



National IT and Telecom Agency

Ministry of Science
Technology and Innovation

Interoperability in in eProcurement: The case of eInvoicing in Denmark

MODINIS workshop
26th September 2006
Helsinki, Finland

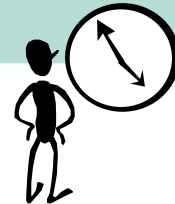


Mikkel Hippe Brun (mhb@itst.dk)
National IT and Telecom Agency
Ministry of Science Technology and Innovation
Denmark



Agenda

- eGovernment in Denmark
- Some thoughts on interoperability
- Implementation of electronic invoicing
 - How we did it...
- A new infrastructure for eProcurement
 - How we will do it now...
- European collaboration and standardization
 - We can succeed together...
- Recommendations





E-government in Denmark – the facts:

- Denmark is a small country
 - 5 million people
 - 36% of the workforce engaged by the public sector
 - 400.000 companies (250.000 SME'es)
 - Decentralized and autonomous regions and municipalities (98 municipalities in 5 regions) with their own local government and administration.
- But we have the same challenges as big countries
 - No central enterprise architecture or coordination
 - No consolidated IT-procurement
 - Fragmented use of IT-standards, SOA and general infrastructure
 - A very complex public sector, with very bureaucratic processes



Challenges which has been met with a dedicated e-government strategy

- Coordinated and shared EA-architecture for SOA in the public sector
- Standardized XML syntax and central government XML schema repository
- Deployment of free PKI infrastructure (700.000 PKI signatures deployed)
- The ability to make standards (technical, data or process) mandatory across the public sector and even the private sector (e-invoicing law)



eGovernment in Denmark – the results

2006 e-readiness rank (of 68)	2005 rank	Country	2006 e-readiness score (of 10)*	2005 score
1	1	Denmark	9.00	8.74
2	2	US	8.88	8.73
3	4	Switzerland	8.81	8.62
4	3	Spain	8.76	8.64
5	5	UK	8.64	8.54
6	8	Netherlands	8.60	8.28
7	7	France	8.58	8.32
8	10	Australia	8.50	8.22
9	12	Canada	8.37	8.03
10	6	Hong Kong	8.36	8.32
11	9	Norway	8.35	8.27
12	12	Germany	8.34	8.03
13	11	Singapore	8.24	8.18
14 (tie)	16	N. Zealand	8.19	7.82
14 (tie)	14	Austria	8.19	8.01
16	15	Ireland	8.09	7.98
17	17	Belgium	7.99	7.71
18	18	South Korea	7.90	7.66
19	19	France	7.86	7.61
20	--	Bermuda*	7.81	--
21	21	Japan	7.77	7.42

1st place
(The Economist)

Figure 1: 2005 overall maturity scores

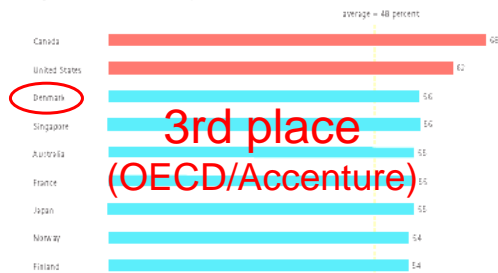


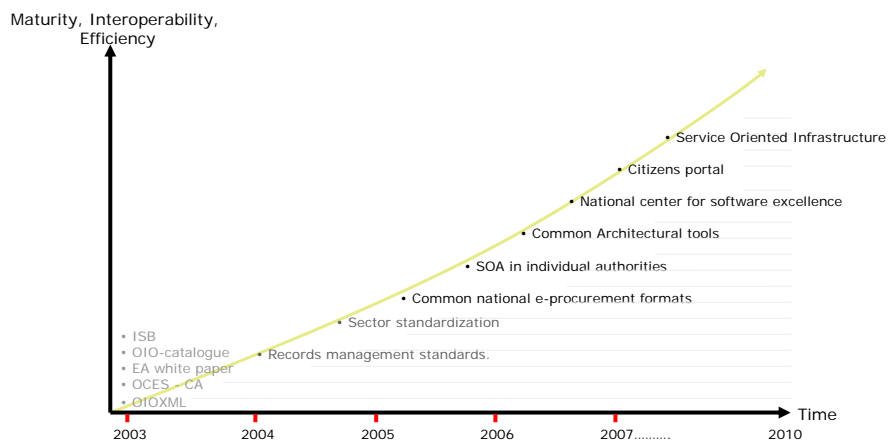
Table 3.1. E-government readiness index 2005: top 25 countries

Country	Index
1 United States	0.9062
2 Denmark	0.9055
3 Sweden	0.8863
4 United Kingdom	0.8777
5 Republic of Korea	0.8747
6 Australia	0.8679
7 Singapore	0.8503
8 Canada	0.8425

2nd place
(UN)



But challenges met, just means new challenges appear...





Vision for e-government 2010

- 50% of all Danish companies are doing full electronic business
- 90% of all Danish companies, citizens and public authorities have a digital signature certificate
- That the public sector organizations follow Enterprise Architecture principles and become service enabled (SOA)
- That we have ONE citizens portal drawing on all the different service offerings across the public sector
- That the public sector play an proactive and innovative role in shaping SOA enablement both in the private as well as the public sector
- Enable competition on services rather than infrastructure, formats or vendor lock-in

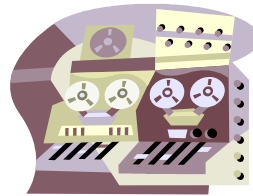
Source: "New challenges, New priorities", "Danish Globalization Strategy", "Strategy for e-government in Denmark"



San Francisco Cable Car Companies anno 1890



Similarities?



Public IT infrastructure in Denmark



The eight original San Francisco Cable Car companies:



Source: <http://www.cablecarmuseum.com>

Clay Street Hill Railroad

One line, 3½' gauge, bottom grip. Service from September 1873

Sutter Street Railroad

Two lines, 5' gauge, side grip. Service from January 1877

California Street Cable Railroad

Three lines, 3½' gauge, side grip on California St. line, bottom grip on the other two. Service from April 1878

Presidio & Ferries Railroad

One line, 5' gauge, bottom grip. Service from January 1882

Market Street Cable Railway

Five lines, 4' 8½" gauge, side grip. Service from August 1883

Ferries & Cliff House Railway

Four lines, 3½' gauge, bottom grip. Service from March 1888

Omnibus Railroad & Cable Company

Five lines, 3½' gauge bottom grip. Service from August 1889

Geary Street, Park & Ocean Railroad

Geary Street, Park & Ocean Railroad began on February 16, 1880



Characteristics of the San Francisco Cable Car Companies

Specifications:

- Deliberate choice of incompatible gauges and cable grip

Purpose:

- To protect the operator from hostile take over by competitors

Problems:

- Tailor made cable cars and components
 - Limited competition
 - Higher prizes
- Expensive to integrate
- Difficult to make profitable



Characteristics of Danish public sector IT infrastructure

Specifications:

- Unintended choice of incompatible systems

Purpose:

- None

Problems:

- Tailor made IT-systems
 - Limited competition
 - Higher prizes
- Expensive to integrate
- Difficult to make profitable

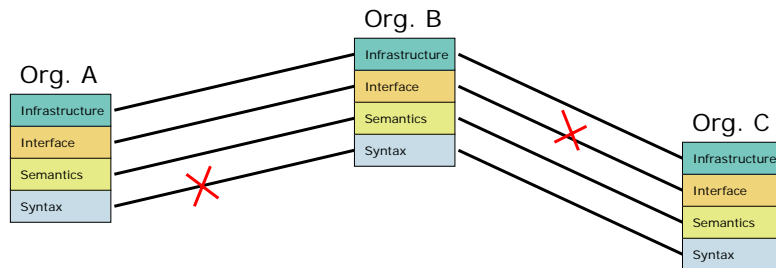


Interoperability is not only syntax

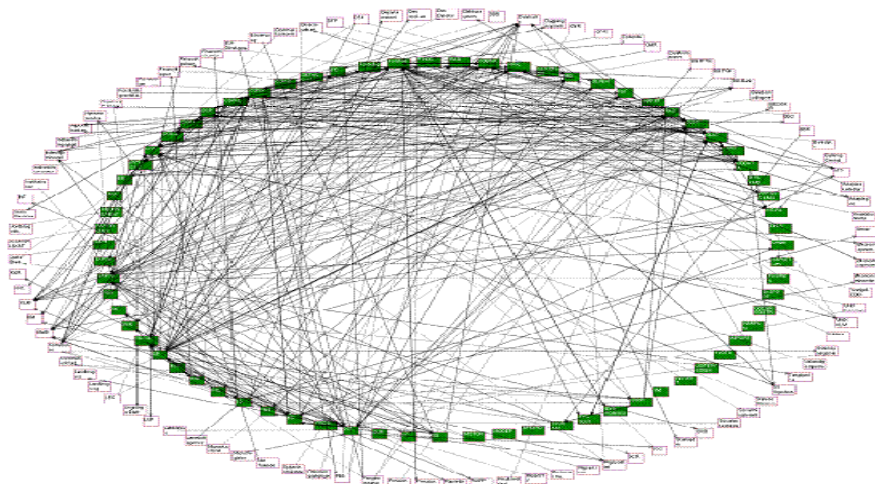
Architecture	Architecture principles and reference models for SOA	Reference model Up and running
Infrastructure	Shared SOA infrastructure-components	Project established Basics under construction
Interface	OIO WS profile: Technical standards for exposing services and data exchange	First profile standardized
Semantics	OIO data model: Semantics for data	Up and running Long way to go
Syntax	OIOXML NDR: Naming and Design for XML	Consolidated Converging to UN



Interoperability at several levels



The threat: Integration spaghetti





Electronic invoicing: This is the story of...



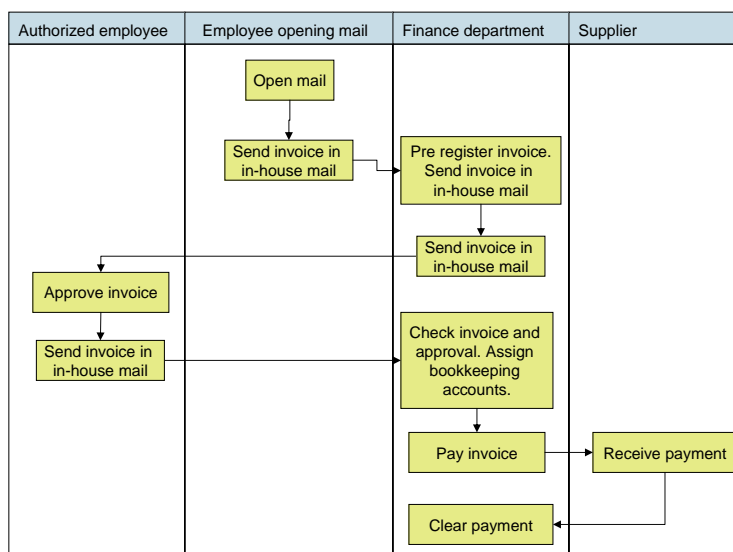
- How electronic invoicing and electronic payment in B2G eBusiness is implemented in Denmark
- How picking the lowest hanging eProcurement fruits – saves millions

The short version

- As of February 1th 2005 – all invoices to the public sector has sent electronically
- 18 million invoices will be exchanged
- The initiatives is mandated by legislation
- 440.000 companies affected
- Scanning agencies handle the conversion of paper invoices
- OASIS Universal Business Language is the underlying standard

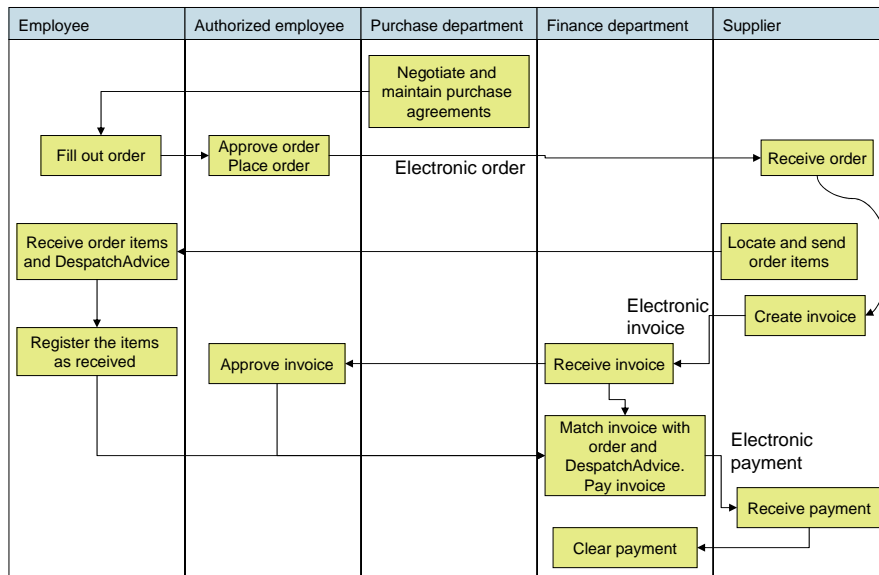


Manual invoice-to-payment





Electronic invoice-to-payment process



The business case (invoicing)



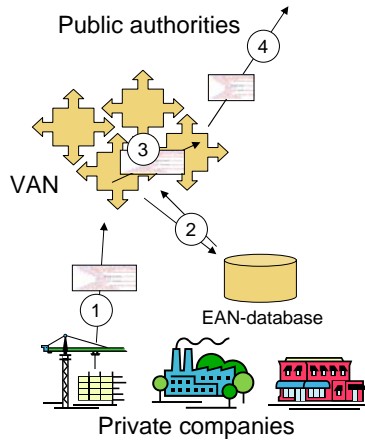
- Each minute saved in invoice handling of 18 million invoices equals 12 million Euro saved
- 10 minutes handling time is saved using an electronic invoice
 - 120 million Euro
- It is estimated that if ordering is also made electronic as much as 17 minutes will be saved in the handling of each invoice
 - Potential savings: 200 million Euro



The VAN Infrastructure



Public authorities



Process

- An invoice is sent to a VAN-operator
- The VAN-operator looks up the EAN-location number in a database
- The invoice is perhaps sent to another VAN-operator
- The invoice is sent to a public authority



VANS infrastructure principles

- A VANS-network provides:
 - Shared addressing mechanism (*using EAN-location numbers*)
 - Secure exchange of data – once data is received by a VANS-operator (*Note that that the data exchange between the customer and the VANS-operator may not be safe and reliable*)
 - Guaranteed delivery of data (*once received by a VANS-operator*).
 - Freedom from bilateral exchange agreements



The Scanning agencies

- Receive paper based invoices
- Scan the invoices (throw the paper away)
- Do intelligent pattern matching
- Produce a reduced electronic invoice
- Certified companies may act as Read In Bureaus
- A maximum of 5 days processing time



The standard

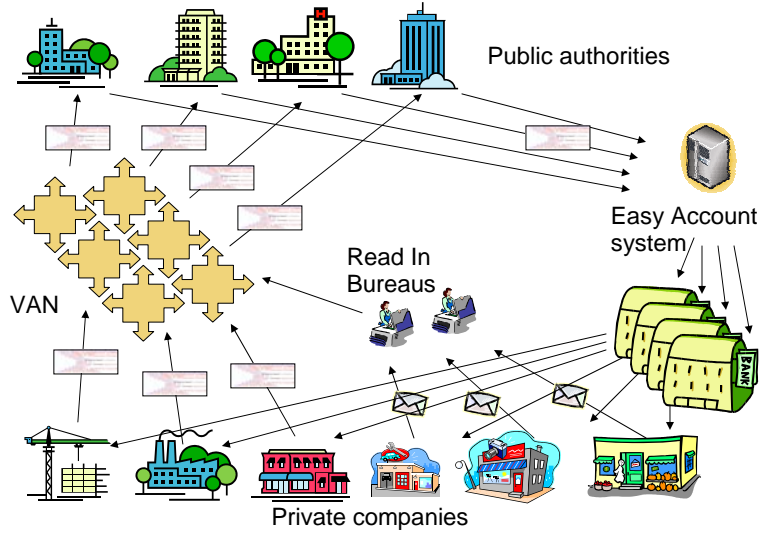


OASIS Universal Business Language:

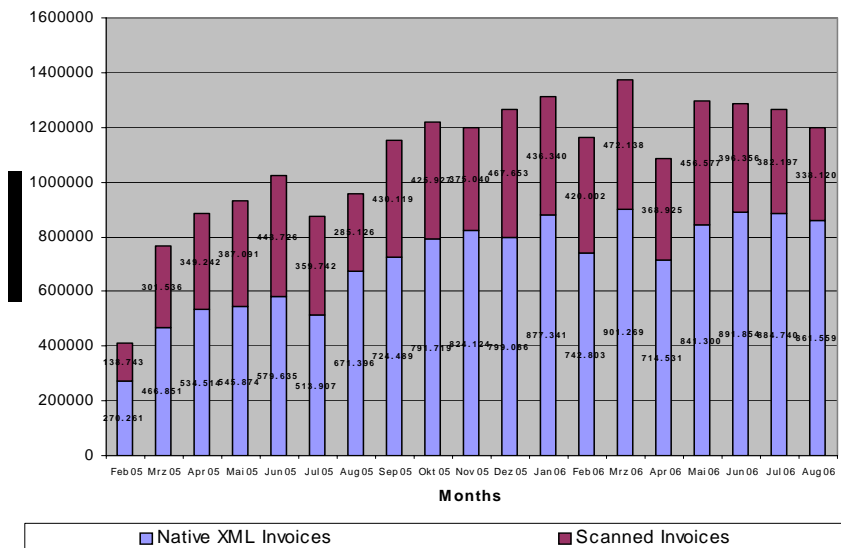
- International effort to define a royalty-free library of standard electronic business documents
- Designed in an open and accountable vendor-neutral OASIS Technical Committee
- North European localization initiative
- UK, Sweden, Norway, Finland and Denmark
- Common subset to be uses in cross border scenarios



The full picture ultimo 2005



Development in e-invoices





eEurope Award for Government readiness

<http://www.e-europeawards.org/>



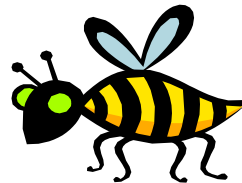
Jury's appreciation:

The project is a good example for all European governments: **electronic invoicing was mandated by law and put into practice with an XML based standard**. Business processes both in government and business have been improved significantly, since it was introduced in early 2005 achieving 95% take-up rate. An important value-added is that provision was made for SME's to comply with the eInvoicing through service providers.



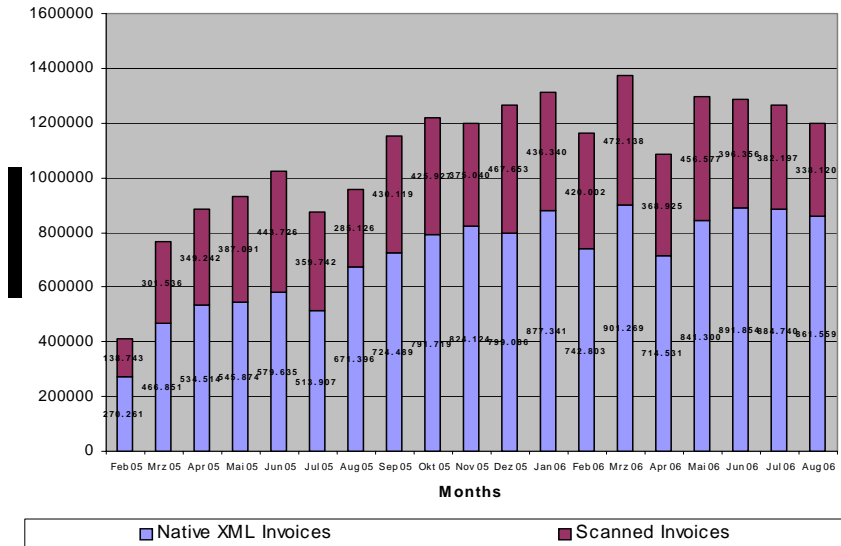
The reality at launch

- Big bang – no pilot
- Extremely tight schedule
- Poor localization
- Untested software
- Immature infrastructure
- Unskilled developers
 - XLM what?
- Unvalidated messages
- Messages sent to non existing endpoints
- A patchwork of infrastructures





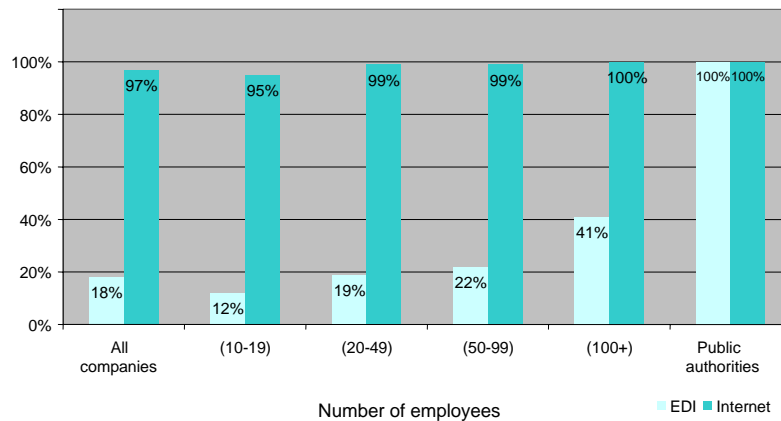
Full digitalization – a challenge



Native XML Invoices Scanned Invoices



EDI is a substantial barrier



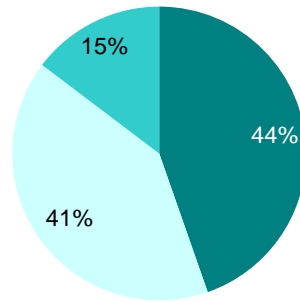
Source: Informationssamfundet Danmark 2004, Danish statistics 2004



But why are the SME's important?

(it's about lowering the barriers for participation, not ignoring the SME's)

Distribution of transaction volume for companies between 10 and 99 employees. (Total volume is 191 million orders and invoices)



KPMG 2005

■ 10-19

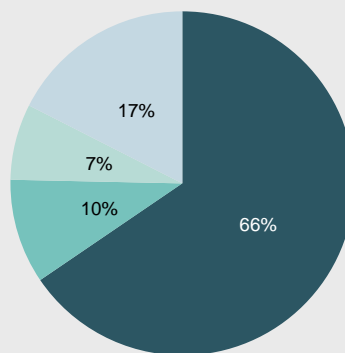
■ 20-49

■ 50-99



The biggest volume is in the private sector

Invoices - by sector



191 million invoices and orders are exchanged in companies with 10-99 employees

■ B2B

■ B2B foreign

■ B2G

■ B2C

Source: "Analyse af besparelses- og innovationspotentiale ved digitalisering af forretningsprocesser" udarbejdet af KPMG, december 2005.

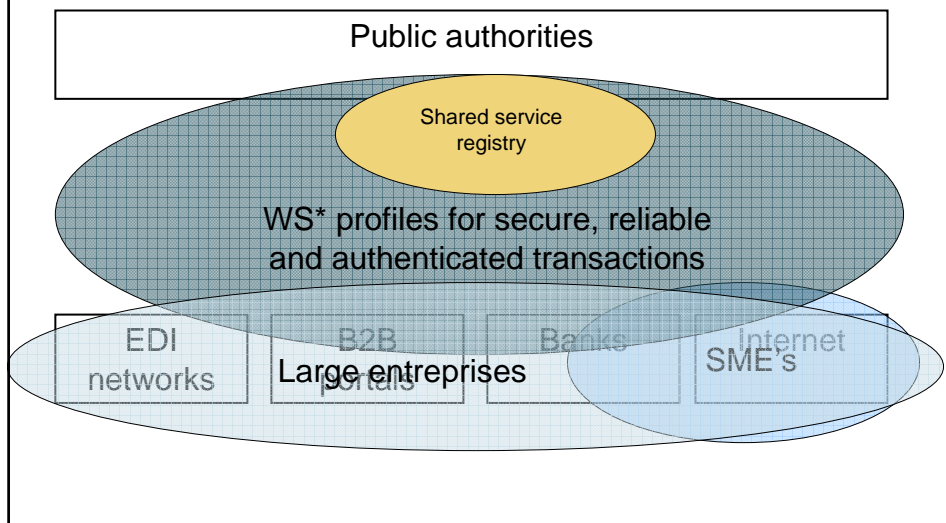


Vision: OIO Service Oriented Infrastructure

- It should be just as easy to exchange a business document electronically as it is to send an email.



Bridging the gap between networks





Goal: A Service Oriented Infrastructure

- Build an open, secure, reliable and service oriented internet based infrastructure.
- Must encompass the business requirements of both the private as well as the public sector.
- Scalable with the ability to handle up to 200+ million transactions per year.

Estimated savings 550-700 million € per year in the private sector, in average half a man year per company.



But there are still barriers towards realizing the SOA nirvana

A survey we did of 600 private companies showed that the main barriers could be divided into 4 groups (KPMG 2005) :

- Technical
- Cost vs. benefit barriers
- Organizational
- Legal / Legislative

These barriers were echoed by the IT-vendors and CIO's we spoke with in the public sector.



Technical barriers

Interoperability is a huge challenge

- It is not trivial to satisfy the basic conditions for inter-enterprise transactions on a large scale:
 - Authentication
 - Authorization
 - Confidentiality
 - Integrity
 - Non-repudiation
- Toolkits are not mature
- Standardization
 - Many different standards
 - Technical standards
 - Data standards (content)



Cost vs. benefit barriers

Without critical mass benefit is small

- Existing infrastructure investments for Big Inc.
 - No good business case for moving services from an existing infrastructure (e.g. EDI)
 - No good business case for establishing new services on a new infrastructure, who is the first mover?
 - "If it works – don't fix it!"
- John's one man company *MyGarage Technologies* on the other hand would prefer to use internet technologies when doing business.
 - On the other hand – John only saves little time in the handling of his 100 annual invoices and he may not have an incentive to do participate in Big Inc.'s electronic supply chain at all (unless of course everybody else were doing it).



Organizational barriers

Critical mass is the key to success

- SME's are needed if critical mass is to be reached
- Specific barriers to small and medium sized enterprises (SME)
 - SME's generally don't have the capability to participate in SOA based supply chains i.e. they often don't have 24/7/365 online message handlers
 - High barriers to participate in an electronic supply chain with current infrastructure (EDI)
 - Usability can be a critical issue
 - Installation of software
 - Initialization
 - Complex requirements



Legal / Legislative barriers

- Laws on PKI-based digital signatures must be passed
- Laws need to be tried in court before mass adoption
- Privacy issues
- National laws may stand in the way
 - E.g. in Denmark a bilateral agreement must be made between the parties exchanging electronic invoices.
 - E.g. in Romania all invoices must be printed on government issued paper.
 - E.g. in Germany a paper trail of invoicing transactions must be kept.

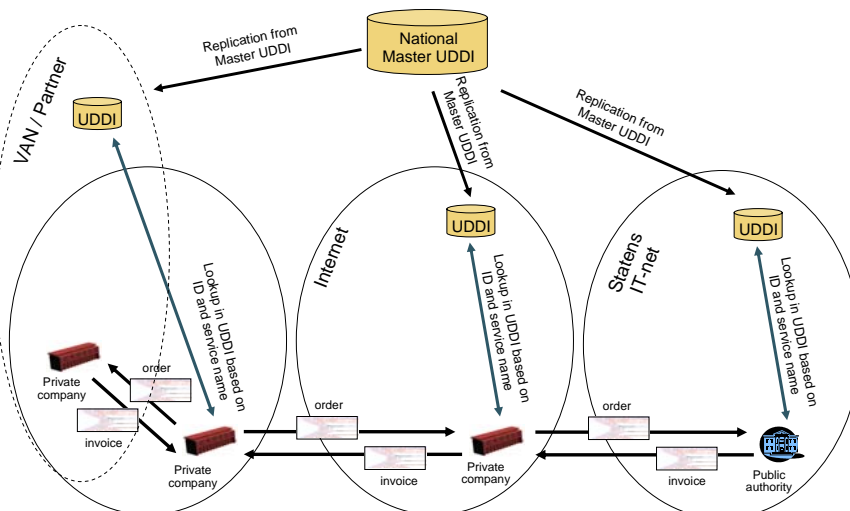


Strategy for addressing the barriers and reaching the goal

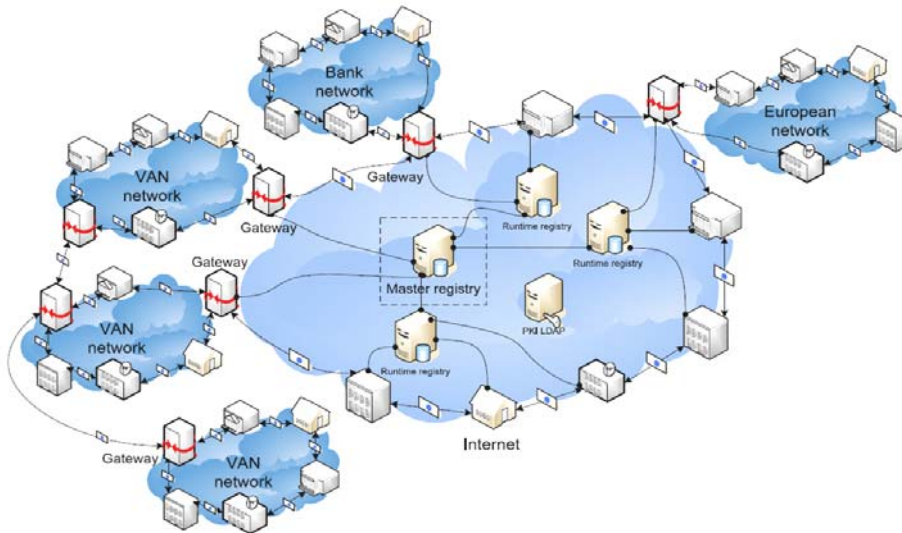
- Technical
 - National authoritative service registry
 - National standardization of a web service profile
 - Development of a toolkit which supports the profile
- Organizational
 - Public sector as a locomotive establishing and financing a shared infrastructure: Leadership
 - Take advantage of the current window of opportunity
- Legal / Legislative
 - All entities must sign a multilateral contract when registering, at a central registry
 - Alternative: Passing a law better suited for e-business transactions
- Cost vs. benefit
 - Start with business transactions that have a good balance between cost and benefit for service providers and service consumers



OIO Service Oriented Infrastructure



Implementing the vision



A simple client

POC klient

Funktioner Opsætning Hjælp

Dokumentmapper

- Udgående dokumenter
 - Ikke afsendte dokumenter (8)
 - Under afsendelse (1)
 - Kvitterede (250)
 - Returerede (0)
- Indgående dokumenter
 - Indbakke
 - Slettede dokumenter

Type	Dok. ID	Til	Adresse ID	Tidspunkt
Faktura	1001	Økonomistyrelsen	CVR 35744796	10-08-2006 08:51
Faktura	1002	Finansministeriet	CVR 63637828	10-08-2006 09:21
Faktura	1003	Globaliseringsrådet	EAN 15396572	10-08-2006 11:15
Kreditnota	75	Erhvervs- og		08-08-2006 15:43
Kreditnota	76	Skat		08-08-2006 16:11
Ordre	110	Kontorforsyning		07-08-2006 13:00
Ordre	111	IDA-kantine		08-08-2006 10:37
Ordre	112	Frukt distribution	EAN 81321629	09-08-2006 11:59

8 dokumenter



A simple client

The screenshot shows a software application window titled "POC klient" with a sub-window "POC klient: Faktura, ID 1001 (til: Økonomistyrelsen)". The window has a menu bar with "Afsend dokument", "Slet", "Udskriv faneblad", and "Luk vindue". Below the menu bar, the status is "Status: Ikke afsendt" and the document path is "Dokument sti: c:/ekonomi/fakturaer/1001.xml".

The main content area is divided into two sections: "Customer" and "Faktura".

Customer
Økonomistyrelsen
SE12345678
Street Name 12
DK-1234 City Name

Delivery
Street Name 12
DK-1234 City Name

Faktura
Company Name A/S
Invoice number 1001
Issue date 10-08-2006
Contract/order 1234
Delivery date 2006-01-01
All amounts in DKK
Payment means Cash

Item	Quantity	Unit price	Total
FE-Element type 12345-67	10 pcs.	500,00	5.000,00
Eventual extra taxes ReasonCode			0,00
VAT basis			6.000,00

At the bottom, there is a button "Vis hjælpetekst" and a status bar showing "0 dokumenter".



A simple client

The screenshot shows the same software application window "POC klient" with the sub-window "POC klient: Faktura, ID 1001 (til: Økonomistyrelsen)". The status is "Status: Ikke afsendt" and the document path is "Dokument sti: c:/ekonomi/fakturaer/1001.xml".

The main content area shows the following details:

Faktura
Dokument ID: 1001 Tidspunkt: 10-08-2006 08:51
Til: Økonomistyrelsen Adresse ID: CVR 35744796

Status
Ikke afsendt

Dokument sti
c:/ekonomi/fakturaer/1001.xml

Bemærkninger
Lorem ipsum dolor sit amet, consectetur adipiscing elit, set eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exerc. Irure dolor in reprehend incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

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At the bottom, there is a button "Vis hjælpetekst" and a status bar showing "0 dokumenter".

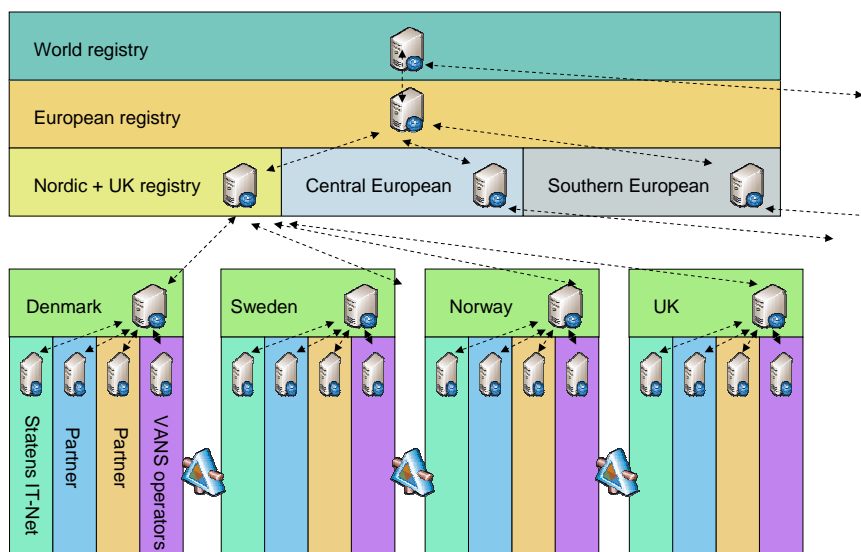


Different procurement profiles

Profile	Document														
	Order	OrderResponse	OrderResponseSimple	OrderChange	OrderCancellation	Invoice	CreditNote	Reminder	Statement	CatalogueRequest	Catalog	CatalogItemSpecificationUpdate	CatalogPricingUpdate	CatalogDeletion	ApplicationResponse
BillingSimple						X	X								X
BillingExtended						X	X	X	X						X
OrderingSimpleToBillingSimple	X	X				X	X								X
OrderingSimpleToBillingExtended	X	X				X	X	X	X						X
OrderingExtendedToBillingSimple	X	X	X	X	X	X	X								X
OrderingExtendedToBillingExtended	X	X	X	X	X	X	X	X	X						X
CatalogSimple											X			X	X
CatalogExtended											X	X	X	X	X
CatalogAdvanced										X	X	X	X	X	X



Registry structure 2012





Experiences and recommendations

(Opinion, process, business case)

- Public authorities and private companies have been positive
 - It is widely recognized that electronic procurement is the way forward
- The overall legislation, standardization and implementation schedule has been too tight
 - Legislation must be ready 12 months prior to launch
 - Standards must be ready and tested in pilots 9 months prior to launch
- Make sure that there is a benefit to be harvested – not only in the public sector
 - Do not forget that electronic invoicing can also be valuable internally in the private sector
- There is a substantial investment to be made **before** the crops can be harvested
 - Do not underestimate the help needed by organizations in order to implement internal electronic workflow



Experiences and recommendations

(Validation and application development support)

- Localize in an open process
- Make sure that your XML Schemas does a good job with strong validation
- Find a customization mechanism that does not break existing applications
- Provide many examples of different kinds of invoices
- Provide online validation tools
- Provide reference implementations of services
- Provide stylesheets and visualization tools
- Provide testing services



Experiences and recommendations (Infrastructure)

- Adoption of old EDI technology (the VANS network) is not necessarily the best solution
 - Do not assume that old EDI-technology reduces complexity
 - The VANS network is a barrier to SMV's
 - The VANS network is expensive and provides limited value
 - You must take responsibility over protocol and enveloping issues
- The addressing mechanism
 - must be under public control
- Consider basing your technical infrastructure on internet technologies
 - Digital signature, SSL, ebMS, UDDI, http(s), SMTP
- Be aware that your choice of infrastructure can be hard to change



Future work:

- Expanding the infrastructure to other domains
 - Healthcare (Electronic Patient Journals)
 - Records management
 - Tax reporting for companies
- New shared infrastructure services
 - Federated Identity and Access Management
 - Attribute service
- International cooperation
 - North European working group
 - European Union / IDABC
 - OASIS / UNCEFACT / CEN

UBL 2006 - Microsoft Internet Explorer provided by IT- og Telestyrelsen

Adresse <http://www.ublconference.com/200611/index.html>

UBL International 2006

The event is held in Copenhagen Denmark, November 13-17 2006

[Home](#) [Venue](#) [Sponsorship](#) [Registration](#)

UBL International 2006 - <http://www.ublconference.com>

UBL International 2006 is running its inaugural event in Copenhagen Denmark ([Scandinavian Trade Building in Allergød](#)) the week of November 13-17, 2006.

UBL International is a training summit bringing together worldwide [Universal Business Language](#) expertise to deliver full-day lectures and hands-on courses from commercial training companies, and a full day of free symposium presentations, this year marking the launch of UBL 2.0!

At this time we are still accepting offers for presentations at the symposium, and for experts or training companies to offer training classes. Please fill out the [Registration Form](#) accordingly expressing your interest.

The venue, directions and hotel information are [summarized here](#).


The event includes a symposium of presentations November 16, 2006, with a theoretical maximum of 230 attendees, but attendance is "first come, first served" and is currently limited by available sponsorship:


SYMPOSIUM ATTENDANCE IS FREE! Current attendance limit: **60**

The attendance limit is set by the number of sponsors who bulk-buy seats in addition to the seats they buy for their own staff (DKR420 each + tax) - [details on our sponsors' page](#):

- Gold sponsors: buy 60 additional seats (DKR420 each + tax) and get 20m² of floor space for an information booth
- Silver sponsors: buy 30 additional seats (DKR420 each + tax) and get 10m² of floor space for an information booth
- Bronze sponsors: buy 15 additional seats (DKR420 each + tax) and get reserved table-top space

Conference organizers:


National IT and Telecom Agency
Ministry of Science
Technology and Innovation



CRANE
SOFTWARES
LTD.

Gold-level sponsors:


Silver-level sponsors:

Bronze-level sponsors:

Supporting organizations:



Questions



Service Oriented Infrastructure:
<http://www.oio.dk/arkitektur/soa/infrastruktur/english>

Legislation and statute on electronic invoicing
<http://www.oio.dk/XML/standardisering/eHandel/materialer/OIOXMLeInvoice>

Online Validator:
<http://purl.oclc.org/NET/OIOXMLeFaktura/validator>

InfoStructureBase – repository / registry
<http://isb.oio.dk>

mhb@itst.dk
chl@vtu.dk