Implementation of Metadata Repository & Protocol Automation at Bayer Pharma

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ABSTRACT

Bayer Pharma has recently implemented a Metadata Repository (MDR) for global use across Bayer Pharma for defining, governing, managing and consuming structured medical standards. The medical standards are used for several downstream processes and the MDR is used to send machine-readable medical standards to other systems both hosted internally at Bayer or externally by vendors such as Electronic Data Capture and Clinical Data Repository. Also in parallel, Bayer developing a system form structured Protocol Authoring & Automation Tool (PAAT). The PAAT keeps track of constraints and connections between study design elements such as Objectives, Endpoints/Variables, Inclusion/Exclusion Criteria, Activities and Trial Parameters. With native integration with the MDR, Company and industry approved clinical trial standards can be incorporated early on in the study design process. Users can plan and author Clinical Trial Protocol documents on demand using Bayer specific or industry standard templates such as TransCelerate's Common Protocol Template (CPT) and the NIH-FDA Clinical Trial Protocol Template. This presentation will discuss Bayers' vision for MDR and PAAT, implementation of these systems, the process change that was needed and the efficiencies that were gained.

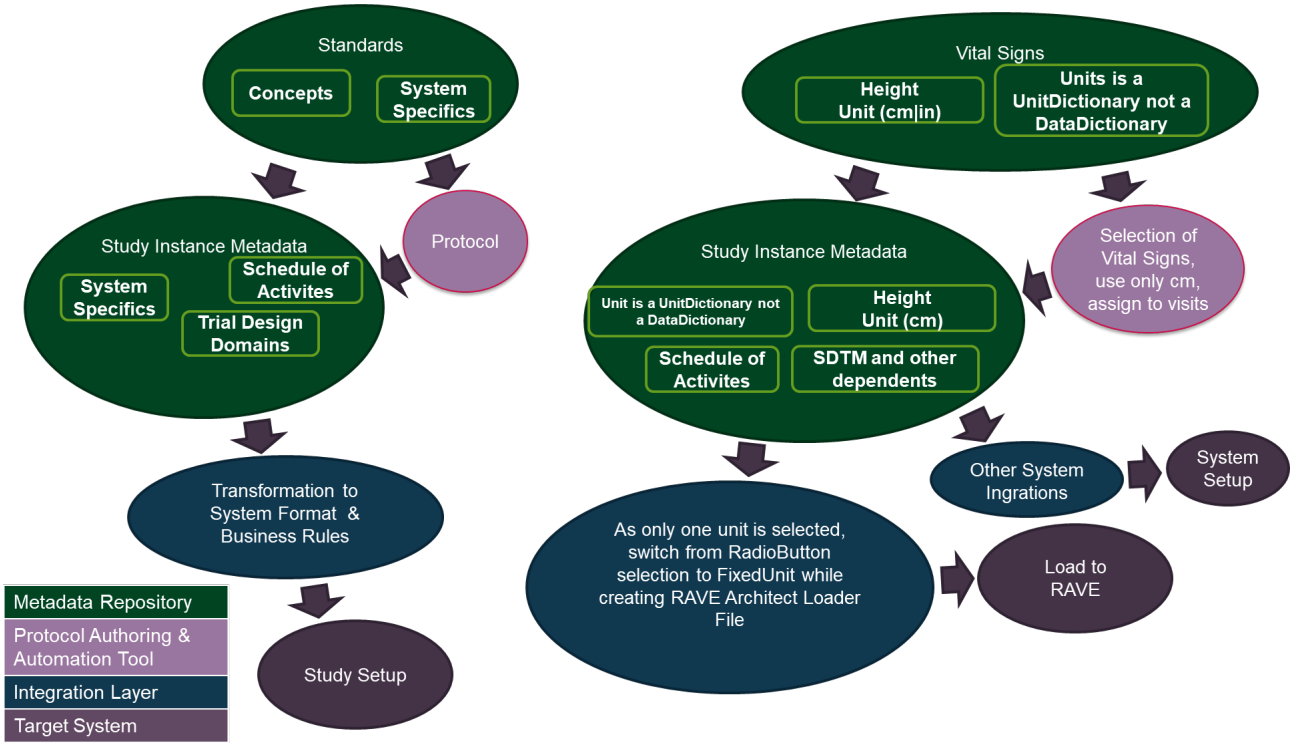
INTRODUCTION

During Bayer Pharma's rollout of the Metadata Repository took several decisions and made several observations that will be discussed in this paper. The major ones are

1. Storing not only standards metadata in the Metadata Repository, but also maintaining specific metadata per system connected
2. Not putting only a transfer integration layer between the Metadata Repository and the system, but a business logic layer that reduces maintenance overhead and increases consistency
3. Not try to automate everything
4. Extending the idea of capturing metadata by introducing a Protocol Automation Tool that guides the clinical team trough available standards and captures their input in a format consumable by the Metadata Repository.

LANDSCAPE

A couple of years ago Bayer embarked on an initiative with the aim of streamlining and automating the processes from protocol authoring, and study design, study build, SDTM data transformation, analysis and reporting for regulatory submissions. Our vision was to have a single source of metadata standards that would act as the nerve center. During the years our vision became more concrete as we understood that metadata has to be approached form two sides: the clinical approach structuring the metadata according to the protocol, i.e. concepts and in addition the system view which augments the clinical metadata with system specific information that then is interpreted by a integration layer.



STUDY SPECIFIC AND SYSTEM SPECFIC METADATA

The base for automation is the availability of metadata that facilitates the study setup. Therefore the metadata has to be specific for the study, which entails that forms/domains are selected to the study need, only variables needed are present, code lists are reduced to the value sets needed and of course the content of the schedule of activity is present. For producing the study setup often some additional system specific metadata is required, e.g. determine whether a valueset is a unit or a data dictionary or a details on access restrictions. Some of the metatdata, especially when it comes to coding within a system is quite complex and the effort to describe it in a Metadata Repository and automate will increase the complexity for the user rather than reduce it. For that reason we decided against automating everything. For some elements like edit checks, we reference implementation details stored outside the Metadata Repository. For orthers like dynamic visit implementation we skip the automation and use the Metadata Repository only to provide instructions to the programmers.

In order to maintain this large volume of metadata, it was imperative that standards across all systems be maintained in the same metadata repository. This would allow the data managers and EDC programmers to easily build the study metadata in the SIM. The next logical step is to reduce the amount of metadata that needs to be maintained and is explained in the following paragraph.

BUSINESS RULES

We noticed that a large number of metadata needed for system setup were basically repetitions. For e.g. in Rave the variables FieldOID, VariableOID and DraftFieldOid had identical values. Similarly the logic for the number of coded values is identical across all fields e.g. less than five elements we use radio buttons, 5-10 are drop down list and more than 10 is a search list. Therefore we built in an integration layer that supports repetitive configuration activities within Rave. All the attributes described above are configurable from the MDR, but if left blank the business rules will kick in and provide a value.

For e.g.

1. For the variable names the integration layer will always populate VariableOid and DraftFieldOid with the FieldOid unless specified.
2. For the display of values sets in the ControlType the business rule will be triggered as described.

1-4 elements – RadioButton

5-10 elements – DropDownList

>10 elements – Search List

If the ControlType attribute is left empty in the standards it not only reduces the maintenance effort but also supports study setup. This business rule will be triggered after the study team has selected the elements of a code list that are needed in a particular study.

PROTOCOL AUTOMATION AUTHORING TOOL

Another key component of the entire e2e automation is the integration of our Protocol Automaton and Authoring Tool (PAAT) with the MDR. The PAAT facilitates a structured protocol definition and defines the study metadata by providing study parameters and enforcing utilization of standards from the standards area of the MDR. One of the significant advantages of having this tool, is that it mandates the protocol authors to utilize those standards which are approved and available in the MDR. With this tool in place we envision that the protocol authors can view study build in Rave within a day of changes in the protocol.

CONCLUSION (HEADER 1)

We embarked upon this initiative a couple of years ago with an aim of automating our study set up from an end to end perspective. This has been a fruitful endeavor as we made pragmatic decisions to optimize standards utilization with MDR to technically support the set up within the Bayer systems.

REFERENCES

Effective use of a Metadata Repository across data operations: the need for a machine readable form of the protocol; Isabelle de Zegher *et al; Phuse 2016.*

Patterns emerging from chaos; Alan Cantrell, PhUSE US Connect 2018.

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CONTACT INFORMATION (HEADER 1)

(In case a reader wants to get in touch with you, please put your contact information at the end of the paper.)

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