ATNP/WG2-WP/
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AERONAUTICAL TELECOMMUNICATIONS NETWORK PANEL

WORKING GROUP 2

CHANGE CONTROL BOARD

Report on ATN Database modifications

Prepared by Jean-Pierre Briand

SUMMARY

This paper reports on the implementation of the ATN database modifications agreed at the last ATNP/WG2 meeting. Discussions and proposals were exchanged on the atn-internet-technical mailing list. They are summarised here.

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1. Introduction

An update of the ATN Database guide was circulated for comments in December together with a document that made specific proposals for the implementation of the new database fields agreed at the last ATNP/WG2.

Initial proposal and mail messages are attached to this Working Paper. ATN Database Guide updated based on this discussion is not attached. The changes from the circulated copy are described below. Final version of the guide will be circulated with next agreed ATN database version.

2. New database fields

The following summarises the views and recommendations expressed in the papers and e-mails #2 and #3 provided in attachments:

1. NOT CREATE the 'validation methodologies' field

> *Attachment 1 contains an initial proposal for the content and use of this field. Email #2 provides a justification for not creating it.*

2. CREATE the 'validation status' field, but clarify its definition and use,

> *Attachment 1 contains a proposal for the content and use of this field. Email #2 provides some elements on how this field should be used.*

3. CREATE cc.mdb (i.e. mapping tables), but not a complete CC Access Database containing all DR/ORCR/CP information,

> *Attachment 1 and proposed ATN Database Guide describe how mapping should be maintained between the ATN database and the DR/ORCR/CP information.*

4. CREATE the 'Package Number' field,

> *See Attachment 1.*

5. NOT CREATE the 'critical path item' field before WG2 identifies clearly a method for filling it,

> *See Attachment 2 Email #2.*

6. NOT UPGRADE anymore the database, before any actual concrete usage of it be clearly defined within WG2

> *See Attachment 2 Email #2.*

3. New database structure and relationships

The new database structure that implements many-to-many relationships as described in the proposed ATN Database Guide is accepted.

4. Comment on upper layer protocol categories

Comment on upper layer protocol categories is valid (see Attachment 2, Email #1). These categories were defined a priori, but have not been used so far to categorise requirements. Due to the scope of ATN Internet SARPs (i.e. Internet and Management) these categories should be defined for the sole use of requirements on upper layer protocols as used by the management framework. This should be clearly explained.

For the time being, it is proposed to delete subcategories in the “upper layers” categories. This will be refined if some contribution establishes a need for it.

Attachment 1: Proposed Data Types and Values for additional ATN Requirements Database Fields

EUROCONTROL EATCHIP STA/6 (23/11/94) -

Action 6/12 - Propose Data Types and Values for additional ATN Requirements Database Fields

1. Introduction

The first meeting of the ATNP WG2 (ATN Internet WG) discussed and endorsed the need to enhance the ATN Requirements Database by the inclusion of a number of additional fields. This discussion was based around the report of the ad-hoc meeting that had taken place in London earlier in the year, the report of which was presented to WG2 as WG2-WP/2.

Eurocontrol undertook to enhance the database with these additional fields. The Eurocontrol EATCHIP ATN Internet Project STA/6 meeting recognised that these fields require detailed definition in terms of data type and values before the database enhancement may be implemented. This paper, based on WG2-WP/2, proposes the data types and values for each of these fields. Readers are invited to comment with proposed amendments as soon as possible so that Eurocontrol may enhance the database as per the WG2 agreed time-scale.

2. Background

The following relevant text is extracted from from WG2-WP/2:

- ***Validation Methodologies***

  This field identifies tool(s) and methodology(ies) to be applied in the validation process. (i.e. analysis, simulation, prototyping, implementation) for each ATN requirement defined in the database. It may transpire that any one requirement may need to be validated by a combination of such methodologies.

- ***Validation Status***

  This field identifies whether the validation process has been completed or not. This information is used as mapping between product 1and product 2 .

- ***Request Number***

  When a requirement is changed by results of Defect Reports, Operational Requirements Change Requests and/or Change Proposals the appropriate report identification number will be put into this fields as a reference.

- ***Package Number***

  It is proposed that this field be used to indicate the ATM/N Package number (e.g. CNS/ATM-1 Package) to which the requirement relates, if any.

- ***Critical Path Item***

  It is proposed that this field be used to identify the 'critical path' ATN Requirements which are necessary to be validated early to ensure for a sucessful migration to the ATN.

3. "Validation Methodology" Field

WG2/1 developed a Validation Strategy which defined the types of validation that States and/or International Organisations will undertake in validating the draft ATN SARPs. The following relevant quote is extracted from the WG2 agreed Validation Strategy.

The Working Group agreed that validation itself is an evolutionary process and that to facilitate that process the following types of validation will be used:

(1) *Analysis: Paper studies to investigate internal consistency and design issues of the ATN internetwork. It is recognized that tools such as the ATN Requirements Data Base are essential to this process.*

(2) *Simulation: Since ATN prototype components will not likely be large in number, simulation plays a key role in fit to purpose assessments. By this we mean that a small number of ATN implementation can be used to gather and assess performance data, and the simulation can then be calibrated against the "real world" results and used to extrapolate ATN performance and behaviors with a large number (e.g., thousands) of aircraft and routers.*

(3) *Prototyping: This activity results in the construction of prototype ATN internetwork components. The prototype components will typically be based on a mix of commercially available, developed, and modified commercial software. Prototype implementations can be developed in a rapid prototyping (i.e., evolutionary) manner. Prototypes may or may not be developed in a rigorous quality assurance environment. When rigorous methods are not employed, States and Organizations are responsible to be aware of the limitations and context of these prototype implementations.*

(a) *Hybrid emulation and prototype: These implementations can be used to assess ATN performance and behavior without incurring the cost of utilizing actual air-ground and ground-ground links. Hybrid prototypes exist in laboratory settings, where measurements can be taken easily, and include a simulated means of producing the effects of aircraft mobility, network connectivity, etc. Data from this activity will be used to calibrate and validate the ATN simulation models and will facilitate more efficient target environment testing.*

(b) *Prototype components: These implementations consist of laboratory implementations, yet utilize target networking components (e.g., air-ground links, ground network connectivity). Prototypes will yield valuable data concerning ATN performance and behavior in a laboratory setting where measurements can be taken easily. Data from this activity will be used to calibrate and validate the ATN simulation models and will facilitate more efficient target environment testing.*

(c) *Rigorous prototyping: detailed rigorous implementation of ATN components in an environment of formal quality assurance.*

(4) *Target Environment Testing: Laboratory based implementations, while useful for easily generating performance and behavior data, cannot predict all of the effects of operation in a target environment. This validation activity extends the use of prototype ATN components to the target operational environment. Target environment testing does not preclude the use of prototype components nor does it preclude the use of "commercial" products, if available. The intent of this activity is to gather and assess ATN performance and behavior data in an environment of ever increasing fidelity. Since these implementations will not likely exist in large numbers, data gathered and lessons learned from this activity will be used to calibrate and validate the ATN simulation models. Target environment testing includes the following activities:*

(a) flight trials necessary to demonstrate the feasibility of ATN internetwork mobile components and to gather engineering data to be used in the evaluation of draft SARPs for a given package.

(b) ground - ground trials necessary to demonstrate the feasibility of the ATN internetwork ground components and to gather engineering data to be used in the evaluation of draft SARPs for a given package.

The four major categories of validation should be reflected in the method of validation field of the ATN Requirements Data Base.

Based on the above types of validation it is proposed that the 'Validation Methodology' field data type is character and that its values are restricted to those identified in the last column of the table below. This proposal does not differentiate between the Prototype 'sub-types' agreed at WG2, however, their future inclusion should not be precluded at this pointy in time.

Analysis (A)	Simulation (S)	Prototype (P)	Target Environment Testing (T)	Database Value
×	×	×	×	**NONE**
×	×	×	√	**T**
×	×	√	×	**P**
×	×	√	√	**PT**
×	√	×	×	**S**
×	√	×	√	**ST**
×	√	√	×	**SP**
×	√	√	√	**SPT**
√	×	×	×	**A**
√	×	×	√	**AT**
√	×	√	×	**AP**
√	×	√	√	**APT**
√	√	×	×	**AS**
√	√	×	√	**AST**
√	√	√	×	**ASP**
√	√	√	√	**ASPT**

2.2 "Validation Status" Field

It is proposed that the same values as proposed for the "Validation Methodology" are used, except the contents should be interpreted as the current status of validation as oppose to the level of validation required for each requirement.

2.3 Request Number

2.3.1 Remark on Change Control database

WG2 Report proposed the following definition for this field:

When a requirement is changed by results of Defect Reports, Operational Requirements Change Requests and/or Change Proposals the appropriate report identification number will be put into this fields as a reference.

The procedure for processing DRs, ORCRs and CPs has not been specified in details yet. It is likely that some form of electronic database will be maintained. If we assume that (part of) this database is maintained under Access, the question as to where the mapping information is held must be answered.

DR/ORCR/CP database and the mapping information to the ATN database must be maintained in a separate 'cc.mdb' file. Otherwise the CCB would be constrained by the version control it applies on the 'atndb.mdb' file. It must be possible to e.g. create a new CP that relate to a number of requirements without being forced to re-issue the ATN database (with a new version number).

2.3.2 Relationships between ATN database and Change Control database

WG2/1 Report, section 3.3.2, states:

"Request Number" was also straightforward provided that when a requirement was modified by a Change Proposal it was replaced by a new requirement - there then being at most one "Request Number" applied to a requirement.

This proposal has the following drawbacks:

Changing the requirement number (i.e. database key) after every change does not preserve the consistency of the relation between ATN database and Change Control database. If two or more CPs impact on a given requirement *r*, the first CP to be implemented will delete *r* and create its replacement *r1*, etc. Only the editors will know the order in which these changes are carried. After completion of the changes, the mapping between CP and the database is out of date.

Only one CP can be processed at a time by the CCB because change results must be available (e.g. new req numbers) in order to draft the next CP.

2.3.2 Proposal

The proposal is as follows:

1. create a new file cc.mdb to support the relationship between the ATN database and the Change Control information. CCB may want to enhance this database to become the CC database.

2. file cc.mdb is not bound to the same version control as atndb.mdb file. In fact it may not be under version control at all.

3. file cc.mdb may be modified at any time to reflect the latest events in the progression of DR/ORCR/CP

4. a separate mapping (table) to the ATN database is defined for each type of CC entry, i.e. for DR, ORCR and CP

5. modified requirements may keep the same requirement number. They still can be distinguished by their version number. The decision as to whether new requirement numbers should be allocated is made during the CP development.

6. all mappings to the ATN database are many-to-many. However, in case 2 or more CPs have one requirement in common, the order in which these CPs are implemented must be defined by the CCB (perhaps a PENDING state should be defined for CPs).

This mapping information can be made accessible to users while working with the ATN database by attachment of tables from 'cc.mdb' file.

2.4 Package Number

It is proposed that the data type for this field be a decimal number 'n' , with allowed values ranging from '1' to '9', where 'n' is the CNS/ATM Package number to which the requirement relates. **The assumption made here is that any requirement identified as being required for Package 'n' will always be a requirement for Package 'n+1'.**

2.5 Critical Path Item

It is proposed that the data type for this field be 'boolean', with a true value (e.g. '1') indicating that the requirement must be validated early (prior to ATNP/2 ?) in order to ensure sucessful migration to the end state ATN.

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Attachment 2: E-mail comments

From: owner-atn-internet-technical
To: atn-internet-technical; boverga; colliver
Subject: Guide to the ATN Requirements Database
Date: Thursday 08 December 1994 14:21

Bonjour a tous,

In the above document ditributed yesterday, section 3.2.8.2, Categories of Protocols, lists ISO 8327, ISO 8823, ISO 8650, ISO 9066, ISO 9072, ISO 9596. Clearly, CMIP and supporting elements are specified in the Manual. However, ISO 9066 (RTSE) is not even in the Manual reference section. Where did this come from?

Note also that the ROSE number changed about 18 months ago to ISO 13712.

We should indicate that the ULA for ATN is not defined, and that all this derives from the one CMIP AOM12 profile.

Regards,

Steve Van Trees

From: owner-atn-internet-technical
To: atn-internet-technical
Subject: comments about the ATN Requirements Database structure & use
Date: Friday 16 December 1994 11:20

Dear all,

please find herewith some comments on the proposed changes to the ATN database contained in the files newfield.doc and atndbg.doc sent on this mailing list by J.P. Briand (Eurocontrol) on 5 Dec. 94.
More comments will be appreciated.

1/ 'Validation Methodologies' field

I agree with the format proposed for this field, but I have some concerns about
its future use in WG2 context:

- according to its definition, this field "identifies tools and methodologies to
  be applied in the validation process." The way I understand this definition
  implies that the objective of WG2 is to use this field as a formal repository
  of prerequisite to be achieved before a given requirement be "stamped" as
  VALIDATED (and then be candidate for inclusion in the SARPs).
  Such a definition almost means that this field holds the complete program of
  the validation work foreseen within WG2.
  Example: the fact that 'Validation Methodologies' for Reqt X = 'APT' (i.e.
           Analysis, Prototyping, and Target Testing) means that WG2 will only
           declare Reqt X as *VALIDATED* once results from Analysis, Prototyping
           and Target Testing will be presented with positive conclusions.

- such a use of this field is probably the ideal method for managing the
  validation work (and consequently the production of SARPs) in a very rigorous
  way, but it implies that:
       1/ Someone (Eurocontrol as ARD editor ?) actually fills this field
          (i.e. assign values) for EVERY requirement.
       2/ WG2 formally approve these values for EVERY requirement.
       3/ any state/organization can conduct validation exercises according to
          the values defined in the 'validation methodologies' field if they
          intend to follow the WG2 validation program.

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        4/ WG2 will then decide that a requirement is *VALIDATED* only when
ALL
           its associated 'validation methodologies' have been exercised with
           positive results.

I must admit that I have doubts about the feasibility of such a process,
especially as regards point 2/:
        - how will WG2 be able to agree on the 'validation methodologies'
          required for every requirement ?
        - do you really believe that WG2 will spend the time required to
review
          all the 'validation methodologies' values to be assigned to each
reqt?
          (the ARD contains 1893 items marked REQUIREMENT out of 3742 items
...)

I am afraid that such a procedure, although it is very rigorous, is too rigid
to be applied efficiently in our environment, as it brings a too significant
workload on every WG2 participant purely as regards control of the validation
procedures.  I believe it is quite illusory to think that WG2 will be able to
agree on the values to be assigned to the 'validation methodologies' field and
then to conduct the validation work in accordance with these values, using
them
as a reference.

Consequently, if we recognize that using this field in such a way is illusory,
the logical conclusion becomes: why would we keep it ? why spend so much
effort
to define this field and allocate values if we do not use it for its original
purpose ?

The real validation work will be performed in the next 2 years via validation
exercises conducted by the various states/organizations involved in WG2.
These validation exercises will be programmed upon individual initiatives
(between 1, 2 states or more) but cannot be planned globally at WG2 level,
simply because such exercises imply the use and exchange of local tools which
always result in technical, financial and legal agreements which can only be
solved punctually, on a case by case basis (i.e. not at WG2 level).
Then, the results of these validation exercises will be presented at WG2 which
will then decide whether or not they are sufficient to declare a set of
requirements as *VALIDATED* or not.

The simple fact that the validation exercises will be conducted in such a way
(i.e. upon individual initiatives versus according to a global work plan)
makes
the work implied by the definition and use of the 'validation methodologies'
field not very productive.

But, on the other hand, I believe it is still useful to store in the database
the status of each requirement as regards its validation.  Such an information
can be stored in the 'validation status' field defined as it is proposed in
newfield.doc paper (i.e. character data type).  This field would be used in
the
following way:
        1/ before any validation result is obtained, 'validation status' =
NONE
           (i.e. reqt not validated yet)
        2/ based on validation results, WG2 will decide that a given reqt is
           validated via 'Analysis', 'Simulation', 'Prototyping' or 'Target
           Testing' exercise.  The related 'validation status' field will then
           be marked as 'A', 'S', 'P', or 'T'.  It is up to WG2 to decide then
           if such results are sufficient to include the requirement in the
           future SARPs.

2/ 'Validation Status' field
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The proposed format seems OK, but I would revise its definition to make clear
that this field contains the current status of validation as regards a given
methodology, i.e.:
        - NONE means 'not validated yet against any methodology',
        - 'A' means 'validated via Analysis',
        - 'P' means 'validated via Prototyping',
```

- etc ...

3/ 'Request Number' field

I agree with the proposal to use mapping tables instead of a new field to maintain relationships between the requirements and the DR/ORCR/CP numbers. But I do not think that it is required to build a new Access database to hold all DR/ORCR/CP information, as this information will be maintained in the CENA Archive. We must avoid to duplicate work !

4/ 'Package Number' field

OK !

5/ 'Critical Path Item' field

I have no problem with the format of this field (boolean) but I am wondering how WG2 will decide which requirements will be considered as 'Critical'.
Who will assign values to this field ?
We should not create such a field before we solve, within WG2, the procedure to actually fill it !

6/ Relationships (itemof, noteof, etc...)

I fully support your idea to hold the relationships information tables in 5 different tables in order to allow for 'many-to-many' relationships.

CONCLUSION
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Based on the previous comments, I suggest to:

1. NOT CREATE the 'validation methodologies' field,
2. CREATE the 'validation status' field, but clarify its definition and use,
3. CREATE cc.mdb (i.e. mapping tables), but not a complete CC Access Database containing all DR/ORCR/CP information,
4. CREATE the 'Package Number' field,
5. NOT CREATE the 'critical path item' field before WG2 identifies clearly a method for filling it,
6. NOT UPGRADE anymore the database, before any actual concrete usage of it be clearly defined within WG2 (I simply want to avoid Eurocontrol to spend too much effort on a tool which may not be used as much as it could)

I believe that the ARD will be useful during the validation work more as a service than an actual validation tool, i.e. it will be an 'information service' which can help a state/organization to conduct validation exercises as
well as WG2 for the production of the SARPs, but it should become a tool which would dictate these states how they should conduct their validation exercises. Consequently, effort within WG2 as regards this database should be now to decide how the fields defined up to now should be filled (a lot of them are still empty: analysis categories fields, some relationships fields, etc.).
We should foresee during the next ad-hoc WG2 meeting in January some actions to
fill this database ! Why not sharing the work between interested parties ?

I hope these thoughts will contribute to the overall progress of our validation
program, rather than to the overall confusion.

Best regards,

Jean-Michel Crenais

From: owner-atn-internet-technical
To: atn-internet-technical
Subject: Re: comments about the ATN Requirements Database structure &
Date: Friday 16 December 1994 08:38

Dear Colleagues,

Below are Jean-Michel's conclusions which I wanted to address. In terms of number 1) although I had pushed for the validation methodologies, he raises valid concerns over their use. As long as a validation status (2) field as defined to contain the validation methodology that has currently been used, and that states and organization can use this information if they think that requirements have not been sufficiently validated, I can agree with this approach.

I also agree that the database should not replicate all DR/URCR/CP information but simply map to that information as needed.

Finally though I see the 'critical path item' field as a boolean value, Y/N which should be created now, but does need more discussion in WG2 on the method for filling it.

Regards

Dave

CONCLUSION
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Based on the previous comments, I suggest to:

1. NOT CREATE the 'validation methodologies' field,
2. CREATE the 'validation status' field, but clarify its definition and use,
3. CREATE cc.mdb (i.e. mapping tables), but not a complete CC Access Database containing all DR/ORCR/CP information,
4. CREATE the 'Package Number' field,
5. NOT CREATE the 'critical path item' field before WG2 identifies clearly a method for filling it,
6. NOT UPGRADE anymore the database, before any actual concrete usage of it be clearly defined within WG2 (I simply want to avoid Eurocontrol to spend too much effort on a tool which may not be used as much as it could)