A Vision for **STANDARD**: **STA**ndard **N**DT **D**ata **A**nd **R**elationship **D**escription

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Objective

To develop a standard method to represent, interpret, integrate and fuse ***NDT Data***, by using the e**X**tensible **M**arkup **L**anguage (**XML**) [1,2]. The proposed method is called STANDARD which stands for "**STA**ndard **N**DT **D**ata **A**nd **R**elationship **D**escription".

The Need

There is an urgent need to evolve a special markup language for NDT Data and its relation with both its own members and with the physical parameters they represent. There have been some initiatives in this direction [9] but they are mostly for NDT documents and general information in NDT, where the emphasis has been in *formatting information* rather than *interpreting, integrating and fusing data*. Formatting information is rather straightforward, as compared to data interpretation and data fusion. Representation of NDT results (which could be a single value, a series of values as a column vector, or a 2-d image), and the physical processes from which they originate (which might differ from one method to another; e.g., eddy current testing involves electromagnetism and diffusive phenomena, whereas ultrasonic testing involves acoustics and dispersive phenomena), in a manner that (a) is uniform, (b) web accessible, (c) allows processing either locally or as a web service, and (d) is platform and device agnostic, is yet to be realized.

Advantages

Nondestructive Testing, as a broad inter-disciplinary science and technology, employs a number of physical processes and methods for its testing and evaluation purposes. The results obtained from these multiple methods, for a given problem, are more often complimentary. At present, there is no standard way to represent these results, retaining their physical origin, in a way to fuse them to obtain additional insight. The proposed STANDARD aims to fill this gap.

Precedence

Domain-specific markup languages have been created earlier [3-7] to fulfill the needs of an area in Science and Technology. Nondestructive Testing's close cousin Materials Science has already set the ball rolling [8] in a modest way.

Pre-requisites, Expectations and How to go about

As mentioned earlier, representation of general NDT information and NDT documents has been discussed. This [9] gives the probable XML format for NDT Societies around the World, alongwith the relevant stylesheets and Document Type Definitions (DTD). Representation of NDT methods, equipments and result values (in individual, standalone mode), has also been attempted [14].

However, the proposed STANDARD aims higher, to achieve a unified integration of data representation not merely from a formatting point of view but from a higher plane of data analysis, integration and fusion. In order to achieve this, the markup language tags of STANDARD must include physical processes, result values (single, series, matrices, higher dimensional clusters), units of measurement and result interpretation, in addition to other experimental details. These tags must be uniform throughout all the NDE techniques and procedures, so that their comparison and integration is easier.

The STANDARD markup language must represent NDT results data so that the following operations on them become possible:

- Standardised multiple-level data formatting and report generation*
- Data transformations from one domain to another (time to frequency, etc.)**
- Mathematical operations on the data**
- Maintaining contextual (e.g., experimental details) relationships and information*
- Identifying and if required, eliminating contradictory physical processes from integrated data obtained through multiple NDE methods***
- Machine-level, trained, interpretations and decision-making***
- Distributed storage, incremental addition and asynchronous analysis*
- Data Analysis & Decision Support as a Web Service**
- Platform and device-agnostic rendering*

* Relatively Easy ** Difficult *** Very Difficult

These stated requirements mandate a thorough knowledge of many important facets of both NDT and Information Technology. Also, the proposed STANDARD must be in harmony with other established (or, in the process of getting ratified) protocols, such as those proposed by the ISO 11179 standard (Parts I to V) [15].

A task of this magnitude requires involvement from a number of organizations, some of which are listed below.

Probable Partners

The International Committee on NDT (ICNDT) [11], the World Federation of NDE Centers (WFNDEC) [12], the International Standards Organisation (ISO) [10] and the World Wide Web Consortium (W3C) [13], are the essential partners in this initiative. If the STANDARD can be conceptualized and developed with inputs from these organizations, it will have wider applicability, sustained improvement and effective use.

References

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