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Specifiers' Properties information exchange (SPie) a buildingSMART alliance project

What is the objective of SPie?
The objective of SPie is to coordinate the development of a United States open standard for product data utilized by architects, engineers, specifiers, contractors, subcontractors, procurement personnel, operators, and maintenance personnel to better select, install, and operate their facilities.

Why begin with Specifiers' Properties?
There are many different types of information needed about products, assembled to order, and engineered to order products during the project life cycle. SPie begins with specifiers' properties since these are the minimum common set of properties needed by all stakeholders. Manufacturer's and their associations can "build out" from the starting point of specifiers' property sets to provide installation, operational, sustainability, and any other properties once the baseline has been agreed upon.

What is SPie data?
SPie data allows manufacturers to deliver product information to specifiers and designers in a form that is useful for modern design practice such as Building Information Modeling (BIM). It uses the existing and widely supported international standard buildingSMART Industry Foundation Class (IFC) model to communicate the shape, symbol and properties of manufacturers' products.

Why do Associations need to be involved?
The buildingSMART standard defines the technical framework and essential properties, but is deliberately flexible where it comes to specific product types, and where it comes to adopting best practice in a regional context such as the US. Some initial work has been done by members of the Specifications Consultants in Independent Practice (SCIP) and the Construction Specification Institute (CSI) and published by the National Institute of Building Sciences (NIBS). Associations are the appropriate forum to review and extend the minimum requirement.

Who owns the data?
The consensus on properties is developed by the Associations, and published through NIBS. The manufacturers decide if they wish to adopt the standard and generate product data to the standard. They can offer their data from the own websites, or on CDs, either publically or behind a login. The SPie data should include a hyperlink to download updates to the data.

Does SPie replace product data sheets?
Both product data sheets and product data will continue to be useful. A hyperlink to the product data sheets will be included in the SPie product data, and the product data sheets will link to SPie data sets. With SPie, a manufacturer can point requestors to a common data format and not need to chase numerous proprietary formats.

Guidance for a Trade Association
The following general guidelines are provided for trade association members interested in working with NIBS to create open standard product data that is compatible with BIM technologies. Specific guidelines may be tailored based on mutual agreement.

(1) Formal Support for SPie project and goals. Associations should formally acknowledge the SPie initiative with their governing bodies and through education/information working committees. Supporting presentations and examples are available from NIBS web-pages. NIBS may also be able to offer further support for the preparatory work, if a Memorandum of Agreement (MOA) is created.

(2) Memorandum of Agreement. Associations sign MOA with NIBS designating points of contact from each participating manufacturers and from the Association and appropriate committees within the Association, committing to process as listed below:

(3) Begin Pilot Testing. Associations will identify a small number of high priority product types to be part of an initial pilot phase. Priority will typically be given to higher value discrete manufactured objects. Assembled to order and engineered to order products will be part of SPie, but the approach during the pilot is "walk before running."

(4) Initial Product Template. For each pilot product complete the form shown in Table 1. The manufacturers' product teams, in conjunction with the designated Associations' BIM committee, will review a number of different existing sources of product data and compile a list of possible properties. NIBS may be able to assist manufacturers to compile this information as stipulated under the terms of the MOA. The minimum sets of sources to be investigated are shown below.

    a. Existing association and manufacturers' database schemas
    b. Whole Building Design Guide (WBDG) productguide™
    c. Industry Foundation Class Product Property Sets

    References to sources (b) and (c) are found in footnotes to Table 1.

(5) Template Review. The Association's appropriate committee will work towards consensus from their membership on the sufficiency of the properties above to support the specification and selection process. Recommendations should focus on additions, deletions and changes required on the WBDG productguide™ property set.

Table 1: Information to be assembled by trade associations for review

Topic	Information to be coordinated by the Association
Product type	***Wood locker***
Classification[1]	
Design / system	***21-61 11 00: Furniture, Fixtures and Equipment***
Work outcome	***22-10 51 00: Lockers***
Product	***23-40 20 11 17: Lockers***
UNSPSC	***……***
buildingSMART[2]	
IFC type object	***IfcFurnitureType***
IFC predefined type	***fixed***
IFC object	***IfcFurniture***
IFC object type	***wood locker***
Property sets[3]	
WBDG productguide™™ [4]	***Pset_WoodLocker***
IFC Predefined type specific	***Pset_FurnitureFixed***
IFC Type specific	***Pset_FurnitureCommon***
SPie Specification	Pset_Specification
SPie Selection	Pset_Selection
IFC Manufacturers type	Pset_ManufacturersTypeInformation

(6) Review Meeting/Teleconference. When a consensus is achieved, the table and any requested amendments to the WBDG productguide™ property set can be submitted to NIBS/productguide™ for review by the specification experts and inclusion on the WBDG productguide™.

(7) Template Update. NIBS updates templates on the WBDG productguide™ and posting of standard data sets. The full product example becomes visible by clicking on the IFCXML link, and the IFC and IFCXML product example can be downloaded. A SPie and/or COBie2 spreadsheet will also be provided for manufacturers to use.

[1] See www.omniclass.org [OmniClass tables 21, 22 and 23].

[2] See http://www.iai-tech.org/ifc/IFC2x3/TC1/html/index.htm [in the top left box select the blue "architectural diagram" and select one of the "Shared *" or "* Domain" shapes. In the middle left box click "entities" and in the lower left box select one of the "Ifc * Type" entities. A full specification of the entity will be shown]

[3] See http://www.iai-tech.org/ifc/IFC2x3/TC1/html/index.htm [in the top left box select the blue "property sets". In the middle left box and select one of the "Shared *" or "* Domain" or "All" and in the lower left box select one of the "Pset_*" sets. A full specification of the property set will be shown]

[4] http://www.wbdg.org/references/pg_spt.php

(8) Demonstration. NIBS will work directly with BIM-based software vendors to implement the product set templates into commercial design, construction, and purchasing software. These public demonstrations are typically held each year in December in conjunction with the NIBS Annual Conference. Depending on the MOA, additional demonstrations may be held at Association meetings.

(9) Publication. Following a successful public demonstration the MOA partners will jointly and separately publish the result of the effort and solicit calls for additional participation.

(10) Continue. The steps above outline a typical 12 month process from start to public demonstration of the results for the piloted products. Additional product manufactures and additional product types should now be included in a parallel fashion to take advantage of the momentum gained during the pilot effort.

Guidance for Product Manufacturers

Given the number and variety of different building products manufactured in the United States it is critical that the effort be accomplished in parallel by as many stakeholders as possible. The end state is that a manufacturer may use SPie templates simply as a common export report from existing product databases. Thus the use of SPie, once the template is determined, is simply a "mapping" from the manufacturer's product database to the SPie output format. The following steps outline one possible way to initiate such an effort.

(1) Select Product(s). Select one or more individual product types. Start with individual manufactured products first, to understand the process. Later move to assembled to order or engineered to order products.

(2) Support Association Efforts. Support your Trade Association in completing a review of your product types, as described in the section above. Without a consensus on the minimum set of properties for a given product, manufacturers will create non-compatible data sets.

(3) Find the Conesus Template. Search the productguide™ for your particular product type. Download the SPie spreadsheet for the product type, depending on which tools you intend to use. NIBS may be able to recommend consultants who can support this process. If a consensus template is not identified work with your association to include the selected product in the consensus process.

(4) Customize Product Information. Manufacturers may add extra informative properties outside of the consensus template to differentiate individual products.

(5) Document O&M Properties. Manufacturers may elect to use the COBie2 to document manufacturer standard warranties, spare parts lists, and preventative maintenance schedules.

(6) Prepare SPie Data. Capture the your product data using one of the following tools:
   a. SPie spreadsheet[5]
   b. Direct generation to ifcXML from product database mapping
   c. E-SPECS editing tool[6]
   d. COBie2[7]
   e. Direct editing of the IFC or IFCXML example.

(7) Publish SPie Data. Ensure that SPie/COBie, ifcXML, and IFC data is available for download from your design support website. One method you can use to create these different, equivalent formats, is to use the free BimServices[8] too.

(8) Inform NIBS and the design and specification community of your progress. Update your Product Data PDFs with hyperlinks to the SPie data.

Guidance for a Specifier or Designer

You may directly contribute your input to product data templates through NIBS, SCIP, and CSI. In many ways the compilation of the technical standard, and having manufacturers provide this information, is actually the easy part. The hard part is for you to demand that your software providers create solutions that contain SPie information so that you no longer have to hunt for hours on the internet for products, or pay for software systems to selected product data into proprietary data systems. Having the SPie data standards will allow you to speak strongly to your software providers to insist that they implement the use of this information. The following steps outline a possible way you can work with SPie.

(1) Liaise with your application providers and review their support for IFC and IFCXML. Report any issues encountered to the application provider.
   a. E-SPECs
   b. Autodesk Revit
   c. Other tools supporting IFC
   d. (others will be added to this list once demonstrated)

(2) The following uses for SPie Product Data are envisaged, depending on your application's functionality
   a. Use with BIM library development
      Conversion to proprietary formats
   b. Use with BIM authoring tools

[5] Available from NIBS/buildingSMART Alliance. Contact dfernandez@nibs.org or AEC3 contact nn@aec3.com

[6] Available from e-Specs. Contact gillesL@e-specs.com

[7] Available from http://www.buildingsmart.com/content/fm_aquarium_cobie2_description

[8] Available from http://www.aec3.com/6/6_04.htm

i. Import from file or website
ii. Drag-and-drop from file or website
iii. Addition of relevant properties onto existing occurrences

c. Use with Specification authoring tools
   i. Insertion of product features as requirements
   ii. Insertion of product as basis of design or nomination
d. Use with Product selection tools
   i. Product comparisons
   ii. Product short-listing
e. Use with Product selection tools
   i. Product comparisons
   ii. Product short-listing
f. Use with handover and facility management tools
   i. Uploading to FM databases
   ii. Cut-and-paste into data collection forms

Appendix 1: Example Product Template

Associated Classifications		
OmniClass Table 22 Masterformat (Work Results)	2004 Edition	**22-10 51 16: Wood lockers**
OmniClass Table 21 UniFormat (Elements and Systems)	1998 Edition CSI/CSC	**21-61 11 00: Furniture, Fixtures and Equipment**
OmniClass Table 23 (Products)	2006 Draft version	**23-40 20 11 17: Lockers**

Type: **Type Definition**	
Name	Wood Lockers
Description	Furnishing Element Wood Lockers example
IFC Type	IfcFurnishingElementType
IFC Pre-defined type	userdefined
IFC Instance	IfcFurnishingElement
IFC Element Type	Wood Lockers
IFC Identifier	1234567890123456789000
Tag	Wood Lockers example

Pset Wood Lockers: Properties for Furnishing Element userdefined Wood Lockers

Property Name	Property Description and Allowed Values	Example Property Value
Application	Application : Application locations_indicated remodel_and_clean_existing other notdefined	locations_indicated
ApplicationNote	Application : Application note	Remodel_And_Clean_Existing
Warranty	Warranty : Warranty manufacturer's_warranty other notdefined	manufacturer's_warranty
WarrantyNote	Warranty : Warranty note	Manufacturer's_Warranty
Sustainability	Sustainability : Sustainability low_emitting_materials_adhesives_and_sealants low_emitting_materials_composite_woods_and_agrifiber_products certified_materials other notdefined	low_emitting_materials_adhesives_and_sealants
SustainabilityNote	Sustainability : Sustainability note	Certified_Materials
Manufacturers	Manufacturers : Manufacturers	As selected
Tier	Tier : Tier single double	single

	multiple other notdefined	
DoorFace	Door Face : Door Face flush_panel_solid_wood raised_panel_solid_wood flush_panel_wood_veneer_face raised_panel_wood_veneer_face louvered plastic_laminate_nema_ld_3 other notdefined	flush_panel_solid_wood
Hinges	Hinges : Hinges butt semi_concealed concealed_fasteners knuckle other notdefined	butt
Locking	Locking : Locking padlock built_in_cylinder_combination_lock keyed digital_keypad deadbolt coin_operated other notdefined	padlock
Tops	Tops : Tops sloped flat other notdefined	sloped
Color	Color : Color	As selected
Mounting	Mounting : Mounting elevated_base no_base other notdefined	elevated_base

Pset FurnitureTypeCommon: Properties for Furniture Type Common

Property Name	Property Description and Allowed Values	Example Property Value
Description	Description : Specific description of this type of furniture.	NotDefined
Style	Style : Description of the furniture style	NotDefined
NominalHeight	NominalHeight : The nominal height of the furniture of this type.	750
NominalLength	NominalLength : The nominal length of the furniture of this type.	450
NominalDepth	NominalDepth : The nominal depth of the furniture of this type.	600

MainColor	MainColor : The nominal color of the furniture of this type.	NotDefined
Pset Manufacturer Type Information: **Properties for Manufacturer Type Information**		
Property Name	**Property Description and Allowed Values**	**Example Property Value**
ModelReference	Model Reference : The name used by the manufacturer	NotDefined
ModelLabel	Model Label : The model number assigned by manufacturer.	NotDefined
Manufacturer	Manufacturer : The organization that manufactured and/or assembled the item.	NotDefined
Pset Specification: **Properties for Specification**		
Property Name	**Property Description and Allowed Values**	**Example Property Value**
AccessibilityPerformance	Accessibility Performance : Accessibility issue(s) which the product satisfies.	NotDefined
CodePerformance	Code Performance : Code Compliance issue(s) which the produc satisfies	NotDefined
Color	Color : Characteristic or primary color of product.	NotDefined
Constituents	Constituents : Optional constituent features, parts or finishes.	NotDefined
Description	Description : Product description	text description
Documentation	Documentation : Location (Uniform Resource Information) for further product information	http://www.wbdg.org/unknown.pdf
DocumentReference	DocumentReference : Location (Uniform Resource Information) for the source or updates to this product information	http://www.wbdg.org/unknown.ifcxml
Features	Features : Other important characteristics or features relevant to product specification.	NotDefined
Finish	Finish : Characteristic or primary finish of product.	NotDefined
Grade	Grade : Standard grading which the product corresponds	NotDefined
NominalHeight	Nominal Height : Nominal height of product, typically the vertical or secondary characteristic dimension.	100
NominalLength	Nominal Length : Nominal length of product, typically the larger or primary horizontal dimension.	300
Material	Material : Characteristic or primary material of product.	NotDefined
ReferenceStandard	Reference Standard : Reference standard(s) to which the product is compliant.	NotDefined
Shape	Shape : Characteristic shape of product.	NotDefined
Size	Size : Characteristic size of product.	NotDefined
NominalWidth	Nominal Width : Nominal width of product, typically the characteristic or secondary horizontal or characteristic dimension.	200
SustainabilityPerformance	Sustainability Performance : Sustainability issue(s) which the product satisfies	NotDefined
Pset Selection: **Properties for Selection**		
Property Name	**Property Description and Allowed Values**	**Example Property Value**
Application	Application : Application by_location	by_location

	throughout remodel_and_clean_existing by_model by_drawing by_function by_table other notdefined	
QualityAssurance	Quality Assurance : Quality Assurance manufacturer's_warranty by_standard other notdefined	manufacturer's_warranty
Method	Method : Method by_performance_criteria by_manufacturer by_nomination_or_equivalent by_choice_of_manufacturer existing other notdefined	by_performance_criteria
Manufacturer	Manufacturer : Manufacturer	named manufacturer(s)
Supply	Supply : Supply by_contractor by_owner existing other notdefined	by_contractor
Installation	Installation : Installation by_contractor by_owner existing other notdefined	by_contractor
SelectionApproval	SelectionApproval : SelectionApproval by_owner by_contractor no_approval_required other notdefined	by_owner
RequiredStandards	Required Standards : Required Standards standards other notdefined	standards
ProductDataSubmittal	Product Data Submittal : Product Data Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required	for_owner_approval

	other notdefined	
SampleDataSubmittal	Sample Data Submittal : Sample Data Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval
PreconstructionSubmittal	Preconstruction Submittal : Preconstruction Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval
ShopDrawingsSubmittal	Shop Drawings Submittal : Shop Drawings Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval
DesignDataSubmittal	Design Data Submittal : Design Data Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval
TestReportsSubmittal	Test Reports Submittal : Test Reports Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval
CertificatesSubmittal	Certificates Submittal : Certificates Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval

ManufacturersInstructionsSubmittal	Manufacturers Instructions Submittal : Manufacturers Instructions Submittal for_owner_approval for_contractor_approval for_architect_approval required not_required other notdefined	for_owner_approval
Ownership: **Owner History**		
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Address	1090 Vermont Avenue NW, Suite 700, Washington DC	20005 United States
SPie_PIP	SPie Product Information Packager	v3.1

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Appendix 2: Using the SPie2 Spreadsheet

The SPie2 spread sheet is a development of the COBie2 spread sheet. The COBie2 spread sheet is extensively documented, and is fully interoperable with IFC and IFCXML. It allows a manufacturer to document one or several products systematically. Using the spread sheet for product data requires a few extra steps: in the following 'product' is used interchangeably with 'type'.

Required Worksheets

The following worksheets are required to be submitted for each SPie product data set.

Contact: ensure that the product manufacturer is fully documented by overwriting the first data row (row 2). The manufacturer's email should be inserted as the 'CreatedBy' column on ALL sheets. Further contact data rows can be used if warranty or spares are available through different sources.

Type: one row of data should be created for each product. Note …

1) The name, description and classification must be given.
2) The manufacturer and the parts and labor warrantors must be named using a contact email address.
3) The purple fields including ExtObject must be completed with the appropriate IFC type object.
4) Additional columns to the right are used represent common product data.

Attribute: one row of data must be created for each buildingSMART and SPie agreed attribute for each product. Note …

1) The unit may be noted as 'enum', 'boolean' , 'classification' or an actual unit.
2) If the unit is noted as 'enum', the value should be selected from comma-separated lists in the column headed 'enumeration'.
3) A 'boolean' value may be '1' or '0', 'true' or 'false' or 'yes' or 'no'.
4) A 'classification' value should contain a ':' separating the code from the description.

Coordinate: two rows of data should be created for product, identifying how the bottom-left and top-right box corners relate to the setting out point.

Document: at least three rows of data should be created for each product, identifying name and possibly the public location of:

1) the SPie2 data sheet: (a document can be associated to several product/types separated by commas).
2) The standard (pdf) data sheet for the product.
3) The IFC and/or IFCXML file for that product

Optional Worksheets

The following additional information may be provided to ensure that facility operators are able to effectively maintain and use products. Public COBie demonstrations and challenge events have demonstrated the capability of maintenance and asset management software to consume this information directly from COBie files.

Warranty: Manufacturer warranty terms for parts and labor are both specified. If there is no difference in terms, simply provide the duration of the term in both categories. This information is provided under the Type worksheet.

Spare: Replacement parts can be identified by catalog of part numbers, ensuring that operators by the correct replacement parts, and may be referenced by documents containing exploded parts diagrams. The Spare worksheet should contain at least one link to the document containing the products' parts list, even if the electronic parts list is not provided in the COBie worksheet.

Jobs: Preventative maintenance and recommended inspection schedules may b provided directly in the Jobs worksheet or by reference to a supplemental document. The Jobs worksheet should contain at least one link to the document containing the PM's and other schedules.

Resource: Jobs that require special tools, materials, or training should have those resources listed in this worksheet.

Context Worksheets

To ensure that product data can be correctly consumed by BIM-based software applications, some additional context information is also needed. Typically this context information will remain static for a given type of product. The paragraphs below identify some of the situations in which these worksheets may need to be updated. Product Templates will contain default values that, generally, will not need to be modified.

Facility/Floor/Space/Zone/System: details on these sheets (except the 'CreatedBy') need not be changed, unless …

1) The products are specific to a particular building type, whereupon alter the classification of the building provided.
2) The products are typically installed outside, whereupon alter the classification of the floor from 'floor' to 'site' or 'roof' as appropriate.
3) The products are specific to a particular function or space, whereupon alter the classification of the space as appropriate.
4) The products are specific to a particular functional system, whereupon alter the classification of the system as appropriate.

Component: one row of data should be created for each designed or installed product.

1) The purple fields including ExtObject will be completed with the appropriate IFC object

Other sheets

The following sheets are in general not relevant to the capture of product data and need not contain data rows. **Connection:** may be used to connect component occurrences. **Issues:** may be used to identify issues, risks or major factors that may affect the product in use.

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