



The Printer Working Group

Semantic Model Workgroup

February 14, 2017

Sunnyvale, CA (hosted by Apple)

Jeremy Reitz (Xerox)

SM Meeting Agenda



When	What
9:00-9:10	Administrivia, Introduction, Agenda
9:10-9:15	Project Status and Activities
9:15- 10:15	Print3D Service Model
10:15-10:30	Break
10:30 -11:30	Generating SM Schema from IPP Registry
11:30- 12:00	Next Steps and Action Items



Administrivia

- Welcome
- Confirm Minutes Taker
- Policy on Non-disclosure of Proprietary Information
- Semantic Model Workgroup Officers
 - Chair: Jeremy Reitz (Xerox)
 - Vice-Chair: Paul Tykodi (TCS)
 - Secretary: Bill Wagner (TIC)
 - Document Editors:
 - Jeremy Reitz (Xerox) – SM2, SM3 Schema
 - Pete Zehler (Xerox) – Print3D Model
 - Ira McDonald (High North) – JDFMAP (awaiting prototype)
 - Rick Yardumian (Canon) – JDFMAP (awaiting prototype)

Introduction



- The PWG Semantic Model defines the semantic elements that constitute the imaging services and subunits of a network-connected Imaging System, and the actions that operate on the objects and elements of the model, independent of a specific protocol or network environment.
- By the current workgroup charter, the primary function of the Semantic Model workgroup is to keep the model updated with additions and changes developed by other PWG workgroups, to make the model documentation accessible without the need for special software, and to provide for the review and approval of model updates by the PWG membership.
- The intent of maintaining an abstract model in parallel with the IPP protocol is to document the Imaging Technology-specific aspects of defining an Imaging Job, describing an Imaging Service, and communicating the status of these two types of objects in a readily comprehensible way.



Projects and Status – Current Projects

- **Mapping CIP4 JDF to PWG Print Job Ticket v1.0 (JDFMAP)**
 - Current draft (<ftp://ftp.pwg.org/pub/pwg/sm3/wd/wd-smjdfmap10-20150604.pdf>) is at Prototype level, awaiting prototype reports.
 - Effort to solicit candidates to do prototyping appears to have been unsuccessful.
- **Print3D Service**
 - In accord with the SM Workgroup charter, the information in the IPP 3D Printing Extensions draft was abstracted to add a Print3D Service to the current Semantic Model. This included the definition of a Print3D Job Ticket.
 - The Semantic Model including the Print3D Service is in Schema 2.909 (<ftp://ftp.pwg.org/pub/pwg/sm3/schemas/pwg-semantic-model-master2.909.zip>). The model needs to be reviewed and the additions made to the IPP extension during Last Call and Vote need to be added.
 - It is to be determined whether specific Print 3D Operations and operations elements need to be modeled.
- **Update and Finalization of Semantic Model 2**
 - The defined project was to produce an updated version of SM2, reflecting corrections and reasonable additions from IPP, but no Cloud or 3D aspects, to finalize and document this version and subject it to an approval process.
 - The effort of comparing the IANA-Registered IPP attributes with the Gap analysis is still in progress (Bill Wagner). The group needs to decide whether the Model is to be modified to reflect each of the identified differences.

Projects and Status – Identified Projects



- SM 3

- The intent was to produce an updated version of SM2, reflecting corrections and reasonable additions from IPP, but no Cloud or 3D aspects. This was to complete the MFD Model. A follow on SM3 project was to refine the MFD model and add the Cloud printing semantics, and more recent IPP additions including Infra, extended finishing and 3D Printing.
- Because of the interest in 3D Printing and the lack of resources to complete SM2 in a timely manner, 3D Printing was added to the basic SM2 model before update. Although the current Schema could be developed into a updated SM2 and an SM3 version, it is unclear that there the interest or the resources to do this.
- Therefore the SM3 project, as differentiated from SM2 update, is suspended. The options to proceed are to be discussed during Next Steps and Action Items.

- Update of the Semantic Model Web Pages

- It had been discussed that the SM parts of the PWG Web page should be expanded to:
 - Give clear examples of the 2D Print Service Capabilities (PSC), Print Job Ticket (PJT), and Print Job Receipt (PJR) structures, including a narrative description.
 - Provide parallel information for 3D imaging
 - Reference the Web-browsable pictorial representations of schema for both completed/approved models and in-process model developments, so that viewers unfamiliar with the PWG Imaging System models may clearly understand, comment on and contribute to what we have done and the new things we are working on.
 - How and whether we will work on this activity will be discussed during Next Steps.



Print3D Service

- Because of the distinct differences between 2D Printing and 3D Printing Elements, 3D Printing in the Semantic Model is represented as a distinct service.
- The Print3D Service is represented in version 2.909 of the Schema.

[Review the Print3D Service Model]

- The Print3D Job Ticket and the Print3D Job Receipt are represented in the Print3DJobTicket files of version 2.909 of the Schema .xsd, .xml and .json versions are provided.

[Review the Print3D Job Ticket and Job Receipt]

Break





- The project is to update, stabilize and finalize SM2 as the basic model for an MFD providing one or more imaging services. This model will then be the basis for SM3, which will include Cloud, 3D Printing and the expanded finishing features.
- The approach is to correlate current IPP attributes, as registered in IANA, with Semantic Model elements, adding new elements and deprecating others. Elements specifically for Cloud, 3D Printing and the expanded finishing features will be removed.
- Once syntactical and format errors are corrected, the updated SM2 will be submitted for PWG approval in accord with the PWG Policy for Maintenance and Approval of Schemata.
- A updated compilation of IANA-registered IPP attributes ([IANA 29Dec 2016.xlsx](#)) is being compared with Semantic Model elements in the current schema version 2.909
- However, if it is decided to proceed with the approach of generating the Model schema from the IPP registry, as discussed in the following slides, this SM2 update activity will be abandoned.



Generating Schema from IPP Registry

- The primary chartered responsibility of the SM Workgroup is to maintain a model consistent with the evolving IPP protocol. Indeed, the SM2 update project has become a time-consuming manual correlation of IANA Attributes with the Model elements.
- Michael Sweet has developed “Proof-of-concept” code to generate SM schema from the IPP registry. This approach is promising, as will be evident by comparing the registry-derived schema with the current generated schema.



IPP Registry Tool "regtosm"

- New tool for converting the IANA IPP registry (XML) to an XML schema
 - Current code uses mapping "rules" from Appendix H of PWG 5108.07-2012: PWG Print Job Ticket and Associated Capabilities Version 1.0
 - Approximates what was proposed for SM 3.0
 - Exclusively uses the IPP registry so the counters, power management, and subunits portions of SM 2.0 are greatly reduced in scope (to the subset present in IPP)
 - Limited to Print service right now; others possible, probably want to add a service association field to the IANA IPP registry for that
 - No WSDL for operations
- Code available on Github:
 - <https://github.com/istopwg/ippregistry>
- Current results provided on tool page:
 - <http://istopwg.github.io/ippregistry>

Compare Derived Schema with V 2.909



- Derived Schema for Print Service
 - HTML Version: <http://istopwg.github.io/ippregistry/sm-current/PrintService.html>
 - .xsd files: <ftp://ftp.pwg.org/pub/pwg/sm3/schemas/Derived-Registry-Feb-2017/>
- Latest Standard Schema (unzipped)
 - <ftp://ftp.pwg.org/pub/pwg/sm3/schemas/pwg-semantic-model-master-2-909/>
- Comparison Points:
 - Structure
 - Completeness
 - Clarity
 - ?

Advantages/Disadvantages of Relying on Registry Derived Schema



- **Advantages: Automating derivation will**
 - Lessen likelihood of the Semantic Model being abandoned.
 - Increase likelihood that Semantic Model will correctly and fully reflect IPP
 - Conversion to Schema form acts as check for Registry errors and inconsistencies. (Michael's proof-of-concept code has found missing or incorrectly defined items in the registry.)
 - There would be no need to go through PWG approval cycle for the model since it would just reflect what had been already approved for IPP
- **Disadvantages**
 - A lot of the system subunits, counters, and power management stuff is either missing or limited in comparison to the current model.
 - There would not be an easy way to separate things for different services, although this could be resolved
 - There currently is no way to model operations with WSDL; addressing that would require a new section to the IPP registry, and populating that content is a fairly big task.
 - The advantage of independent schema to view IPP additions in the abstract, to exploit parallelism in elements, operations and services, is lost.

Questions on Implementing Registry Derived Schema Approach



- **Addressing Disadvantages**

- To what extent would the system subunits, counters, and power management stuff be incorporated when the System Service is fully fleshed out?
- Would it be possible to meld existing and derived .xsd files to preserve current degree of handling with what derivation provides?
- Are the operations a critical part of the Model? Is WSDL needed to document them or is some other method available? Would including the 'new section' in the IPP registry have advantages?
- Would recasting and reviewing IPP operations and attributes in schema form in itself provide a better consideration of consistency, parallelism, and generality.

- **Implementation**

- Who would take responsibility for and under what workgroup would the maintenance of the derived schema update fall>
- To what extent would the validity of the derived schema be verified, and by whom?



Issues & Next Steps - Organizational

- The ability of the WG to act on chartered projects and provide a realistic plan and schedule for those projects depends upon having reliable, competent resources for execution and review.
- There have been insufficient resources to proceed with the projects in a timely manner and insufficient participation in SM conference calls to review the work that has been done.
- Suggestions that the Model has a function beyond echoing IPP, that the presentation of imaging semantics in a more readily understood form, and that documentation of Imaging Services and Imaging Jobs in abstract form has intrinsic and lasting value to the industry have not been accepted and have not prompted increased participation.
- Although, in previous MFD Modeling work, the Semantic Model has preceded IPP activity by modeling Imaging Services beyond printing, the current SM Charter effectively limits SM activity to reflecting what has already been approved in IPP.
- It has been suggested that:
 - There is no need to put Models up for PWG approval since they merely reflect what has been approved in IPP.
 - The modeling activity should be part of the development process for IPP Specifications.
 - There is no need for a separate Semantic Model Workgroup.



Issues and Next Steps - Projects

- **Furtherance of the Semantic Model - Options**
 - Proceed with the chartered projects of updating the SM2 MFD model and creating a new SM3 model which includes Cloud, 3D, and expanded Finishing
 - Proceed with the current single model, updating it with IPP elements added in the past five years, including Cloud, 3D, and expanded Finishing.
 - Completing the SM2 update, but not adding Cloud or 3D. The Print3D Service model can be extracted and stand as a separate model. Cloud Imaging has already been separately documented.
 - Adapting the Derived approach.
 - The derived model would be, by definition SM3
 - Information in the derived model could be used to help update the SM2 model, which would then be closed.
 - Terminating the WG, with the understanding that the Semantic Model would be created and updated by the IPP Workgroup.
- **Print3D Service – Options**
 - Update to include attributes in IPP Extensions, as approved.
 - Update to reflect the information in the NIST [am_schema_20161208.xsd](#)
 - Maintain as separate schema
- **JDFMAP – Options**
 - Continue to look for prototyper
 - Issue document as White Paper or other non-specification PWG publication
- **Web Page Update**
 - Do or Drop



More Info/How to participate

- **We welcome more participation from member companies**
- **Much of the discussion of issues will be on the SM3 mail list. You must subscribe to the list to be able to post to the list. See <http://www.pwg.org/mailman/listinfo/sm3> to subscribe.**
- **The group maintains a Web Page for Semantic Model that includes links to the latest documents, schema and a browse-able version of the schema at <http://www.pwg.org/sm3>**
- **Next conference call: To be announced on the SM3 mail list.**

Call-in toll-free number (US/Canada): 1-866-469-3239

Call-in toll number (US/Canada): 1-650-429-3300

Call-in toll number (US/Canada): 1-408-856-9570

<https://ieee-isto.webex.com/ieee-isto/e.php?MTID=m8f8fab044b3f41be0f376cb7745eca40>