

XPSL (Extensible Pipeline Simulation Language) Plan

PSIG 001/2003

Objective: Provide a plan of the development of XPSL
common data language for simulation

Contents

1	PSIG COMMON SIMULATION DATA COMMITTEE GOAL	3
2	XPSL OVERVIEW	3
3	XPSL RECOMMENDATION APPROVAL PROCESS.....	3
4	XPSL SCHEMA FILES AND SDKS.....	4
5	ROLE OF SIMULATION VENDORS IN RECOMMENDATIONS	4
6	RECOMMENDATION VERSIONS AND REVISIONS	4
7	PLANNED RECOMMENDATIONS.....	5
7.1	XPSL LANGUAGE GUIDELINES DOCUMENT	5
7.2	XPSL:UNITS RECOMMENDATION DOCUMENT	5
7.3	DEFINING A PIPELINE CONFIGURATION.....	5
7.3.1	<i>XPSL:CfgObjects Recommendation Document.....</i>	<i>5</i>
7.3.2	<i>XPSL:InputProfiles Recommendation Document.....</i>	<i>6</i>
7.3.3	<i>XPSL:Configurations Recommendation.....</i>	<i>6</i>
7.4	DEFINING A SIMULATION	6
7.4.1	<i>XPSL:Fluids Recommendation Document.....</i>	<i>6</i>
7.4.2	<i>XPSL:Setpoints Recommendation Document.....</i>	<i>6</i>
7.4.3	<i>XPSL:SetpointTrends Recommendation Document.....</i>	<i>6</i>
7.4.4	<i>XPSL:Simulations Recommendation Document.....</i>	<i>6</i>
7.5	DEFINING SIMULATION OUTPUTS	6
7.5.1	<i>XPSL:OutputObjects Recommendation Document.....</i>	<i>6</i>
7.5.2	<i>XPSL:OutputSnapshots Recommendation Document.....</i>	<i>6</i>
7.5.3	<i>XPSL:OutputProfiles Recommendation Document.....</i>	<i>6</i>
7.5.4	<i>XPSL:OutputTrends Recommendation Document.....</i>	<i>6</i>
7.6	DEFINING REAL TIME SIMULATION INPUTS	6
7.6.1	<i>XPSL:RTDObjects Recommendation Document.....</i>	<i>7</i>
7.6.2	<i>XPSL:RTDObjectSnapshots Recommendation Document.....</i>	<i>7</i>
7.6.3	<i>XPSL:RTDObjectsToSetpoints Recommendation Document.....</i>	<i>7</i>

XPSL (Extensible Pipeline Simulation Language)

1 PSIG Common Simulation Data Committee Goal

The goal of the PSIG Common Simulation Data Committee is to provide a series of recommendations that together provide a *common* (or standard) simulation definition language that can be used to define pipeline configurations, pipeline simulation inputs, and pipeline simulation outputs. The language is intended to be general enough to allow a common simulation definition file to be used for multiple simulation vendor's simulation products or simulation applications. The simulation language is also designed to be extensible so that individual users or simulation vendors may extend the language to meet application or vendor specific requirements.

2 XPSL Overview

The simulation language is named XPSL (Extensible Pipeline Simulation Language). The simulation language uses XML (Extensible Markup Language) as its basis. The X in XPSL is intended to denote this association.

An XPSL simulation definition file is a true XML file and can be viewed using any text editor or XML file viewer (such as Internet Explorer). It can also be imported as an XML file into any application that reads XML files including Microsoft Excel XP, Microsoft Access XP, and Microsoft SQL Server 2000.

An XML file is a structured text document. The XML document is interpreted as a structured tree containing nodes. Each node may have a number of attributes. Also, nodes may have child nodes that may also have attributes and child nodes (ad infinitum).

The node names and node attributes in an XML file can be constrained a priori (through XML schema) so that the node names and attributes are constructed using a specified "vocabulary". Node attributes can also be restricted to specified data types.

The PSIG Common Simulation Data Committee's goal is to provide a recommended XPSL vocabulary and grammar that provides a common language for the following:

1. Defining pipeline objects (pipes, valves, compressors, etc)
2. Defining pipeline description profiles (elevations, ambient conditions, etc)
3. Defining pipeline fluids
4. Defining user units (units for length, diameter, etc)
5. Defining simulation control setpoints (both fixed and time changing)
6. Defining simulation outputs (snapshots at a specific time as well as trends over time)
7. Defining a real time data inputs to the simulation

These definitions will be provided in a series of documents. Associated with each document will be an XML schema file that may be used to ensure that any XPSL file conforms to the XPSL recommendations.

3 XPSL Recommendation Approval Process

Each of the XPSL documents, including this XPSL Plan, will be subjected to a well defined review process. Each participant in PSIG will be invited to participate in this review process.

The XPSL document review cycle will include the following steps.

1. The PSIG Common Simulation Data Committee will prepare a *Draft Recommendation*. The purpose of a *Draft Recommendation* is to inform the PSIG membership of the committee's approach and current thinking with respect to finalizing a recommendation on a portion of the XPSL language. It is anticipated that a *Draft Recommendation* will undergo substantial revisions before the recommendation is finalized.

2. The *Draft Recommendation* will be published on the PSIG web site both in PDF and Microsoft Word versions.
3. PSIG members will be notified of the *Draft Recommendation* by email and invited to comment within six weeks.
4. The *Committee* will review the comments and prepare a *Working Recommendation*. The *Working Recommendation* will be complete in detail and represent the *Committee's* first complete draft of the recommendation document.
5. The *Working Recommendation* will be published on the PSIG web site both in PDF and Microsoft Word versions.
6. PSIG members will be notified of the *Working Recommendation* by email and invited to comment within two months.
7. The *Committee* will review the comments and prepare a *Proposed Recommendation*. The *Proposed Recommendation* is the final draft of the *Recommendation*.
8. The *Proposed Recommendation* will be published by on the PSIG web site both in PDF and Microsoft Word versions.
9. PSIG members will be notified of the *Proposed Recommendation* by email and invited to comment within two months.
10. The *Committee* will review the comments and prepare the *Candidate Recommendation* document. The *Candidate Recommendation* is the version that will be presented to the PSIG membership for approval. It is not a draft.
11. The *Candidate Recommendation* will be published on the PSIG web site both in PDF and Microsoft Word versions.
12. PSIG members will be notified by email of the availability of the *Candidate Recommendation* and the intention of the *Committee* to present it to the membership for approval. The *Candidate Recommendation* will be made available at least two weeks prior to the annual meeting.
13. The *Committee* will make a motion during the business session at the next annual meeting that the *Candidate Recommendation* be approved as a *PSIG Recommendation*. If the membership approves this motion, PSIG will publish this recommendation on its web site as a *PSIG Recommendation*.

4 XPSL Schema Files and SDKs

The *Committee* will create *Schema* files for each *Recommendation* to allow users to validate their XPSL files for vocabulary or grammar errors. The *Committee* may also provide tutorials, help files, *XSLT* files (translation files) or utilities to allow users to more effectively make use of the XPSL language. Any such tools provided by the *Committee* will be provided solely for the convenience of the users and will not be subject to a rigorous approval cycle.

5 Role of Simulation Vendors in Recommendations

The *Committee* will encourage all simulation vendors to be involved in the review cycle and views vendor suggestions as an important part of ensuring that the *Recommendations* will appropriately define a common simulation language. It is understood that vendor support is important in the success of these *Recommendations*. However, the purpose of the XPSL recommendations is to provide a common simulation language without any vendor specific orientation.

6 Recommendation Versions and Revisions

PSIG *Recommendations* will be issued with a version number. The *Committee* anticipates that additional versions of the *Recommendations* may be issued after the initial release. However, each new version will be subject to the same approval process as the initial version (Version 1).

The *Committee* may release minor revisions of *Recommendations* to resolve problems or errors in released documents. These revisions will be identified with the version number and the revision number (Version 1, Revision 1). These revisions will be released only when necessary to resolve unanticipated

problems with the *XPLS Recommendations* and will not be subject to the detailed review afforded new versions of the *Recommendations*.

7 Planned Recommendations

A number of *Recommendation* documents are anticipated. This draft of the plan identifies each basic topic as a separate document. Future revisions of the plan may combine several related topics into a single *Recommendation*. The following *Recommendation* documents are anticipated:

1. XPLS Plan (this document)
2. XPSL Language Guidelines
3. Specifying Pipeline Configuration Objects (*XPSL:CfgObjects Recommendation*)
4. Specifying Pipeline Input Profiles (*XPSL:InputProfiles Recommendation*)
5. Specifying Pipeline Configurations (*XPSL:Configurations Recommendation*)
6. Specifying Pipeline Fluids (*XPSL:Fluids*)
7. Specifying Pipeline Simulation Setpoint Snapshot Inputs (*XPSL:Setpoints*)
8. Specifying Pipeline Simulation Setpoint Trend Inputs (*XPSL:SetpointTrends*)
9. Defining a Pipeline Simulation (*XPSL:Simulation*)
10. Specifying User Units (*XPSL:Units*)
11. Specifying Simulation Output Objects (*XPSL:OutputObjects*)
12. Specifying Simulation Output Snapshots (*XPSL:OutputSnapshots*)
13. Specifying Simulation Output Profiles (*XPSL:OutputProfiles*)
14. Specifying Simulation Output Trends (*XPSL:OutputTrends*)
15. Specifying Real Time Data Input Objects (*XPSL:RTDObjects*)
16. Specifying Real Time Data Input Snapshots (*XPSL:RTDObjectSnapshots*)
17. Mapping Real Time Data to Simulation Setpoints (*XPSL:RTDObjectsToSetpoints*)

7.1 XPSL Language Guidelines Document

The XPSL Language Guidelines document will address the following subjects:

1. Relationship of XPSL to XML
2. XML Recommendations used in XPSL (XFragments, XPointer, etc.)
3. XPSL Namespaces
4. Extensibility of the XPSL Language
5. Use of XML Schema
6. Use of XML Nodes and Node Attributes
7. Object orientation of XPSL
8. Language guidelines for allowing inline definition of objects as well as references to objects defined in an object collection

7.2 XPSL:Units Recommendation Document

This document defines how one may specify a customized set of user units for the various pipeline quantities (e.g. length, diameter, wall thickness, power, etc).

7.3 Defining a Pipeline Configuration

Three related *Recommendations* are used to define a pipeline configuration.

7.3.1 XPSL:CfgObjects Recommendation Document

This document defines how pipeline objects (pipes, valves, compressors, etc) are defined in the XPLS language. It also defines how the user may specify a library of objects that may be referenced in a configuration.

7.3.2 XPSL:InputProfiles Recommendation Document

This document defines how pipeline properties that vary with distance may be defined. This document will provide a generalized syntax for specifying a variety of distance dependent data including elevation profiles, ambient temperature profiles, thermal conductivity (of pipeline surroundings) to name just a few. It will also provide a syntax for specifying pipe properties (wall thickness, outside diameter, etc) as a profile.

7.3.3 XPSL:Configurations Recommendation

This document defines how objects defined using the syntax of the preceding two documents may be combined with connectivity information to specify a complete physical pipeline configuration. The syntax will allow pipeline configurations to be created using "inline definitions" of pipeline objects as well as using object definitions defined in an "object library".

7.4 Defining a Simulation

A simulation requires a pipeline configuration (preceding section) as well as details about the fluid(s) in the pipeline and setpoints for pipeline controls.

7.4.1 XPSL:Fluids Recommendation Document

This document provides the syntax for defining fluids that may be used in the pipeline simulation.

7.4.2 XPSL:Setpoints Recommendation Document

This document defines how a set of control setpoints will be specified. This document does not address the issue of setpoints changing in time.

7.4.3 XPSL:SetpointTrends Recommendation Document

This document defines a syntax for specifying trends (time varying) control setpoints that may be used as inputs to a simulation.

7.4.4 XPSL:Simulations Recommendation Document

This document provides the syntax for combining a pipeline configuration (XPSL:Configurations), fluid definitions (XPSL:Fluids), control setpoints (XPSL:Setpoints) and/or control setpoint trends (XPSL:SetpointTrends) to define a full simulation.

7.5 Defining Simulation Outputs

Simulation outputs are specified using the syntax defined in the following documents.

7.5.1 XPSL:OutputObjects Recommendation Document

This document defines the syntax used for specifying outputs from the pipeline configuration objects.

7.5.2 XPSL:OutputSnapshots Recommendation Document

This document specifies the XML file format for a simulation output snapshot (at one point in time).

7.5.3 XPSL:OutputProfiles Recommendation Document

This document specifies the XML file format for simulation output profiles (values that vary with distance).

7.5.4 XPSL:OutputTrends Recommendation Document

This document specifies the XML file format for simulation output trends.

7.6 Defining Real Time Simulation Inputs

In order to drive simulations from real time data, the following XPSL documents will be created.

7.6.1 XPSL:RTDObjects Recommendation Document

This document defines the syntax for defining the real time input data objects.

7.6.2 XPSL:RTDObjectSnapshots Recommendation Document

This document defines the XML file structure for a snapshot of real time data.

7.6.3 XPSL:RTDObjectsToSetpoints Recommendation Document

This document defines the mapping between real time input data objects (see XPSL:RTDObjects) and control setpoints.

Draft