneurs that are developing consumer oriented business cases by prototypes, pilots and small-scale exploitations of dedicated services".

The concept of the smart factory consists of an extended workbench plus a methodology to make the customer step-by-step more acquainted with a new product and aware of the effects that it could have on his business or business process. Smart Factory is a method to open new markets, because it breaks down the investments in small portions, each with a milestone for a go / no go decision for a next step. It reduces the risks for the investments, and for the business effects, because it starts with the workbench make a low investment start possible, with gradual extending the influence. Customers can make prototypes, do pilots and small-scale introductions, without the immediate full burden of the complete new system.

The smart factory concept assumes that there are 'half fabricated products' that have to be integrated and complemented as an offer to the end user. This is typically the case for e-service providers, wanting to use generic IAS and create interoperability for their services.

The relevance of the smart factory concept lies very specifically in the fact that PKI, being the core technology for IAS, is difficult to implement. Failure of an application can be caused by small factors in the complex multi vendors / multi system / multi application / distributed environments that must be dealt with.

In terms of the value chain, the smart factory should be positioned between the elements of basic + trust services and the e-services with two key transfer points coming together:

- Business to business transfer (from basic smart cards services and trust services to e-service providers)
- Business to consumer transfer: the e-service to the cardholder.

The smart factory is an organisation concept for these elements

The e-service provider is the key player in the ultimate value creation process for the user, but he has to deal with the well-known "chicken or egg" problem:

- You need content or a trigger-service for developing infrastructure
- You need an operational infrastructure for developing any e-service.

He has therefore to create an e-service community, based on several components held and managed by different other stakeholders:

- Smart cards base
- Infrastructure
- Strong authentication
- Qualified signature.

The smart factory aims at supporting him in this process. The value chain makes clear that the abilities to create and exploit a smart cards base and an infrastructure are totally different from the abilities to exploit an e-service to the consumer. It also pinpoints the way out of this

vicious circle by indicating that you need to position a 'business tool' between the smart card community (basic services and trust services) and the e-service communities. The smart factory is a 'business tool' which will take care of expanding the usage of the basic and trust services since they are cost oriented, which means looking for large scales and multiplication of the usage, by multiplying the e-services offered to the card holders.

2.4.2 Applying the concept to SCC

Applying this concept to the value chain for e-services, with generic IAS, the smart factory could be defined as 'a workbench' for smart card services and infrastructure, with trust services and ready-made interfaces for the demonstrations, experiments, prototypes, pilots and (temporary small) scaled applications for any e-service'.

This workbench covers:

1. Primary IAS / IOP application, available on smart cards
2. Packaged software for the secondary (conditioning) processes to run a smart card community
3. Ready made modules to connect tertiary processes of any e-service
4. Tools (for example for IOP adapters and the testing of IOP)
5. Documented methodologies and coaching capabilities

The customers of the smart factory are companies and entities wanting to enter the e-commerce market (B-t-b, b-t-c). The smart factory is equipped with all the necessary solutions and licences to offer temporary situations to customers, in preparation of the 'real' e-commerce equipment.

It is important that the smart card community not only establishes the workbench. It is important to develop also a methodology that complies with the strategy. This methodology could cover:

- Individualised demo's
- Prototyping, eventually for parts of the e-service process
- Experiments in environments chosen by the e-service provider
- Pilots
- Small-scaled temporary set up, to support the start up of new services.

In order to start the smart factory concept, the following elements have to be elaborated by the smart card community:

1. A representative problem definition, first general business case calculations and demo to show the potential use or impact for the customer
2. A partial prototype, provisionally integrated in the customers' infrastructure
3. The quick investigation where to start the first business case development
4. A pilot in order to build and / or extend the internal acceptance

The smart factory could operate as an autonomous legal entity, or as a part of the operations centre as introduced in section 2.2. It is organised as a virtual organisation, using all ICT-means and services that are available for a 24h / 7 days everywhere to contact company.

To give a first idea about the number and nature of means and tools that could be involved in creating an active virtual organisation, the following workbench-related tools can be mentioned:

- MS exchange (e-mail, to do, addresses, shared files, etc.)
- WEB server / intranet for news etc.
- Personalisation server / security / VPN's
- Discussion groups
- Project management, time/material management, work flow management

- Net meeting
- Voice over IP / Web cam
- Search engine

The smart factory itself could also be the reference tool for the smart card community to offer e-services to the new entrants.

2.4.3 Applying the concept for IOP

When an e-service provider wants to welcome users / smart cards from other smart card communities, and when the smart card community has made basic arrangements, the e-service provider can use the smart factory concept to expand its business reach to the card base of the other community. The activities should be directed to:

- Access points in the target groups, co-ordinated with existing cards base, infrastructure in the community involved
- Temporary arrangements on 'perceived trust'-services: certificates etc. connected with the e-service involved
- Temporary connection facilities (IOP adapter)
- Pilots, experiments etc to test the (e-service) target group
- Plans for follow up and facilities when reasonable growth use of the card base and its infrastructure is to be expected

The key element in the negotiations and arrangements between e-service providers and the smart card communities will probably be:

- The coverage of the targets groups (card base)
- The price per unit of use (per identification, authentication, signature)
- The entrance level
- The investments
- The expected business development, including the management of the risks
- The operational subjects (testing IOP etc.)

3 How to build a Deployment Strategy

3.1 Introduction

In the previous chapter we have introduced the main 'concepts' for creating/transforming a smart card community, based on IAS / IOP. This chapter will deal with a 'deployment strategy', for which two documents that must be produced:

- The mission document
- The strategy document.

The mission and the strategy document give the basis for a generic 'knowledge based organisation', using the value chain methodology to offer e-services based on generic IAS / IOP. It could be useful to establish also a 'smart factory' for supporting the 'entrepreneurs' willing to develop e-services, in a strategy for mass deployment of smart cards for IAS / IOP. It is important indeed to have a proactive measure aimed at fostering and supporting the creation of e-service communities taking advantages of the IAS interoperability offered by one or several smart card communities.

Note: In other documents it is proposed not to speak about 'IAS / IOP based on smart cards' but "Your reliable key to e-services". In this chapter we will follow this, by speaking in short about "Your Reliable Key" (YRK)

3.2 Introduction development

It is assumed that the initiative for creating a smart card community which will support e-services based on a generic interoperable IAS, is taken or supported by a number of enthusiastic entrepreneurs, preparing a strategic decision on the creation of the smart card community. Ideally they cover together interdisciplinary the subjects like:

- ID issues
- Legal / juridical issues
- E-services
- ICT / infrastructure
- Policy making
- Human resource
- Change management / innovation management.

Of course any relevant body could take the initiative to prepare a smart card community and assign a preparation group, covering the subjects as mentioned here.

The primary objective of such an initiative or preparation group is to produce an **initiative document**. This document is based on basic notions about the smart card community and a SWOT⁴ analysis. It defines objectives, identifies constraints and available resources for pursuing the objectives. It would include e.g.:

- Mission of "Your Reliable Key" or the IAS/IOP project
 - o Target groups / customers
 - o Business case driven or not or partly
 - o Type(s) of services to be offered
- Key elements and limits of a business strategy
 - o Stakeholders and their contribution
 - o Budgets / investment requirements
 - o Basic offer to customers
 - o Business development strategy
- Key Technological decisions
 - o Cards and infrastructure
 - o Systems and tools

⁴ SWOT stands for "Strengths, Weaknesses, Opportunities and Threats"

- o Development / adaptation processes
- Key Financial policies
 - o Investing
 - o Cost compensations
- Key Policy statements
 - o Public ID
 - o PKI
 - o Privacy
 - o Stakeholder missions and constraints

It is clear, when an existing smart card community is involved, the initiative must be based on the accepted constraints:

- Mission renewals
- Business Strategy: complements or turn around
 - o Issuing; new IAS function on the cards
 - o e-Services
 - o Access providing
 - o Certificates
- Technology adaptation
 - o Card base: renewing, phasing out etc. Bring in IAS (minimum?) on existing cards ?
 - o Terminals infrastructure: renew, emulation of processes according to GIF-specs
 - o Front office: split off IAS – connection block – e-service as such
- Financial policies: new financial relations between existing stakeholders
- New or additional policy statements

The initiative phase is closed when a high level group has endorsed the initiative. Such a group gives the initiative the necessary political authority.

In this phase there are no formal rules or methods, how to handle. When the initiative has come from a high level body, the initiative phase is closed when there is a kind of agreement or consensus about the follow up.

3.3 Mission document

After the informal initiative, it is recommended to prepare a 'mission document'. The value chain concept helps to determine the most strategic decisions as mentioned in the initiative phase, and make them consistent. The value chain will also help to elaborate the mission document for the smart card community. The content of this mission has to cover:

- The smart card community
 - o What type of problem / solution is addressed / basic quantities
 - o Legal entity / Ownership relations
 - o Mission towards e-services to be offered
 - o Mission towards cardholders / branding
- Products and services: requirements / basic choices / basic quantities
 - o Basic offer: cards and infrastructure
 - o Trust offer: card management, PKI, e-sign
 - o E-Services offer
- Marketing
 - o E-services segments to be addresses
 - o Product / segment matrix
 - o Positioning
 - o Quantities
- Creating the technical environment: buying/ building / altering/ adapting
 - o Cards
 - o Infrastructure: card readers / terminals, network services /

- o Front office for card issuing / card management / RA / development and compliance testing
- Development strategies and strategic tools
 - o Towards user groups: Action research yes / no
 - o Towards e-service suppliers: smart factory yes / no
 - o Towards technical suppliers: accelerated development
- Global financial plan
- Organisation plan
- Action plan

This document must finally be accepted by a high-level group, that is established in the initiative phase.

After the mission document, it is recommended to establish a more formal organisation, to continue the work to be done. The initiative group could be transferred into a steering committee or a project team, responsible for professionally developing the strategy document.

3.4 The strategy document

On the basis of the mission document, the strategy document takes care of defining action plan and methods for actions at business, technical and operational levels. It should address individually each stakeholder concerned and would include e.g.:

- **The business strategy** (including financials, ownership and proprietary issues)
For each value chain element, the following has to be defined
 - o Input value (strategy, expected quantities)
 - o Added value (mission, strategy, assigned quantities, qualities)
 - o Output value (targeted quantity, quality)
- **The technical strategy**
The purpose of the technical environment (generic IAS or IOP adapters) is to offer the systems, tools and building blocks for accessing the considered e-services. A technical strategy would include the following steps:
 - o Project Initiation
 - o Requirements establishing
 - o Technical feasibility Assessment
 - o Risk reduction planning
 - o Project planning
- **The operational strategy**
The objective of the IAS/IOP project is to prepare for mass deployment. A project-type organisation would be most appropriate for ensuring
 - o Security for all operations
 - o Learning by experience
 - o Flexibility for quick reaction on success and failure
 - o User acceptance for success in target groups

It is clear that the strategy for an existing smart card community which want to go for IOP and expand the number of e-services based on generic IAS, has to include a 'gap' analysis between the existing situation and the desired one. It is considered as a dedicated situation, which follow in principle the same methodology.

3.4.1 Imaginary examples of 'turn around' strategies

Health care

Existing:

- Insurance companies oriented card bases (smart card communities with a minimum level of offered e-service)
- Mandatory membership cards (crypto processor).
- Infrastructure: kiosks and PC's in hospitals, GP's, Pharmacies, etc. for local use
- Front office: forms

- Cards and infrastructure paid by insurance companies justified by saving in administrative input

Desired (imaginary)

- IOP cards (international); insurance companies will be CI for 'health theme smart card communities'
- IAS on existing cards (only certificates).
- Infrastructure:
 - o New software for existing kiosks and terminals, or
 - o Every cardholder receives a personal card terminal with capabilities to phone to the internet
- Front office: (1) IAS certificate check (2) internet forms
- In case of 'personal card terminal': Back office connection between front office form and
- Funding: earning back card and personal terminal by adding new services. Pro-active involvement of e-service providers in 'theme of health'

City cards

Existing

- City based card community
- Voluntary cards, no crypto on board
- Infrastructure: kiosks and (private) card readers for PC platforms
- Front office: info
- Cards and infrastructure free (funded temporary by the local community)

Desired (imaginary)

- National scale IOP, with city as CI
- Offering 'upgrade' of card (new card with crypto)
- Extending infrastructure, based on internet tools
- Front office: high value commercial local internet based e-services that save time, traffic, give security / convenience for niche groups
- Funding: via the niches

3.4.2 The business strategy

Value chain elaboration

In the mission document the basic choices of the smart card community are made. On the basis of these choices, the business strategy contain:

- Detailing business goals concerning IAS, e-services offer, and IOP
- Trends in e-services / Analysis of opportunities
- Analysis of alternative business approaches
- Strategic targets and objectives for
 - o Card issuer (smart card base)
 - o e-services providers
 - o Trust services
- Key performance indicators for the chain
- Business development strategy
- Planning
- Budgets

For each value chain element has to be defined:

- Input value (strategy, expected quantities)
- Added value (mission, strategy, assigned quantities, qualities)
- Output value (targeted quantity, quality)

The content of this general value chain for the smart card community is determined by the strategic choices with regards to knowledge management, as indicated in sections 2.2.3 and 2.2.4, and laid down in the mission document:

- Services value (in total) pull the (development of) card base and infrastructure
- Card base and infrastructure push the e-services value.

Core Stakeholders involvement

The general value creation strategy has to challenge, and must be recognised by the stakeholders in the process.

e-Service provider

As we see the e-service provider as the main business driver(s) in the value creation, the strategy towards him is directed to maximising his abilities and opportunities. Actually the strategy should be directed to increase the number of

- Card holders interested in the e-services and therefore the smart card community
- Applications per card
- The number of sessions per
 - o Cardholder
 - o Per application
 - o Per day (week, month, year).

Card issuer

The strategy for the card issuer + access provider should define how to

- Offer good quality of the basic services or the best quality / price ratio
- Cover of target groups
 - o Card penetration target areas
 - o Access infra structure for target groups in / basic

Certificate Authority

The strategy for the CA should define how to create and offer the trust services (generic ID, authentication and e-sign):

- Establish strong authentication and qualified e-sign
- Create high perception of 'trust'
- Communicate proactively the established 'brand' and defend against scepticism of public and opinion leaders towards the use of PKI

The card issuer is the 'primus inter pares' to organise the community. He has to translate the strategy decisions, by

- making the contracts, with agreement on business accounting model, etc (see further).
- establish a accounting mechanism between stakeholders
- agree a simple accounting mechanism for IOP between smart card communities
 - o 'on us' keeps all, as a basis
 - o charges for not on us e-services arranged by the not on us –e-service intself.
 - o Statistical data for analysis and assessing the skewing of the volumes.

The business accounting model

The business accounting strategy could be based on a matrix representing investments, cost sharing and income flows between stakeholders in the community.

Transparency in the chosen performance units is a must for a successful partnership.

In the following table it is indicated that

- CI and AP invest in the basic services
- CA invests in the trust services
- SP invests in the e-services

The arrows represent the cash flows, to cover the investments + operational costs + margins

In this example three **alternative cash flows** are indicated:

1. Card holder pays all services to the service provider, and the SP pays the trust services and the basic services.

2. The cardholders pays for the card and the certificate(s) to the CI, and for the e-services to the SP
3. The card holders pays for the card to the CI, for the certificates to the CA and for the e-services to the SP.

This list is not exhaustive. The access provider is here considered to be paid via the card issuer, but the strategy could contain other options

It is clear that this strategy not only involves a internal accounting system, but also a payment system towards the cardholder. When IOP is involved, this payment systems should be applicable for

- not on us cards, to be handled via the initial registration when a cardholders is entering an e- service for the first time.
- Not on us infra structure.

| | Basic services | Trust services | e-services | | | |
|-------------------|---------------------------|----------------|------------|---|---|---|
| CI | investment ↓ ↓ ↓ | | | | | |
| AP | investment | | | | | |
| CA | | Investment | | | | |
| SP | | | investment | | | |
| CH | | | | | | |
| Alternative flows | 2 | 3 | 3 | 3 | 2 | 1 |

Table 4: Cash flow for cash flow from cardholder

In the strategy it can of course also be decided to follow other choices, like:

- Cash comes from cardholder
 - o All gathered by the e-services: per session, per subscription period
 - o Gathered by card issuer (per card or per card per period) and by service provider (per subscription period or per session)
 - o Gathered by e-service provider, card issuer, and trust services
- Cash comes from stakeholders, without contribution of cardholder (sponsoring, stakeholder benefits etc.)

It is clear that payments from the cardholder, require strategy that can convince the cardholder to use his own choice of the offered e-service.

Approach and development of the market

It is basic to define the targets for the two market levels:

- The card base and infra structure as a kind of 'half fabricate', offered to e-service providers
- The consumer market, to be approached by e-service providers.

The business success depends, as indicated before, from the ability to balance these two and avoid the following danger:

- Over-sizing the card and infra structure base for the offered e-services, which practically means that the price for the use of the card, which is the price per e-service access to an e-service, will be to high

- Under-sizing the card and infrastructure base for potential e-services, which means that the optimal mix of e-services can be offered for business exploitation, which also means that the price per access of the e-service that is using the generic IAS is higher than it could be.

3.4.3 The technical strategy

The basic goal of the technical environment of the smart card community is to offer the systems, tools and building blocks for: the e-services.

The smart card community is not involved in the e-service application itself, only in the access mechanism and the connection to the generic IAS-function.

The technical strategy has to answer questions like:

- What technical components are already in use, and need to be continued and /or adapted, in what order, and how are we to do that?
- How are we to acquire the technical component:
 - o Software for primary / secondary / and connection to tertiary processes
 - o Infrastructure components
 - o Cards
- How are we to build the components, especially the software
- What development tools are to be used, and how to exploit them

Looking from the content point of view, every smart card community can make own choices. For that reason, the recommended technical strategy is methodology oriented.

The process that the smart card community could go through consists of the following steps

1. Project Initiation
2. Requirements Definition
3. Technical feasibility Assessment
4. Risk reduction planning
5. Planning of the technical environment
6. Execution of the planned development / acquisition process
7. Test
8. Implement
9. Evaluate experiences

Process initiation

The process to create the technical environment for the smart card community has to cover the systems and building blocks as defined in GIF parts 1,2,3.

1. The generic definitions and goals have to be defined:
 - o Processes and functions:
 - o Tools to support the following functions
 - o Building blocks or system components
2. The stakeholders involved in the smart card community have to agree with the goals
3. The participation in the accelerated project development plan must be gained.

Requirements definition

With the technical involved people in the background, the functional involved people have to define the requirements for:

- Processes
 - o Primary process
 - o Secondary processes (the processes to manage the smart card community)
- Functions to be supported
- Data required, and data flow requirements
- The requirements for the technical components

Technical feasibility Assessment

With the functional involved stakeholders in the background, the technical solutions will be created, based in the comparison of alternatives.

Risk reduction planning

The planning how to implement the technical environment:

- What elements
- What sequence

Project planning

Two situations for the smart card community have to be considered:

- The technical environment have to be build up from zero
- There is already a technical environment, and it must be investigated which parts of that must be integrated in the new defined technical environment.

In the first situation is to define the requirements and send out a request for information or a request for proposal, and to build the technical environment for the smart card community. In the second situation it must be investigated what components can be re-used, and what can be re-used after modification. The list of requirements has to be used first for this investigation. The size and consequences of the adaptations have to be compared with the assessment of starting from zero. When the result of the assessments is positive, than the RFP has to be dedicated to the adaptations and complementary technology.

In both cases it make sense to use the Accelerated project development process. The existing systems have to be brought in as extra technical constraints. The consequences will appear in the rest of the process. In the project planning it will lead to different elaboration.

Who are the stakeholders that have to be involved in this technical strategy process?

- Card issuer as primus inter pares
- Access provider(s) as the main party(ies) to exploit the infrastructure of the community
- The eventual smart factory, on behalf of one or more stakeholders in the smart card community.

3.4.4 The operational strategy

Operational mission is not just 'organising secure card issuing'. Its mission is to prepare for mass deployment.

We need to establish an operational approach in which we can combine:

- Security for all operations
- Learning
- Flexibility to react quickly on success and failure
- Growing the acceptance of success in target groups

It seems that the project-type organisation is most appropriate for these requirements. Mapping this with the concept of the 'knowledge organisation', the strategy has to make the choices for:

- A small central organisation, for steering and supporting tasks; in the knowledge organisation concept this is indicated as: Smart card community centre. Tasks are:
 - o Communicate
 - o Co-ordinate
 - o Control (including the accounting)
- Operational tasks organised by objectives and much own responsibility for the flexibility.

- o Operations centre, dedicated to the infrastructure, including compliance testing for the e-services
- o The services centre, dedicated to the cardholder, including the card issuing, card management and helpdesk
The operational services strategy should be ruled by the requirements for the qualified certificates As indicated in GIF part 2, this should be at the level of EAL 4 +. Here we just mention that this requirement has severe consequences for the operational procedures in card issuing and card management. Requires good attention and study!
- Business units for the e-services.

The operational strategy also makes choices for:

- The common corporation model (smart factory is the reference organisation concept)
- The common action, learning, and acceptance strategy (action research could be the reference method; see appendix)

The corporation model at least has to give all stakeholders responsibility for the processes mentioned below. They can be organised by a contractual relation with the card issuer

- The certificate issuing and certificates checking (*)
- The access providing (*)
- The e-services providing (*)
- The IOP providing with other smart card communities (*)

(*) with the dedicated and more or less autonomous responsibility, the stakeholders involved can realise the quick adaptations when respecting the common interfaces in the architecture.

The operational organisation, and especially the question to use the smart factory as a reference, depends very much of the type of strategy that the smart card community want to follow.

- When the smart card community means that the success will be determined by 'serendipity', you accept that you cannot know what will be the successful service. The policy is to offer and try out many services and wait for success: at some moment you have the right combination that suddenly can be lead to mass exploitation: this mix involve
 - o Content
 - o Image / attention / hype
 - o Acceptance by the right target group
- When the smart card community is able to isolate the success drivers and the eliminate the prohibits in high potential cases, then the strategy could be to build out small but clear successes
- When the smart card community could have the strategy to just grow, starting with small groups, with high security constraints and professional enlarging the base / number of services

3.4.5 Legal entities, ownership and funding strategy

It is clear that we cannot do more than bringing up a check-list for this strategy. It is also clear that the strategy is not only related with the business strategy, but also with external requirements like the national legal framework and the national policy on the subject of EID.

The main determining question concerns:

- Does the national government issue the EID card, directly or indirectly
- Could there be any non-IED-related data on the card
- And if not, how is the checking of the certificates by third interested parties arranged.

Following are questions like

- Legal entity of the smart card community

- Legal entity of the bodies involved in the smart card community
 - o Smart card community centre
 - o Support centre
 - o Service centre
 - Legal entity of the card issuer
 - o Primus inter pares or
 - o Main entity, giving the legal structure to the whole smart card community
 - Contractual relations between the smart card community and the stakeholders, including responsibilities, and liabilities
 - o Towards stakeholders
 - o Towards cardholder
 - o Towards third parties
- It is important that it is clear that especially the relations to the card holders are clear and not conflicting
- o With the card issuer
 - o With the service provider
- Ownership of the cards
 - Ownership of the infrastructure
 - Ownership of the IAS software on the card
 - Ownership of the IAS data
 - Ownership of the smart card community as 'brand'
 - Does the smart card community deploy the concept of smart factory ?c
 - Billing procedures for the shared services.
 - Service procedures

4 Deployment

4.1 Intro

The high level documents (mission document and the strategy document) are the basis for deployment

Deployment as elaborated in this chapter means implementing the tactical level (managerial and organising) of the smart card community.

In fact this means establishing the bodies of knowledge based organisation, and eventually the smart factory. This concerns:

- People and organisation
- ICT infrastructure
- Products offer
- Interoperability procedures
- Bench marking

It all has to come together in a phasing and planning to get started with the smart card community or to organise the turn around in an existing smart card community. In the last case the focus is on organising:

- To accept the consequences of IOP by all stakeholders
- To split off the generic IAS from the existing applications, and make a connection module
- To build IAS application for the card
- To adapt the card base (phasing out, upgrade, etc.)
- To re-establish the terminals and infrastructure
- To re assess and re-implement the community management software (issuing, billing and so on)
- To implement tariffs and accounting for the sharing of services among the t

This chapter has the nature of a checklist

4.2 People and organisation issues

The knowledge based bodies have to be established, 'staffed' and started. This could also mean that existing bodies could be adapted.

- Establishing / adapting the required bodies to organise the smart card community as a knowledge organisation
 - o Smart card community centre
 - o Operations centre
 - o Services centre
 - o Business units for every E service
- Staffing core organisation bodies
- Contract stakeholders
- Creation of the teams, in the assignment areas of:
 - o 'Combine and connect' (strategy)
 - o 'Sense and respond'
 - o 'Create and produce'
- Create and implement the procedures for the stakeholders' involvement in the primary process
- Implement smart card management processes (secondary processes)
- Implement the procedure to connect applications / e-services

It is clear that the deployment of the smart factory concept, when this is part of the chosen strategy, has substantial influence on the way and the presentation of this deployment.

4.3 ICT issues

Implementing the strategy document plan

- Buying systems and components (cards, terminals, networks, front office servers, software, tools)
- (Re) building systems and components
- Implementing the work / test bench
- Adapting systems and components
- Altering systems and components
- Developing IOP-adapter(s)
 - o Connection of any e-service to IAS.
 - o IOP

4.4 Products and marketing

The deployment of the business case to the market depends from the strategic choices made:

- Is smart factory-concept used: then the deployment of the basic and trust services is b-t-b oriented, directed to e-services-providers.
- The smart card community is taking direct responsibility for establishing the community as a brand in the consumer market. Then the deployment can be compared with the provider of consumer goods with a strong brand, who communicates directly with the market. The shops have to take the consequences from that.
- The mechanism to share the cost must be established
- The business case must be made

4.5 IOP

The following questions have to be answered when a smart card community want to be interoperable with another smart card community:

- What is our common interest:
 - o Our users, using the not-on-us infrastructure and vice versa
 - o Our users, accessing not-on-us e-services and vice versa
- Are our processes similar
 - o Primary process
 - o Secondary process (do I trust you?)
- Are the functions oriented standards / conventions applied?
 - o Application connection
 - o Human interface
 - o Card / terminal connectivity
 - o PKI
- Are the mandatory data applied
- Are the standard for the technical components applied
 - o Card
 - o Readers / terminals / network
 - o Front office
- Can we prove IOP (testing), based on "IOP-adapters"
 - o Make connection
 - o Transition of differences
 - o Buffer data

4.6 Benchmarking

To speed up the learning curve it is recommended to create from the beginning the 'benchmarking spirit'.

Set benchmarks in the deployment environments (people and organisation, ICT, Products offer, Business growth, Interoperability) for:

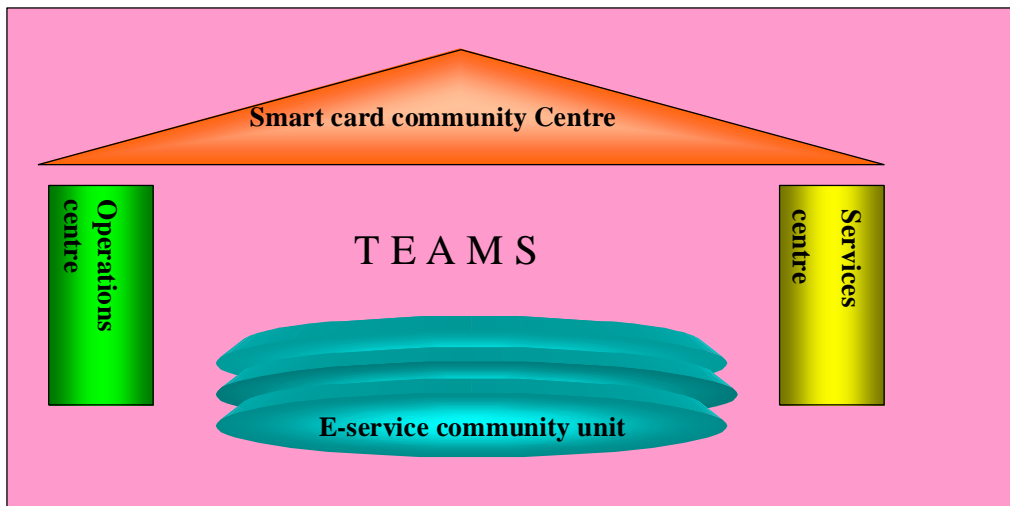
- Costs
- Successful services
- Successful technologies

Make a plan to compare own results to these benchmarks.

5 Appendix

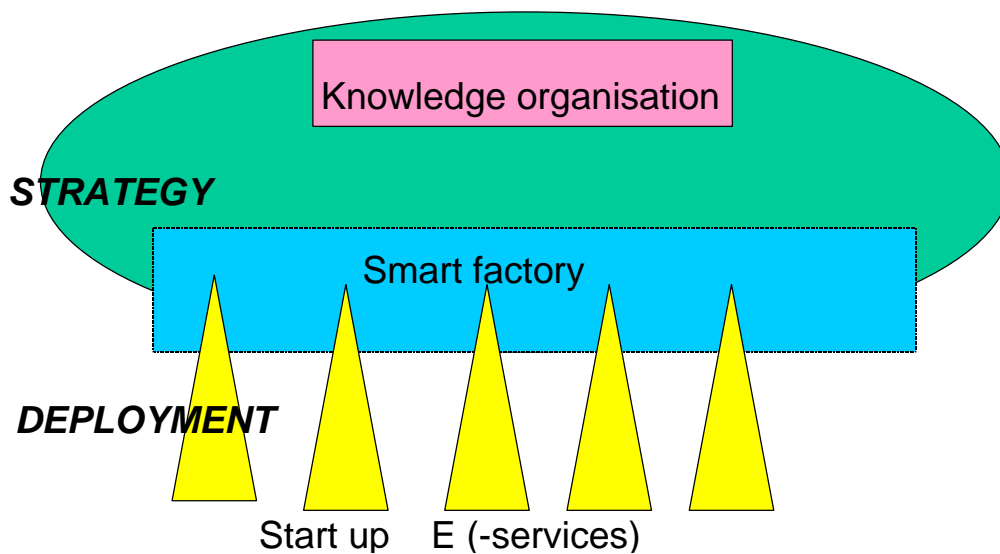
5.1 Knowledge organisation

Without the processing of the information flow, as indicated in chapter 2, this is the overview of bodies involved in the 'knowledge organisation'.



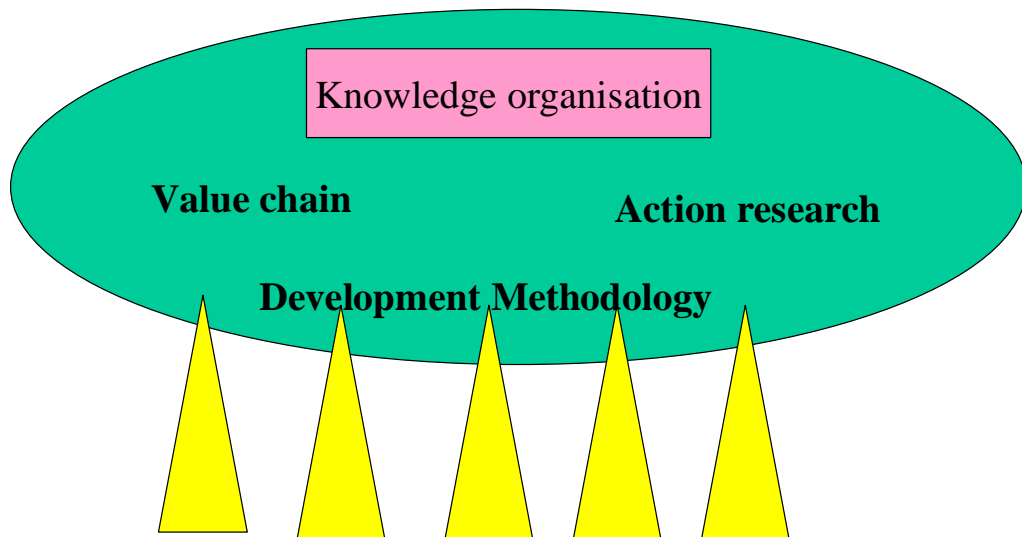
5.2 GIF Deployment: reference organisation model

The knowledge organisation as presented above (in 5.1) positioned in strategy and deployment area. The smart factory is the 'mediator' between the knowledge organisation and the start up e-service communities.



5.3 GIF deployment: reference methods

The 3 methods mentioned in GIF part 3 positioned in the environment of the knowledge organisation



5.4 Action research

For the learning curve, and the acceleration of experience accumulation in the smart card community, the concept of 'action research' is useful.

It is not considered as THE common method for all communities. So it is presented as an appendix.

Knowledge is today's' key driver to business success. Knowledge exists in a social context: people in companies, institutions, and networks with a clear goal and/or common interests.

The challenge about knowledge is to get it transferred and accepted in relevant social contexts. In a quick changing environment, learning is at least one of the keys surviving mechanism of any institution. Boosting the learning curve means orienting on benchmarking and best practices on one hand, but also on sharing and deploying on the other hand. This is what modern companies do.

'Action research' is a basic method for developing, accepting and disseminating new knowledge. This research has the following elements:

- Study and solve problems direct in reality (no lab experiments)
- Deploy repeated cycles of: problem definition, planning, action and evaluation
- Direct to changing the thinking and acting of people involved in a problem
- Orient the knowledge to the problem and to the ('social') system that has to handle the problem.

Action research is worldwide applied and modernised since more than 70 years and gives the methodological anchor points to find the way out from small scaled projects and mass deployment of smart card oriented e-services.

The method of action research builds a community to:

- Try out and learn what services are under what conditions successful
- Grow the number of 'knowledgeed' insiders and acceptants, for exponential growth.
- Learn from (the use) of services in other communities.

In the community the people involved in the research are 'object' of study (how do we gain business success) and 'subject' as well (everyone is actively involved in the research project). The required objectivity and quality assurance is given by the objective empirical data that are gathered around the models.

5.3.1 Research model

- Action research is a methodology to develop new knowledge and organise the support for it.
- Action research is directed to a 'theme' which is researched.
- Action research is a co-operation project of actors (involved in the theme) and researcher(s).

In the context of this document, the themes could be:

- Research of the business drivers for mass implementation of electronic ID-tokens
- Research for the conditions to accelerate the experience curve for mass deployment if electronic ID tokens

To accumulate the experience between projects, the results should be comparable. In this case it is proposed to test the models of GIF to their adequacy and accuracy to support the business cases for mass deployment.

The phases of action research are:

1. Theme phase: the result is the general description and structure of the questions to be studied



2. Crystallisation phase, resulting in consensus between actors and researcher about the adequacy, accuracy and order of the questions
3. Exemplar phase, with tryouts, prototypes, pilots and small scale starts to learn about the question raised in the previous phase.

The action research project is characterised by the following statements:

- Research, acting and learning are organised as an integrated process
- Actors and researchers learn from each other
- The new knowledge and the changes that follow from the new insights are not separated
- The total research activity stays explicitly in the context of the research project

There is a clear division in tasks and attitude between the action research project leader and the researcher. Generally spoken, the project leader takes responsibility for the relevant content, the action researcher for the qualities of the process.

5.3.2 General characteristics during the main phasing

| | Thematic stage | Crystallisation stage | Exemplarian stage |
|-----------------------------|--|---|---|
| Formal cycle | <ul style="list-style-type: none"> • Problem formulation • Problem listing | <ul style="list-style-type: none"> • Diagnosis • Blueprint | <ul style="list-style-type: none"> • Operations • Evaluation |
| Concrete research objective | From general problem to inventory of themes | <ul style="list-style-type: none"> • Fine tuning of problem • Priorities • Action plan: exemplar | <ul style="list-style-type: none"> • Execution of action plan • Evaluation in the effects |
| Main research activities | <ul style="list-style-type: none"> • Collection of data • Discussions • Actions | <ul style="list-style-type: none"> • Discussions • Actions • Collection of data | <ul style="list-style-type: none"> • Action • Collection of data • Discussions |
| Task actors (accent) | Discussions | Discussions | Actions |
| Task of researcher (accent) | Collection of data | Discussions | Actions / discussions |