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Excuse Me, Are You 'Vendor Neutral'?

Achieving True Interoperability

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The term "Vendor Neutral" is a loosely defined one and often subjected to interpretation. The most common reference would "*a product or specification that is not proprietary and controlled by one vendor*".

So what exactly does "Vendor Neutral" means in the world of health informatics? A recent conversation with a colleague in the industry led to an interesting comment – this term '**lacks bite**'.

Her complaint is a typical one. The healthcare enterprise where she works selected a Cardiology PACS solution provider that was 'vendor neutral', hoping that such a decision would ensure interoperability, ease of implementation and on-going support but the opposite came true. I quizzed on her definition of 'Vendor Neutral' and the reply was a fairly reasonable one – "The solution provider selling the Cardiology PACS does not have any conflict of interest as they do not sell (cardiology related) modalities".

When we talk about vendor lock-in, many a times we lament on the usage of 'Private Tags' by solution providers between their modalities and PACS. 'Private Tags' are tags containing data elements that are not defined by MITA (a division of NEMA managing DICOM) but rather, by the solution provider to convey information not defined within the DICOM standard. Such practices are commonly adopted (and perfectly 'legal' by the DICOM Specification) to help achieve specific or advanced functionalities and features unique to the solution provider.

Due to the nature of 'Private Tags', they are generally not recognized by another DICOM nodes (Modality equipment or PACS) provided by a different solution provider. This is the same reason why such unique functionalities and features stops working when not used in the prescribed 'same specific vendor' environment.

I term this category of 'Vendor Neutral', **Commercial-Driven**, because the entire context of this 'neutrality' is driven by commercial reasons - maybe the company providing the particular Cardiology PACS made a business decision not to dabble in the modality business, maybe due to strategy or maybe due to a lack of expertise etc.

Commercial- Driven Vendor Neutrality

Commercial-Driven Vendor Neutrality does not guarantee interoperability. It might motivate the solution provider to try and accommodate changes so as to gain more commercial benefit but for sure, these changes will require dedicated technical efforts and resources to ensure each new request is catered for.

The problem with the medical imaging industry (at this point in time) is that every solution provider out there, be it modality or PACS providers, have multiple product lines, each filled with products developed from R&D centers located all over the world, all with unique 'Private Tags', each requiring dedicate efforts, technical expertise and precious time from the solution provider catering to the interoperability request to hard-code the modifications, more importantly, such requests must make commercial sense.

Taking the example mentioned above, imagine that you wish to interface an ultrasound machine to your 'Vendor Neutral' Cardiology PACS;

- However, the particular model is an uncommon one (extremely unpopular or rare model) that would only amount to a total of 10 units in the world
- Your Cardiology PACS solution provider have thousands other customers with similar requests, however the ultrasound machines other customers are requesting to connect to are popular models with a large install base around the world

- Given that the total cost of investments (to your Cardiology PACS solution provider) to develop such customized connectivity is about the same regardless of make and model
  - Requiring the same level of dedicate efforts, expertise and time to hard-code the modifications for each individual request
- Don't you think it would make more commercial sense for your Cardiology PACS solution provider to focus on the requests that will please more customers?
  - It's going cost the same but the returns-on-investment (commercial opportunities) is much higher

Standards-Driven Vendor Neutrality

Commercial-Driven Vendor Neutrality will not guarantee interoperability, what we need is Standards-Driven Vendor Neutrality.

Standards are an important component in the world of Healthcare IT as it enables interoperability between disparate systems. To better explain the concept, we need to first understand that there are different levels of interoperability.

Levels of Interoperability

Broadly speaking there are three levels of interoperability; Physical, Functional and Semantic interoperability.

1. **Physical Interoperability**

   Physical Interoperability refers to the medium of connectivity or the physical connections that enables information to move from place to place.

   Examples of this can be an Ethernet cable, a Thumb Drive, a Memory Card or a wireless network. This aspect of interoperability is so fundamental that most people take it for granted.

2. **Functional Interoperability**

   Functional Interoperability is syntactic in nature. The syntax refers to the structure of a communication; this is similar to the concepts of spelling and grammar rules.

   The systems communicating must agree on the syntax for the exchange of information. HL7 Version 2.x is the best example of Functional Interoperability.

3. **Semantic Interoperability**

   Semantics refers to the meaning of a communication in terms of the vocabulary, dictionary or thesaurus and simplistically put, Semantic Interoperability refers to the ability of the systems communicating to understand what each other are saying.

   The absence of semantic interoperability will result in the exchange of data with no guarantees that it is understood by the receiving system. Common examples of Standards that address Semantic Interoperability include SNOMED, LOINC HL7 CDA.

   To give an example, imagine an American and a British conversing in English but not understanding each other due to the differences in lingo used – that is a **Semantic Interoperability** issue!

More on Private Tags

Now that we understand the different layers of interoperability, I would like to revisit the topic of "Private Tags" and point out more clearly the problems associated.

DICOM provided **Functional Interoperability** by enabling the communicating systems a structure to understand how to exchange information (the DICOM Header comprises of metadata) as well as the **Semantic Interoperability** with **Standards Tags** in the DICOM Header to ensure that both systems communicating understand what each other are saying.

With Private Tags, systems communicating have no idea what the tags are used for, or worst, if two systems happens to use the same tag to store information proprietary, mis-interpretation of the Tags will take place. In other words, with "Private Tags", DICOM can only provide interoperability at the **Functional Interoperability**, not at the **Semantic Interoperability**. Let me illustrate this with an example;

- PACS System A use Tag 1500 to store Admission Date
- PACS System B use Tag 1500 (the same Tag) to store Discharge Date
- Both PACS Systems will function properly if working in individual silo
- If images of Patient Z are send from System A to System B, PACS System B will inform the Clinician, that Patient Z has already been discharged today but in actual fact, Patient Z has was only just admitted.

Of course, the example above is an overly simplistic one. In a real world implementation, it could contain information that might result in image distortion, image artifacts or maybe mis-orientation of the images (e.g. from left to right).

So how can we ensure **Semantic Interoperability** even when "Private Tags" are used?

Find the answers (and more) in the EBook "Vendor Neutral Architecture & How it will change the World (of Health Informatics)" ISBN 978-981-08-8883-1, a community project by binaryHealthCare. This EBook addresses related topics including;

- What PACS vendors are not telling you about VNA
- Areas of assessment in selecting a VNA solution
- Best practices associated with VNA in areas of PACS Administration, Change Management, Data Migration etc
- What new exciting possibilities exists for your facility if it achieved an effective implementation of VNA
- Emerging trends in imaging informatics after the impact of VNA

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