Anti-Counterfeit

Project Update – Feb 2014

Project Members

Main Contributors

Alan Rae – NMIC

Chad Noddings - Boeing

Colm Nolan - IBM

Dave Brown - Intel

Laurence Schultz - HDPUG

Marshall Andrews - HDPUG

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Additional Contributors

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Mark Mooder – Curtis Wright

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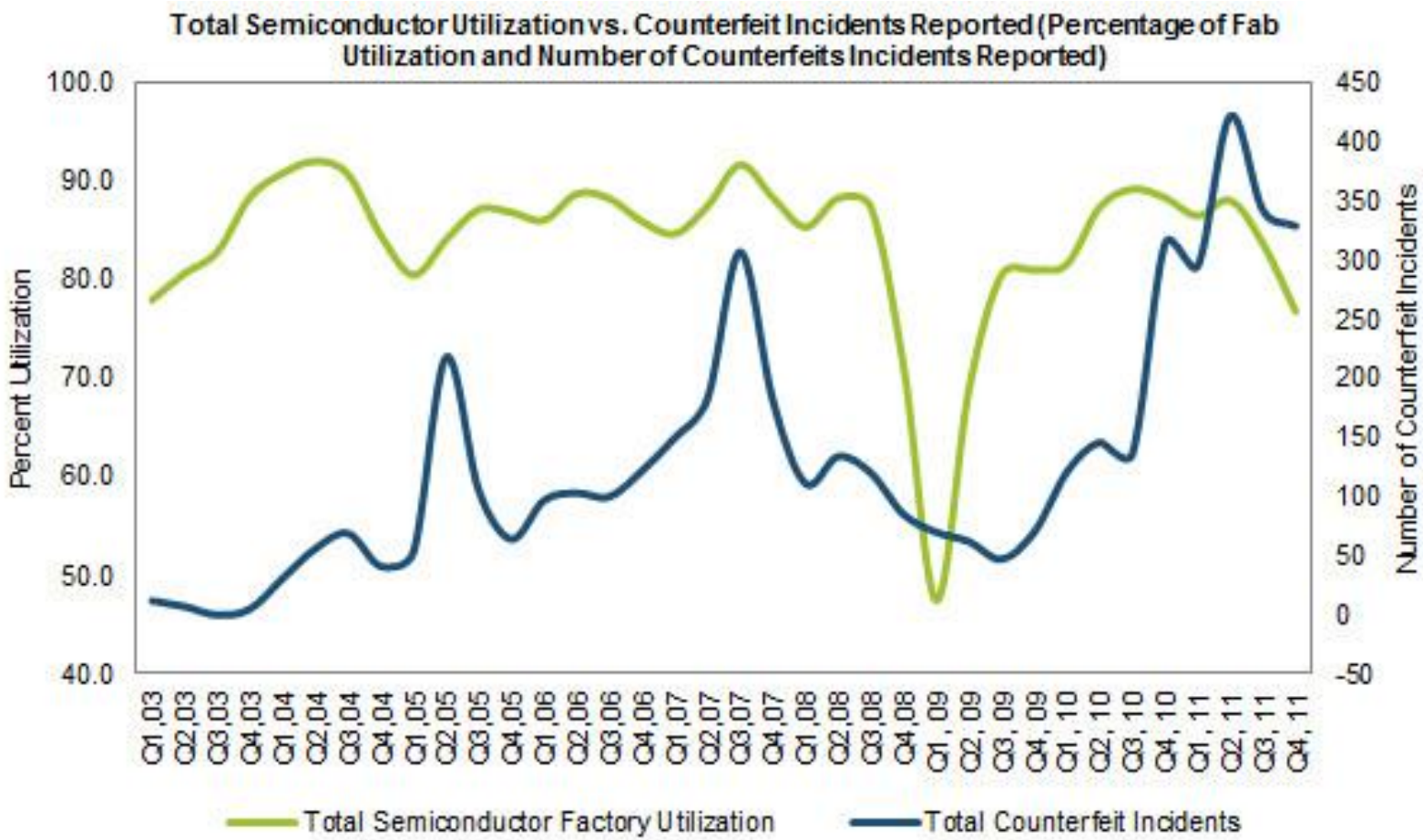
Summary

- Counterfeit Activity is a growing problem
- Impacting all companies
- NDAA 2012 is a game changing piece of legislation
- Increased FOCUS on Industry Action
- Various groups working on various aspects

➢ HDPUG will look at data sharing requirements and the associated technologies that support those requirements to ensure e2e supply chain integrity

Counterfeit – A Growing Problem



Source: IHS iSuppli Research, November 2012, IHS Parts Management, CAPS Universe, Q3 2012

Health/Safety Concern -- Example

EECA ESIA

Automated External Defibrillator or AED

Medical device end user customer reported to semiconductor company that semiconductors they purchased from a Broker failed. Examination revealed the semiconductors to be counterfeit.

Counterfeit Backdrop

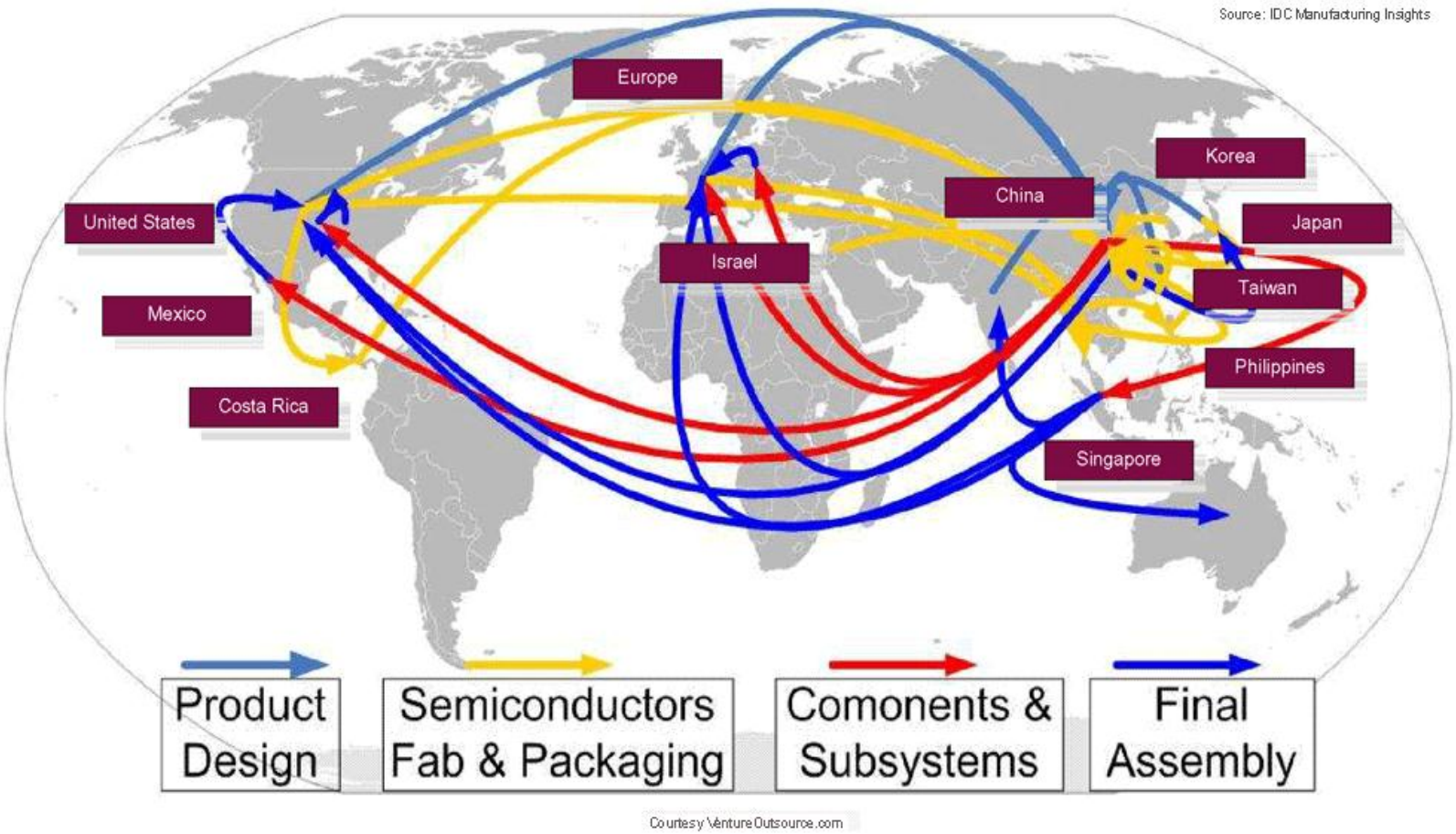
Drivers of Supply & Demand of Counterfeit Products

Macro-level drivers of supply	Macro-level drivers of demand
• The growing prevalence of digital and networked technologies • The globalization of trade, the growing importance of international brands • The presence of large integrated markets supporting free trade • Low or weak enforcement of penalties targeting violators of IPR infringements • The growing presence and involvement of organized crime in the production and distribution of counterfeited and pirated goods • Industry-specific factors.	• Social acceptance to buy products that violate intellectual property rights • Limited availability of authentic goods • The high price of authentic goods • The rising quality of counterfeit goods.

Source – Rand Corporation, 2012

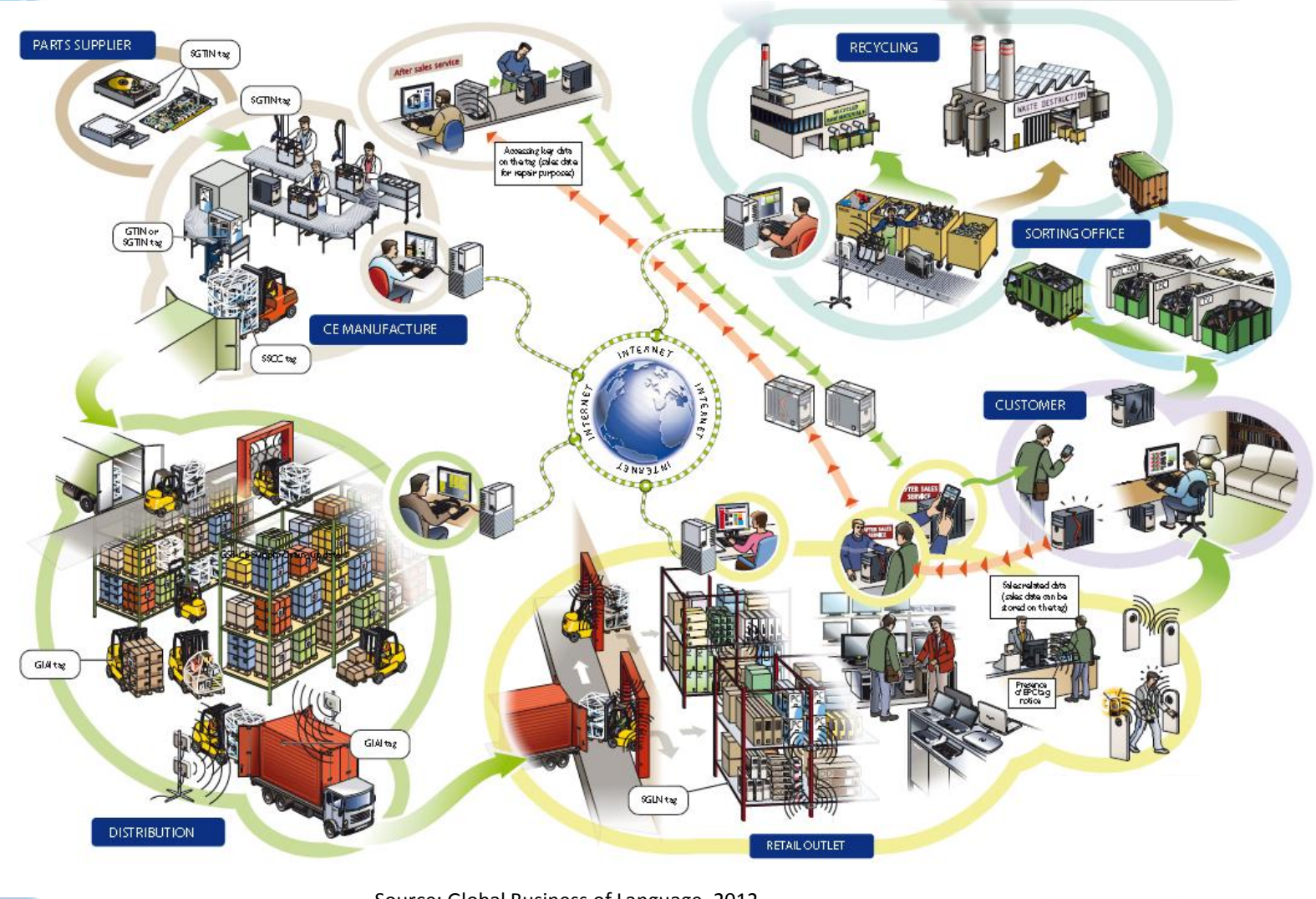
Semiconductor Industry

Global Value Chain



Semiconductor industry characterized by global transfer of goods and services.

The Global Consumer Electronic Supply Chain



Source: Global Business of Language, 2012

Growing Area of Concern & Focus

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Product Authentication & Traceability in the Supply Chain

Phase 2

Authentication Technology Evaluation

HDPUG Anti-Counterfeit Project
Phase 2

Title	**Product Authentication & Traceability in the Electronics Supply Chain**
Phase 2	Phase 2 – List, evaluate and compare the existing and emerging technologies for product authentication throughout the electronics supply chain and map those technologies to the data sharing requirements identified in phase 1 and identify gaps if & where they exist.
Details	1) Existing Technologies * Project Members to identify the current technologies being used & evaluated * Evaluation / Assessment of those technologies .. Applicability, Cost, Effectiveness * Ranking of technology effectiveness by supply chain segment
	2) Emerging Technologies * Examination of the new & emerging technologies * Evaluation / Assessment of those technologies … Applicability, Cost, Effectiveness * Ranking of those technologies based on effectiveness & future proofing
Comments	# Supply Chain Evaluation should include all major steps in the electronics SC. The project team must define those steps to be included and evaluated. # Information shared between members will be non-confidential # New technologies will require an SME or experienced user to explain how it works, what issue it addresses and the typical costs / benefits involved.

Phase 2 - Actions

	Work Item	Owner	Due Date
1.	Consolidate Technology List	Team	Complete
2.	Determine Rating Criteria	Team	Complete
3.	Complete Technology Evaluation	Team	E/Feb
4.	Generate White Paper ToC	Colm	M/March
5.	Draft White Paper	Team	M/April
6.	Assemble Inputs	Laurence	E/April
7.	Issue 1st White Paper Draft	Colm	M/May
8.	Edit 1st Draft	Team	E/May
9.	Issue 2nd Draft	Colm	M/June
10.	Peer review	HDPUG	M/July
11.	Issue Final Document	Colm / LS	E/July
12.	Issue Phase 2 Final Report	Colm / LS	M/Aug

Technology Listing

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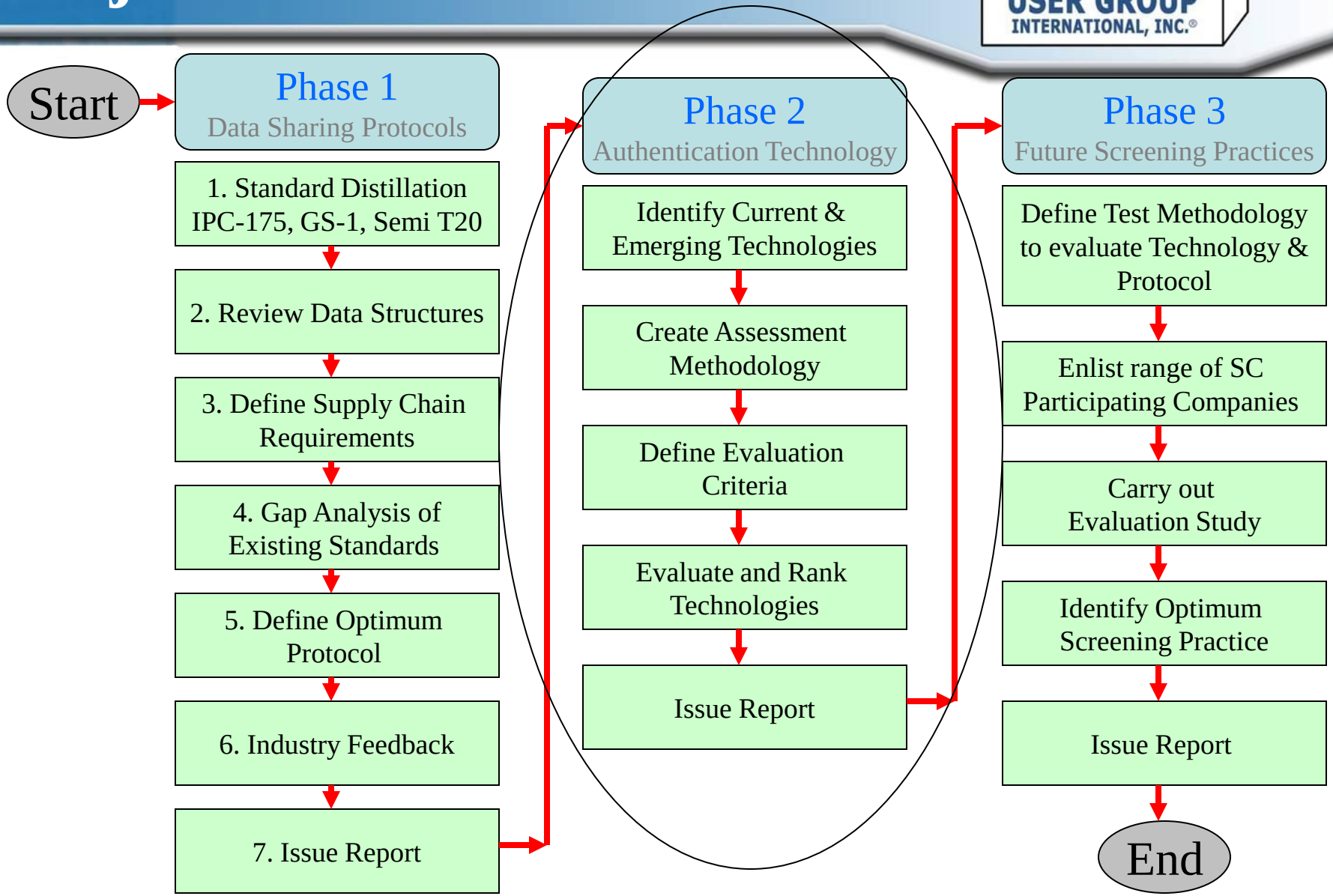
Authentication Technology Evaluation

No	Type	Technology	Description
1	Materials / Chemical	DNA Tagging	Adding a consigned materal to the product provided by a trusted source
2		Phosphor Tagging	Adding a consigned materal to the product provided by a trusted source
3		Micro-ceramic Particles	Adding a consigned materal to the product provided by a trusted source
4		Carbon-dating-like ingredient	Chemical decay (a designed and measurable shift in performance)
5	Visual	Proof Tag	Serialized label affixed with a small drop of a clear polymer that has bubbles randomly dispersed within it.
6		Color Shift Ink	Unique type of pigmentation that changes color depending on the angle of the light reflecting off the ink
7		Holographic Image	Three-dimensional images change as the position and orientation of the viewing system changes
8		Authenti Guard	AuthentiGuard is a security printing and document security technology.
9		Nano Pattern	Deliberate paterning that counterfeiters cannot afford to do
10		Un-clonable Laser Mark	Large two-dimentional barcodes containing 5 to 20% random errors
11		Extreme magnification	Any surface mag'd enough becomes unique.Digitizing and signing this view becomes an authentication signitur
12		Bar Code	
13	Electronic	RFID	Active and passive and can be embedded in chip
14		PUF	There are half a dozen implementations of this
15		Thermal Profiling	University research at Howard U. (by Dr. Preston D.Frazier)
16		Prorgramable cells	fuses, Eprom, Flash, etc. - used to store private keys or other secrets
17		Odometer circuits	U. of Conn. Research on circuits that change with time
18		Random Number Gen.	Used to protect programmed secrets
19	Other	Mass Serialisation	Remote and secure database storing attribute data
20		As-built data records	Materials used in most BOM's change over time.

Technology Evaluation Criteria

1. What it does
   * How the technology provides authentication capability
2. What it does not do
   * Authentication Limitations of the technology
3. System Requirements
   * Key requirements for the technology to be effective
4. Limitations / Killers
   * Cost, Time & Expertise required, Destructive technology
5. Examples / Comments
   * Additional information / explanation
6. Warnings
   * Long term limitations & implications

Project Flow Chart



Backup

Complete

Phase 1

Optimum Supply Chain Data Sharing Protocols

HDPUG Anti-Counterfeit Project
Phase 1

Title	**Product Authentication & Traceability in the Electronics Supply Chain**
Phase 1	Phase 1 - Define the Data sharing requirements between linked nodes on the supply chain that enables and supports the integrity & authentication of product between those nodes
Details	Currently there is no agreed method of data exchange or data sharing between hi-tech companies to support or facilitate product authentication. This phase will examine what data is required to be exchanged between companies to enable product authentication and ensure supply chain integrity. It will examine existing standards such as IPC-175X, Semi T-20 or GS-1 and building on those the team will create a protocol for forward and backward product authentication between nodes in the supply chain.
Comments	• User must specify level of criticality required • Mission critical may require all nodes to be covered • Non critical applications may need original manufacture data only • The Protocol will require trust is established before data is shared • How to know who is Trusted has to be defined. • Is Certificate of Conformance (CoC) part of the protocol ? • Information shared is confidential but not trade secret e.g.NDA protocol • Authentication may compare physical attributes with manufacturing records • Length of time the data should be available … and how that should be managed .. Business model TBC

Phase 1 - Actions

	Work Item	Responsible	Due Date
1.	Standard Distillation	Dave / Yaw	Nov 1st
	- IPC-175X, Semi T-20 , GS-1		
2.	Review Data Structures of these standards	Team	Nov 15th
	- Compile Data Requirements from standards	Laurence / Alan	Nov 29th
3.	Define Supply Chain requirements	Team	Dec 13th
	- Present details of the SC requirements	Laurence / Alan	Jan 10th
4.	GAP Analysis of Existing Standards		
	- Review suitability of current standards	Team	Feb 7th
	- Propose additions / mods if required	Team	Feb 7th
	- Compile Gap Analysis	Laurence / Alan	Feb 21st
5.	Define Optimum Protocol / Policy	Team	Mar 21st
6.	Solicit Feedback from Industry	Team	April 25th
7.	Issue Report		
	- Draft Report	Colm / Laurence	May 23rd
	- Review Draft Report	Team	June 13th
	- Issue Final Report	Colm / Laurence	July 4th

All Items Complete

Standards Comparison

Function	IEC 62474	UC1?	T-20	IPC 175X
Source	IEC	GS1	SEMI	IPC
Title	Material Content Declaration and Format of Electronic Transmission		Specification for Authentication of Semiconductors and Related Products	Matrls Standardization Std.
ID of Material	√	√ (all numbers)	No	√
ID of Manufacturer	√		√	√
ID of Requester			√	√
ID reg. materials present	√		No	
Am'ts reg. mtl present	√		No	
Shared Preamble				√
Formal Format	√		√	
Move lg. data in XML			√	
Data Downstream	√		√	
Data Upstream				
Auto method for mat'ls	√		No	
Database	√ (Names of reg. mat'ls)		SEMI Whitelist	√
Pre-exist data structure			√	
Commonly used by Mfg	√	√	TBD	
Guide/checklist to Std	√			√
XML compiler			√	√
need for	EAS msg,UDS or XML desc.		TBD	
Codes			TBD	
Status	Final draft	Complete	Complete / Published	In progress

Current Data Sharing

Category	No	Description	ERAI	GIDEP	US CBP
Contact Details	1	Name / GIDEP rep	x	x	x
		Address		x	
	2	Point of Contact (Ph / email)	x	x	x
	3	Company Name:	x		
		MSRP			x
		Trademark Reg No			x
Product Info	4	High Risk Part Information	x	x	x
	5	Part Number:	x	x	
		Government PN		x	
	6	Manufacturer:	x	x	x
		Mfg Address		x	
		Mfg Contact Details		x	
		Notification Date & result		x	
	7	Date Code:	x	x	
	8	Lot Code:	x		
		Country of Origin:	x		
	9	Suspect Counterfeit Part:	x		x
		Grade			x
	10	Description of Nonconformance:	x	x	x
Supplier Info	11	Supplier Name & Address	x	x	x
		Notification Date & Result		x	
		Who provided you this part?	x		
Action		Action Taken / Planned		x	

Counterfeit Reporting Requirements

Supply Chain Requirements

Final

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SC Step	Supply Chain Stage	Data Required at this Step	Controls that can be applied	Trust Assurances
1	**Raw Materials Supplier** (Chemicals, Metals, Pastes..)	Material Supplier ID and COC by Unique Batch ID No for all materials supplied	Unique composition	Ethical Source
2	**Wafer Manufacturer**	Materials Supplier ID and COC for all materials received by Unique Batch ID No	Unique composition	Limited Source
3	**Component Manufacturer** (IC, Caps, Resistors, Cables …)	For all materials used - Wafer Supplier ID, Unique Material Batch ID No with COC,	Laser Marking. Taggants, Doc Retention to support Product Lifecycle	Approved Mfg
4	**Board Manufacturer** (PCBs, Modules, Drives, PSUs…)	For all components & materials used - Component Supplier ID, Unique Component ID for high value / high risk items, unique Batch ID for low value / low risk items	MAC, VPD, S/N, Auth System, Taggants, GIDEP Alert	Approved Mfg
5	**System Manufacturer** (Complete System)	For all components - Board Mfg ID, Unique Component ID for high value / high risk items, unique Batch ID for low value / low risk items	Content by S/N, GIDEP Alert	Approved Mfg
6	**System Integrator** (H/W & S/W Integration)	For all components (H/W & S/W) - System Mfg ID, Unique Component ID for high value / high risk items, unique Batch ID for low value / low risk items	GIDEP Alert	??
7	**Distribution** (Authorised Channel)	For all products - System Integrator ID and Unqiue Product ID	Physical Access, Invoice S/Ns, Doc Retention, GIDEP Alert	Authorised Distributor
8	**Retail / Broker**	For all products - Dist ID and Unqiue Product ID. Procurement & Sales record for all products	Invoice S/Ns, Doc Retention, Lab Insp records for IDEA brokers, GIDEP Alert	IDEA Certified
9	**Service / Repair**	For all products used - Distributor / Broker ID and proof of autenticity.		Certified
10	**Customer**	Proof of Purchase with Supplier ID and unique Product ID listed	Archive spare parts, GIDEP Alert	

SC Optimum Protocol

SC Step	Supply Chain Stage
1	**Raw Materials Supplier** (Chemicals, Metals, Pastes..)
2	**Wafer Manufacturer**
3	**Component Manufacturer** (IC, Caps, Resistors, Cables …)
4	**Board Manufacturer** (PCBs, Modules, Drives, PSUs…)
5	**System Manufacturer** (Complete System)
6	**System Integrator** (H/W & S/W Integration)
7	**Distribution** (Authorised Channel)
8	**Retail / Broker**
9	**Service / Repair**
10	**Customer**

Optimum Data Protocol

Latest Version

1. Material ID
(Mfg, PN, SN, DOM)

2. Supplier ID

3. Date Procured

4. Where Procured

5. Customer ID

6. Customer Location

7. Date Sold

Or Batch No

Phase 1 – Project Report

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Project Report

Authentication and Traceability in the Electronics Supply Chain

North America

Europe

Report Complete

HDPUG Anti-Counterfeit Project

Title	**Product Authentication & Traceability in the Electronics Supply Chain**
Description Of Project	**Phase 1 - Define the Data sharing protocols between linked nodes on the supply chain that enables and supports the integrity & authentication of product between those nodes.** Phase 2 – List, evaluate and compare the existing and emerging technologies for product authentication throughout the electronics supply chain that support those protocols, their applicability and effectiveness at all stages. Phase 3- Identify the optimum future product Screening practices required to identify counterfeit product where various levels of latest authentication technology is utilised, based on a multi-link test of selected protocols & technologies.
Expected Outcome	The project will define the optimum Protocols for forward and backward traceability that provides built-in integrity to transactions throughout the electronics supply chain, evaluate the technologies that support those protocols and conduct a multi-link test to confirm applicability and effectiveness of the selected protocols and technologies.
Benefits to Members	Participating companies will get a very good understanding of future data structures required for product authentication and the various technologies and methods, the principles behind them and their applicability to their own industry segment. They will also gain from the expertise and assessments of other participating member companies.
Other Comments	We would need interested members from all segments to get a thorough assessment across the entire supply chain.