

Applying the Biz NGO Principles to the Electronics Sector



Electronics TakeBack Coalition

Challenges for the Electronics Industry: Complex Supply Chain

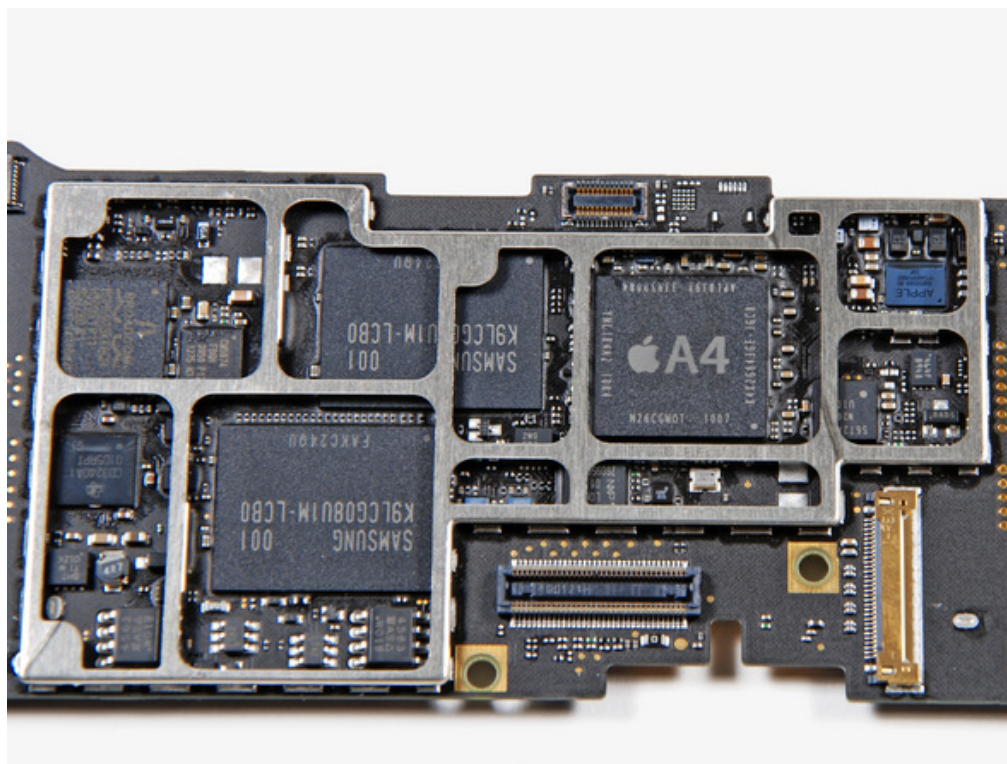
- Most electronics brand owners don't make their own products – they contract it all out to a complex supply chain of semiconductor manufacturers, component and parts makers, and assembly shops.
- Brand owners don't know process chemistry, often don't know full product chemistry.

Semiconductor Suppliers for the iPhone 4s

| Model # | Apple iPhone 4S | Skyworks | |
|------------------------|------------------------------|-------------------------|---------------|
| | | | 0.5% |
| | IHS iSuppli/ AppleInsider | Maxim | 0.5% |
| Row Labels | | NDK | 0.4% |
| Unknown | 52.6% | AKM Semiconductor | 0.3% |
| Samsung Semiconductor | 12.4% | Peregrine Semiconductor | 0.3% |
| Hynix | 9.8% | NXP | 0.2% |
| Qualcomm | 8.0% | Intel (Infineon) | 0.2% |
| Amperex Technology | 3.2% | RF Micro Devices | 0.2% |
| Murata | 3.0% | TAOS, Inc. | 0.2% |
| Meiko Electronics | 2.3% | Macronix | 0.1% |
| ST Microelectronics | 1.1% | AAC | 0.1% |
| Dialog Semiconductor | 1.1% | Epson Toyocom | 0.1% |
| TriQuint Semiconductor | 1.1% | TXC | 0.1% |
| Avago Technologies | 1.0% | Fairchild Semiconductor | 0.1% |
| Cirrus Logic | 0.6% | On Semiconductor | 0.0% Sub 0.1% |
| Texas Instruments | 0.6% | Grand Total | 100.0% |

Challenges for the Electronics Industry: Complex designs

- An electronic product may have dozens of components, hundreds of parts, and be made with over a thousand chemicals.



Challenges for the Electronics Industry:

New Technology Emerging Constantly

- New technologies often use new chemistries
- Proprietary claims, trade secrets



The Biz NGO Principles

- Know
- Disclose
- Assess
- Avoid
- Continuous improvement

Separate efforts on product and process chemistry

- **KNOW** your product chemistry
- **DISCLOSE** your product chemistry
- **KNOW** your process chemistry
- **DISCLOSE** your process chemistry
- **AVOID KNOWN HAZARDS** - the chemicals (product and process) already known to be hazardous (on the hazard list). Find safer substitutes.
- **ASSESS** the other chemicals you are using (product and process) - the ones not on the hazard list - to determine if they are hazardous. Including those with NANO materials.
- **AVOID** the chemicals (product and process) that your assessments (above) found to be hazardous. Substitute with safer alternatives.



Linear Steps of Continuous Improvement

| | Not started yet | Getting Started | Better | Best |
|--|-----------------------------|-----------------|-------------|-------------------|
| "You" = brand owner | Dial up | DSL | T-1 | Fiber Optic |
| | Rock-Paper-Scissors | Clue | Donkey Kong | World of Warcraft |
| KNOW your product chemistry | Comply with laws | | | |
| DISCLOSE your product chemistry | Comply with disclosure laws | | | |
| KNOW your process chemistry | Comply with laws | | | |
| DISCLOSE your process chemistry | Comply with disclosure laws | | | |
| AVOID KNOWN HAZARDS – (product and process) already known to be hazardous . | Comply with laws | | | |
| ASSESS the other chemicals you are using (product and process) to determine if they are hazardous. Including NANO. | Comply with laws | | | |
| AVOID the chemicals that your assessments (above) found to be hazardous. Substitute with safer alternatives. | Comply with laws | | | |

Know and Disclose Product Chemistry

| | Getting Started | Better | Best |
|---|---|---|---|
| "You" = brand owner | DSL | T-1 | Fiber Optic |
| | Clue | Donkey Kong | World of Warcraft |
| KNOW your product chemistry | List-Based Approach. Ask suppliers if they are using chemicals on existing lists of chemicals of concern. | Full chemical inventory - Require suppliers to provide full chemical inventory | Verification Do verification of full chemical disclosure |
| DISCLOSE your product chemistry | List-Based Approach Public disclosure of chemicals on existing lists of chemicals of concern. | Partial Disclosure Disclose the chemicals in products but only by trade names or categories | Full public disclosure Full public disclosure of chemicals in products by chemical name, CAS #, chemical company name |

Detailed Continuous Improvement Steps For Know Your Product Chemistry

| List-Based Approach | | | Full chemical inventory | | | Verification | |
|---|--|---|--|---|---|--|---|
| <p>Short list. Suppliers disclose to us the presence of a [short list] of chemicals of concern, such as a company-wide list, that goes beyond the regulated chemicals.</p> | <p>Medium list. Suppliers disclose to us (brand owners) the presence of any chemical of high concern from Prop 65 or SIN list (or list >100 chemicals)</p> | <p>Large list. Suppliers disclose to us the presence of any chemical of high concern from the Green Screen Red List.</p> | <p>Asking. We are asking all suppliers to tell us ALL chemicals in our products, including nanomaterials and "impurities of concern."</p> | <p>Getting Some info. We are getting chemical full disclosure from at least half our suppliers</p> | <p>Getting full info. We are getting chemical full disclosure from at least 95% of our suppliers (not validated)</p> | <p>Partial Verification. We validate the information sent from suppliers.</p> | <p>Full verification. We validate all of the information sent from suppliers</p> |



Know and Disclose Product Chemistry

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| KNOW your product chemistry | List-Based Approach. Ask suppliers if they are using chemicals on existing lists of chemicals of concern. | Full chemical inventory - Require suppliers to provide full chemical inventory | Verification Do verification of full chemical disclosure |
| DISCLOSE your product chemistry | List-Based Approach Public disclosure of chemicals on existing lists of chemicals of concern. | Partial Disclosure Disclose the chemicals in products but only by trade names or categories | Full public disclosure Full public disclosure of chemicals in products by chemical name, CAS #, chemical company name |



Detailed Continuous Improvement Steps For DISCLOSE Your Product Chemistry

| List-Based Approach | | | Full chemical inventory | | | Verification |
|---|--|--|---|---|---|---|
| We only disclose info on a short list of chemicals of concern. | Medium list of chemicals of concern | Large list. We publicly disclose the presence of any chemical of high concern from the Green Screen Red List. | 50% of chemicals are disclosed by chemical name and CAS number. | 75% of chemicals are disclosed by chemical name and CAS number. | Full disclosure of all chemicals used but not broken down by product. | All chemicals publicly disclosed by chemical name and CAS numbers. And manufacturer? |



Know Your Process Chemistry

"You" = brand owner

| | Getting Started | Better | Best |
|------------------------------------|---|--|---|
| | DSL | T-1 | Fiber Optic |
| | Clue | Donkey Kong | World of Warcraft |
| KNOW your process chemistry | <p>Map your supply chain. Map out your whole supply chain and what processes are used in each step. Identify likely hot spots.</p> <p>List-Based Approach. Ask suppliers if they are using chemicals on existing lists of chemicals of concern. Get info on use of chemicals of concern</p> | <p>Ask for disclosure of chemicals in known hot spots</p> <p>Ask for all the MSDSs on production chemicals. If they don't have them, they should request them from their upstream.</p> | <p>Full chemical inventory Require suppliers to provide full inventory of chemicals in production, including specifying use of nano materials</p> <p>Verification Do verification of full chemical disclosure</p> |

Disclose Your Process Chemistry

"You" = brand owner

| | Getting Started | Better | Best |
|--|---|---|---|
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| Disclose your process chemistry | <p>Make your supply chain public. Publicly release supply chain map.</p> <p>Disclose Releases of Hazards. Public disclosure of any PRTR (hazard release) reporting made in those countries in supply chain.</p> | <p>Partial Disclosure, including MSDS's Public disclosure of MSDS for all substances used, including to workers.</p> | <p>Full public disclosure All chemicals disclosed by chemical name and CAS numbers</p> |



Avoid Known Hazards

"You" = brand owner

AVOID KNOWN HAZARDS – (product and process) already known to be hazardous

| Getting Started | Better | Best |
|--|---|---|
| DSL | T-1 | Fiber Optic |
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| <p>Find out if there are safer substitutes for known hazards Do an alternatives assessment to see if there are safer substitutes for all known hazardous chemicals. In your products and processes.</p> | <p>Disclose findings, ask suppliers to make substitutions Disclose to suppliers and to public the results of alternatives assessments. Ask suppliers to make substitutions with the safer alternatives. Ask chemical companies to develop safer alternatives where none exist.</p> | <p>Full substitutions, verification. Suppliers make safe substitutions on all hazardous chemicals on Green Screen list Benchmark 1. Verification by Brand Mfgr</p> |

Assess the Other Chemicals

| | Getting Started | Better | Best |
|--|---|---|---|
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| ASSESS the other chemicals you are using (product and process) - the ones not on the hazard list - to determine if they are hazardous. Including those with NANO materials. | <p>Request test data on other chemicals</p> <p>Ask chemical manufacturers for test data on all chemical constituents used (product and production) including those containing NANO MATERIALS. If not, ask suppliers to begin collecting the data.</p> | <p>Get testing data from chemical companies</p> <p>Chemical manufacturers provide their test data on product and process chemicals</p> | <p>Evaluate, disclose, request missing data</p> <p>Compile results of chemicals testing, classify chemicals.</p> <p>Disclosure of information to public. Request that chemical companies test those that are inadequately tested.</p> |

Assess the Other Chemicals

"You" = brand owner

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|--|--|--|
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| <p>AVOID the chemicals that your assessments (above) found to be hazardous. Substitute with safer alternatives.</p> | <p>Find out if safer substitutes are available. Perform alternatives assessment for all process/product chemicals that were found to be hazardous via assessments (not previously on any list of high hazard chemicals)</p> | <p>Disclose findings, communicate to suppliers. Disclose to public and suppliers the results of alternatives assessments. Ask suppliers substitute with safer alternatives identified. Ask chemical companies to develop alternatives for hazardous chemicals with no safer substitute.</p> |
| | | <p>Full substitutions Suppliers make safe substitutions on all chemicals found to be hazardous via assessments. Verification.</p> |



Steps of Continuous Improvement

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| KNOW your product chemistry | List-Based Approach. | Full chemical inventory | Verification |
| DISCLOSE your product chemistry | List-Based Approach | Partial Disclosure | Full public disclosure |
| KNOW your process chemistry | List-Based Approach. Map your supply chain. | Ask for disclosure of chemicals in hot spots Ask for all the MSDSs on production chemicals. | Full chemical inventory Verification |
| DISCLOSE your process chemistry | Make your supply chain public. Disclose Releases of Hazards. | Partial Disclosure, including MSDS's | Full public disclosure |
| AVOID KNOWN HAZARDS – (product and process) already known to be hazardous . | Find out if there are safer substitutes for known hazards | Disclose findings, ask suppliers to make substitutions | Full substitutions, verification. t |
| ASSESS the other chemicals you are using (product and process) to determine if they are hazardous. Including NANO. | Request test data on other chemicals from chemical companies | Get testing data from chemical companies | Evaluate, disclose, request missing data Compile results of chemicals testing, classify chemicals.. |
| AVOID the chemicals that your assessments (above) found to be hazardous. Substitute | Find out if safer substitutes are available. Perform alternatives | Disclose findings, communicate to suppliers. | Full substitutions 17 Verification. |

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- MSDSs
- Purchasers
- Reporting