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Topic (i): Web technology in statistical information systems

THE ALTINN PORTAL

A COMMON PORTAL FOR REPORTING DATA FROM PRIVATE INDUSTRY TO GOVERNMENTAL INSTITUTIONS

Contributed Paper

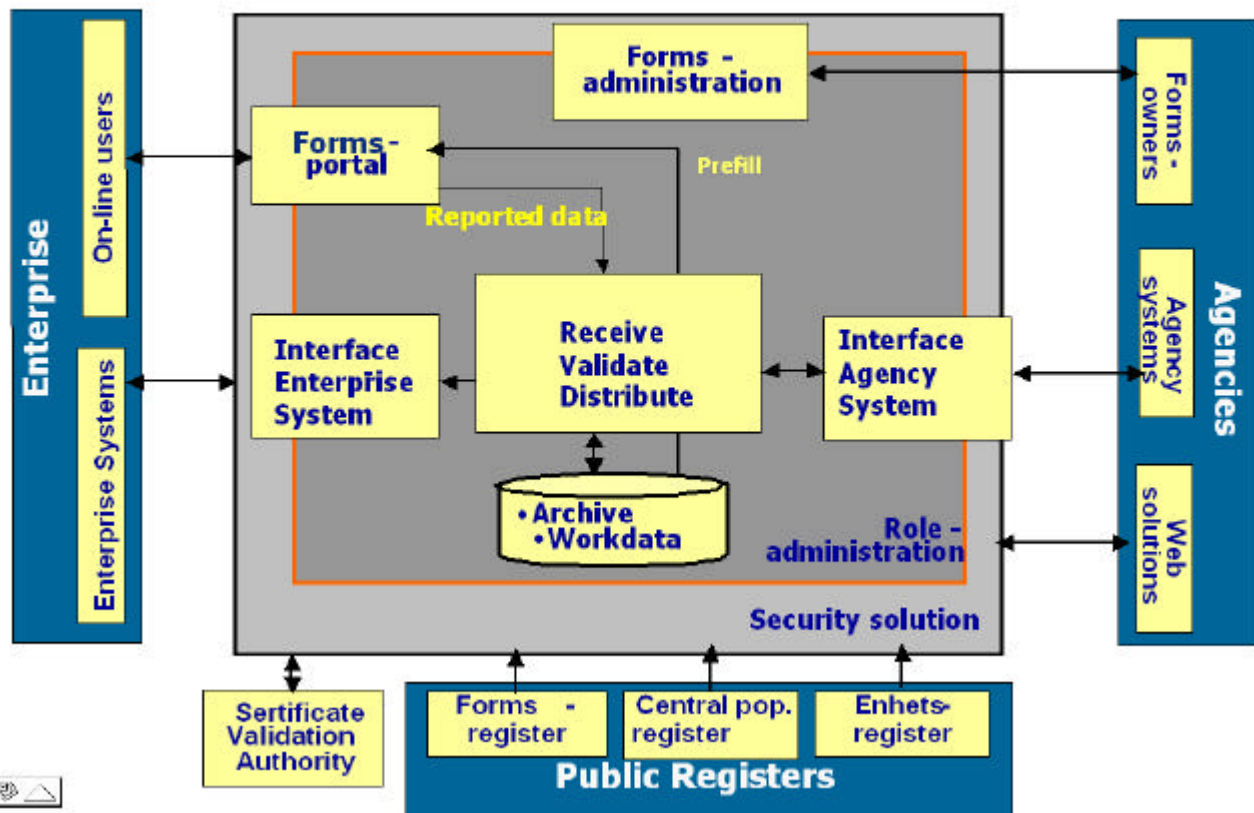
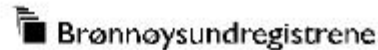
Submitted by Statistics Norway¹

I. INTRODUCTION

1. Over the last two years a common portal named ALTINN, has been created for reporting data from private industry to governmental institutions.
2. Statistics Norway, The Tax Administration (The Directorate of Taxes), and The Bronnoysund Register Centre have been the driving forces in the development of this portal. The solution provides a new way of reporting data electronically from any juridical entity; business, private persons and public organizations. The aim is to reduce the burden of reporting by a better coordination of the request for data from different governmental institutions, to have an easier way of reporting the data, and to improve the quality of the data at lower costs.
3. The application architecture consists of four main parts:
 - The ALTINN Portal where data providers can fill in forms and submit data;
 - Integration of exchange of data between the enterprise systems and public registers;
 - A communication Service Center/archive for handling reported data;
 - The forms and maintenance of the forms.

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II. THE ALTINN SOLUTION

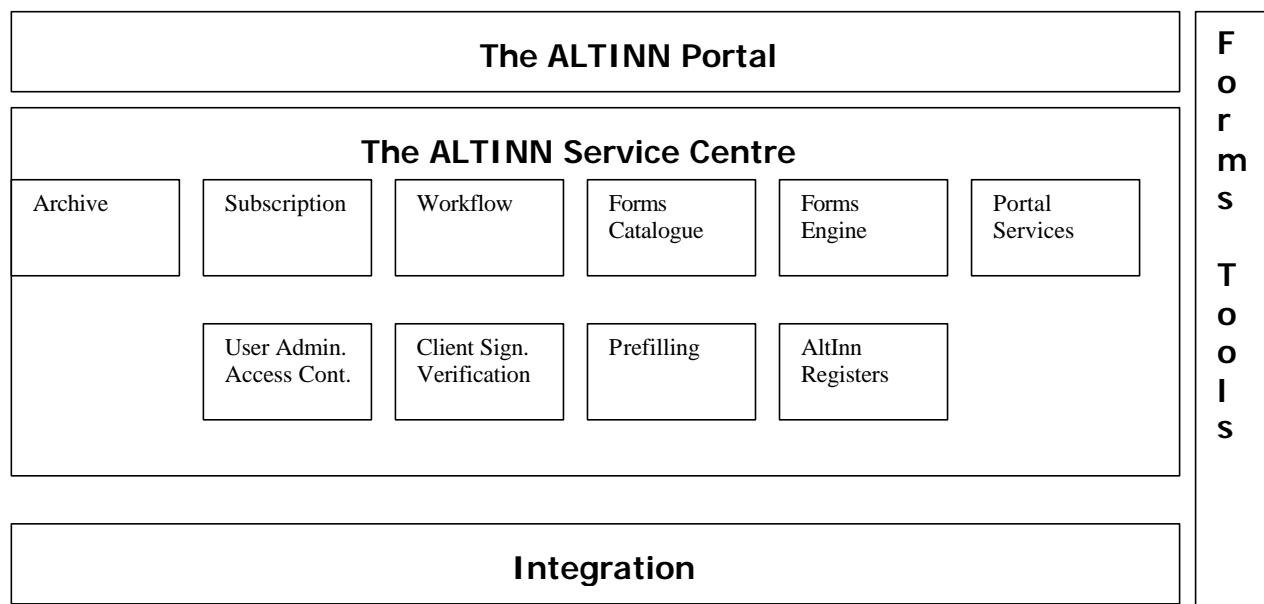


The solution

4. The reporting solution consists of the following:

- An interface towards enterprise systems for receiving complete - or partly filled in questionnaires;
- A web portal where users can fill in and control data, send data, and check previously sent data;
- Agencies (users with access) may check the forms the agency owns;
- A Service Center which:
 - receives, validates and distributes data;
 - includes a work database where the enterprise may store forms - uncompleted or complete;
 - an archive/ juridical log;
- Interface towards agency systems:
 - send prefill and subscription data;
 - receive reported data;
- Interface towards public registers;
- Interface towards other web solutions of the agencies.

5. The solution to establish or change existing forms consists of:
 - Interface to The National Register of data elements (NR) to receive metadata for the forms:
 - A forms administration tool to establish or maintain forms based on metadata from NR;
 - A forms administration tool to establish or maintain forms without metadata from NR;
 - Interfaces to public registers also includes access to data for roles and rights administration (who may send data on behalf of the enterprise).
6. The security solution includes a PKI solution, and an interface towards a trusted third party for certificates, validation and authorization.
7. The application architecture is shown in the figure below, and it consists of four main parts:
 - The ALTINN Portal, where users may fill in and send their forms;
 - The integration of enterprise systems, agency systems, and public registers;
 - The service Centre;
 - The forms administration tools for establishing new forms or changes to existing forms.



A. The ALTINN Portal

8. A content management system (CMS), has been included to establish a good information channel for the agencies and the users. News, plans, data definitions, meetings, seminars and information about new forms etc. may be published in the portal. Users will have access to an eLearning system.
9. Forms may exist in the portal in several versions (for instance for overlapping interviewing periods).
10. Persons in companies who have the role as user administrator, may distribute roles to other persons in the company.

B. The ALTINN Service Centre

11. The ALTINN Service Centre consists of 10 main parts:

(i) The Archive

- All data sent through ALTINN must be stored in a way making it legally possible to use the data as proof of what the sender has sent. This means that the stored data cannot be changed or deleted, and that all necessary approval information, envelope information and data for tracking a transaction must be stored in the Archive.
- There are multiple users that store data in the archive. Common for these are that they have to use the archive service to execute storage. The process of storing data and attachments is transactional, which means that everything is stored correct or if something goes wrong nothing will be saved. With the transaction the archive service ensures that the data integrity is not compromised. The transaction makes sure of this:
- The archive stores all the submitted forms and attachments, and information about the identity of the sender. It should not be possible to modify the data in the archive after storing. This is solved by approving the stored data with an ALTINN digital approval based on the data and timestamp for storing, and copying the archived data to optical storage.
- The form data is stored as XML (XFD), with a reference to the form definition file (XFT file) used for the specific form instance. The form definition files are version controlled and not stored directly in the archive. The form data with the reference to the form definition file is stored in a table in the archive database. In addition to the form data, available envelope information from the shipment (such as timestamp, sender ID, sender address, digital approval data etc) will be stored in the database. Attachments will be stored in a separate table, with a foreign key to the form data they belong to.

(ii) Subscription

- This consists of two parts:
 - Storage of data coming from the Register Centre and/or the agency.
 - Instantiating the work processes for enterprises where expiration date for the next population is even or less than actual date.
- The subscription file will contain the following information:
 - Governmental Organ
 - Participant
 - Form
 - Start Date
 - Scheduled Date
 - Expiration Date
 - Due Date
 - Period Type (week, month, quarter etc)
- Normally data is available from the Register Centre, but the agency may send their own subscription data, and in this case they will overwrite data from the Register Centre:

(iii) Workflow

- The Workflow System keeps track of which step of a process a form is in. Instantiating the work process for a given form happens when:
 - data from a form is to be completed or signed in the portal (received from enterprise system).
 - By the subscription component
 - if the user chooses a form from the list of all forms established in the solution

(iv) Forms catalogue

- The Forms Catalogue keeps track of which combinations of forms, versions, languages, and media type (web, PDF) that have been established.

(v) Forms Engine

- The Forms Engine is a run-time component steering the filling of the form. It is also handling the navigating menu, the computing, the validation, and the presentation of help- and error messages.

(vi) The Portal Services

- 22. The Portal Services covers the application components that are not directly attached to the filling of the forms

(vii) The User Administration and Access Control

- A copy of one public register contains information of rights and roles of people who may log into the system and send data

(viii) The Client Signature and Verification

- A PKI functionality has been built into the system.

(ix) The prefilling of forms

- This function ensures that users do not need to fill in data that already have been given. There are two sources of information, the agency systems, or public registers

(x) The ALTINN Registers

- The registers in ALTINN are copies of public registers. They are frequently updated.

C. Integration - Enterprise Systems and Public Registers

12. The communication centre includes a copy of central public registers, which are updated on a daily basis from the register owners. They are used for control purposes, prefilling and user administration (handling of roles). Only persons identified by a role in the enterprise is allowed to send data through the system.

13. Data sent from agencies are sent in different ways, using different standards, but the standards to be used are XML. Data may be sent continuously to the governmental institutions, or at agreed given timestamps as batches of data. The data may be sent in different ways (different protocols), depending of what is the preferred way for the institutions.

14. Statistics Norway receives their data over the Internet using https. The receiving and sending system installed at Statistics Norway is XML Mediator (Software AG).

15. To log into the system, a user must key his birth number, a password (pin code sent to mobile phone). Every form in the system will be defined in the standard XML Schema (XSD). Data sent through the system will be validated based on these definitions. In addition ALTINN defines a framework round these specifications to handle 'batching' of documents, attachments and information not directly linked to the data in the forms. The aim is to have an XML standard for all data sent to the agencies, but ALTINN will support standards currently used (Edifact, or flat file formats over SMTP and FTP).

16. Alternative 1. A Web Service with WS-Security.

Forms are transmitted to ALTINN Integration via one of two optional ways: In the Web Service a module is called to receive data in batch mode. One of the advantages is that the sender immediately receives an acknowledgement message that data has arrived. Another advantage is that the sender does not have to install any software to log on to ALTINN. The interfaces are available on the Internet through the protocols WSDL and UDDI.

17. Alternative 2. A batch of data may be enveloped into the ebXML format and sent to the Service Centre Integration for processing. The ebXML protocol will secure the technical transfer of the message. This solution will require a module on the sender side that supports ebXML. The ebXML protocol guaranties sending over different types of protocols.

18. Attachments may be sent as binary files (Word, EXCEL etc). The attachments will have a reference, which identifies the questionnaire they belong to.

19. ALTINN will support a service for sending acknowledgement messages in all levels of the system to be able to handle track ability.

III. FORMS

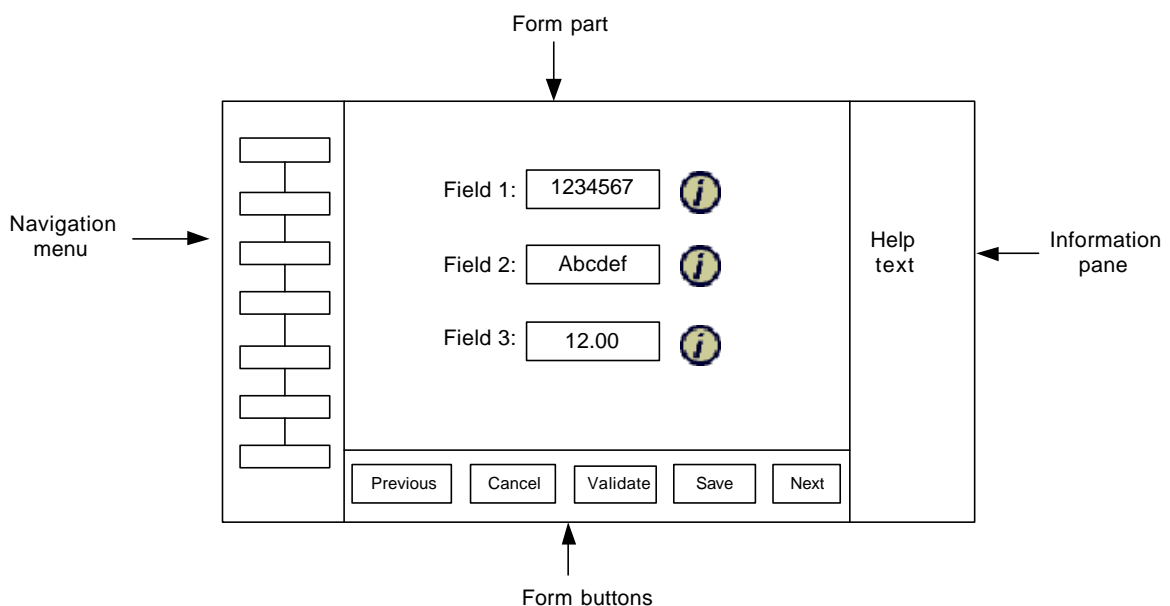
A. The Forms

20. ALTINN will give the form filler a simple and intuitively form-filling interface. A functional area called Forms Engine will control this functionality. "Adobe Form Server" will constitute the core in this area.

21. Governmental institutions must register all questionnaires and their metadata to The Bronnoysund Register Centre (eg. National Repository on data elements - NR), which is a governmental body under the Norwegian Ministry of Trade and Industry. This Centre also consists of several different other national EDP registers.

22. ALTINN receives data from NR in Xforms and XSD format, and converts them to Adobe Accelio's XML Forms Architecture (XFA). Users of NR, gets information whenever changes are made to one of the forms they use.

23. The metadata are used to create the web forms almost automatically, and businesses will find all their questionnaires and reporting periods listed in the ALTINN portal. The form-filling window consists of 3 main parts. The window contains a navigation menu, a form part and an information part, see figure below.

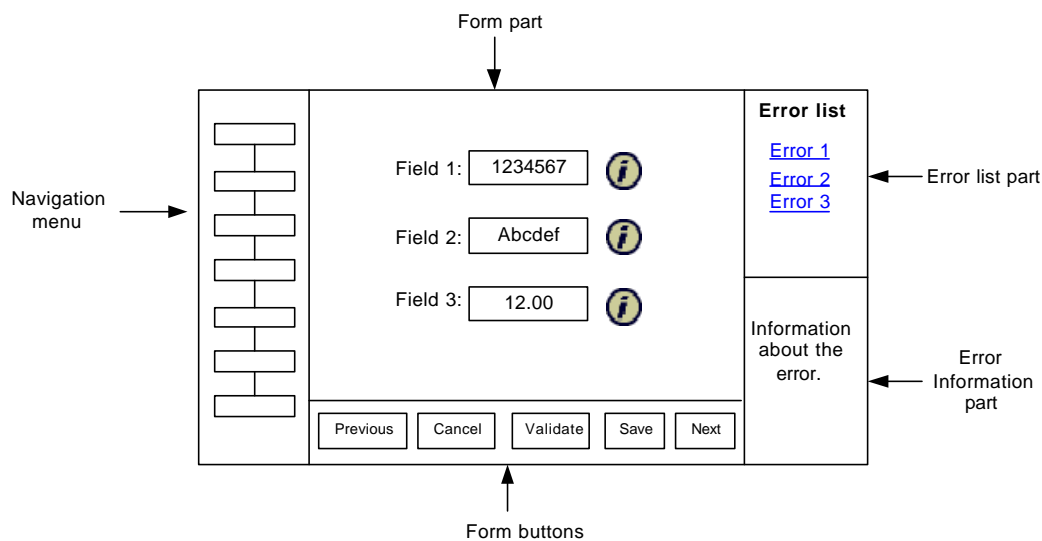


24. The form will be in the middle of the screen and the entire form will be visible without scrolling (with some exceptions) at a screen resolution as low as 800x600. I.e. the form will fit in the area, which is left after the navigation menu, and the information part is placed on the screen. The information icons on the form will always be visible.

25. Navigation, storing, cancelling and validating a form is done with the buttons at the bottom of the page. When the user clicks the validation button, the validation process will start and the validation page will be shown to the user. If there are errors on the form, the user will be presented with an error list of all the errors. If there are no errors, the validation page will only inform the user that the form is validated and no errors were found. From the validation page the user can navigate back to the form or he can go to the "Next step" page.

26. When the user is filling out a form, the information part of the window will contain help text for a field or a group of fields. When the user has performed a validation of the form, an error list will be available in the

information part. It will contain an error list in the upper part and information about the error in the lower part. The error list will take up the entire information part until the user selects a link, the error text will then appear and the error list will be correspondingly smaller. If the user selects the information icon, the error list will be substituted with the field information text.



27. When the user presses the validate form button, a validation page will be shown. If the form contains errors, a list of all the errors will be presented to the user. This error list will contain links, which takes the user back to the page where the error is located. The cursor will be placed in the field with the selected error and the error text will be shown in the bottom section of the “information part”.

28. When the page with the error is shown, an error list will be shown in the top of the “information part”. When the user selects a link in the error list, the cursor will be placed in the field where the error is.

29. If the form contains sub forms, they must also be validated before the form can be sent to the agency. The validation page for the form will also contain information about sub forms that are not validated. There will be links for opening each of the invalid sub forms as well as a link for validating all the sub forms at once.

B. Sub forms

30. The application gives the user the option of sending sub forms along with the form. This will be done during the form filling process. The sub forms will be stored in the workflow component together with the form instance. It will be possible to attach both sub forms and file attachments (e.g. Word and Excel files). If the user do not send in the form, but only stores a temporary version (with an uploaded file attachment), it will be possible to download the file attachment, edit it and upload it back to the server (this is done by deleting the old one and uploading the new version). It is possible to add several instances of the same sub form to a main form and send them in together.

- Shared fields between the main form and the subforms

31. Some of the sub forms may contain the same fields in both the subform and the main form. If the user enters a value in a shared field (in the subform), the value will also be updated in the main form. This will be done when the subform is saved.

- Cross-calculation between the main form and the subforms

32. Cross-calculation between the main form and the subforms is done by using hidden fields in the main form and populate these fields with the values from the subforms. The main form’s hidden fields will be

populated when the user saves the subform. The calculation rule is added to the field's OnCalculate event. Thus the actual cross- calculation is done when the user reopens the main form.

- Cross-validation between the main form and the subforms

33. Cross validation between the main form and the subform is done only in the main form. I.e. the validation error will only appear when the user validates the main form and the error will be indicated as an error in the main form. The cross-validation is based on the same functionality as the cross-calculation where the main form contains hidden fields which are populated with values from the subforms. The only difference is that the validation rules are located in the validation form. Thus the hidden fields are located in validation form as well as in the main form.

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