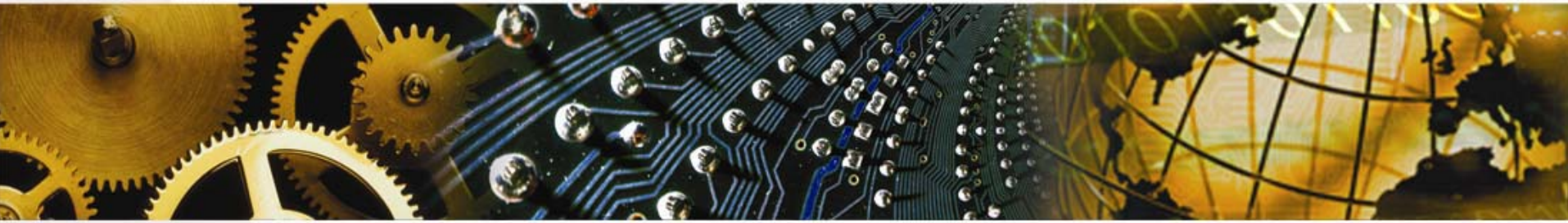

# Material Composition (MatComp): A Comparison Between PIP 2A10 & 2A13

Aug 2004

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# Agenda

- DTD and XML Schema
- Monolithic and Modular PIP Specification
- Explicit and Dictionary-Based PIPs
- Introduction to PIP 2A10 and 2A13
- PIP Content Mapping Between PIP 2A10 and 2A13
- Differences and Similarities

# DTD and XML Schema

## *Document Type Definition (DTD)*

- The Document Type Definition (DTD) is the method used to define all markup languages
- The purpose of DTD is to define the legal building blocks of an XML document
- It defines the document structure with a list of legal elements; - document structure model
- Independent developers can agree to use a common DTD for exchanging XML data
- Application can use this agreed upon DTD to validate the structure of the data it receives

# DTD and XML Schema

## *Limitations of DTD*

- Limited data types: strings as tag content and ID, IDREF, NAMES, TOKEN, NMTOKEN as attribute content
- It is not possible to have precise data type information other than the above 6 types nor can the above data types be further restricted or extended to specific data lengths and content patterns
- The syntax used to write DTD is not the same as the one used to write XML Schema, which are written in SGML
- DTDs support only a closed model: each document instance must mirror the entire DTD and subparts of the DTD cannot be reused in another DTDs
- XML Document can only refer to a single DTD
- Namespaces are not applicable to DTD documents
  -> Namespaces allow the localization of a tag's effect, which allows the same term (e.g., "amount") to be used in different contexts (domains) with different meanings and different data typing

# DTD and XML Schema

## *XML Schema*

- XML Schema language (often called XSD) is used to describe both the structure and the content of an XML document
- Schema is the Information modeling language for XML developed by W3C
- Full support for datatypes
  - Over 40 built-in types (integer, boolean, dates, etc.)
  - Custom types (e.g., contactInformation type, etc.) can be defined as extensions or restrictions of the built-in types
  - Data types, if well-defined in a given XML Schema, can help reduce backend error checking by up to 60%
- An XML document that is syntactically correct is considered *well formed*

# DTD and XML Schema

## *XML Schema Validation*

- Schemas can be used to validate documents in two ways:
- Content model validation: To check the order and nesting of elements. This is similar to DTD validation
- Data Type Validation: It can be used to check for the valid data type for contents. And also for a values to be in a range eg. If Month is defined as Integer with value range of 1-12 then
  - <Month>12</Month> Valid
  - <Month>13</Month> Invalid
  - <Month>January</Month> Invalid

# DTD and XML Schema

- XML Schema
  - Support namespaces
  - Written in XML syntax, there is a normative XML Schema definition for XML Schema
  - Extensive data type support
  - Full, object-oriented extensibility
  - Open, closed or refinable content models
- DTD
  - Written in SGML
  - Limited data type support
  - Extended via string substitutions
  - Closed model

# DTD and XML Schema

- Differences in data typing and syntax

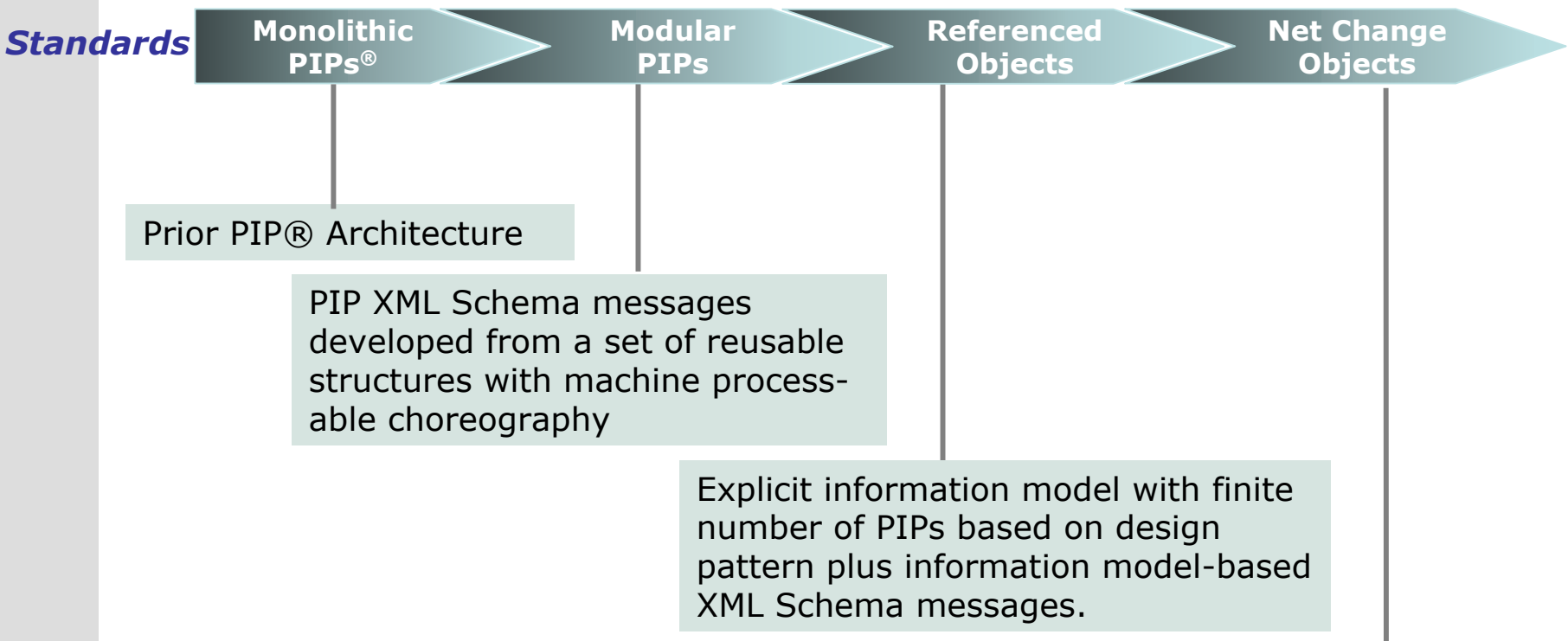
| DTD | <!ELEMENT Age (#PCDATA)> |
|---|---|
| XML Schema | <element name="Age" type="integer"/> |

| XML | <Age>20009</Age> |
|---|---|

- With XMLs using DTD typically 60% of the code is spent checking the data, while using Schemas the code is only for the business logic checking and the data type checking task can be handed over to schema validator

# Monolithic and Modular PIP Specification

## *RosettaNet Architecture Roadmap*





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# Monolithic and Modular PIP Specification

## *Objectives of Modular PIP Specification*

- Reduce cost of implementation and development by
  - reducing ambiguity and inconsistencies
  - promoting reuse across PIP specifications
  - reducing optionality in business content of messages
  - introducing a design notation for documents
- Improve interoperability
  - define PIP specifications in machine-processable XML to allow
    - automated checking
    - direct installation

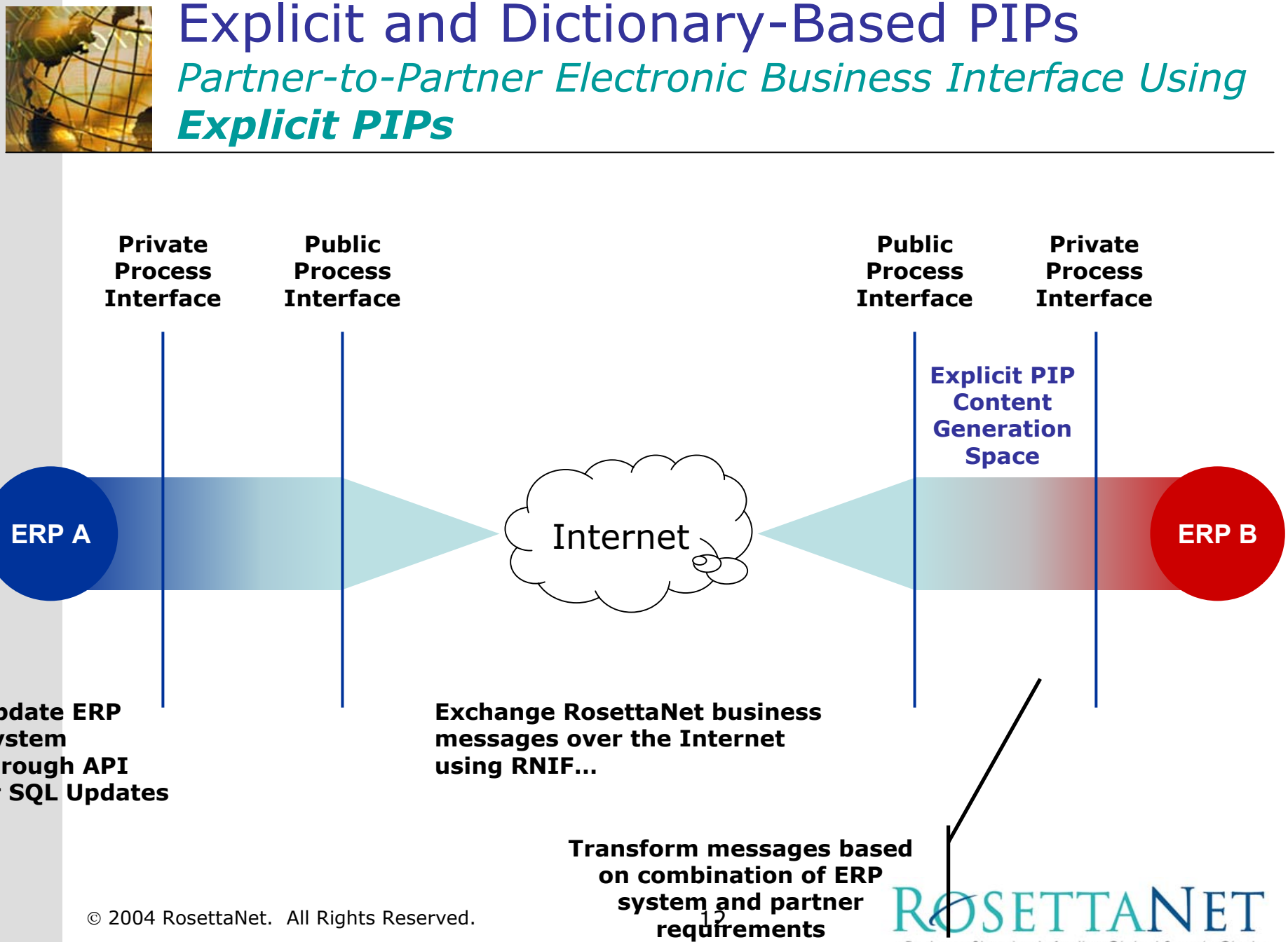
# Explicit and Dictionary-Based PIPs

- Explicit PIPs
  - Document-driven architecture
  - Exchange of information occurs in an explicit way through messages that describe
    - The structure of the information
    - The values of the payload
  - Dictionary (RNBD) is used at design time (backend mapping)
  - All RosettaNet PIPs are explicit PIPs, except for 2A9 and 2A10

- Dictionary-Based PIPs
  - Shared knowledge and its semantics is stored in a common dictionary
  - Message do not explicitly carry information, but refers (points) to common dictionary
  - Dictionary (RNBD) is also used at design time
  - In addition, dictionary (RNTD) should be used at design, message composition and message validation time
  - These mapping is supported by non-machine readable document known as IDA (Information Distribution Agreement)
  - Only PIPs 2A9 and 2A10 utilize the separate Dictionary (RNTD) to exchange product information

# Explicit and Dictionary-Based PIPs

## *Partner-to-Partner Electronic Business Interface Using* ***Explicit PIPs***





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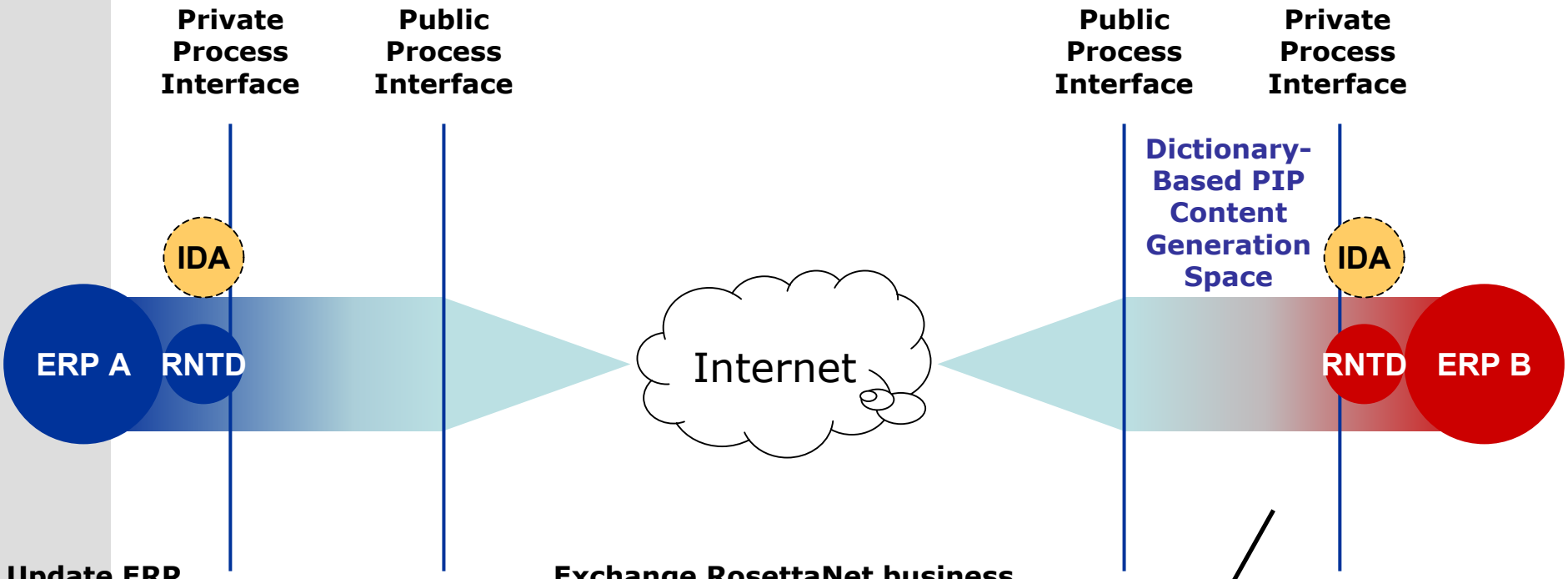
# Explicit and Dictionary-Based PIPs

## *Partner-to-Partner Electronic Business Interface Using* ***Dictionary-Based PIPs***




**Update ERP System through API or SQL Updates**

**Exchange RosettaNet business messages over the Internet using RNIF…**

**Transform messages based on combination of ERP system, partner requirements and RosettaNet Technical Dictionary & IDA**





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# Explicit and Dictionary-Based PIPs

## *Message Content (Payload) Example*

- Explicit PIPs

```
<PartInfo>
    <ManufacturerName>Micron Technology Inc.
    </ManufacturerName>
    <PartNumber>MT28F321P20FG-70BET
    </PartNumber>
    <OperatingTemperature>
          <Min>40</Min>
           <Max>85</Max>
    </OperatingTemperature>
</PartInfo>
```

- Dictionary-Based PIPs

```
<part.info>
  <element dicRef="RNP211">
    <name>Manufacturer Name</name>
    <value>Micron Technology Inc.</value>
  </element>
  <element dicRef="XJE010">
    <name>Part Number</name>
    <value>MT28F321P20FG-70BET</value>
  </element>
  <element dicRef="XJE219">
    <name>Operating Temperature</name>
    <value type="min">-40</value>
    <value type="max">85</value>
  </element>
</part.info>
```

Optional Tag

# Introduction to PIP 2A10 and 2A13

- Both PIP 2A10 (V02.00.00) and 2A13 (R11.00.00A) support MatComp requirements

- PIP 2A10 (V02.00.00 – Aug 2, 2004)
  - Completed validation with extended capability to support MatComp Milestone Program
  - Previous version supports Design Engineering process
  - Based on Monolithic PIP Specification using DTD as the message structure definition language
  - A **Dictionary-Based PIP** which requires dictionary (RNTD) to support payload creation prior to information exchange

- PIP 2A13 (R11.00.00A – Aug 13, 2004)
  - Currently under validation
  - A new PIP based on Modular PIP Specification using XML Schema as the message structure definition language
  - An **Explicit PIP** which does not require RNTD, the message structure designed in an explicit way describing the semantics and values (RNBD)

# Introduction to PIP 2A10 and 2A13

## *Overview of MatComp Business Requirements*

- The industry's requirement is to have sufficient material composition information in order to
  - Satisfy legislation
  - Drive environmental "green" improvements in design
  - Provide information for customer and other stakeholders when required
  - Have a common format and an efficient electronic process for reporting material composition in products

# PIP Content Mapping Between PIP 2A10 and 2A13

## [PIP 2A10 (V02.00.00)]

fromRole [1]

GlobalDocumentFunctionCode [0..1]

**DesignEngineeringInformation** [1]

- AgreementIdentifier [1]
- ProductInformationHeader
  - MessageReason
  - DataComposite (Recursive)
    - DataElement, etc..
- ProductInformation [1..n]
  - GlobalActionCode [1]
  - DataComposite [0..n] (Recursive)
    - DataElement [0..n]
    - DependentCondition [0..n]
    - **DictionaryReference** [0..1]
    - ProprietaryReferenceIdentifier [0..1]
  - ProductInformationObject [0..n]
- **RNDictionaryAdd** [0..1]

thisDocumentGenerationDateTime [1]
thisDocumentIdentifier [1]

toRole [1]

## [PIP 2A13 D11.00.00)]

DocumentHeader [1]

- CorrelationInformation [0..1]
- DocumentInformation [1]
- Receiver [1]
- Sender [1]

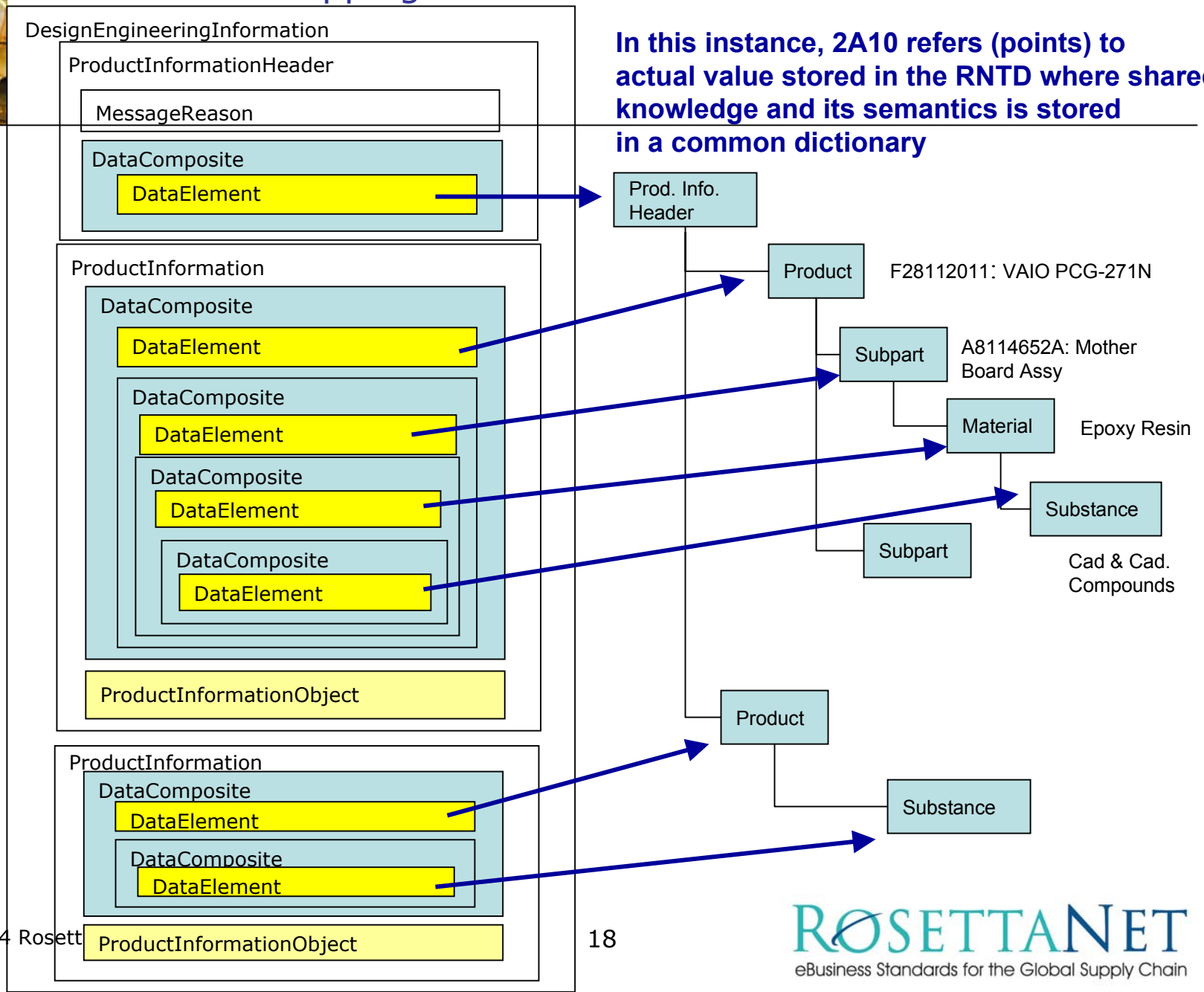
**ProductMaterialComposition** [1]

ProductInformation [1..n]

- AgreementIdentifier [1]
- ManufacturedBy [1]
- ProductIdentifier[1] , ProductMass [1]
- NotificationNote [0..n]
- NotificationActionCode [0..1]
- Subparts [0..n] (Recursive)
  Material [0..n]
  Substance [0..n]
  DependentCondition [0..n]
- ProductInformationObject [0..n]

# PIP Content Mapping Between PIP 2A10 and 2A13

**In this instance, 2A10 refers (points) to actual value stored in the RNTD where shared knowledge and its semantics is stored in a common dictionary**





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# PIP Content Mapping Between PIP 2A10 and 2A13

## [PIP 2A13 (R11.00.00A)]

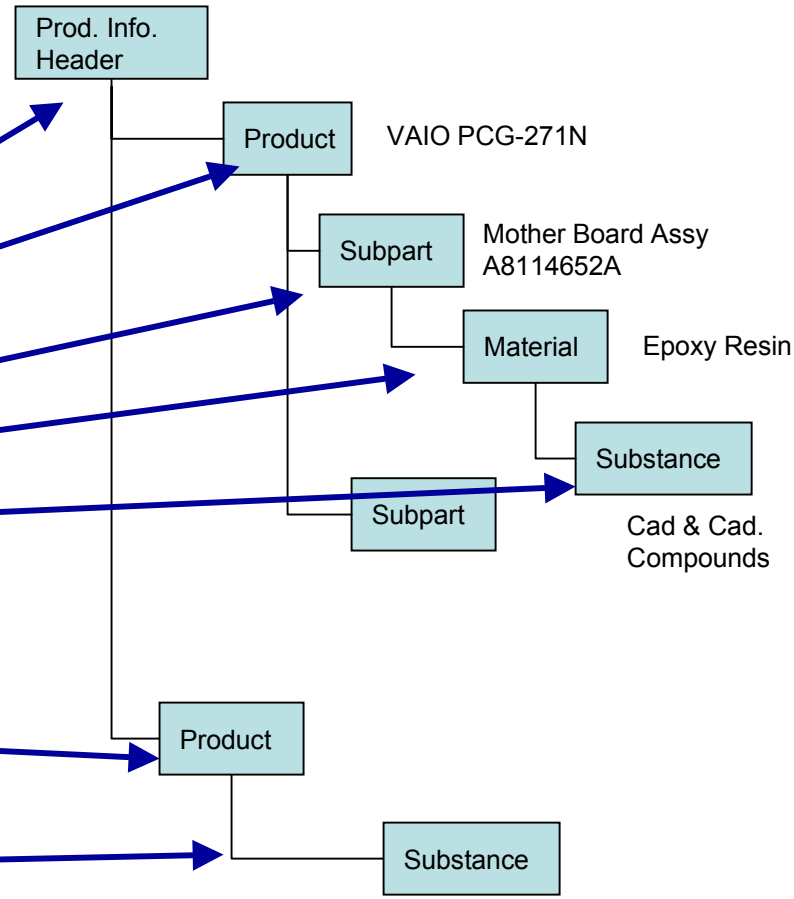
DocumentHeader [1]
- CorrelationInformation [0..1]
- DocumentInformation [1]
- Receiver [1]
- Sender [1]

**ProductMaterialComposition** [1]

ProductInformation [1..n]
- AgreementIdentifier [1]
- ManufacturedBy [1]
- ProductIdentifier[1] , ProductMass [1]
- DistributionNote [0..n]
- DistributionActionCode [0..1]
- Subparts [0..n] (Recursive)
  Material [0..n]
  Substance [0..n]
  DependentCondition [0..n]
- ProductInformationObject [0..n]

ProductInformation [1..n]
- ProductIdentifier[1] , ProductMass [1]
- Subparts [0..n] (Recursive)
  Material [0..n]
  Substance [0..n]
  DependentCondition [0..n]
- ProductInformationObject [0..n]

**In this instance, the actual value of the Material Composition information are contained within the message structure tags with explicit semantics**





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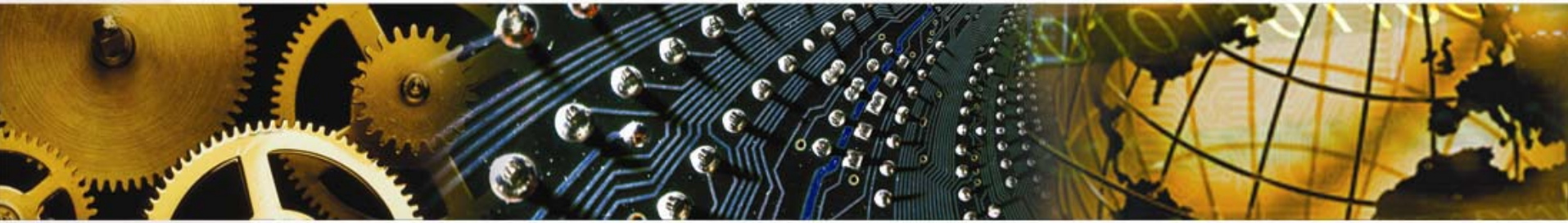
# Differences and Similarities

- Both PIP 2A10 (V02.00.00) and 2A13 (R11.00.00A) support MatComp requirements
- Material Composition PIP2A10 and PIP2A13 have consistent business content and they enable the same eBusiness process capability
- The Materials Composition sponsors consciously chose to develop standards for both PIP types to enable the trading partners to quickly adopt these standards while leveraging their existing implementation investments
- PIP 2A10 (V02.00.00) refers to a RNTD v3.2 which has 770 classes, 3391 characteristics defn., 494 terms and 764 property defn.
  - 0 MatComp classes
  - 5 MatComp sets
  - 48 MatComp definitions
  - 383 MatComp terms
- RNTD v3.2 defines all c. 380 Group A and Group B substances agreed upon at the EIA-EICTA-JGPSSI joint committee on material composition
- And the above dictionary terms can be implemented using explicit PIP, and no conflicting terms were created during engineering
- Elements were carefully engineered in PIP 2A13 to conform to PIP 2A10 in order to support existing implementation and no contradicting definitions exist
- In conclusion, decision of which PIP to implement should be based on existing PIP implementation capability by partners and their respective trading partners



# Backup Slides

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# Monolithic and Modular PIP Specification

## *RosettaNet Architecture Roadmap - Summary*

| | Monolithic PIPs® | Modular PIPs | Referenced Objects | Net Change Objects |
|---|---|---|---|---|
| *Content* | Unique message for each B2B exchange created with **no pre-defined info model**. Message-based business dictionary in **human-readable** format. Structured tech product dictionary-RTND. | Unique message for each B2B exchange **revised with common reusable components**. Message-based business dictionary in **machine-readable format**. Structured tech product info dictionary-RTND. | Explicit business and technical **information model** available in a RosettaNet Repository. **Revised transaction messages** with content and references (keys) based on info model. | Extended information model with **change rules & change descriptions**. Available in a RosettaNet repository. |
| *Access* | Many stand-alone monolithic documents in **DTD and text format**. | Many stand-alone monolithic documents in **XML Schema Packages**. | Information **model-based messages** in XML schema pkgs. with **external reference** (key) options. Plus a **finite number of PIPs based on design patterns** to enable access to information model. | **Net Change message** format that leverages change rules, change descriptions and keys to exchange precise and small messages. Plus all access methods available in Referenced Objects phase. |
| *Implement* | Must **combine human and machine specification** to map every document to enterprise app. Individual company's information model 'hidden' to trading partners. | Must map each new **machine process-able specification** to enterprise app. Individual company's information model 'hidden' to trading partners. | Must **map a single information model** to enterprise app **for information access**. **Company Repositories** will enable 'public' view and subscription access to an individual company's B2B information. | Must **map a single object model** to enterprise **for transactions.** |





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# Monolithic and Modular PIP Specification

## *Objectives of Modular PIP Specification*

- PIP® process specs: choreography and message controls
  - Use Business Process Specification Schema (BPSS)
- Re-architected business content
  - Standard re-usable PIP "components"
  - UML as a message design notation
- PIPs defined in machine-sensible XML Schema
  - choreography and message controls in a BPSS document
  - each business document consist of multiple schema files modularized into Universal Structure, Domain, System Structure and Interchange

# Monolithic and Modular PIP Specification

## *Comparison*

- Main difference:
  - use of ebXML's *Business Process Specification Schema* (BPSS) to capture the PIP choreography & message exchange controls in machine- sensible XML
- Specification Guide rewritten to make it easier to understand
  - tables gone
  - controls explained
- Semantic content essentially unchanged from current PIPs (i.e., BOV, FSV, etc.)

# Explicit and Dictionary-Based PIPs

## *Message Content (Payload) Hypothetical Example*

- Explicit PIPs

```
<PhysicalAddress>
    <addressLine>Maple Rd
    </addressLine>
    <cityName>New Rochelle
    </cityName>
    <regionName>NY
    </regionName>
    <PostalCode>10804
    </PostalCode>
</PhysicalAddress
```

- Dictionary-Based PIPs

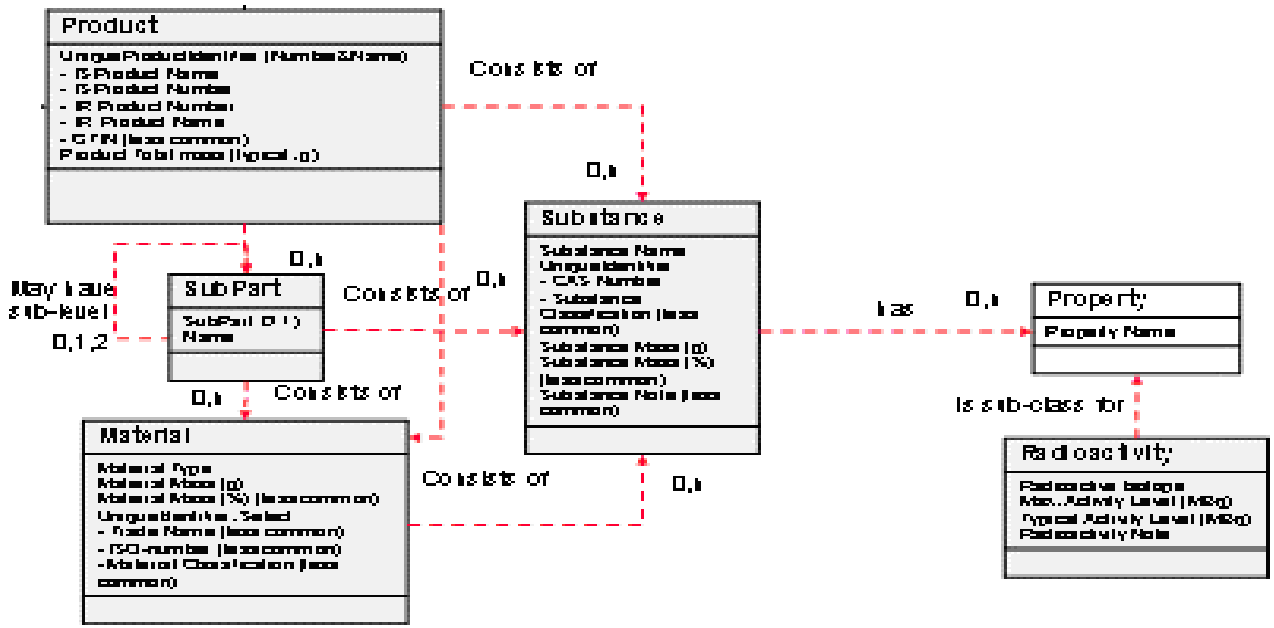
Optional Tag

```
<PhysicalAddress>
  <element dicRef="RNP211">
    <name>addressLine</name>
    <value>Maple Rd</value>
  </element>
  <element dicRef="XJE010">
    <name>cityName</name>
    <value>New Rochelle</value>
  </element>
  <element dicRef="XJE219">
    <name>regionName</name>
    <value >-NY</value>
  </element>
 <element dicRef="XJE123">
    <name>NationalPostalCode</name>
    <value >10804</value>
  </element>
</PhysicalAddress>
```

# Introduction to PIP 2A10 and 2A13

*Overview of MatComp Business Requirements*

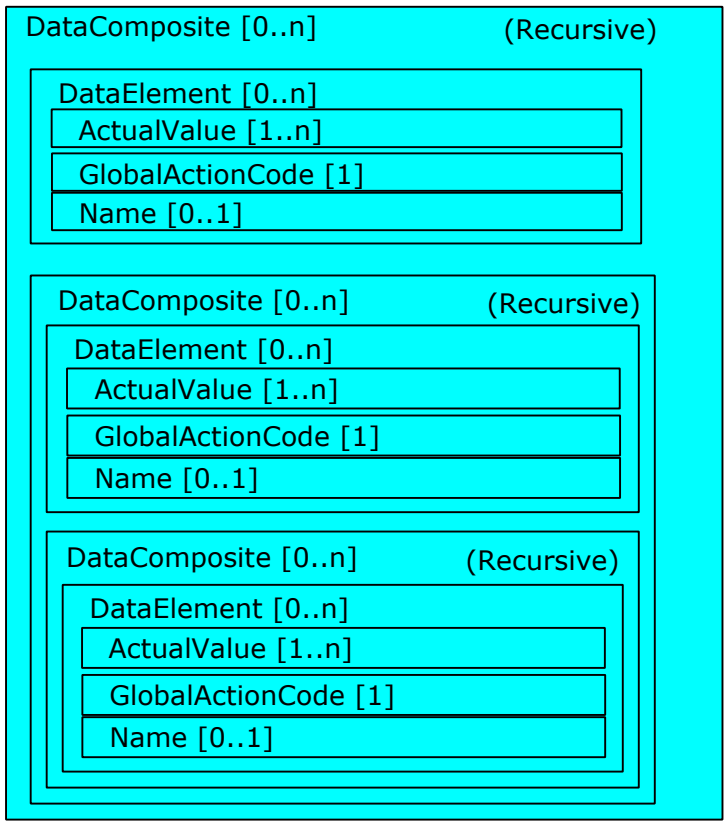
- MatComp Logical Data Model



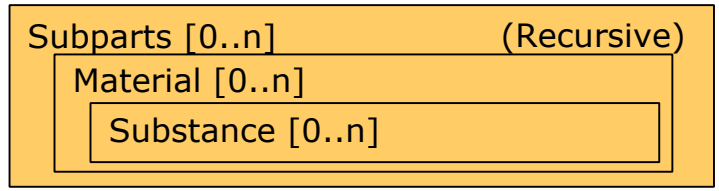
# PIP Content Mapping Between PIP 2A10 and 2A13

## *XML Instance Structure for **Subparts***

**[PIP 2A10 (V02.00.00)]**




**[PIP 2A13 (D11.00.00)]**





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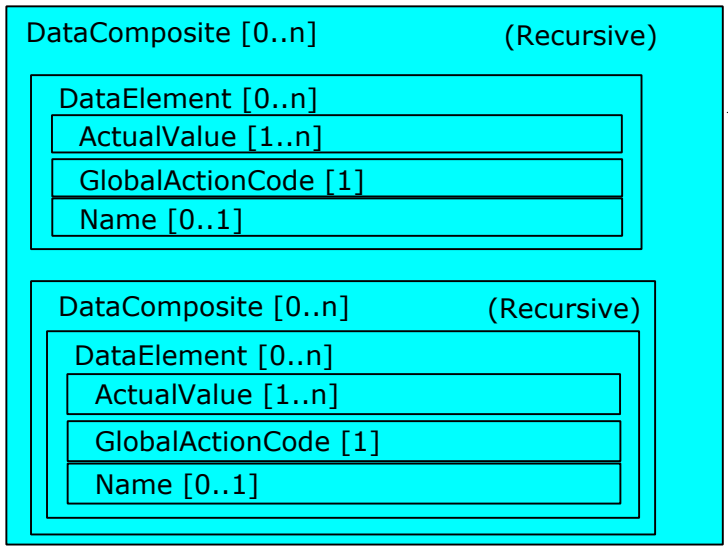
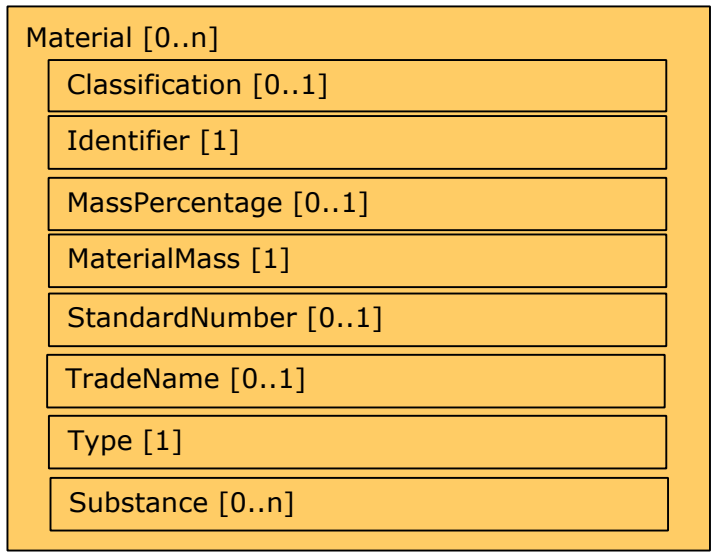
# PIP Content Mapping Between PIP 2A10 and 2A13

## *XML Instance Structure for **Material***

**[PIP 2A10 (V02.00.00)]**



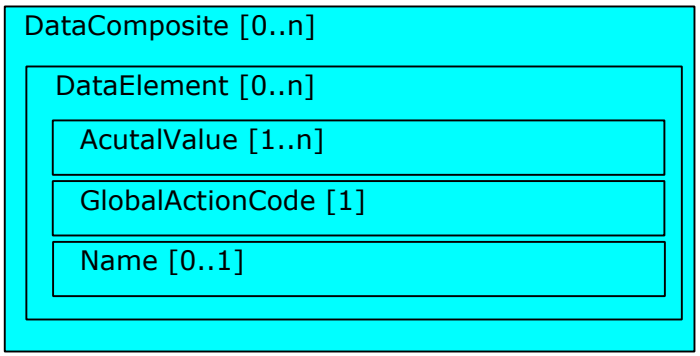

**[PIP 2A13 (D11.00.00)]**



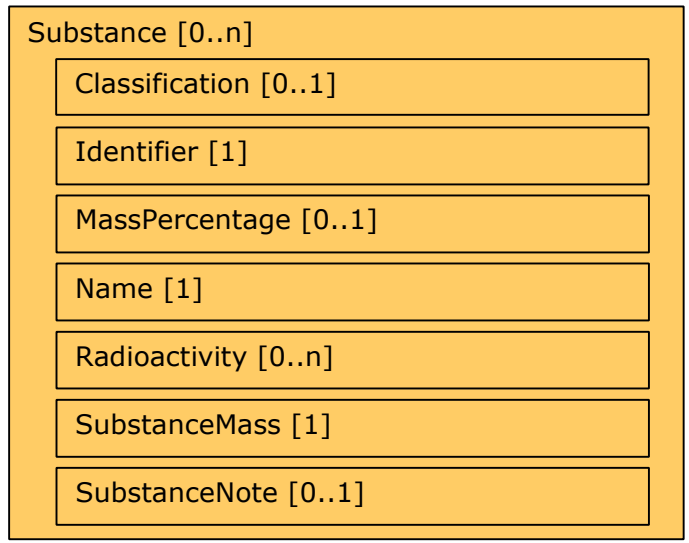
# PIP Content Mapping Between PIP 2A10 and 2A13

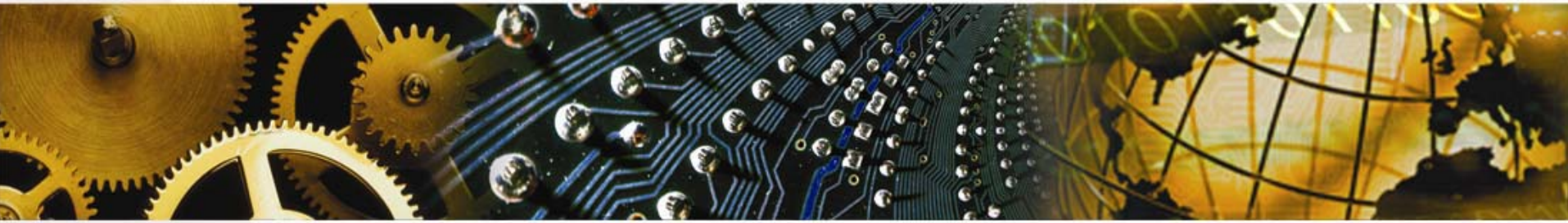
## *XML Instance Structure for **Substance***

**[PIP 2A10 (V02.00.00)]**




**[PIP 2A13 (D11.00.00)]**





# End

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