



Data Standardization to Support Safer Products

Green Chemistry & Commerce Council (GC3): A project of the Lowell Center for Sustainable Production,
University of Massachusetts Lowell

Joel Tickner/Monica Becker

Lowell Center for Sustainable Production, UMASS Lowell

www.greenchemistryandcommerce.org

Monica Becker & Associates Sustainability Consultants

www.monicabecker.com



What is the GC3?

A cross sectoral, B-2-B network of more than 60 companies and other organizations formed in 2005 with a mission to promote green chemistry and design for environment (DfE) nationally and internationally





What is the GC3? (cont.)

A dynamic forum for leading edge companies to:

- **Share best practices and push the frontier of business practices that promote green chemistry**
- **Work collaboratively on projects to develop new business strategies, technologies, tools and information**



GC3 Members

Chemical/Specialty Chemicals

Alpha Chemical Service, Inc.
BASF Corporation
Bayer MaterialScience LLC
The Dow Chemical Company
Kluber Lubrication
The HallStar Company
Hubbard Hall
ACS Green Chemistry Institute
Diversey
DuPont
ecoSolv Technologies, Inc.
Rivertop Renewables

Apparel & Footwear

Anvil Knitwear
Nike, Inc.

Retail

Walmart
Staples
Target
Green Depot

Outdoor Industry

REI

Consumer Products

Avon Products, Inc.
Johnson & Johnson
Henkel/Dial
Method Products, Inc.
Seventh Generation, Inc
Colgate-Palmolive Company

Office Furniture

Steelcase
Herman Miller
Designtex

Building Products

Construction Specialties

Aerospace

Lockheed Martin

Electronics

Bose Corporation
HP
Intel
Dell
EMC Corporation

Pharmaceutical

BWC Pharma Consulting



GC3 Members

Software

Actio Software
The Wercs

Product Standards & Certification

Bureau Veritas
Green Seal
EPEAT, Inc.
NSF International

Consulting

Inside Matters
Pure Strategies
ToxServices, LLC
Environmental and Public Health
Consulting
Daley International
Sustainable Research Group

Government

Minnesota Pollution Control Agency
Environmental Protection Agency
German Federal Environment Agency
Mass. Toxics Use Reduction Institute
Washington State Department of Ecology

Non Governmental Organizations

Investor Environmental Health Network
Center for Environmental Health
Clean Production Action
Cradle to Cradle Products Innovation Institute
GreenBlue
Environmental Health Fund
Pacific Northwest Pollution Prevention Resource
Center

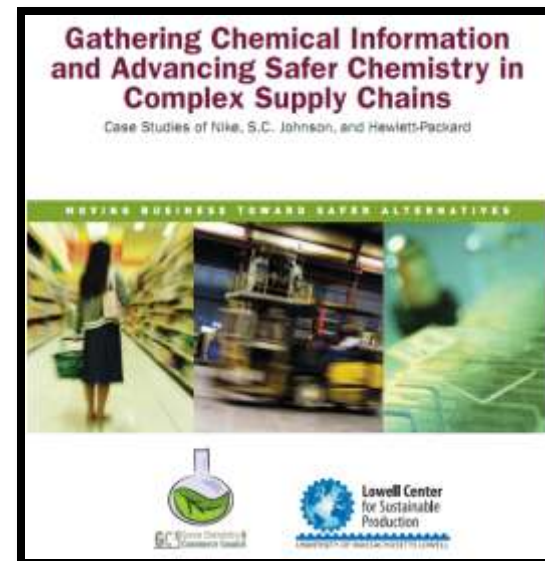


Current Projects

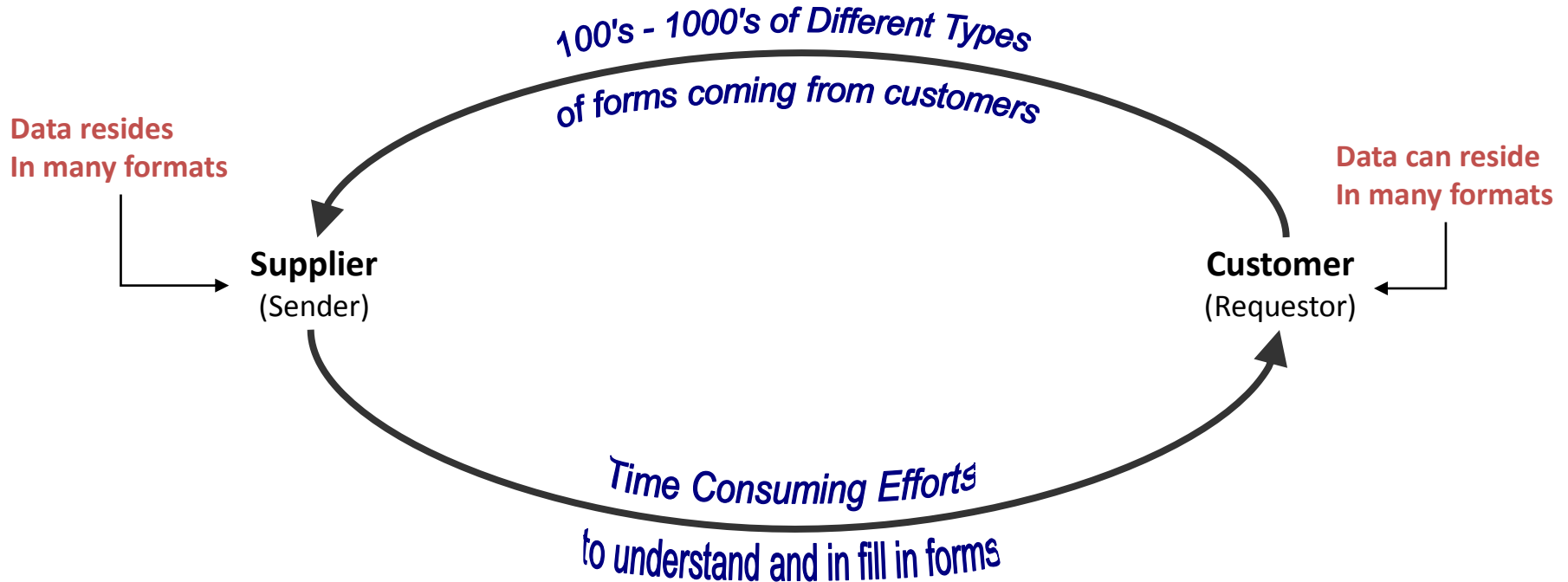
- **Facilitating Chemical Data Flow Along Supply Chains**
- **Retailer engagement to advance safer chemicals and products**
- **Business and Academic Partnerships**
- **Green Chemistry Education**

GC3 Chemical Data Project Group

- 2007 Tools for chemical assessment
- 2008 Report on Restricted Substances Lists (RSL)
- 2009 In-depth case studies of Nike, HP and SC Johnson on:
- Gathering chemical data from supply chains
 - Use of chemical data to develop safer products
- 2010 “Meeting Customers’ Needs for Chemical Data: A guidance document for suppliers”
- 2011 **Chemical data standardization project**



*The Problem: Lack of Standardization**



*Adapted from
Mark Frimann, TI

Current methods for data requests:

- There are almost as many different types of forms as there are customers needing data
- Works against efforts to communicate chemical data in supply chains



NSF International Standard /
Green Chemistry Institute /
American National Standard

NSF/GCI/ANSI 355 - 2011

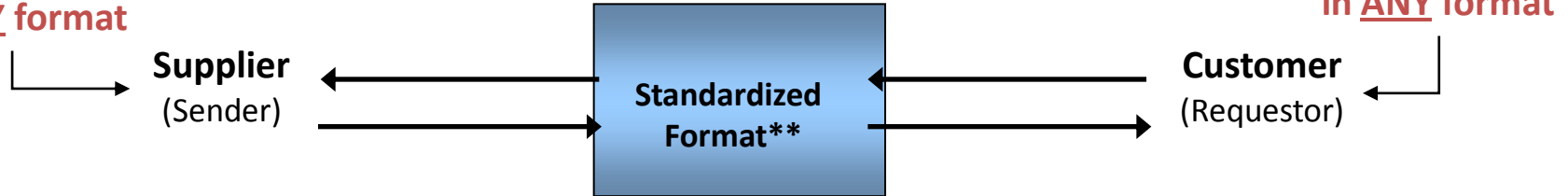
Greener Chemicals and
Processes Information



So many different systems... Which one and what data are we looking for?

*Solution: Standardization**

Data can still
reside
in ANY format



*Adapted from
Mark Frimann, TI

**** Using a standardized, XML based format allows 2 ways to exchange data**

- Pull = Customer sends the XML data request with criteria and Supplier sends XML data
- Push = Supplier publishes XML data for download by customers
- Automation possible by using it as a data transfer standard with any required translators feeds from the Supplier database and to the Customer database

The electronic's sector's IPC175X Standard provides a [framework](#) for standardization in electronics and other sectors

GC3 Chemical Data Standardization Project

Objective: To evaluate the feasibility & benefits of standardizing chemical data types/formats/collection systems across companies in supply chains

For the range of corporate programs that these data are needed for, including:

- Regulatory compliance
- Product design & selection
- Identification of chemicals of concern
- Chemical substitution
- Product certification programs
- Ingredient disclosure initiatives
- Chemical hazard assessments – using systems such as GreenScreen, GreenWERCs, SciVera Lens, etc.
- Alternatives assessment
- LCAs

Key question such data answers: What's in it? Getting this right supports other questions such as How toxic is it? What are safer alternatives?

Potential benefits of standardization:

- Increased data availability
- Reduced cost of data gathering/communication
- Improved quality of data



GC3 Chemical Data Standardization Project

Approach:

- Conduct a pilot in the electronics sector -- with engagement of companies in an actual supply chain
- Ensure that results are value-add for all GC3 members, in all sectors

Focus for Pilot:

Phase I. Chemical content information – now
Phase II. Chemicals used in manufacturing - ?

Electronics Pilot Workplan:

Task 1: Create chemical data “superset” – a set of chemical data that will satisfy the needs of all/most companies in a supply chain

Task 2: Select a simple component; collect and format data

Task 3: Evaluate data/gaps

Task 4: Develop and disseminate GC3 Report on the Pilot





GC3 Chemical Data Standardization Project

Electronics Supply Chain Pilot



Pilot Team Members

Mark Frimann, Texas Instruments

Brian Martin & Bill Haas, Seagate

Lyndsey Ridgeway, HP

Roger McFadden, Staples

GC3 Chemical Data Standardization Project

What makes this project unique

Focus on chemical flow in entire whole supply chain, in particular downstream users – not just first link in chemical chain

Focus on robust, consistent information on product content data can flow through supply chain

Focus on all standardized information on all chemicals, not just chemicals of concern.

Example: Chemical Mixture becomes a plastic which becomes a product component which becomes a product which is then sold in retail



GC3 Chemical Data Standardization Project

Electronics Pilot Workplan

Task 1: Create chemical data “superset” – a set of chemical data that will satisfy the needs of all/most companies in a supply chain

Data “Modules” for Electronics Sector (Draft)

1. Requestor (i.e., Customer) Information
2. Supplier (i.e., Sender) Information
3. General Component Information
4. Component Compliance Declarations
5. Chemical Substance Information
6. Substance & Material Group Information



Chemical data “superset” for electronics - draft

1. Requestor (Customer) Information

Company Unique ID (DUNS or equivalent)
Company Name
Company address
Contact Name
Contact Title
Contact Email
Contact Phone Number
Division Name
Business Unit

2. Supplier (Sender) Information

Company Unique ID (DUNS or equivalent)
Company Name
Company Address
Contact Name
Contact Title
Contact Email
Contact Phone Number
Division Name
Business Unit

Chemical data “superset” for electronics – draft

3. General Component Information

Request Date

Need Date

Requestor Component Name

Response Date

Supplier Component Name

Component Build Site

Component Mass

Unit of Measure (mg, gram)

Unit Type (each)

Chemical data “superset” for electronics – draft

4. Component Compliance Declarations

Component/ Device Status - REACH

Component / Device REACH Availability Date

Component / Product Status - RoHS

EU RoHS Exemption (if applies)

Component / Product RoHS Availability Date

Chemical data “superset” for electronics – draft

5. Chemical Substance Information

CAS Number or Other Unique Chemical ID No.

Substance Name

Amount in Component (mg, grams or kg)

Substance Concentration in component – ppm and/or %

[calculated from *Component Mass* and *Amount in Component* above]

Description of Chemical Use/Function

Chemical data “superset” for electronics – draft

6. Substance & Material Group Information*

EU RoHS Substance Category

For IPC 1752 Class B (when updated from IEC 62474)

Material Class ID (Number)

Material Class (Name)

IPC 1752 Class C

JIG 101 threshold for substance [taken from JIG

Below threshold?

REACH

Substance on ECHA Substance List? (released and proposed Candidate List)

JAMP**

Material Name

Material Group ID

Material Group

Use Category

* IPC 1752 and other chemical data programs in the electronics industry have created groupings of substances and materials, selected because of their importance to legislative, economic, environmental, or other management concerns.

** JAMP - Joint Article Management Promotion - electronics consortium; mainly in Japan & South Asia; developed platform for exchanging information through SC; some electronics companies have to report to customers using JAMP format

Task 2: Select a simple component; collect and format data

Input			
Requestor Information			
Requestor Company Unique ID (DUNS or equiv):	98533326	Requestor Company Name:	SEAGATE TECHNOLOGY
		Requestor Company Address:	10200 S. De Anza Blvd, Cupertino, CA 95014, USA 95014
Requestor Contact Name:	Brian Martin	Requestor Contact Title:	Sr. Director, Product Environmental Compliance
		Requestor Contact email:	brian.martin@seagate.com
		Requestor Contact Phone Number:	831-439-2460
		Requestor Division Name:	Corp. Compliance
		Requestor Business Unit:	Supply Chain Management
Supplier Information			
Supplier Company Unique ID (DUNS or equiv.):	101345692	Supplier Company Name:	TEXAS INSTRUMENTS INCORPORATED
		Supplier Company Address:	12500 TI Boulevard, Dallas, Texas 75243
Supplier Contact Name:	Mark Frimann	Supplier Contact Title	TI SC Product Stewardship Mngmt
		Supplier Contact	m-frimann@ti.com
		Supplier Contact	214-567-6354
		Supplier Division Name:	Supply Chain Mgmt
		Supplier Business	Corp. Compliance



IC Package 16 pin RGT
(TI integrated circuit (IC))



Task 2: Select a simple component; collect and format data

Chemical Substance Information				Component Level Substance Concentration		Description of Chemical Use	
Component Name	CAS Number or Other Unique Chem ID No.	Substance Name	Amount (mg)	%	ppm	Choose from Dropdown list of REACH Descriptors or fill in as needed (see REACH worksheet for defn's of Use Cat.)	If "other" is indicated in column F, type in function
	Choose from Dropdown List - See CAS Number Worksheet for List of Unique IDs and Chem Names	Confirm Chemical Name. If no CAS or other Unique Chem ID, enter Substance Name					
SH6855ABA0RGTR G4 - IC Package 16 pin RGT	7440508	Copper	8.248668	37.9511865	379,511.87	Conductive agents	
	7440315	Tin	0.020778	0.0955972	955.97	Conductive agents	
	7440666	Zinc	0.019946	0.0917693	917.69	Conductive agents	
	7440020	Nickel	0.14268	0.6564545	6,564.55	Plating agents and metal sur	
	7440213	Doped Silicon	0.90801	4.1776511	41,776.51	Conductive agents	
	606768860, 14464461	Fused Silica	10.776338	49.5807097	495,807.10	Conductive agents	
	7631869	Silica	0.005555	0.0255579	255.58	Conductive agents	
	7440417	Beryllium	0.000002	0.0000092	0.09	Other	blah blah
	7440702	Calcium	0.000002	0.0000092	0.09	Conductive agents	
	7440473	Chromium	0.021609	0.0994206	994.21	Conductive agents	
	7440746	Indium	0.000006	0.0000276	0.28	Conductive agents	
	1333864	Carbon Black	0.059538	0.2739276	2,739.28	Colouring agents, pigments	
	7440575	Gold	0.181781	0.8363538	8,363.54	Conductive agents	
	7440053	Palladium	0.00615	0.0282955	282.95	Conductive agents	
	7440224	Silver	0.191651	0.8817645	8,817.65	Conductive agents	
	Epoxy	1.152227	5.3012658	53,012.66	Binding agents		
Total			21.734941	100.000000	1,000,000.00		

Our Rules:

No de minimis level for reporting - if you know the chemical is in the component, it should be reported (and you should know!)

No Zeros (they cause confusion). If a chemical is present, report it and carry the number through no matter how low the concentration

Report any contaminant that you know about, particularly if it's on a restricted list

Task 3: Evaluate data/gaps

Standardization requires unique chemical and material identifiers

Gap: Lack of unique chemical identifiers (i.e., numbers) for chemicals and materials (a key enabler of data standardization)

Problems that Pilot Group members have identified:

- Reliance on CAS numbers
- Some chemicals have multiple CAS numbers
- Some chemicals have no CAS numbers
- Some CAS numbers do not map on EC numbers

Enablers of Chemical Data Standardization:

- A single, standardized, universally accepted set of unique chemical and material identifiers
- A curated, database of identifiers, on the web

Lessons learned

- Standardized chemical ingredient data is critical for:
 - Understanding what chemicals are in what components/products
 - Feeding into chemical hazard assessment and substitution processes
 - Ultimately regulatory compliance and design of safer products
 - Efficiency and comparability across sectors
- This is not easy and lots of limitations
- There are lots of data collection tools that are not consistent.
- Lessons from the electronics model can be extracted to other sectors
- Standardization makes lots of sense at this stage. Little debate over basic data parameters