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Material Provenance related to REACH – Guidelines for the Aerospace & Defense Industry

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1 Abstract

The Aerospace and Defense Industries are fully committed to supporting global regulatory requirements such as but not limited to REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals REACH Regulation), and have consistently taken a leadership role in this regard. This collaboration produced a “Risk Matrix” that highlighted the business risks due to emerging substance regulations. This scope of consideration included the entire landscape of material provenance issues that impact things like:

- Source and continuity of supply (conflict materials, counterfeits, obsolescence)
- Product life cycle composition (design, manufacture, maintenance, disposal)
- Product performance (substitutions, re-qualifications)
- Compliance reporting (ITAR, intellectual property)

In order to assist in making product and process decisions to support compliance with regulatory requirements and to meet customer and other third party obligations, it is desired to define industry attributes that can be used by member companies to select or develop IT tools for data management. The most recent regulation regarding the risk management of chemicals is currently being addressed by entities that do business in the European Economic Area. It is anticipated that parts of this model of regulation will be embraced by other countries in the future.

This guidance is structured based on a decision matrix for Material Declaration Management (MDM). It links the five Capability Maturity Model (CMM) levels for MDM with three approaches to declaration management (Complete, Full, and Partial). The five levels of CMM have also been directly associated with three integration strategies for IT solutions and processes (Strategic, Tactical and Adhoc). The matrix also suggests linkages to A&D industry collaboration opportunities, which are not formally included in this document (e.g. AIA Hosted Social Media: the REACH wiki). This references industry social media based collaborations (conversations) regarding which substances and critical data elements should be included for various profiles of member companies’ disclosure processes. These are to be based on a member companies’ selected MDM approaches. The data element conversations will be based primarily on both IPC-1751/2 and SAE-AS9535/6 standards. These should provide guidance related to those data elements which are critical to include, as well as those which could incur undue cost and/or risk to AIA member companies of a given profile.

A longer term goal will be to establish guidance related to systems and process for determining substitutes for restricted materials up to and including to developing industry collaborative solutions. This process should be flexible enough to accommodate several regulations beyond REACH, to ensure that the value of this system will be capable of supporting current and future requirements.

2 Responsible Organization

On June 1, 2007 a legislative framework on chemicals of the European Union (E.U.) came into effect. This framework called REACH (Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals) places greater responsibility on industry to manage the risks that chemicals may pose to the health and the environment. The European Chemical Agency (ECHA) is responsible for managing the implementation of the REACH requirements in relation to the
registration, evaluation, authorization and restriction processes of chemical substances and has established criteria and guidance document for the various facets of REACH.

### 2.1 Lead Organization within AIA
Electronic Enterprise Integration Committee (EEIC) (IT aspects in support of) the Engineering Management Committee (EMC) & Environment, Health and Safety (EHS) - contact Rusty Rentsch (e-mail: rusty.rentsch@aia-aerospace.org)

### 2.2 Other stakeholders – by function/organization
- AIA Product Support Committee
- AIA eBusiness Steering Group
- AIA Supplier Management Committee
- U.S. Department of State (DoS)
- U.S. Department of Defense (DoD)
- U.S. United States Trade Representatives

### 2.3 Business Justification
E.U. importers and manufacturers of chemical substances have certain obligations relative to registration and communication within the supply chain. The A&D industries and their supply chains are impacted by the regulation and individual contract so that track of content throughout the supply chain. Impacted companies must now be able to track the contents of their products.

The business justification can be summarized as follows:
- Companies that do not comply with REACH may lose access to REACH-based markets.
- Companies that understand the business implications and impacts of REACH and develop and execute strategic action plans will gain competitive edge over those that do not.
- Awareness of chemical and substance composition is required to ensure that there is no disruption of product continuity.

### 3 Description of activity/deliverables
Activities by the AIA include the creation of aerospace industry guidelines for REACH data exchange between partners (this document). It may also include the definition of data exchange formats and methods suitable for AIA member companies and their supply chain to follow. Development of a risk matrix and its Capability Maturity Model (Table 1) related to the ability to address the issues has been developed in order to address these issues across the industry. The possibility of posting social media tools to facilitate conversations regarding candidate chemicals, as well as the development of Authorization Dossiers, is also being considered.

#### 3.1 Deliverables
- EEIC REACH Use Case Scenario [http://www.aia-aerospace.org/assets/REACH_IT_Scenario_20120721.pdf]
- Material Provenance Guidelines (this document)
  - [http://www.aia-aerospace.org/assets/REACH_Guideline_20120721.pdf]
- AIA Hosted Social Media: the REACH wiki
3.2 Assumptions

- Availability of published information requirements and procedures
- Contracts requirement flow down assumes E.U. or country specific
- A&D has unique requirements
  - Military Exemptions
  - Proprietary
  - ITAR/EARS controlled
  - Classified

3.3 Business benefits

1. Guidelines should help reduce the costs for REACH compliance across the industry
2. Enabling business continuity and avoiding disruption
3. Streamlining supply chain visibility for maintaining sustainable manufacturing
   - For example, assessment and risk mitigation for obsolescence in terms of knowing where substances are used

3.4 Location in EEIC Framework

This activity will potentially impact, or be impacted by, all elements of the AIA eBusiness framework [http://www.aia-aerospace.org/assets/ebusiness/Guidebook.doc]. This includes “Product Definition” data throughout the life-cycle (PLCS) across the industry supply chain, as well as business and ERP elements.

3.5 Adoption Plan

The extent to which AIA is involved needs to be defined as the strategy evolves.

- Developing guidelines for industry best practices (this document)
- Defining and/or coordinating standards to be implemented
- Enabling industry applications and services
  - Such as the “industry material provenance cloud”

3.6 Industry Guidance

The matrix in Table 1 shown below identifies the relationship between a member companies’ selected business approach to MDM compliance, their specific CMM level, and the ability to expend resources for near term vs. long term strategies. Each cell will contain links to a corresponding set of AIA industry specific social media content. This linked content will identify the complex and evolving issues related to creating MDM solutions. They will also contain suggested references to the various regulations with substance and material lists corresponding to the various types and sizes of companies within the A&D supply chain. The matrix also identifies the typical vendor tools and service capabilities required in the implementation of a given MDM CMM solution.

These capabilities are:
1. **Forms and data collection**
2. **Processing** *(rollup calculations/algorithms)*
3. **Reporting**
4. **Risk analysis**
5. **Information subscription services**

A consideration for creating or procuring tools, systems and services which support very long and complex A&D product life cycles, such as information subscriptions, is to ensure that any solution or service integrations can be removed or replaced without risking the ability to maintain historical and future compliance. Specific issues related to this very complex problem will be discussed in the AIA industry specific social media content. A good example identified in the AIA report on “Disruptive Information Technologies” [http://www.aia-aerospace.org/assets/report_ebiz_2010_web.pdf] suggests that an enterprise that relies exclusively on a 3rd party cloud service for storing its critical information can be jeopardized when those services are unexpectedly lost or unavailable for even a short period (or more tragically – permanent loss without recourse or backup).

The minimal business capabilities used for compliance has been determined. This allows for services to facilitate required forms and data collection with compliance processing and reporting. It identifies the use of email to simply send and receive spreadsheets with a minimal set of required data elements. If possible, this process should be automated through integration with existing sources of data.
The minimal set of data elements are based on a common subset of required data elements within both IPC-1751/2 and SAE-AS9535/6 standards.

These are:

- **Request and Preparation:** Date
- **Requestor and Preparer ID:** Company Name, **Contact ID:** Name, Title, Phone, Email, Address
- **Requestor Item ID:** Name, Identifier (e.g. P/N-Rev/Date)
- **Preparer Item ID:** Name, Identifier (e.g. P/N-Rev/Date)
- **Item:** Mass, Unit of Measure (e.g. kg), Per Unit Type (Default Each or Option: Length, Area for in-process mfg. modifications)
- **Contained Substance or Homogenous Material:** Name, Material Group or Substance Category/Family, Unique Identifier (e.g. CAS #), Issuing Authority (e.g. CAS)
  - If partial disclosure declaration:  
    - **Requestor:** Complete list of substances needing disclosure
- **Contained Concentration:**
  - Threshold %w/w & Check box indicating “Does NOT contain > Threshold”
  - or %w/w substance contained in item
  - or substance Mass and Unit of Measure and Per Unit Type (Default Each or Optional Volume, Length, Area for in-process mfg. modifications)
- **If conflict mineral declaration:**
  - Source of supply
  - or Check box declaring source is not a designated conflict mineral supplier
  - or Check box declaring source is unknown
### 3.7 Business Model to Declaration Method Matrix

Table 1: [Business Model to Declaration Method Matrix](#)

<table>
<thead>
<tr>
<th>Business Model Approach</th>
<th>Strategic Approach</th>
<th>Tactical Approach</th>
<th>Adhoc Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete declaration of all chemical / material composition</td>
<td>Capability Maturity Model Level 4-5</td>
<td>Capability Maturity Model Level 3</td>
<td>Capability Maturity Model Level 1-2</td>
</tr>
<tr>
<td>(e.g. Class D of IPC-1752A Material Classification)</td>
<td>Higher upfront cost offset by longer term ROI and lower non-compliance risk.</td>
<td>Minimize near term costs at the expense of higher permanent recurring costs.</td>
<td>No proactive planning or long term cost or risk mitigation.</td>
</tr>
<tr>
<td>Declaration Methods ↓</td>
<td>Maximal automation and integration with IT systems with end-to-end information linkage.</td>
<td>Complete declaration of all chemical / material composition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Covering all service capabilities.</td>
<td>(e.g. Class D of IPC-1752A Material Classification)</td>
<td></td>
</tr>
<tr>
<td>Full Declaration with only &quot;potentially regulated&quot; chemical / material composition</td>
<td>Fully integrated with IT systems with end-to-end information linkage.</td>
<td>Partially integrated / semi-automated processes and systems.</td>
<td></td>
</tr>
<tr>
<td>(e.g. Class B and C of IPC-1752A)</td>
<td>Covering most or all service capabilities.</td>
<td>Recommended services should include risk analysis and information subscription services.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate data volume to manage with significant “compliance process complexity”.</td>
<td>Moderate data volume to manage with most “compliance process complexity”.</td>
<td></td>
</tr>
<tr>
<td>Partial Declaration with specific regulated chemical / material composition</td>
<td>Significant integration with IT systems with end-to-end information linkage.</td>
<td>Some integration / semi-automated processes and systems.</td>
<td>Manual processes (e.g. email spreadsheet).</td>
</tr>
<tr>
<td>(e.g. Class A of IPC-1752A Material Classification)</td>
<td>Covering most or all service capabilities.</td>
<td>Services may also include risk analysis and/or information subscription services.</td>
<td>Minimal required forms, data collection, processing &amp; reporting. Little or no risk analysis or information subscription services.</td>
</tr>
<tr>
<td></td>
<td>Least near term data volume with automated long term “compliance process complexity”.</td>
<td>Least near term data volume with significant long term “compliance process complexity”.</td>
<td>Least near term data volume with increasing long term “compliance process complexity”.</td>
</tr>
</tbody>
</table>
3.8 Data elements and/or process requirements

The following data elements and/or process requirements can potentially incur undue cost and/or risk:

Table 2: data elements and/or process requirements

<table>
<thead>
<tr>
<th>Data Element Risks</th>
<th>Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration ranges or estimates</td>
<td>Potential for rollup algorithm errors or inconsistencies</td>
</tr>
<tr>
<td>Substance application method or use</td>
<td>Restrictions based on regulations specific to REACH</td>
</tr>
<tr>
<td>Intended for release flag</td>
<td>Creates full disclosure complexity for SAE-AS9535</td>
</tr>
<tr>
<td>Authorized Representative</td>
<td>If different from preparation contact, creates potential validity issues</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Risks</td>
<td></td>
</tr>
<tr>
<td>Submitting data structures (XML)</td>
<td>This requires system integration or translation</td>
</tr>
<tr>
<td>Using either actual or worst case “As Manufactured” information for mass property rollup calculations</td>
<td>Probable lack of source information due to lack of shop floor collection detail. Nominal estimates may not be adequate for compliance due to process variances, design margins, tolerances, and substitution options.</td>
</tr>
<tr>
<td>Using worst case “As Designed” information for mass property rollup calculations</td>
<td>Near term complexity reduction. Potential future process complexity increases related to potential future requirement for “As Manufactured” or “As Maintained” information detail. Nominal estimates may not be adequate for compliance due to process variances, design margins, tolerances, and substitution options.</td>
</tr>
</tbody>
</table>

4 AIA adoption statement

Adoption of these guidelines is voluntary and should be based on individual business context.

5 AIA recommendation

AIA recommends all member companies read and understand where their business context is in relation to their MDM CMM and associated declaration approaches. It further recommends that they engage in the industry collaboration on the AIA REACH wiki site to obtain the latest information related to critical data elements, substitution options, etc.

6 Links to external standards sites and supporting material

SAE-AS9535/6 - http://standards.sae.org/as9535/