



cfiXML PROCESS DOCUMENT

18 April, 2004

Version 1.5

This is a working document. Please add comments and changes (with change tracking on) and return the document to rurik@eplantData.com. All ideas and feedback VERY welcome.

MODEL: WORLD WIDE WEB CONSORTIUM PROCESS DOCUMENT

The W3C Process Document <http://www.w3.org/Consortium/Process/> Copyright © 1999 – 2003 W3C®, has been used as the model for the cfiXML Process. This has been done to avoid having to “re-invent the wheel”. However, where the full W3C Process is considered too formal, too high an overhead or inappropriate for the cfiXML working groups, it has been adapted. These adaptations as well as details of the use of SourceForge and the cfiXML specific collaboration and version control environment use are described in this document.

This document contains parts inserted from the W3C web site Process Document. All such sections are Copyright © W3C and are provided under the W3C copyright terms: <http://www.w3.org/Consortium/Process/> Copyright © 2 February 2004 [World Wide Web Consortium](#), ([Massachusetts Institute of Technology](#), [European Research Consortium for Informatics and Mathematics](#), [Keio University](#)). All Rights Reserved. [http://www.w3.org/Consortium/Legal/2002/copyright-documents-20021231"](http://www.w3.org/Consortium/Legal/2002/copyright-documents-20021231)

All text in italic is from the W3C Process Document and when in bold as well, indicates a term with a precise definition in the W3C document.

DOCUMENT VERSIONS

Ver ⁿ	Date	Who	Notes
1.0	17 Mar 04	RWT	First release
1.1	18 Mar 04	TLT	Incorporates additional information in reaction to MEP comments to clarify and elaborate concepts more clearly.
1.2	22 Mar 04	TLT	Incorporates revisions from team web conference and accepted all revisions through the end of the meeting. Incorporates Mark Palmer’s supplementary comments by email as well.
1.3	23 Mar 04	RWT	As per the Monday morning conference call: Added CVS directory (module) structure using Unix acceptable names and provided a location for the referenceXml files for QA testing. Removed Beta schema modules from CVS to remove duplication with the File Release System. Removed the explicit patch package from the File Release System. Revised the “Change Approval – Post Implementation” to streamline the process and maximize use of existing SourceForge features as discussed with Josh Lubell.
1.5	29 Mar 04	TLT	Incorporate comments and suggestions from KC Morris for the document to become more ‘proscriptive’ in tone and to place Release Numbering system explanation in separate section. Some additional minor edits and added clarification on working groups by identifying proposed chairmen of the current working groups in Appendix C.

1.6	18 Apr 04	RWT	Accepted all changes and added to SF cfixml/documentation.
-----	-----------	-----	--

CONTENTS

MODEL: WORLD WIDE WEB CONSORTIUM PROCESS DOCUMENT	1
DOCUMENT VERSIONS	1
CONTENTS	3
WORKING GROUPS' STRUCTURE	4
WORKING GROUP PARTICIPANTS	5
SCHEMA CHANGE MANAGEMENT	5
Requirements	5
Schema Versions and Releases	5
Schema Release Designations	6
SourceForge CVS Modules	6
SourceForge File Release System	7
Change Management Procedures	8
Change Approval – Post Implementation	9
Breaking Deadlock	9
PUBLIC PROMOTION AND RELEASES	10
APPENDIX A - REFERENCES	11
APPENDIX B – EXAMPLES OF WORKING GROUP CHARTERS	14
APPENDIX C –WORKING GROUP MEMBERS	15

WORKING GROUPS' STRUCTURE

cfiXML is a term used to describe a collaborating set of organizations and workgroups working to develop and support a coordinated suite of common industry XML schemas to support electronic data exchange for the capital facilities industry (cfi), which includes industrial and commercial capital facilities.

Each '*working group*' of cfiXML focuses on developing schema and documentation to be included in cfiXML. There are currently 3 *working groups*:

1. cfiXML core
2. AEX
3. ppdx

Each group focuses on a particular subject domain, ideally associated with a single namespace or a limited group of namespaces.

FIATECH AEX and DIPPR are industry collaborative initiatives supported by organizations that are providing financial resources and domain expertise. The organizations that are active members and provide support to these industry initiatives participate in the work groups.

Currently DIPPR (Design Institute for Physical Properties, an Industry Technology Alliance of the American Institute of Chemical Engineers, see www.aiche.org/dippr) is the lead organization on the ppdx (physical properties data exchange) working group and has responsibility for the 'mtrl' (core) and 'thmo' (subject) namespaces. Future participants in the ppdx work group, if they choose to participate, might be TRC (ThermoML) and MatML. ePlantData currently supports DIPPR as its 'technical lead.'

Currently FIATECH (see www.fiatech.org) AEX Project is the lead organization for the AEX working group, and has lead responsibility for the equipment domain schemas (all the 'eq' oriented namespaces). ePlantData currently supports FIATECH-AEX as its 'technical lead.' NIST and FIATECH-AEX are currently working with the Hydraulics Institute that may evolve into a separate working group. This group has a vital interest in implementing centrifugal pump data exchange. ePlantData (through FIATECH-AEX) supports several commercial companies (e.g., HTRI and others) interested in implementing exchange interfaces for shell and tube heat exchangers, and so comprises an 'informal' working group in the shell and tube exchanger domain currently consisting of ePlantData and its customers (primarily HTRI at the current time).

Both DIPPR and FIATECH, use the cfiXML core schema architecture' (ext, etl, pq, obj, ctx, proj, dx, eq, mtrl, site, and uo namespaces) that was originally developed and contributed to both DIPPR and FIATECH by ePlantData. In the future there may be other separate work groups that use the core schemas as well. As a principle, all the working groups that use them should collaboratively manage the core schemas. Currently this includes three organizations – DIPPR (materials and properties), FIATECH (equipment and pump related), and ePlantData (core and heat exchanger related).

Feedback, maintenance and support of the cfiXML core will be managed by a coalition of organizations that use the core schemas. Ideally all *working groups* will operate on W3C principles.

The cfiXML core workgroup will be responsible for:

1. Coordinating releases from all the other working groups
2. Compiling complete cfiXML schema from the core and other working groups' files.
3. Validating¹ and testing against test and implementation software.
4. Publishing, promoting and obtaining feedback on the schema and documentation on the cfiXML.org web site.

¹ "Validating" in the W3C Schema definition of the word. For cfiXML will include validating the schema using at least 2 XML Schema tools or validating parsers.

5. Managing the cfiXML.org web site (delivered through Source Forge aexdev project web space).

WORKING GROUP PARTICIPANTS

The 3 categories described by the W3C are *member representatives*⁶¹, *invited experts* and *team representatives*. For the purposes of the cfiXML working groups, member representatives are individuals who are employed, or nominated by a non-profit organization or a company that is a member of such an organization. Currently DIPPR and FIATECH-AEX are such organizations. In the future this may include Hydraulics Institute or ASHRAE. Each working group may designate a ‘chairman’ of the working group. The current working group participants and chairmen are listed in Appendix C.

SCHEMA CHANGE MANAGEMENT

A key element of the change management procedures is to ensure that momentum is maintained. See reference [3] for the W3C description of ‘heartbeat’. The schedule given here for obtaining consensus on change notes and post-implementation approval is aimed at achieving this momentum.

Requirements

1. The developers of the cfiXML schemas must have configuration-controlled access to the schemas with the conventional check-in and check-out procedures, to allow parallel development and testing.
2. Active Software Implementers, who are authorized to modify and extend schema to meet industry-oriented implementation requirements, must be able to make changes and additions to the schema ‘on the fly’ as needed to support software implementations at the working and beta levels until at least two pieces of software have been completed.
3. A standard, relatively stable version that has been QA tested against reference example files must be available to the public as an exchange standard so that they are all talking the same language.
4. Other developers need read access to the most current working version which includes quick fixes, additions and changes that they have requested and that have been tested successfully
5. Working group reviewers need read access to the most current working version.

Schema Versions and Releases

Originally, the cfiXML working groups considered using the W3C "Draft" ... "Recommended Standard" type of versions status. However, because there are many different views and usage scenarios associated with software implementations, we believe it is likely that schemas will be in a relatively high state of flux until several software implementations have been completed. Hence we have modified the W3C approach to use the following version and release system:

Approved public release: Complete set of cfiXML schemas available on cfiXML.org and is available as a downloadable zip file. The schemas have met the Beta public release standard, having been validated,² Further, they will have been reviewed relative to meeting end user requirements, QA tested using agreed reference instance files, and approved for release by the sponsoring working groups, by consensus or in extreme cases by vote. This is THE public exchange specification for recommended use by industry software implementers in commercial software releases. The Approved public release will be made available on a regular basis to standards development organizations to adopt as standards or include in relevant standards, e.g., API 610 and PIP RESP73. Approved public releases will only occur quarterly or less frequently to ensure that there is a reasonably stable schema available to the public.

² “Validated” in the W3C Schema definition of the word. For cfiXML will include validating the schema using at least 2 XML Schema tools or validating parsers

β public release: Complete set of validated² (e.g., in MSXML4, XMLSpy, IBM Schema Quality Checker and TurboXML) cfiXML schemas available on cfiXML.org as a downloadable zip file for software developers. The β public release results when one of the working groups puts their current working version through full schema validation, including validating appropriate example instance files, and posts this revised version as part of a ‘complete validated set’ β public release.

Working version: One working version of schema will exist for each working group. Validating and sending this schema to cfiXML.org creates a β release when combined with core schema and other domain schema. This is the most up to date version of the schema.

Trial versions: A working group can have any number of trial version of schema for prototyping, experimentation etc. No control will be required to be applied to these versions what so ever.

Schema Release Designations

Each Approved Public Release will be given a number and will consist of one of each of the schema files at a recorded version number. The convention for labelling an Approved Public Release would follow the convention of xx.yy.zzzz, where xx is the major release number, yy is the minor release number and zzzz would be the ‘build’ or ‘service pack’ number. Software configuration managers such as CVS allow developers to create release labels or tags . The CVS release number label and the schema version numbers would correspond for an Approved Public Release. In rare circumstances, this release may also have service packs or patches applied so, as per Windows software a release may be "1.0 SP3". Patches will ONLY contain emergency fixes required for the schema to correctly handle the scope it was released to cover. These patches will also be applied to internal working versions to ensure that the fixes are not lost at the next release.

SourceForge CVS Modules

aexdev

aex

documentation

examples

schema

baseSchema

documentSchema

userBaseSchema

userdocumentSchema

software

trialSchema

baseSchema

documentSchema

userBaseSchema

userdocumentSchema

cfixml

documentation

examples

referenceXml

software

core

documentation

examples

schema

baseSchema

documentSchema

userBaseSchema

userdocumentSchema

software

trialSchema

- baseSchema
- documentSchema
- userBaseSchema
- userdocumentSchema
- ppdx
 - documentation
 - examples
 - schema
 - baseSchema
 - documentSchema
 - userBaseSchema
 - userdocumentSchema
 - software
 - trialSchema
 - baseSchema
 - documentSchema
 - userBaseSchema
 - userdocumentSchema

SourceForge File Release System

The SourceForge File Release System will be used for public distribution of a cutting edge, but validated version of the complete cfiXML schema (β) and a fully QA tested release version. SourceForge recommends using the File Release System in this way and not for temporary internal releases. See references [1] and [2]. File naming conventions need to be unambiguous across platforms, e.g., avoiding use of spaces in file names and avoiding dependence on letter case to distinguish file names.

Packages, File Releases and Files:

cfixmlBeta

1.01	Example file release. Corresponds to the SchemaRelease number for the release. Build number is assumed 0000
cfixmlBeta1.01Windows.zip	Windows release file.
cfixmlBeta1.01Unix.zip	Unix release file. (Or appropriate extension for Unix compression utility – such as tar.gz)

cfixmlRelease

1.50	Example file release. Corresponds to the SchemaRelease number for the release. Build number is assumed 0000.
cfixml1.50Windows.zip	Windows release file.
cfixml1.50Unix.zip	Unix release file. (Or appropriate extension for Unix compression utility – such as tar.gz)

Under exceptional conditions, patches will be issued for the authorized public release as files in the cfixmlRelease package.

The goal will be to provide Beta releases monthly or more frequently so that software developers can obtain the latest version of the schema. The Approved Public Release version is the most stable version used in production environments by end users and distributed with commercial software. This will be kept as stable as possible with new releases initially being provided once a quarter at most. The issue of a project new item will accompany each release and patch, which will also be available on the project web space.

Releases of trial, test and development packages for use by aexdev project developers are done using the Source Forge project web space. This project web space is currently a simple 'one-page' site targeted at aexdev developers. This will become a more elaborate cfiXML public web site with readily available downloads and other supporting information about and for active workgroups within the cfiXML community and to the public. The web site would include integrated hyperlink pointers into the native Source Forge collaboration work space for active Source Forge developers as it does now.

Change Management Procedures

Each working group (AEX, ppx, and cfiXML core) should agree on a small number, ideally 2 or 3, qualified people who will be the Authors of the deliverables of that working group. The Authors will be either selected by the working group or by the sponsors of the working group. All working group members will have read access to all CVS directories and write access to the trialSchema module. The Authors will be the sole people with write access to all CVS directories in the working group CVS module and may make changes without a formal change note. The Authors will collaborate closely, e.g. instant messaging or 'on the fly' phone calls, with one another on changes they are considering and implementing. However, anyone within the group, or indeed the public, interested parties etc may create and submit a change note. Authors will also raise change notes for any contentious or important issues that require feedback and consensus. Change note is a working document with associated emails, logs, discussions and support files and will include the following information:

[TBD: Provide via a custom SourceForge Tracker?]

1. Date, Person making the proposal, Description of proposed change, Purpose of the change.
2. Assigned manager (normally the working group chair person or manager). This person will be responsible for ensuring that the issue is resolved within the agreed procedure times.
3. Assigned Researcher to research the change and assess it against the approved change criteria.
4. Category: Fix, Improvement, Extension.
5. Urgency: High, Medium or Low.
6. Impact: High, Medium or Low.
7. Assessment of the change against the agreed change criteria.
8. Discussions, feedback and advice on the change. Normally implemented via mailing list or Web discussion area.
9. Working group response to the need for the change. Each member to respond with: Strongly approve, Approve, Neutral, Object, Strongly object. Through discussion and perhaps some alterations to the proposal, the goal should be for there to be no objections. If there are objections, then the goal should be to minimize the number of strong objections (rather than objections in general).
10. Decision on the proposal.
11. Assigned to author for implementation: Yes/No, Date, who, for implementation before.

Matrix of deadlines in working days for coming to a consensus on a proposed change when handled remotely via email and Web:

Urgency	High	Medium	Low
Impact			
High	5	7	10
Medium	2	3	5
Low	2	3	5

The manager may decide to address a high impact proposal via a conference call. In which case the conference call should be arranged within 5 working days.

Change Approval – Post Implementation

The Author will document all implemented changes by adding a comprehensive comment when committing the change to SourceForge, using CVS client software to producing a log of changes implemented each day and posting them to the aexdev project mailing list. This provides a permanent record of all changes and also allows the working group to review changes implemented by the Authors which were not raised through a change note. Allowing the Authors to make fast on-the-fly changes provides the high response rate required for commercial needs.

To maintain momentum, any feedback on changes must be provided within 2 working days and the Author should include a note at the top of the email posting requesting feedback by this time. If any of the feedback includes an objection, the review process will be extended to 5 working days. If the issue is substantial and objections have been raised, a full change note can be raised to allow the issue to be fully investigated.

Breaking Deadlock

The W3C stresses the need to achieve consensus if at all possible, but within the frame of maintaining momentum in the project. See reference [4]. In extreme cases a vote may have to be undertaken to break a deadlock and move on [5]. For the cfiXML Schema development process each company and organization in a particular working group has one vote. e.g., for the core cfiXML working group, one vote for each of:

- DIPPR (paid members of DIPPR who are actively participating in good standing)
- ePlantData
- AEX (paid members of FIATECH-AEX project who are actively participating in good standing)

This is based on the W3C: “*Each organization represented in the group **MUST** have at most one vote, even when the organization is represented by several participants in the group*”

W3C: “*at times it may be necessary (e.g., for timely delivery of a specification) to proceed with a large majority in favor and a small minority convinced in their hearts that the majority is making a mistake (possibly minor, possibly grave).*”

If it is not possible to break a deadlock and the chairman of the working group cannot make a clear decision, then a vote will take place with each vote being for, against or abstain on the proposal or issue. Only “*group participants³ in good standing*”⁴ may cast a vote and only one vote from each company or organization will be accepted. Votes

³ W3C defines Participant as “*There are three qualities an individual is expected to demonstrate in order to participate in W3C:*

1. *Technical competence in one's role*
2. *The ability to act fairly*
3. *Social competence in one's role*

Advisory Committee representatives who nominate individuals from their organization for participation in W3C Activities are responsible for assessing and attesting to the qualities of those nominees.”

⁴ W3C defines Good Standing as: *Participation in a Working Group on an ongoing basis implies a serious commitment to the charter, including all of the following:*

- *attending most meetings of the Working Group.*
- *providing deliverables or drafts of deliverables in a timely fashion.*
- *being familiar with the relevant documents of the Working Group, including minutes of past meetings.*
- *following discussions on relevant mailing list(s).*

from “*invited experts*” will be accepted. 75% of the votes must be for the proposal for it to be accepted. All terms in *italic* are defined in the W3C Process Document.

PUBLIC PROMOTION AND RELEASES

The main public gateway into the cfXML Schema initiative is the cfXML.org website. This will be hosted on SourceForge using the VHOST facility to point to the project Web space. This Web space can be developed to be as user friendly as required. Some technical issues need resolving, including how to ensure that cfXML software and XML tools can obtain access to the latest version of the β and release versions of the schema via direct HTTP connection.

The web site will include links to the SourceForge project, Project News and Change Note tracker. Additionally full support will be provided for Web users to register for emails of News releases, access discussion forums and request support.

The site will also contain a list of software and companies that support cfXML and provide tools and services related to the standard. The site may also include a link to the NIST AEX testbed.

APPENDIX A - REFERENCES

1. SourceForge documentation

“File release data is persistent; SourceForge.net generally stores this data indefinitely once it has been added to the file release system. Files which are of only temporary benefit, or which have a far more limited audience than your project end-users, might be better served from your project web space than from the file release system.” –

2. SourceForge documentation

“Some projects have both a stable branch and a development or unstable branch. This permits end-users to choose between stability or the availability of cutting-edge features as they see fit. The best way to accommodate such a scheme under the SourceForge.net file release system is to have a separate package for the development releases from that used for the stable releases.” –

3. W3C Process Document

6.2.7 Working Group "Heartbeat" Requirement

When a Working Group has one or more technical reports in the [Recommendation Track process](#) that are not in an [end state](#), at least every three months the group **MUST** publish a new draft of at least one of them on the [W3C technical reports index \[PUB11\]](#). Each Working Group **SHOULD** publish a new draft of each active technical report at least every three months.

*In exceptional cases, the Chair **MAY** ask the Director to be excused from this publication requirement. However, in this case, the Working Group **MUST** issue a public status report with rationale why a new draft has not been published.*

There are several reasons for this Working Group "heartbeat" requirement:

- *To promote public accountability;*
- *To encourage Working Groups to keep moving forward, and to incorporate their decisions into readable public documents. People cannot be expected to read several months of a group's mailing list archive to understand where the group stands;*
- *To notify interested parties of updated work in familiar a place such as the W3C home page and index of technical reports.*

As an example, suppose a Working Group has one technical report as a deliverable, which it publishes as a Proposed Recommendation. Per the heartbeat requirement, the Working Group is required to publish a new draft of the Proposed Recommendation at least every three months, even if it is only to revise the status of the Proposed Recommendation document (e.g., to provide an update on the status of the decision to advance). The heartbeat requirement stops when the document becomes a Recommendation (or a Working Group Note).

4. W3C Process Document

3.3 Consensus

Consensus is a core value of W3C. To promote consensus, the W3C process requires Chairs to ensure that groups consider all legitimate views and objections, and endeavor to resolve them, whether these views and objections are expressed by the active participants of the group or by others (e.g., another W3C group, a group in another organization, or the general public). Decisions **MAY** be made during meetings ([face-to-face](#) or [distributed](#)) as well as through email. **Note:** The Director, W3C Chair, and COO have the role of assessing consensus within the Advisory Committee.

The following terms are used in this document to describe the level of support for a decision among a set of eligible individuals:

1. **Consensus:** A substantial number of individuals in the set support the decision and nobody in the set objects. Individuals in the set may abstain. Abstention is either an explicit expression of no opinion or silence by an individual in the set. Unanimity is the particular case of consensus where all individuals in the set support the decision (i.e., no individual in the set abstains).
2. **Dissent:** At least one individual in the set objects.

By default, the set of individuals eligible to participate in a decision is the set of group participants in [Good Standing](#). The Process Document does not require a quorum for decisions (i.e., the minimal number of eligible participants required to be present before the Chair can call a question). A charter **MAY** include a quorum requirement for consensus decisions.

Where unanimity is not possible, a group **SHOULD** strive to make consensus decisions where there is significant support and few abstentions. The Process Document does not require a particular percentage of eligible participants to agree to a motion in order for a decision to be made. To avoid decisions that are made despite nearly universal apathy (i.e., with little support and many abstentions), groups **SHOULD** set minimum thresholds of active support before a decision can be recorded. The appropriate percentage **MAY** vary depending on the size of the group and the nature of the decision. A charter **MAY** include threshold requirements for consensus decisions. For instance, a charter might require a supermajority of eligible participants (i.e., some established percentage above 50%) to support certain types of consensus decisions.

3.3.1 Managing Dissent

In some cases, even after careful consideration of all points of view, a group might find itself unable to reach consensus. The Chair **MAY** record a decision where there is dissent (i.e., there is at least one [formal objection](#)) so that the group may make progress (for example, to produce a deliverable in a timely manner). Dissenters cannot stop a group's work simply by saying that they cannot live with a decision. When the Chair believes that the Group has duly considered the legitimate concerns of dissenters as far as is possible and reasonable, the group **SHOULD** move on.

Groups **SHOULD** favor proposals that create the least strong objections. This is preferred over proposals that are supported by a large majority but that cause strong objections from a few people. As part of making a decision where there is dissent, the Chair is expected to be aware of which participants work for the same (or [related](#)) Member organizations and weigh their input accordingly

5. W3C Process Document

3.4 Votes

A group **SHOULD** only conduct a vote to resolve a substantive issue after the Chair has determined that all available means of [reaching consensus](#) through technical discussion and compromise have failed, and that a vote is necessary to break a deadlock. In this case the Chair **MUST** record (e.g., in the minutes of the meeting or in an archived email message):

- an explanation of the issue being voted on;
- the decision to conduct a vote (e.g., a simple majority vote) to resolve the issue;
- the outcome of the vote;
- any objections.

In order to vote to resolve a substantive issue, an individual **MUST** be a group [participant](#) in [Good Standing](#). Each organization represented in the group **MUST** have at most one vote, even when the organization is represented by several participants in the group. For the purposes of voting:

- A Member or group of [related Members](#) is considered a single organization.
- The [Team](#) is considered an organization.

Unless the charter states otherwise, [Invited Experts](#) **MAY** vote. Organizations represented by one or more Invited Experts are subject to the same one vote limitation.

A group **MAY** vote for other purposes than to resolve a substantive issue. For instance, the Chair often conducts a "straw poll" vote as a means of determining whether there is consensus about a potential decision.

A group charter **SHOULD** include formal voting procedures (e.g., quorum or threshold requirements) for making decisions about substantive issues.

6. Member Representatives

Generally, individuals representing a Member in an official capacity within W3C are employees of the Member organization. However, an Advisory Committee representative **MAY** designate a non-employee to represent the Member. Non-employee Member representatives **MUST** disclose relevant affiliations to the Team and to any group in which the individual participates.

APPENDIX B – EXAMPLES OF WORKING GROUP CHARTERS

<http://www.w3.org/2002/05/html/charter>

<http://www.w3.org/QA/WG/charter>

<http://www.w3.org/Graphics/SVG/SVGcharter2.html>

<http://www.w3.org/Math/Documents/Charter2001.html>

<http://www.w3.org/2002/09/voice-charter.html>

APPENDIX C –WORKING GROUP MEMBERS

As a general principal, working group members with voting rights are organizations that contribute financially to the working group products, or who make significant ‘in-kind’ work product contributions, which the funding organizations agree constitute legitimate participation, in lieu of financial contribution.

There are currently three cfiXML working groups, with member organizations listed below.

cfiXML Core

AEX, DIPPR (ppdx), ePlantData

Chairman: Mark Palmer (NIST)

AEX

Autodesk, Aveva, Bechtel, Big Machines, Citadon, DuPont, ePlantData, Flowserve, Goulds, Grundfos, Hydraulics Institute, Impress, Intelliquip, Jacobs, NIST, PlantSTEP, Process Industry Practices, Smithsonian Institute, Xynchron

Chairman: Mark Palmer (NIST)

ppdx

DIPPR – Conoco-Phillips, Shell Oil Chemicals, EPCON International, Chemstations, and others

Chairman: Dale Embry (Conoco-Phillips)