A Simple Mechanism for Sharing and Transporting Medical Digital Case Information Across Disparate Computer Language and Data Storage Environments

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It is challenging to remotely share generic medical case information without an agreed upon definition of a medical digital teaching file (DTF). By utilizing an application of the extensible markup language (XML) called web-distributed data exchange (WDDX) along with an agreed upon WDDX structure, it is technically easy to share or syndicate medical case DTFs across computing environments that use different information models and computer languages. Thus, this easily implemented technology offers us an immediately available means to share and increase the value of scientific knowledge.

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IT IS CHALLENGING to remotely share generic (nonsensitive) case information without an agreed upon definition of a medical digital teaching file (DTF). This is because DTFs have been organized in many different ways (different information models) and with different mechanisms (spreadsheets, relational databases, hypertext markup language [HTML], and text files). The main difficulty arises, for example, when a person using a Microsoft Access database and a specific database model needs to share a DTF across computing environments (and programming languages) with another system that is using a Sybase relational database and a different database model. In this case, there is a need to bridge a variety of information models, storage mechanisms and programming languages where each party has a different knowledge base.

One simple and currently available way of bridging the different language/data storage environments and information structures is through the use of an application of extensible markup language (XML) called web-distributed data exchange (WDDX). WDDX is a language-independent representation of an XML document. WDDX works through a computer system acting as a "consumer," which requests a case DTF from a remote computer system—typically through an internet protocol like hypertext transport protocol (HTTP) or file transfer protocol (FTP)—acting as a "producer" (Fig 1). The "producer" creates an

agreed upon WDDX information structure (serialized packet) from the case archive (non-patient-identifiable information) on the "producer's" system. The "consumer" receives this structure (a copy in most situations) from the "producer," unpacks or deserializes the packet, and processes it for display or storage. Thus, two different systems composed of various information models employing different programming languages have been bridged.

The consumer may be a networked workstation or an internet server while the producer in most situations will be an internet server. Using internet servers in this manner requires that a WDDX enabled "processing" language or "middleware" tool (Personal Home Page [PHP], Practical Extraction and Report Language [PERL], Active Server Pages, Cold Fusion, JavaScript) exist on the side of both the consumer and producer (Table 1). Each language has its own WDDX module that allows the WDDX package of information to be handled in a data structure native to the specific language. Because WDDX acts as a transparent "glue" for transferring information, developers and content authors benefit by using technologies that are familiar.

For example, the University of Utah and the University of Chicago could provide access to publicly available case DTFs via WDDX. A central DTF world wide web (WWW) site at the University of California at Davis could access each of these syndicated content providers (as well as their own) and build an index of DTF's for display

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Fig 1. WDDX serialization-deserialization process.

to students using a common WWW browser. Each item could then be displayed as a hyperlink that would access the originating producer for a specific case DTF WDDX packet for display within the University of California's WWW site. Therefore, there is an increase in value to all participants by syndicating information in a common manner.

With familiar technologies it is technically easy to share or syndicate DTF case material across a network of content sources (Fig 2). Each DTF content provider can therefore maintain and control their content while sharing content to a community of users. Thus, the community has leveraged and created enormous value through the syndication or network of information. At the same time, the ability to confidently and effectively share complete and congruent DTFs depends on mutually agreed upon semantics and information structure implemented by all participating DTF producers and consumers. WDDX facilitates the

Table 1. Technologies Supporting WDDX

Supported Languages	Transport Protocols	Data Types	Operating Systems
PHP	HTTP	String	Macintosh
PERL	FTP	Number	Windows
Python	SMTP	Boolean (true/false)	Unix/Linux
C/C++	POP	Date-time	OS/2
Java		Ordered array	
Javascript		Associative array	
VBScript		Recordsets	
Frontier		Binary (base 64 encoding)	
ASP/COM			
Cold Fusion			
Delphi			
Visual Basic			
Power Builder			
TCL			

NOTE. More information is available at <http://www.wddx.org>.

validation and enforcement of the "sharing rules" by supporting a language neutral set of data types and structures: strings, numbers, date-time, arrays, associative arrays, and recordsets (Table 1). Despite the ease of using WDDX and the support for sharing, success of the content syndication will

Fig 2. Possible WDDX scenario.

depend on defining a mutually acceptable and commonly understood structure of information so that a “producer” knows what to provide and a “consumer” knows what to expect.

There are multiple technical possibilities for remotely sharing DTFs. WDDX is a simple, available and easily implemented technology that can facilitate DTF sharing and syndication

of DTF content. Other technical substitutes are often very complicated, requiring a significant amount of planning and agreed upon standards, such that immediate use is not possible. WDDX offers us an immediately available and simple means to share and explore the process of remotely distributing the diversity of DTF material available.