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Tracing a Path Forward:

A Study of the Challenges of the
Supply Chain for Target Metals
Used in Electronics



RESOLVE

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For complete information and continued dialogue regarding this project, please visit the project wiki at eicc-gesi.resolve.wikispaces.net. This site hosts a complete version of this report for download, interim reports, the complete desk reviews of related initiatives, and links to codes of conduct and other related documentation on the project wiki. We hope that readers will continue to participate in an ongoing moderated discussion regarding this research.

Tracing a Path Forward: A Study of the Challenges of the Supply Chain for Target Metals Used in Electronics

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The Global e-Sustainability Initiative (GeSI) is an international strategic partnership of companies, industry associations, NGOs, and inter-government organizations involved in the Information and Communication Technology (ICT) industry. Together, GeSI members are committed to creating and promoting technologies and practices that foster economic, environmental, and social sustainability and drive economic growth and productivity.

www.GeSI.org

Electronic Industry Citizenship Coalition

The Electronic Industry Citizenship Coalition (EICC) is a group of companies working together to create a comprehensive set of tools and methods that support credible implementation of the EICC Code of Conduct throughout the Electronics and Information and Communications Technology (ICT) supply chain. Through the application of high standards, EICC can foster better social, economic and environmental outcomes for all those involved in the global electronics supply chain. Outcomes include:

- Increased efficiency and productivity for companies and suppliers.
- Improved conditions for workers.
- Economic development.
- A cleaner environment for local communities.
- A better understanding of and/or reduced risks to supply chain and business continuity.

www.EICC.info

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Executive Summary

Diverse sectors such as clothing, automobile manufacturing, forest products, jewelry and electronics have shown a clear trend toward supply chain transparency. Companies, nongovernmental organizations, and agencies are working to address environmental impacts, labor rights, health and safety, displacement and resettlement, and other social and sustainability issues throughout the supply chain. One particular area of recent focus has been the link between mineral extraction, trading, and conflict and human rights abuses, particularly in areas such as the Democratic Republic of Congo (DRC) and the broader Great Lakes region of Central Africa. These natural resources are sometimes at the center of disputes, directly or indirectly financing warring groups, resulting in violence or other human rights abuses. Conflict areas also appear to have limited attention to safety and environmental protection, which may lead to additional negative legacies.

Minerals originating in conflict regions can end up in electronics and many other products such as jewelry, airplanes, and automobiles as a few examples. Greater awareness of these issues on the part of the public and end-use industries has prompted leading companies in the electronics sector to investigate their supply chains to determine the steps to promote responsible sourcing of specific minerals. However, these companies face significant challenges due to a lack of transparency and complex structure and relationships in particular metals supply chains.

Seeking greater understanding of the challenges and potential pathways to greater transparency in their product supply chains, the Global e-Sustainability Initiative (GeSI) and the Electronic Industry Citizenship Coalition (EICC) asked RESOLVE to research the supply chain for electronics products starting with three metals: tin, tantalum, and cobalt.

RESOLVE's research was built around an effort to trace the supply for these metals beginning with suppliers for GeSI and EICC member companies and then pursuing suppliers upstream in the supply chain. RESOLVE also undertook a desk-based review of supply chain initiatives relevant to the tin, tantalum, and cobalt supply chains, and the supply chain for other metals in electronics such as gold. RESOLVE reviewed initiatives that addressed supply chain transparency as well as human rights, social and environmental issues relevant to the electronics sector. The tracing research was expected to be challenging because of the nature of the supply chains for these metals. As such, the research objectives and strategy were to learn from the discontinuity encountered in the flow of information, in order to identify potential solutions.

RESOLVE committed to the idea that a research project designed with stakeholders was more likely to improve results. Therefore, to inform this work, RESOLVE sought input from a Stakeholder Advisory Group of diverse organizations including GeSI and EICC members, international and local NGOs, mining companies, investors, and trade associations (approximately 30 organizations received materials for review and/or participated on [calls](#)).

Supply Chain Research

Starting with supplier information from eleven electronics companies, RESOLVE tested “tracing” approaches (starting with electronics companies and working up the supply chain toward the mine). RESOLVE contacted companies at each step in the supply chain (e.g., component manufacturers, refiners, smelters) and requested contact information for their suppliers and their codes of conduct via an online survey. As a secondary approach, RESOLVE also conducted tracking activities, working from mines or smelters downstream the supply chain toward the end-use companies. (This approach was undertaken in limited cases where interested mining companies approached RESOLVE as they became aware of our research.)

Desk Review

Concurrent to supply chain research, RESOLVE reviewed supply chain initiatives with relevance to the electronics sector, identifying a set of characteristics, mechanisms, and lessons that could be applied to the electronics supply chain for future efforts. Initiatives reviewed included the Association for Responsible Mining’s Green Gold; the German Federal Agency for Geosciences and Natural Resources program on Certified Trading Chains in Mineral Production; Forest Stewardship Council Certified Post-Consumer Recycling; the Kimberley Process; Birks, Direct Metals Sourcing case studies; and eight others.

Findings

The tracing and tracking research resulted in a partial map of the electronics supply chain for these metals (see attachment 1) and a set of lessons regarding supply chain transparency. As expected, RESOLVE encountered a number of breakage points in the supply chain mapping due to lack of supplier response or inadequate information. Overall response rate for the surveys was approximately 24% over the approximately six months of survey outreach. (Again, this figure represents response from suppliers RESOLVE identified rather than a percentage of the entire supply chain.)

Some suppliers declined to participate, while others simply did not respond to repeated requests from RESOLVE and EICC or GeSI members. Reasons given by suppliers for not participating in the survey included confidentiality (i.e., concerns regarding sharing information with a third party or existence of nondisclosure agreements with other companies) although RESOLVE did sign confidentiality agreements with a number of companies. It should be noted that this study was based on company self-reporting of supplier information and codes of conduct.

RESOLVE was able to use tracing research to identify pathways from an electronics product to the mine in four instances. More specifically, for cobalt, three instances of tracing a supply chain from original equipment manufacturer (OEM) to the mine were achieved, and one instance of tracking from a mine to OEM. For tantalum, there was one instance of tracing, two instances of tracking, and two instances in which a combination of tracing and tracking established a supply chain. For tin, one supply chain was identified using a combination of tracing and tracking.

Mines identified through tracing and tracking were not those located in known conflict zones of the DRC. (DRC mines represented in this research provide cobalt and are located in southern and western DRC.)

It is important to note that these findings did not establish a literal supply chain (at a molecule-by-molecule level); this research was not designed to track or trace actual material. Further, RESOLVE did not attempt to determine whether it is possible to identify all sources that may contribute to final consumer products. Currently, large-scale smelting facilities typically mingle materials from multiple sources as they are processed. Tracing a metal in a given product is also complex because the material sources vary, and can vary over the life of the product. A given product will often have several suppliers for a particular component, and thus tracing or tracking one supply chain is a snapshot unlikely to remain static or represent a complete supply chain picture.

Today, there is difficulty verifying sources that enter the supply chain from mines that are illegal or part of the informal economy. With these sources, a paper trail can be difficult to establish and verify, and many question the credibility of record-keeping related to these sources. In regions such as the Great Lakes of Central Africa, supply chain tracking mechanisms are likely to be necessary with regard to informal, artisanal and small-scale sources—RESOLVE has seen positive examples of relevant mechanisms, such as those developed by the Association for Responsible Mining.

Processed material can be deemed “conflict free” only if all material entering a processing facility is tracked or batched and handled separately from materials of different origin. An alternate strategy could be to credit a percentage of the material entering a smelter. Both strategies can succeed if attention is paid to the unique characteristics of the relevant supply chain; the challenge is likely to be testing approaches and taking them to scale.

This means that, today, while end-use companies have the potential to establish and have confidence in sources for some percentage of the metals in their products, they cannot assert 100% sourcing certainty about individual metals or the product as a whole without significant alterations and/or assurance mechanisms in their supply chains. Success requires confidence in supply chain relationships and new strategies, such as direct sourcing, or innovations, such as minerals tagging or fingerprinting. Movement is likely to come in a step-wise manner.

With the above caveats, RESOLVE’s research does demonstrate that supply chain transparency is possible in the future, potentially allowing end-use companies to certify target metals as originating from conflict-free sources, if partnering with a number of willing actors in the supply chain.

While confidence can begin to be built, it will likely happen in steps and through testing, trial and error. This is particularly true for sources from regions in or near conflict zones. Based on lessons from this supply chain research and the desk study of related initiatives, the following is useful guidance:

- Explore multi-industry approaches and efficiencies: As many industries share common metals supply chains and challenges, end-use companies and suppliers from multiple sectors can achieve efficiencies by working across industry sectors to explore and design solutions.
- There is value in multi-stakeholder collaboration: To achieve credible systems and utilize information sources and on-the-ground capacity (especially in regions of conflict), active engagement and consultation with nongovernmental organizations and international and local governments from the earliest stages of design to testing can be beneficial. Through the multi-stakeholder advisory group, RESOLVE is aware of this capacity and interest. RESOLVE's desk studies of initiatives such as FSC and ARM also demonstrated significant evidence of the value of this approach.
- Tackling complex challenges on multiple levels can yield results. For example, for these metals, a two-track approach of smelter-based certification plus in-region pilots could be beneficial. For both gold and diamonds, there is evidence that both systems development (e.g., the Kimberley Process and the Responsible Jewellery Council) and site based and community based projects supporting source development are necessary.

As we complete our work on this report, a number of these recommendations are already being considered, including exploration of smelter validation and a trial to identify responsible, localized sources from commercial and small-scale mining sites in the Great Lakes region of Central Africa.

In moving forward, there would be significant value in linking related initiatives to focus and maximize the impact of available resources; this research consistently highlighted the need for a coordinated effort to integrate civil society, governments and industry. RESOLVE is hopeful that this analysis, combined with lessons from other organizations, can provide information and impetus for stakeholders to jointly define activities and identify solutions to conflict and broader environmental and social issues.

Background and Purpose

Over the past decade, industry leaders, including those in the electronics sector, have placed greater emphasis on corporate social responsibility (CSR) efforts and reporting. Industry membership organizations such as the Electronic Industry Citizenship Coalition (EICC)¹ and the Global e-Sustainability Initiative (GeSI)² were formed to support and promote environmentally

and socially responsible practices among their members and partners, and especially their first tier suppliers.

Issues of concern have included health and safety of workers and communities, living wages and other labor rights, displacement and resettlement, environmental impacts, and other social and sustainability issues, which have been highlighted by the international community.

While acknowledging and focusing efforts on a broader range of CSR issues, many NGOs, companies, governments, and consumers have expressed concern about and focused much attention on the link between natural resource extraction and conflict. The extraction and trade of minerals (including diamonds), timber, and oil are thought to have directly or indirectly financed warring groups and violence or other human rights abuses in areas such as Sierra Leone, Côte d'Ivoire, Cambodia, Angola, and Liberia. Since 1996, the Democratic Republic of the Congo (DRC) has been a focus of international concern, with a history of governance challenges and large mineral deposits believed to be contributing to violence perpetrated by rebel groups as well as the Congolese army.³

Many minerals originating in conflict regions such as the DRC, including gold, tin, tantalum, and tungsten, end up in products including computers, cell phones, and other personal electronics, as well as in many other products like airplanes and automobiles. Greater awareness of these issues on the part of the public and end-use industries such as electronics has prompted a closer investigation of their supply chains, including through public campaigns.

It is important to note that although conflict has been a major focus of extractives discussions, labor and health and safety issues also remain a concern. For example, NGOs have profiled challenges of the tin industry in Indonesia, especially for informal, small-scale miners facing dangerous working conditions and inability to make a living wage;⁴ and concerns regarding health, safety, and wages of workers in cobalt mines and plants in the DRC and Zambia.⁵

While expressing a desire to source responsibly, GeSI and EICC companies have found three major challenges for transparency down to the mine level: 1) their supply chains are not sufficiently transparent to this level; 2) their tracking capacity and accountability mechanisms to this level are missing or limited; and 3) the on-the-ground capacity (in conflict regions) to differentiate sources and ensure independence from operations that may support warring groups does not exist. Metals from multiple mines and other sources are typically undifferentiated and mixed at various points in the supply chain, including by *négociants*, *comptoirs*, traders, and smelters.

To better understand these challenges and potential pathways to greater transparency, GeSI and EICC asked RESOLVE to research the supply chain for electronics products containing tin, tantalum, and cobalt. Specifically, RESOLVE was asked to

- Assess the challenges and ability to create a transparency model by mapping the supply chain for tin (solder and solder paste), tantalum (capacitors and deposition targets), and cobalt (batteries and magnetic recording media) used in electronics⁶
- Assess suppliers' use of codes of conduct addressing social, environmental, health, and labor issues; and
- Identify the challenges of collecting this data and consider ways to enhance and maintain transparency of the supply chain.

To achieve these goals, the project was conducted in two parts:

- 1) Supply Chain Survey and Mapping: Starting with supplier contacts provided by a set of GeSI and EICC members, RESOLVE created a survey ([tracing survey](#), [tracking survey](#)) and contacted companies to seek information on their suppliers and codes of conduct, to trace and create a “map” of the supply chain for the three metals. As a secondary approach, RESOLVE conducted tracking activities (from a few mines downstream in the supply chain) to complement the tracing activities (from the OEM seed list upstream in the supply chain).
- 2) Desk Review of Supply Chain Transparency Initiatives: RESOLVE reviewed supply chain initiatives with relevance to the electronics sector, identifying a set of characteristics and lessons that could be applied to the electronics supply chain for future efforts.

In undertaking both research components, RESOLVE took a collaborative approach. RESOLVE convened a Stakeholder Advisory Group of NGOs, electronics companies, mining companies, investors, and others to seek input on key decisions for both the supply chain mapping and desk reviews. [Calls](#) with this group were held monthly throughout the project, from June 2009 to January 2010. With the publication and sharing of status updates and initial supply chain maps online through a wiki site (<http://eicc-gesi.resolv.wikispaces.net>), RESOLVE also sought input from other stakeholders with knowledge of the supply chain.

This report outlines findings of the supply chain research and desk review of supply chain initiatives, with an emphasis on lessons learned for future efforts aimed at improving the transparency of the electronics and other supply chains.

Electronics Products Supply Chain Research

Background

The members of GeSI and EICC represent only part of the end-use industries that use metals in electronics products, and an even smaller percentage of a much broader set of end-users.⁷ Electronics can be defined to include a wide spectrum of devices and equipment, from household appliances, to devices in automobiles, to medical products, to televisions, radios, and computers.⁸

Further, conflict regions such as the DRC can be important suppliers for certain metals; however, such sources should be kept in the context of worldwide sources and supply chains. Below, please find a brief overview of information on sources and uses for each of the three metals studied in this report.

Tin

Though a fairly scarce element, about 35 countries mine tin throughout the world, with an important tin-mining country on nearly every continent. Most of the world's tin is produced from placer deposits; at least one-half comes from Southeast Asia. The only mineral of commercial importance as a source of tin is cassiterite.⁹

Two developing countries, China and Indonesia, dominate two-thirds of tin mining. Producing 37% of the world's tin, China is both the world's largest miner and user of tin and has recently shifted from a net exporter to a net importer of the metal. Indonesia produces 31%; Indonesian crude tin is traded in significant portions to Malaysia, China and Thailand where it supplements domestic production and feeds established refineries. South America is the third largest mining region, accounting for about 22% of production.¹⁰ In the DRC, there is sporadic and artisanal mining of tin (about 5% of global production).¹¹

The production of tin involves three steps: 1) mining of ore from mostly surface operations (exceptions are the underground mines in South America, Australia and China, as well as in eastern DRC); 2) smelting to a crude tin metal; and 3) refining to a pure grade (refining often occurs in the same country as mining). Following this process, solder product and other alloys are produced.¹²

Most tin is used as a protective coating or as an alloy with other metals such as lead or zinc. The use of tin in electronics represents about 36% of global tin consumption. Tin is mostly used as solder in electrical and electronic applications. In 2007, 53% of tin produced was used in solder,¹³ with specific uses including computers (8%)¹⁴ and cell phones (1%).¹⁵ Tin is also in coatings for steel containers, in solders for joining pipes, in bearing alloys, in glass-making, and in a wide range of tin chemical applications.¹⁶

Tantalum

Australia and Brazil have major tantalum reserves; Canada, China, Ethiopia, and Mozambique are also large producers.¹⁷ Currently, Talison's Australian facility (with typical annual production of 1.4 million pounds) is not in production, and there has been reduced production from Mozambique and Canada. As such, the DRC is leading producer (projected at 900,000 pounds for 2009). It is expected that this will change once the global economy picks up again.¹⁸

"Coltan" is an abbreviated term associated with tantalum sources in Africa. However, it should be noted that coltan is not the same as tantalum but rather is a local name derived from "columbo-tantalite." Mineral concentrates or ore containing tantalum are usually referred to as "tantalite," while columbite contains the element columbium (also known as niobium). Tantalum is the metallic element which can be extracted (or refined) from the ore.¹⁹

Recycled tantalum came mostly from new scrap generated during the manufacture of tantalum-containing electronic components and from tantalum-containing cemented carbide and superalloy scrap.²⁰

Tantalum is ductile, easily fabricated, highly resistant to corrosion by acids, a good conductor of heat and electricity, and has a high melting point.²¹ Tantalum metal powder is a major use for the metal and significant to the production of electronic components, mainly in tantalum capacitors. Major end uses for tantalum capacitors include portable telephones, pagers, personal computers, and automotive electronics.²² Alloyed with other metals, tantalum is also used in making carbide tools for metalworking equipment and in the production of superalloys for jet engine components.²³

Cobalt

Cobalt is used in numerous commercial, industrial, and military applications.²⁴ Cobalt is not a particularly rare metal and is widely scattered in the earth's crust. There are only two types of ores (Moroccan and Canadian arsenide ores) that are sufficiently rich in cobalt to make it feasible to extract it alone from these sources. Otherwise, it is normally associated with copper or nickel and extracted as a co-product.²⁵

Potential new cobalt sources include large cobalt-containing nickel and copper deposits in Canada, Western Australia, DRC, Zambia, and Madagascar. Until recently, significant volumes of ore and concentrate were being mined for refining elsewhere, mainly China. The DRC Government enacted export restrictions in 2006-2008 to encourage development of processing. However, the Cobalt Development Institute (CDI) notes that certain contracts are being renegotiated and estimates that DRC production will be significant in coming years.²⁶

On a global basis, the leading use of cobalt is in rechargeable battery electrodes. Superalloys, which are used to make parts for gas turbine engines, are another major use. Cobalt is also used to make airbags in automobiles; catalysts for the petroleum and chemical industries; cemented carbides (also called hardmetals) and diamond tools; corrosion- and wear-resistant alloys; drying agents for paints, varnishes, and inks; dyes and pigments; ground coats for porcelain enamels; high-speed steels; magnetic recording media; magnets; and steel-belted radial tires.²⁷

Recycling

As discussed by Young (2008), statistics on recycling often conflict and/or represent an aggregation of different categories of sources such as “home” or in-house scrap, “new” or post-industrial scrap, and “old” or post-consumer scrap.²⁸ Metals to be recycled are processed before re-melting, re-refining, or re-smelting. Fabricators or manufacturers typically use high-grade scrap in place of “new” metal, while primary metal producers and large smelters or refiners typically use lower-grade material.²⁹ Recycled post-consumer scrap is widely variable.³⁰

Regarding metals of interest for this project, estimated recycled supply (as a percentage of total annual production) for cobalt is 25%.³¹ ITRI, a membership organization representing the tin industry, estimates that secondary material accounts for over 30% of total tin usage (with more recycled in alloy form than as refined metal).³² The Tantalum-Niobium International Study Center (TIC) notes that tantalum recycling typically represents approximately 20% of input from primary and concentrates, scrap recycling and synthetic concentrates, and tin slag, a byproduct of tin smelting.³³ (One 2009 tantalum estimate puts slag production at 200,000 pounds and recycled sources at 700,000 pounds.³⁴)

Supply Chain and Conflict Minerals

Irrespective of industry, product type, or brand, minerals typically lose their provenance (or traceability) as they move through the supply chain from source (i.e., mine) to product. Transparency can be challenged due to one or more of the following typical supply chain characteristics and processes:

- mixing of ore, particularly during trading and prior to smelting;
- the smelting or refining process, where ore is processed to obtain the target metal, with a smelter often drawing from different sources; and/or
- re-melting, re-processing or recycling of metals.

The link from mines in the DRC to final products can be broken down into the following steps, as outlined in Figure A:^{35,36, 37}

1. Artisanal and small-scale mining (ASM) or commercial-scale mining
2. A *négociant* may buy minerals.
3. Trading houses or *comptoirs* based in Goma and Bukavu buy and sell (sometimes exporting) minerals.

4. Traders (exporters) sell minerals to processors that are typically located in other countries. (Smuggling as well as legal exports take place.)
5. Minerals go through one or more processing steps at a smelter or other refiner. (For example, tantalum is chemically processed and refined into tantalum powder or wire.) Minerals originating from many mines and countries are typically mixed when processed.
6. Manufacturers use the refined metal to create components such as capacitors (from tantalum), solder (from tin), and batteries (from cobalt).
7. Product manufacturers or original design manufacturers (ODMs) assemble the components into products (such as hard drives, notebooks, power supplies).
8. Product companies or OEMs may do final assembly and sell their products to end-use customers. Alternately, the final product may go through a business customer that markets and sells the product to the consumer.

Supply chains outside of conflict regions follow a similar path, though *comptoirs* and *négociants* are more typical of Central African than other regions.

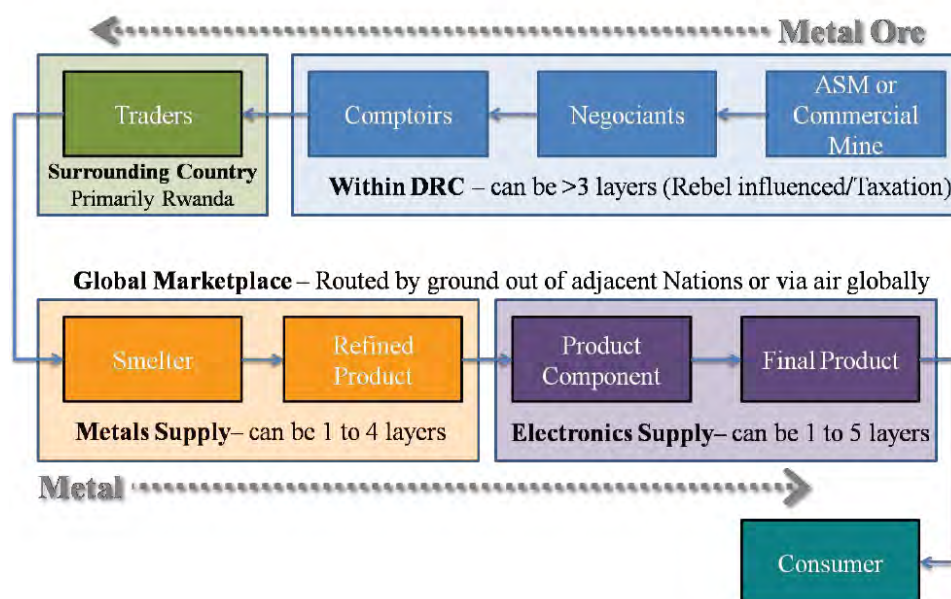


Figure A: Example supply chain of minerals originating in the DRC to consumer products. (Adapted from EICC-GeSI Extractives Work Group product.)

Supply Chain Research Methodology

RESOLVE's primary method of researching the electronics supply chain was through "tracing," or following the supply chain from OEMs or end-use companies toward mining sources. This method took advantage of supplier information provided by EICC and GeSI member companies.

Beginning with a "seed list" of suppliers identified by 11 GeSI and EICC member companies,³⁸ RESOLVE worked with the GeSI-EICC Extractives Work Group to identify priority suppliers in

each of the three metal categories. As a proxy for volume, those companies identified as suppliers to multiple GeSI and EICC members were selected to receive the survey. Approximately ten suppliers were chosen for each metal category.

From July 2009 – January 2010, RESOLVE sent and collected survey responses from supplier companies that use tin, tantalum or cobalt. Upon receiving a letter from RESOLVE requesting their participation, supplier companies completed an online survey seeking information on supply chains, sourcing codes and standards, and mechanisms ensuring supplier compliance with codes and standards. In this way, RESOLVE traced the supply chain to begin creating a map or flowchart for each metal. ([Tracing survey](#) questions can be found in on the [project wiki](#).)

Beginning in November 2009, RESOLVE also employed tracking activities (from mines downstream in the supply chain toward OEMs) to complement the tracing activities. With assistance from GeSI-EICC members and other stakeholders, RESOLVE identified mines willing to participate in the survey. These companies were then sent a version of the survey modified to accommodate the identification of customers rather than suppliers. ([Tracking survey](#) questions can be found on the [project wiki](#).)

The GeSI and EICC joint extractives work group met in September and November 2009 with representatives from the tantalum supply chain, from mining to original equipment manufacturers.³⁹ At the November meeting, RESOLVE requested participants' assistance in completing the survey. RESOLVE sent tailored surveys to this group in early December.

In January 2010, ITRI sent a request in its weekly newsletter encouraging the participation of their members. Three companies requested a survey as a result of the ITRI announcement

Other stakeholders, particularly through the Stakeholder Advisory Group, offered assistance by identifying key suppliers and providing alternate contacts for companies that had not responded to RESOLVE's survey requests.

In conducting this research, RESOLVE held confidential all commercial relationships. Certain information cited as confidential by companies was also listed as such in the results, particularly when disclosing information could have implied commercial relationships.

Supply Chain Results and Maps

Below is a brief overview of results of the survey research. Please see attachment 1 for the final maps.

Findings Common to Tin, Tantalum, and Cobalt

Response Rate

Overall response rate for the surveys was approximately 24%. (Again, this figure represents response from suppliers RESOLVE identified rather than a percentage of the entire supply chain.) The “non-responders” category includes suppliers contacted who declined to respond, suppliers who otherwise did not respond, and suppliers whom RESOLVE identified but did not or could not contact. Partial responders (who may have shared only supplier information or only code of conduct information) were considered responses. The response rate treats all respondents of various sizes equally, as one data point. It should also be noted that this study was based on company self-reporting of supplier information and codes of conduct.

Eight companies were identified as having an interest in participating through a tracing survey. All eight of these companies that RESOLVE sent a survey provided complete responses.

Recycled Content

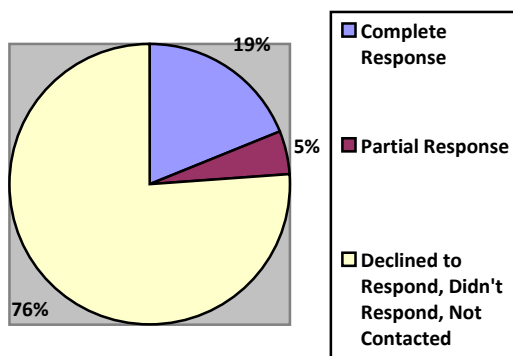
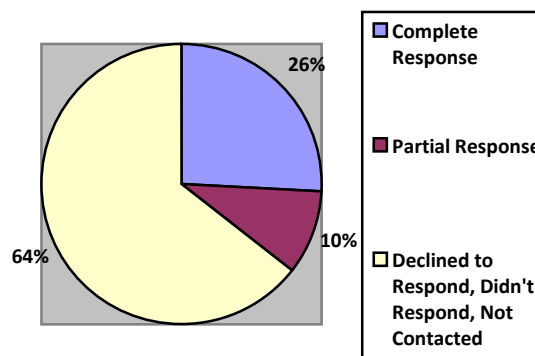
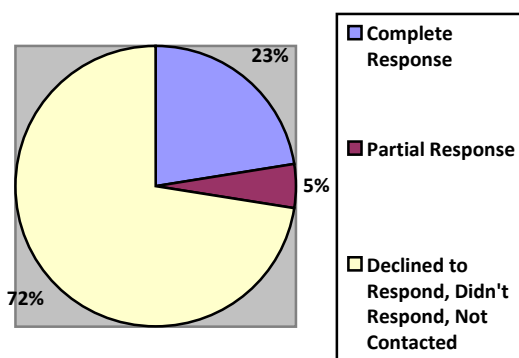
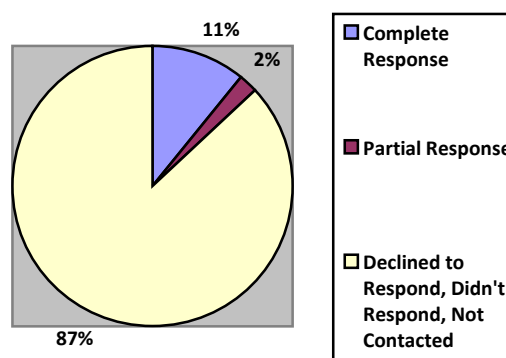
The tracing surveys asked “*Does this facility provide you with recycled metal? (Yes/No)*” for each supplier named. While recycled content has been reported to play a large role in the supply chains for cobalt, tantalum, and tin, few survey respondents indicated the use of recycled sources. Respondents indicated that approximately 9% of all suppliers identified provided recycled materials or products containing recycled materials to their customers, while 32% of all suppliers identified were reported as not providing recycled elements. Respondents indicated that they were unaware of whether suppliers provided recycled elements in 23% of cases, and gave no responses on recycling or indicated confidentiality in 36% of cases.

The tracking surveys asked “*Do you provide recycled metal? (Yes/No)*” for each survey respondent. 50% of total tracking survey respondents indicated that they provide recycled metals to their customers.

The inconsistency in recycling responses from tracing surveys (reported by buyers) and tracking surveys (reported by suppliers), combined with the relatively high rates of uncertainty from buyers (23%), indicates that buyers and suppliers are in many cases not exchanging or requesting information on recycled content.

Survey respondents willing to ask suppliers to cooperate

Survey respondents were asked if they were “...willing to ask that your supplier(s) cooperate with RESOLVE and EICC/GeSI as we take the next step in this research and request similar information from them?” Approximately 83% of respondents indicated that they would be willing to ask their suppliers to cooperate, and 17% indicated that they would not be willing to ask their suppliers to cooperate.

Overall Response Rate – Figure BTantalum Response Rate – Figure DCobalt Response Rate – Figure CTin Response Rate – Figure E

Codes of Conduct

The EICC code of conduct “provides guidelines for performance and compliance with critical CSR policies” and covers five main areas:⁴⁰

- Labor
- Health and Safety
- Environment
- Management System
- Ethics

In its supplier surveys, RESOLVE requested code of conduct information. Approximately 77% of companies that completed surveys stated that they had a code of conduct. Of these respondents, approximately 60% had adopted the EICC code or their own company or other industry codes covering issues comparable to the EICC code. Some of these companies cited industry standards or principles such as the International Council on Mining and Metals (ICMM) Sustainable Development Framework.⁴¹ One company cited Responsible Care, a voluntary initiative of the chemical industry to continuously promote and improve health, safety, environmental performance, and stakeholder communications.⁴²

Approximately 25% adopted a unique company code covering a subset of issues in the EICC code.

Companies who did not share a code of conduct indicated that either 1) a code is currently in development; 2) a code exists but is not “on record” or not publicly available; 3) did not answer the question.

Approximately 15% covered issues going beyond the EICC code. For example, one company cited the EICC code as well as company compliance with the United Nations Global Compact, a policy initiative encouraging the private sector to address human rights, labor, environment, and anti-corruption in their operations and business strategies.⁴³ Multiple companies specifically cite non-use of materials from conflict regions or the DRC in particular, and/or requirements for suppliers to avoid sourcing from these regions.

As noted in materials on the EICC code of conduct, adoption of codes covering social responsibility issues are important first steps, in combination with company-wide training and commitment and continuous improvement. Verification of compliance with codes is also a step critical to success and stakeholder confidence.

While RESOLVE did not have the resources to verify implementation or compliance, companies were asked to explain whether and how codes are verified, including any third-party audits conducted on practices of their own company and/or their suppliers. Specifically, survey respondents were asked to “*describe any mechanism(s) (e.g., supplier auditing, corporate social responsibility report, investor report, government reporting) that you institute to provide evidence of supplier compliance with these codes of conduct, standards, or requirements, either directly or through a trade association or voluntary initiatives.*” 56% of respondents indicated that they institute mechanisms requiring evidence of supplier compliance. Of those companies performing an auditing activity, 6% request their suppliers provide a statement of compliance, 56% use internal or “first-party” audits, and 44% use industry association or third party auditing. Of respondents who answered the question, “*are the mechanisms or reports described above publicly available?*” 32% of respondents answered yes, these mechanisms and reports are publically available, and 68% indicated their mechanisms or reports are not publically available.

Codes of conduct provided to RESOLVE which are also publicly available on respondent’s websites can be found through links on the [codes of conduct wiki page](#). As previously discussed, these findings are based on codes of conduct as reported by companies.

Challenges and Lessons Learned

A driver for this research was a desire to understand some of the challenges and lessons for electronics companies interested in better understanding and increasing transparency in their own

supply chains. In other words, the research sought to identify gaps and challenges so that these findings could be used to develop methods and strategies to increase transparency and respond to underlying environmental and social issues. RESOLVE was not seeking to place blame but to help prompt consideration of responses and solutions.

RESOLVE identified a number of challenges faced in conducting the supplier survey, and responses taken or recommended for future transparency initiatives. These challenges included the following:

1. Identification of proper company contacts
2. Lack of incentive or leverage
3. Confidentiality and disclosure concerns
4. Competing surveys and limited resources
5. Self-reporting
6. Overrepresentation of “good actors”
7. Language and accessibility

Challenge 1: Identification of Proper Company Contacts

In some instances, information supplied to RESOLVE was outdated or inaccurate. In other instances, initial contact was made with individuals without sufficient authority or access to data to complete the survey. While the most immediate connection between companies and suppliers may often lie in procurement and sales relationships, these linkages may not provide the impetus or information needed to achieve full cooperation. Further, as procurement or sales points of contact change over time, relationships and corresponding levels of response may also be impacted.

Response and Lessons: Gaining approval for survey response and data sharing often required the sign-off and participation of supplier representatives from CSR, government or public affairs, and/or legal departments. While future transparency efforts should not ignore good procurement-sales relationships, it is important to build contacts and relationships with public-facing company representatives such as those with CSR responsibilities. It is also likely that legal or other management will need to be involved when requesting information disclosure.

Another useful avenue is through supplier-oriented associations. RESOLVE found that some associations do not have the authority or inclination to share information and contacts in such a way as to support transparency on a company-specific (as opposed to membership-wide) level. However, these associations do have direct connections with leaders and decision makers of member companies, and it is therefore important to involve and build relationships with association staff. A request for participation in one industry newsletter, facilitated by an

association staff lead, yielded response from few but very significant suppliers who did not respond through other channels.

Challenge 2: Lack of Incentive or Leverage

GeSI and EICC members' direct contact with their component manufacturers encouraged responsiveness to the survey. However, beyond this level, the influence of end-use companies typically diminishes. While some companies were supportive and assisted in contacting and encouraging participation by their suppliers, most of the influence that created results in this study came from the energies of end-use electronics companies; this was not sufficient in many cases to secure the participation of those suppliers removed from association with and pressure from brand-name companies and consumers.

Response and Lessons: Identifying companies willing to promote transparency within the supply chain, and educating others on the issues, will be key to the success of these efforts. The customer-supplier relationship is influential and should be capitalized on whenever possible.

At the same time, other leverage points do exist and should be explored. Industry associations can provide a pathway for communication to both supply chain leaders and laggards. A number of associations have begun supply chain or other CSR efforts and can suggest contacts as well as ideas of which companies should be involved.

Investors and others with relationships and influence can also assist, and many socially responsible investors are already actively involved in conflict minerals issues. One recent example is the January 2010 Investor Statement regarding Conflict Minerals from the Democratic Republic of the Congo.⁴⁴ In the course of this project, a number of investors expressed interest in reaching out to companies in their portfolios.

There may also be a value in numbers. One OEM asking for information may have value with primary suppliers. Multiple companies seeking this information in a coordinated fashion can send broader signals. This, for example, seemed to have impact as GeSI-EICC companies began a series of meetings with companies in their supply chains during our research.

While response rates were limited in places, many that responded expressed a willingness to be part of a solution to these issues. The fact that this project has not asserted blame may have allowed companies with a limited focus on these issues to emerge as potential partners in crafting solutions.

Challenge 3: Confidentiality and Disclosure Concerns

As an unknown third party conducting the survey, many suppliers were hesitant to provide RESOLVE information requested in the survey. While the survey request stated RESOLVE's pledge not to disclose confidential information or commercial relationships, this statement was understandably insufficient to persuade many companies to share sensitive information. Some companies sought reassurance that supplier disclosure would not enable customers to challenge profit margins or costs. Others noted that they had a unique supplier and so would not disclose this information (either confidentially, publicly, or both).

There were also multiple cases in which suppliers declined to respond due to nondisclosure agreements (NDAs) between their company and a supplier or customer. Others declined to respond to any parties other than their direct customers.

Response and Lessons: RESOLVE anticipated the need to execute NDAs with companies to provide assurance. The use of NDAs did encourage participation of companies that otherwise would not have completed the survey. However, NDAs did not always overcome confidentiality concerns.

RESOLVE also worked with participating companies to negotiate amendments to existing company-to-company NDAs to release suppliers for the purpose of responding to the survey. Unfortunately, few companies were willing to explore this option, which would typically require cooperation of the legal and sales or procurement department in both the customer and supplier companies. Most companies who cited a customer-supplier NDA declined any further participation.

RESOLVE expects that some suppliers' expression of confidentiality concerns were driven by general disinterest or served as a rationale to avoid responding to the survey. To promote better participation in future efforts, supplier-customer relationships should be used to the greatest extent possible to work around existing NDAs between companies and to encourage participation of unwilling suppliers.

Challenge 4: Competing Surveys and Limited Resources

Some suppliers contacted have expressed frustration at the internal resources needed to complete the survey. Others noted that they have received multiple survey or audit requests from their customers or industry associations. Some companies who cited this frustration have not participated in the survey, while others requested an extension.

Response and Lessons: Associations, companies, NGOs, and others should coordinate to minimize duplication of effort and to increase efficiencies for suppliers asked to participate. Coordination should not stop at surveys. As discussed later in the report, stakeholders should

consider how to promote coordination and collaboration on larger transparency or certification efforts.

Challenge 5: Self-reporting

This research was designed to rely on information reported to RESOLVE by participating companies. While RESOLVE requested documentation on information such as codes of conduct, it was not within the project scope to seek documentation on supply chain information such as customer-supplier contracts, or to conduct independent audits (as the project was intended to highlight lessons rather than to create a definitive supply chain map). Thus, any inconsistencies or disagreements that may arise in supply chain map findings would be difficult to fully investigate and settle.

Response and Lessons: RESOLVE does not have deep concerns regarding self-reported information received from suppliers in this project, as we suspect that companies that might be motivated to misrepresent information were more likely to simply not participate in this project. However, larger-scale mapping or transparency activities, whether initiated by individual companies, industry groups, or others, should consider mechanisms for third-party verification. Verification is ultimately important so reported information is credible to not just companies investigating their supply chain but to other interested parties such as governments, investors, and NGOs.

Challenge 6: Overrepresentation of “Good Actors”

Those supply chains with perhaps the least concern are those represented on the map; companies confident that they had no potential link to issues such as conflict minerals were more likely to respond. One company specifically noted they had high confidence that most of their suppliers followed responsible sourcing practices; however, they declined to disclose any supplier information due to concerns about one particular supplier’s link to minerals from Central Africa. (This company also expressed intent to conduct further investigation into their suppliers.)

The tracking-oriented research was particularly skewed; those mining companies who volunteered to complete the survey had high confidence that they were free of connections to conflict minerals and other CSR issues.

Response and Lessons: Listing companies that did and did not participate in the survey was one way to encourage participation. However, this practice alone was not sufficient to secure the participation of many companies. Again, for those companies that did not independently see value in participating in the survey, encouragement by their customers typically provided the best motivation as well as education about the issue.

Regarding companies in the supply chain who are not inclined to respond or whom were not reached in this work, other methodologies have been and will likely remain more effective at identifying such connections, particularly “ground-up” and in-country research.

However, in near-term supply chain initiatives, “good actors” are likely the first who will volunteer to take part in a certification effort or trial. This research was useful in identifying such potential participants.

Challenge 7: Language and Accessibility

RESOLVE does not have direct information that suggests companies failed to respond due to language challenges, and there were no requests for translation (all RESOLVE materials were in English). However, it is logical that English speakers may have been more likely to respond or communicate about the survey to their company.

Further, this project focused on sharing information electronically. While this seemed to be an effective and efficient way to communicate with companies and stakeholders in this work, not all players will have frequent or reliable internet access.

Response and Lessons: Larger companies with international business likely have capacity to correspond in English, especially within management. However, there could be important companies within the supply chain, or individuals within these companies responsible for supply chain or data management, that do not typically operate in English. Other companies or stakeholders may also not be accustomed to frequent electronic communications.

Future efforts will require greater dialogue and participation by companies, governments, NGOs, and others in Asia and Africa. In crafting and carrying out certification or standard setting initiatives, participants should consider an expanded set of language services to ensure robust participation. Transparency efforts involving participants in developing countries may also need to consider multiple approaches (beyond email) to communicate and share information with project partners, such as telephone or face-to-face meetings, with interpreters if needed.

Desk Review of Related Supply Chain Certification Initiatives

Concurrent to the mapping of supply chains, RESOLVE conducted a desk review of supply chain initiatives with relevance to the electronics sector. The review focused on initiatives relating to supply chain, assurance, certification, and sustainability issues around the production, sourcing and handling of natural resources. The purpose of these desk reviews was to identify lessons and potential linkages with potential relevance to minerals used in electronics.

Methods

RESOLVE utilized a collaborative research methodology to undertake a review of initiatives with potential relevance to GeSI and EICC as these organizations and their members develop strategies and programs to help meet their stated environmental and social objectives related to metals utilized in their products. These objectives include sourcing minerals from non-conflict sources, and sourcing minerals that meet environmental and social criteria during mining and processing.

RESOLVE worked with a multi-sector Stakeholder Advisory Group to select the most relevant initiatives and define a methodology that allowed comparison across initiatives. Based on design decisions in certification and transparency initiatives, RESOLVE examined the following supply chain characteristics of each chosen initiative:

- Supply chain complexity. Is it similarly complex to GeSI-EICC target minerals?
- Formalization of sector. Is the sector informal or formal? Is government oversight and enforcement capacity strong or weak? Are economic transactions regularized and reported, or hidden or covert?
- Material processing, coherence. What is the type or nature of the resource and how is it processed? Does the material remain whole or intact through key steps in the process?
- Significance in product composition. Does the material end up as a significant part of a product or is it found in a product component? Is the material mixed into a product in a way that it is no longer recognizable or identifiable?
- Issue/source geography. Does the geography of the material match that of GeSI-EICC target minerals? Is it relevant to regions of conflict?

RESOLVE also examined the nature of initiatives, including the following characteristics:

- Stage of development, maturity. What is the stage of development of the project or initiative? Was or is it a one-time pilot? Is it ongoing, active? How mature is the project or system?
- Nature of governance. Is this an initiative organized by one company or organization? Are those who participated in establishing the system from multiple sectors?
- Standards breadth and focus. Does the initiative address one specific issue or objective or multiple issues? If multiple issues, does the initiative respond to one category of issues such as “environment” or “human rights” or multiple categories?
- Nature of standards/program development. How was the social good or goal that this initiative seeks to meet defined and measured? By one party or an association of parties within a sector? Dialogue across sectors? By utilizing standards developed by others?
- Approach to verification. How are results verified or how is compliance monitored? Is verification self-administered or performed by an external party?

After the Stakeholder Advisory Group reviewed the initiatives list and criteria, RESOLVE drafted profiles of a number of different initiatives and requested that participants in these initiatives. Profiles selected include the following:

- Association for Responsible Mining (ARM) Green Gold
- Birks, Direct Metals Sourcing Case Studies
- Bullion Vault
- Diamond Development Initiative (DDI)
- Forest Stewardship Council Certified Post-Consumer Recycling (FSC)
- German Federal Agency for Geosciences and Natural Resources (BGR) program on Certified Trading Chains Trading Chains in Mineral Production (CTC)
- Green Lead Project
- Initiative for Responsible Mining Assurance/Framework for Responsible Mining (IRMA)
- Kimberley Process (KP)
- Mining Certification Evaluation Project (MCEP)
- Responsible Jewellery Council (RJC)/Council for Responsible Jewelry Practices
- Roundtable on the Sustainability of Platinum Group Metals
- Wal-Mart “Love, Earth”

To create each profile, RESOLVE worked from publicly available documents (e.g., web site summaries, meeting minutes or reports, and newspaper articles). RESOLVE also reviewed commentary from external sources, where available.

After drafting each profile, RESOLVE asked for input from an external reviewer, typically an individual involved in the design and/or implementation of the initiative. Most reviewer comments addressed factual issues, often adding new information that was not available on websites or in posted reports. In a few cases, reviewers challenged initial findings or conclusions. In instances where their input could be substantiated, RESOLVE made the suggested changes.

Desk reviews were not intended as comprehensive profiles; rather, they are focused on issues of significance to GeSI-EICC and their stakeholders. They are designed to focus on issues relevant to the supply chain for minerals utilized in electronics products.

RESOLVE has posted these desk reviews [online](#) and requests public input, responses, reaction and dialogue via the project wiki. The goal of posting these reviews online is to encourage an iterative and interactive process leading to a rich discussion that can inform the GeSI-EICC members and other stakeholders about mechanisms for increasing transparency in a way that is credible to a range of stakeholders.

Challenges and Lessons from Related Initiatives

In analyzing these desk reviews of related initiatives, RESOLVE identified a number of findings that can inform future transparency initiatives. Below are a set of challenges, lessons and potential responses, and other observations of relevance to the electronics and other sectors, including the following:

1. Traceability and metals processing
2. Electronic product composition
3. Certification fatigue and potentially competing efforts
4. The pace and nature of change

Challenge 1: Traceability and Metals Processing

As previously described, minerals typically lose their provenance in the supply chain when ores are mixed (during trading, prior to refining; in the smelting or refining process; or in re-melting, re-processing, or recycling of metals).

In other sectors, methods have been developed in response to similar traceability challenges. For example, with recycled paper, a product is certified in proportion to the post-consumer recycled content that enters a pulp mill. FSC has also established a mixed source standard and label for products where different components meet different types of standards. Metals recyclers have started to offer assurance to jewelers as to the post-consumer content in their metals.⁴⁵

Lessons and Potential Response: For minerals targeted by GeSI-EICC, a number of solutions are possible, some of which are already being utilized in other sectors:

- 1) Intervention early in the supply chain, at the mine and through to the smelter, to mark and record ore, so that it can be tracked and verified into the smelter. This type of approach is being advanced by ITRI, the tin association, and may form the basis for a trial for tin and tantalum.⁴⁶
- 2) Agreements with specific mines willing to track product into the smelter, coupled with batch processing in the smelter, where ore is processed separately.
- 3) A smelter that is captive to a particular mine (or a number of mines all of which meet standards) allows for a coherent, singular supply chain, at least through smelting phase (e.g. Wal-Mart “Love, Earth”).
- 4) A crediting system that allows for a smelter to mark the percentage of its outflow that matches the certified inflow, or to ascribe % content to the metal, as with recycled paper.
- 5) The creation of unique source to product relationships such as those put in place by Tiffany & Co., Birks and others.

Challenge 2: Electronic Product Composition

Voluntary supply chain certification systems have typically been advanced where the target natural resource or material represents a significant percentage of the consumer product. Examples include trees (for wood products or paper), fish, organic produce, diamonds or gold for jewelry, agricultural products under the fair trade system, and cotton for clothes. For these products, certification systems can result in a market premium and reputational or brand value.

There are also certification systems that verify the performance of the product itself or a particular aspect of performance or impact. These include energy efficiency ratings for appliances or safety ratings for automobiles.

Minerals for electronics are different than many of the products certified, to date, in that each of the metals typically represents a relatively small percentage of the components or subcomponents of a consumer product like a cell phone or computer. Therefore, an assertion that a cell phone or computer is free of minerals from conflict zones is significant but may only certify a very small percentage of the product. (For example, the major metals in cell phones included copper at 19%, followed by aluminum at 9% and iron at 8%. Other metals, including the three in focus of this report, constitute 1% of the materials in the mobile telephone.⁴⁷) Nor does it begin to address the myriad impacts related to other product components—from copper in wiring, to gold used as a conductor, to oil used in plastics, to end-of-life product issues. Gold is currently the most valuable element in electronics, despite its relatively low weight, and composes 67% of the metals value in a cell phone and 65% of the value in a personal computer.⁴⁸

Lessons and Potential Response: The emerging GeSI-EICC strategy is to advance a program of supply-chain transparency metal-by-metal, due to the differences in actors and supply chain relationships and dynamics for each target metal (although there may be linkages for some metals in regions such as DRC, at least in the pre-smelter trading phase). This, and the complexity related to the composition of electronics, indicates a somewhat different strategy than in other sectors. One could envision a strategy that seeks to increase the responsibly sourced content inside electronics over time rather than an assertion regarding the product itself—and all of its component parts. The sector may also be ripe to test crediting strategies were company action serves as an incentive to increase the percentage of responsibly sourced content in the marketplace but don't necessarily need to take step to establish a literal chain-of-custody, which might prove inefficient in some instances.

GeSI and EICC members may have more in common with the automobile, airline and aerospace, energy systems, green technology, and medical equipment sectors, and other industrial sectors, than with sectors and products like jewelry and forest products. Of note in

this area are the Platinum Study Group, the Green Lead Initiative, and the supply chain work undertaken by Ford Motor Company.⁴⁹

Specific strategies could include:

- Articulation of a phased approach, to target metals in sequence, and to potentially add environmental and social dimensions, in addition to the issue of conflict.
- A focus on percentage content, such as those for recycled paper.
- Credit for achieving advances related to product components—a variation on the FSC certification for products with different components from different sources. Although in this case the product lines are probably not yet in a position to make assertions regarding all product components and materials.
- Exploration of crediting schemes and/or non-literal chains-of-custody, where an end-use company or retailer could get credit for demonstrated increases in responsibly sourced product into the market, without the requirement that that a literal chain of custody is in place. These strategies could range from smelter-focused schemes that allow credit for outflow based upon a small but increasing inflow, to the purchase of credits that don't actually require any form of tracking as long as product is verified at the source and actually enters the market.
- The US EPA and other stakeholders are exploring concepts related to tallying the full sustainability value of particular electronics products—including sourcing, energy use, and recycling or end-of-life issues. GeSI-EICC could monitor these discussions for useful advances.

Challenge 3: Certification Fatigue and Potentially Competing Efforts

Some industry and NGO actors have expressed a growing sense of fatigue with the number of similar initiatives and with the proliferation of reporting requirements. For industry there is frustration with the cost associated with compliance and questions about the value and benefits. For NGOs, there is concern related to limited resources and an interest in focusing efforts to achieve maximum impact.

Through this research and other initiatives RESOLVE is aware of the following:

- the KP system for diamonds, focused on conflict;
- BGR trials focused on tagging and certifying minerals from the Great Lakes regions with a focus on Rwanda;
- the IRMA initiative, including some leading mining companies, jewelers and NGOs, focused on standards development and verification for a broad set of metals and the large scale metals sector;
- RJC with a focus on standards development, supply chain issues, and certification for gold and diamonds (and potentially gemstones) in jewelry;

- ARM focused on a Fair Trade certification for gold and the other minerals used in jewelry;
- the Diamond Development initiative focused on creating standards, sources and models for diamonds that protect human rights and promote economic and community development;
- the Platinum Working Group focused on responsible sourcing of platinum metals;
- the Green Lead initiative to promote responsible handling and recycling of lead;
- ICMM's sustainability principles and company-specific verification requirements;
- Mining Association of Canada's Towards Sustainable Mining program;
- research getting underway to assess the effectiveness of the KP to extend to conflict metals;
- multiple types of stakeholder engagement in conflict regions such as DRC to explore the potential to create certification trials; and
- a number of company-specific initiatives, such as Birks and Wal-Mart.

Even beyond this list is a significant set of transparency efforts such as the Global Reporting Institute, International Organization for Standardization, Extractives Industry Transparency Initiative, Publish What You Pay, investor indices, and other existing reporting systems followed by some mining companies. As previously noted, RESOLVE's survey research led to some confusion and frustration because a number of electronics companies were already requesting similar information from the same suppliers.

There are sometimes benefits to multiple initiatives. Some target specific issues, sectors, metals or problems; sometimes individual actors or small groups can move more quickly than larger groups; and sometimes individual companies need to act given specific conditions in their supply chains.

At the same time, while the actors and issues can be different for different minerals, there is certainly a convergence with regard to issues from the smelter back to the source (i.e., the mine or recycling facility).

Lessons and Potential Responses: RESOLVE is struck by the potential inefficiency of overlapping efforts and sees a danger in potentially diminishing returns. A wide-angle look at the product/manufacturing end of the minerals supply chain and the mining sources leads us to a number of observations and questions that may promote efficiency and results.

There may be an opportunity to use this proliferation of reporting and disclosure initiatives to initiate a cross-sector conversation on the issue of reporting and disclosure. Like other industrial and manufacturing sectors, the electronics industry uses a wide array of minerals

and materials. There is potential to work across industry sector to develop a coherent set of principles related to supply chain transparency.

All of these sectors overlap at the source. GeSI and EICC companies are in a position to work from existing standards and criteria, support current multi-sector standards development initiatives, and participate in existing programs. While issues and responses will vary to some extent by mineral type, a core package of principles, standards and/or criteria could be developed across mineral types, with two forms: 1) an add-on package for each mineral type and 2) standards for large-scale and ASM sources. There is likely to be a benefit to addressing the development of standards and criteria across sectors, rather than GeSI-EICC companies launching yet another effort.

Challenge 4: The Pace and Nature of Change

A review of other systems and initiatives shows that those that address multiple issues and include diverse stakeholders often emerge from a complex disorganized array of activities, move in fits and starts, and go through significant trial and error. They tend to emphasize inclusion and legitimacy over speed. This was true of FSC, the Fair Trade Label and ARM but is less true of MSC—which emerged more quickly although with considerable difficulty.

There can also be a tendency for systems to move relatively quickly to address a high-profile urgent issue (such as clear-cutting of forests, conflict diamonds, exposes on sweatshops, fisheries collapse or conflict metals) and then take years to accommodate related human rights, social and environmental issues. It would appear that FSC is a relatively successful model in this regard given its adaptability over time. KP is an interesting case in that some argue that KP can be adapted or serve as an example with regard to conflict minerals. However KP was designed with one issue in mind and it is unclear if it serves as a model for a broader set of conflict metals issues and/or can or should be adapted.

Lessons and Potential Responses: At this relatively early stage it is probably important for GeSI-EICC and/or stakeholders to determine whether they are building a response solely to conflict metals or to the broader set of issues related to responsible sourcing of metals—including or starting with the issue of conflict metals.

Our analysis would suggest that a system built to respond to conflict metals as a priority but with the flexibility to include other issues is likely to be the most effective and efficient way forward. For example, a sequence such as the following could be considered:

1. Focus first on supply chain transparency and accountability with tracking mechanisms required for target minerals.
2. Test and perfect the transparency and accountability system so that it builds confidence.

3. Develop and pilot a mechanism to secure conflict free minerals from the Great Lakes region, to test the system in a target region of concern.
4. Begin to work with companies and stakeholders in other sectors to share learning from the system and pilot and explore linkages.
5. Integrate systems with those in other sectors, link to standards development in other sectors or draw from other standards to develop criteria for GeSI and EICC.

Other Observations on Roles and Relationships in Transparency Initiatives

Supply Chain Relationships

Current systems are typically inadequate to trace (or track) materials flow with confidence. New supply chain systems (e.g., tracking technology, certificates of custody, transaction records, business-to-business agreements, independent auditing) and relationships are typically required to provide confidence as to the source and processing of the material. In most other sectors shifts in supply chain relationships, structures and dynamics have occurred. In some instances actors in the supply chain may feel threatened as relationships shift and companies make decisions based upon new sourcing criteria. Resistance can form due to the potential for loss of business, the added cost of compliance with new standards and criteria, and a sense that actors with no direct financial interest (e.g. NGOs) are interfering in business relationships.

It is worth noting that there can be legitimate business reasons to protect relationships and information in a supply chain. When this occurs it is possible to create systems or strategies that allow necessary disclosure and accountability, without jeopardizing proprietary information. To create and maintain legitimacy with regard to transparency and accountability, it is important to engage with stakeholders as provisions to protect proprietary information are developed.

Companies and/or stakeholders have pursued a variety of strategies to respond to the limitations of extant supply chains. With the FSC, stakeholders worked over many years to create a multi-sector governed certification system and there is competition between FSC and SFI for market share and legitimacy. In the jewelry sector multiple efforts have been launched in recent years. RJC pursued an organizing strategy which includes jewelers, manufacturers, miners and other commercial actors in the supply chain, and is working to create a business-to-business assurance mechanism with representatives from the entire supply chain at the design table. KP focused on an agreement among governments, and a system of warranties, to address particular human rights abuses associated with diamond mining. ARM/Fair Trade and DDI have focused on literal supply chains and building support on a community basis. IRMA targeted a broad set of mining issues and sought to be multi-sector from the outset. Specific companies like Wal-Mart, Tiffany & Co. and Birks have pursued their own, direct sourcing relationships.

Balancing Roles of Governmental and Voluntary or Market Solutions

In these desk reviews, RESOLVE focused primarily on voluntary initiatives. However, it is important to note the critical role of government in long-term, system-wide solutions to extractives sector challenges.

There are a number of lessons based on initial analysis. First, certain issues such as conflict require the participation of governments, regional government bodies, and/or supporting international government agencies. This is particularly true for conflict minerals given recognition that trade of these materials is just one symptom of larger governance challenges.⁵⁰ Government efforts are essential with regard to a performance floor and/or instituting bottom-line mandates.

Secondly, government can and should seek to promote efficiency of efforts in leading, participating in, and funding activities. Just as this report has noted the need for coordination on the part of NGOs and companies, there are opportunities for greater efficiencies with regard to initiatives led or supported by governments. One small snapshot of governmental-based activities related to conflict metals includes the following:

- The International Conference on the Great Lakes Region (ICGLR) is an initiative of the governments of Angola, Burundi, the Central African Republic, Congo, the Democratic of Congo, Kenya, Rwanda, Sudan, Uganda, Tanzania and Zambia. The ICGLR was formed to provide a legal framework governing relations between the Member States, create conditions for security, stability and sustainable development between the Member States; and implement a pact covering topics ranging from economic development, security, social and environmental issues, and governance.⁵¹
- The UN Group of Experts was appointed to monitor implementation of the arms embargo in eastern DRC and investigate the financial and material support of these groups, as well as to produce guidelines for due diligence by minerals importers, processors, and consumers regarding the purchase, sourcing, acquisition and processing of minerals from the DRC.⁵²
- The United Nation Organization Mission in DRC (MONUC) conducts peacekeeping activities including facilitating the transition to democratic rule and elections, helping the DRC Government dismantle armed groups in the Kivus and Ituri, monitoring ceasefires, and supporting cooperation and reconciliation in the Great Lakes Region.⁵³
- The Organisation for Economic Cooperation and Development is working on responsible investment in the mining sector (building on their Guidelines for Multinational Enterprises and Risk Awareness Tool for Multinational Enterprises in Weak Governance Zones)⁵⁴
- Through an amendment to the appropriations bill for the U.S. Department of Defense, the U.S. State Department has been commissioned to create a map to overlay areas under control of armed groups with zones of mineral resources in the DRC. The U.S. Senate

and U.S. House of Representatives have both introduced bills that would employ this map and, through different mechanisms, 1) require importers or companies whose products may contain potential conflict goods to certify whether imports contain conflict minerals, and 2) require government agency reporting on which companies are importing goods containing conflict minerals.^{55,56}

- The German Federal Agency for Geosciences and Natural Resources (BGR) is researching and piloting a program on Certified Trading Chains in Mineral Production (highlighted in this project's desk review).
- Communities and Small-scale Mining (CASM) compiled information on major DRC donors including World Bank, the European Union, UNICEF, the United States, the United Kingdom, France, Germany, Belgium, the Netherlands, Japan, Germany, Canada, Sweden, South Africa, and Angola. These countries have funded projects including infrastructure, security, education, health services, governance, and civil society.⁵⁷

Thirdly, and perhaps most importantly, voluntary and governmental initiatives, such as those described above, can have a mutually reinforcing role. While some will argue that only a solution imposed by governments will fundamentally resolve the problems that have plagued the Great Lakes region, others are seeking ways to take action during the long process of designing and implementing governmental solutions.

KP, for example, is a solution enacted by individual governments that has benefit in the marketplace. KP required a long negotiation and significant political will, leadership, and investment on the part of key companies, trade associations, NGOs, and governments. The evidence suggests that such considerations will be essential if a similar strategy is utilized. There is also evidence that voluntary initiatives are both necessary and complementary.

While government and political approaches will be essential to long term solutions, voluntary solutions supported and organized by industry, NGOs and associations also have a role to play. A hybrid approach could utilize the stakeholder engagement and negotiation necessary to create an effective sourcing mechanism and chain-of-custody as a means to take a real, concrete step in building the social and political capacity to get to a political agreement. In essence, political negotiations and commitments would be linked to a virtuous supply chain test or trial—both will be needed.

It is also worth noting that there is growing evidence about the value of voluntary systems creation as a means to strengthen civil society and build social and political fabric. Negotiating agreements and systems for effective natural resource management, even if voluntary, are nonetheless an example of effective governance built from the ground up.⁵⁸ Such agreements can create leverage, relationships, and success stories. It can be useful to have an organized and successful venture in a conflict region, with leading global electronics brands, NGOs, experts,

and other international actors. Even the early stages of system development can begin to create relationships and dynamics that provide new opportunities and useful leverage to those working to address issues of conflict, human rights abuses, community benefit, and environmental protection.

Early Corporate and NGO Initiatives Can Test Concepts and Create Momentum

There is evidence that company initiated and directed initiatives can advance more quickly from conceptualization to implementation. Examples include the sourcing strategies pursued by the Wal-Mart “Love, Earth” program⁵⁹ and Birks.⁶⁰ A particular company is interested in protecting its brand or corporate reputation, or meet a corporate imperative, is likely an underlying driver. Industry-wide or multi-sector initiatives tend to move slower and a particular company or NGO is only one voice. In some instances, the risk may simply be too high for a company to put reputational issues solely in the hands of a multi-sector, negotiated decision making process.

While some may see company-driven initiatives as separate from broader industry-wide or multi-sector initiatives, it can be argued that these initiatives serve as critical pilots for broader systems, allowing systems and methods to be tested on the ground, and helping to create momentum. There is some evidence of this in the forestry sector, where a push-and-pull has existed between various systems and the early actions of particular companies created new leverage and legitimacy. The minerals sector has also seen early action by a number of companies.

Given on-the-ground complexities and political challenges related to mineral sourcing and trading in DRC, the Great Lakes region, and other mineral rich zones around the world, it is likely that in this sector a two-track strategy will emerge—with the creation of broader systems as one focus and targeted pilots and company specific initiatives as another track. If this emerges it could be useful to consider an intentional strategy to integrate these efforts so that the pilots and company-specific programs actually serve as testing ground and lessons are actually shared.

Defining Issue Scope and “Conflict Free”

While conflict is a current issue of focus among governments, private sector companies, and NGO actors, all acknowledge a range of linked social responsibility issues including environmental impact, labor rights, governance, and community health and safety. In designing a certification or similar assurance system, parties must carefully consider, agree upon, and articulate the scope and desired outcomes. A narrow issue focus may frustrate some stakeholders, but too large of a focus may overwhelm the early systems design and frustrate efforts to address pressing issues.

There is also a need to address the tension between moving quickly to advance “conflict free” sources and an interest in help advance economic, social and political development in conflict

zones like DRC and parts of the Great Lakes region. As above, there is evidence that focused initiatives tend to advance more quickly to tangible results. While certified “conflict free” minerals should start to flow into supply as a set of agreements is established, such a system will not initially have in place a system to source from highly informal sources in or near conflict zones. For this to occur, without jeopardizing the credibility of the larger supply chain system, specific source-to-smelter mechanisms, targeting sources in these regions, will have to be developed. This is where the system could begin to look at elements of the KP system, the ARM chain-of-custody, or other systems designed for small scale sources where unique tracking mechanisms and/or independent auditing were initiated.

In a number of previous cases, interest emerged from a number of places: individual miners and traders who saw an opportunity begin to work with NGOs and leading global companies, NGOs with relationships with local communities and miners (particularly development oriented NGOs), entrepreneurs who saw an opportunity create new partnerships, and trade associations that were able to help connect actors and sometimes help with systems development.

It will be important to catalyze the development and testing of trials, strategies, and models to help create a flow of minerals from DRC into this newly transparent supply chain. For this to occur, these trials and alliances will have to be stimulated and supported, both financially and in terms of linkages. A fabric should be created that fosters testing and learning. This approach will also require patience. As RESOLVE sees with DDI, ARM, and other initiatives, it takes time to build credible systems and approaches.

Finally, there is strong evidence to suggest that for these activities to be successful (both the broader transparency and accountability initiative and in-region trials) it will be important for a fabric of stakeholder participation to be organized on a global and regional/local level.

Summary of Project Findings and Future Opportunities

1. Start With Supply Chain Transparency and Accountability, and Willing Partners

GeSI-EICC companies are clear on their intention to ensure that minerals sourced from conflict zones do not enter their supply chains. Without transparency and accountability in the supply chain, it is difficult to move to a proactive position and make claims that are credible and can be verified.

Supply chain transparency is challenging where mining and trading of minerals is organized informally or illegally, and/or government capacity is limited. Although transparency is particularly challenging in DRC and the Great Lakes region of Central Africa, companies and stakeholders in other sectors (e.g. conflict diamonds,^{61,62} gold mined using child labor,⁶³ and sweatshops) have encountered similar challenges.

The actors best positioned to move quickly in a supply chain transparency initiative for tin, tantalum, cobalt, and other metals such as gold and copper are likely to be medium- and large-scale operators from the formalized mining sector. In other words, miners in the ASM sector, particularly those in conflict regions, will have difficulty entering such a supply chain, at least initially. There is evidence that a similar pattern occurred with diamonds, where some retailers moved to source from “safe” sources, such as those in Canada, in response to the conflict diamonds issues.

GeSI and EICC member companies are already finding, both through the RESOLVE tracing research and as a result of discussions with smelters, traders and miners, that supply chain transparency and accountability are more readily achieved when working with established companies operating in the formal mining sector. Although the mapping exercise faced a number of challenges, it did prompt positive reactions from a number of companies at various stages in the supply chain, including smelters and mining companies, thus identifying potentially willing collaborators for future efforts.

2. Forge Agreements with Key Stakeholders on Transparency and Accountability Measures

Stakeholders have valuable information that can help inform systems development. Each supply chain presents unique challenges. It is useful to discuss potential responses with stakeholders so that they are aware of both the challenges and potential solutions, can offer input and guidance and even participate in systems design, and can provide feedback when new approaches are tested.

Solutions will vary from sector to sector due to unique factors in a particular supply chain, but in many instances useful lessons can be drawn from other sectors. For example:

- Focus on the information that is essential to confirm compliance with the target human rights, social and environmental issues—for example the KP’s use of warranties and ARM’s and Mammoth Tusk Gold’s use of affidavits and an outsider auditor.
- Design a work-around for unique sectors-specific challenges such as FSC did for recycled and mixed content products.
- Take the time necessary to ensure effective accountability mechanisms and adapt to changing realities. Without those mechanisms, credibility can wane, despite the time and resources expended to build or create a system. For example, FSC has demonstrated significant ability to adapt over time. On the other hand, KP is currently having difficulty with accountability and may need to be more rigid.

Myriad activities are underway with regard to conflict metals, for GeSI-EICC it is recommended that a robust stakeholder engagement strategy and protocol be established with a focus on the

desired results, design, and accountability mechanisms for a) the supply chain transparency systems, and b) the pilots or trials focused on DRC.

As discussed previously, governmental initiatives are also key, and actors including Great Lakes country and regional initiatives, donor country agencies, international agencies should be consulted early in project design so as to take advantage of existing staff and resources as well as to ensure strategies work within development governance and other frameworks.

When designing and testing mechanisms, local efforts should also be examined and local stakeholders consulted. NGOs, government representatives, and other citizens local to mines and trading centers in regions of interest can provide valuable knowledge and perspectives and help “ground-truth” the efficacy of potential solutions.

Whatever level of participation is established, clear agreements should be reached from the outset. If stakeholders are to have input, then the regularity of discussion, who participates, and the key areas of focus should be jointly established—as should feedback loops so that stakeholders know the basis for decisions. If stakeholders are involved in co-design, then mutually agreed ground rules are also necessary. There is evidence from a number of other initiatives including IRMA, RJC, the early stages of FSC, Wal-Mart and even ARM that misunderstandings about the nature of engagement have slowed-down the process or threatened legitimacy.

3. Coordinate and Collaborate

A sober look into the future suggests that the interrelated issues of minerals as a source of or fuel for conflict; conflicts over mineral resources, and mining in or near conflict zones is likely to grow at the same time that ore bodies for essential minerals, precious minerals and rare earth minerals will become more difficult to locate. The issue is not really centered on a particular mineral. Conflict and human rights challenges are likely to occur around minerals with significant economic value in the marketplace. While some regions will be in pressing need of political intervention and solutions designed with the relevant political, cultural, historical, social and economic factors in mind. A system that seeks to create voluntary industry and civil society response to these issues is more likely to work if it is designed with a global view in mind. It is hard to imagine unique systems designed region-by-region, mineral-by mineral.

There are sufficient standards and criteria documents related to responsible mining for electronics companies to learn from while initiating stakeholder consultation. The challenge for electronics companies is more one of how to make effective choices: which issues to address, which existing criteria to utilize or draw from, and how to work efficiently with stakeholders when making choices.

4. Explore a Multi-Sector Approach

The electronics industry is clearly not the only sector challenged by conflict minerals or issues pertaining to supply chain accountability for minerals, nor is it the only sector that will have to address social and environmental issues related to the source of the material in its products.

Furthermore, it will be useful for a design and trial stage and necessary to any long-term solution to involve end-use sectors beyond electronics companies. This research showed that there are very willing actors at all key steps in the supply chain. However, many significant mining sources, traders, processors, and product manufacturers supplying diverse industries were not reached in the tracing and tracking activities. As long as warring groups can find significant alternate routes or supply chains to take advantage of mineral mining and trade, they will be successful in continuing to finance their activities. In the words of one GeSI member, “to stop the flow of water, one must build a dam all the way across the river.”

In identifying suppliers willing to participate in next steps, GeSI and EICC companies should also consider how to involve other end-use sectors, particularly automobile, airline and aerospace, energy and other green technology, medical equipment, and other industrial sectors.

5. While Designing Long Term Approaches, Create Opportunities to Test Solutions

Stakeholders from NGOs, end-use companies, suppliers, government, investors, and others are exploring and advocating for long term approaches to establishing and verifying conflict-free supply chains. GeSI and EICC members should continue to engage in these conversations and learn from past chain of custody, transparency, and other initiatives when evaluating design options for suitable to the electronics and related supply chains.

However, as seen in other supply chain efforts, establishing such standards and programs can be quite time-intensive. This is especially true of initiatives incorporating multi-stakeholder consultation, which is highly recommended for any chosen conflict minerals approach.

As such, RESOLVE recommends a two-track approach, in which GeSI and EICC members work to establish a multi-stakeholder network of suppliers, end-use companies, NGOs, and other experts to consult on the design of the following:

- 1) **Smelter-based “conflict-free” verification.** A long term approach is clearly needed to address conflict minerals through a supply chain transparency and tracking system that could eventually support “conflict-free” sourcing for products. RESOLVE’s tracing and tracking research indicated that major end-use companies such as GeSI and EICC members have sufficient leverage to reach smelters. Furthermore, a developing dialogue

between electronics companies and smelters indicates that key smelters are willing to participate in designing a mechanism for verifying processed/refined metals.

- 2) **Pilot(s) based in regions of conflict.** While undertaking larger systems design, companies and other stakeholders should undertake a pilot or series of pilots that begins to test a number of different potential solutions. Ideally, these pilots will take place in conflict regions such as the DRC to demonstrate the existence of legitimate sources (including ASM) and mitigate likely initial reactions by some companies to halt sourcing from Central Africa. The pilots can test different transparency and chain of custody mechanisms such as “bagging and tagging” from a mine site, batching ores at the smelter, establishing dedicated mining and refining facilities, or creating unique source-to-product relationships. These pilots can also build the capacity of actors in conflict regions to participate in and benefit from conflict-free supply chains.

RESOLVE recommends this two-track approach as a way to take advantage of lessons learned from other initiatives, allow space for coordinating across sectors and related efforts, and invest in a thoughtful design of a sustainable transparency system, while still creating the opportunity to act and seek measurable results on the ground in the coming months.

List of Acronyms and Abbreviations

ARM	Association for Responsible Mining
ASM	Artisanal and Small-scale Mining
BGR	German Federal Agency for Geosciences and Natural Resources
CASM	Communities and Small-scale Mining
CDI	Cobalt Development Institute
CSR	Corporate Social Responsibility
CTC	Certified Trading Chains Trading Chains in Mineral Production
DDI	Diamond Development Initiative
DRC	Democratic Republic of Congo
EICC	Electronic Industry Citizenship Coalition
EITI	Extractive Industries Transparency Initiative
EPA	Environment Protection Agency
FSC	Forest Stewardship Council
GeSI	Global e-Sustainability Initiative
ICGLR	International Conference on Great Lake Region
ICMM	International Council on Mining and Metals
IRMA	Initiative for Responsible Mining Assurance
ISO	International Organization for Standardization
ITRI	Tin Industry Association
iTSCi	ITRI Tin Supply Chain Initiative
KP	Kimberley Process
MCEP	Mining Certification Evaluation Project
MONUC	The United Nation Organization Mission in DRC
MSC	Marine Stewardship Council
NDA	Nondisclosure Agreements
NGO	Non-Government Organization
OEM	Original Equipment Manufacturer
PGM	Platinum Group Metals
RJC	Responsible Jewellery Council / Council for Responsible Jewelry Practices
TIC	Tantalum-Niobium International Study Center
UNICEF	The United Nations Children's Fund

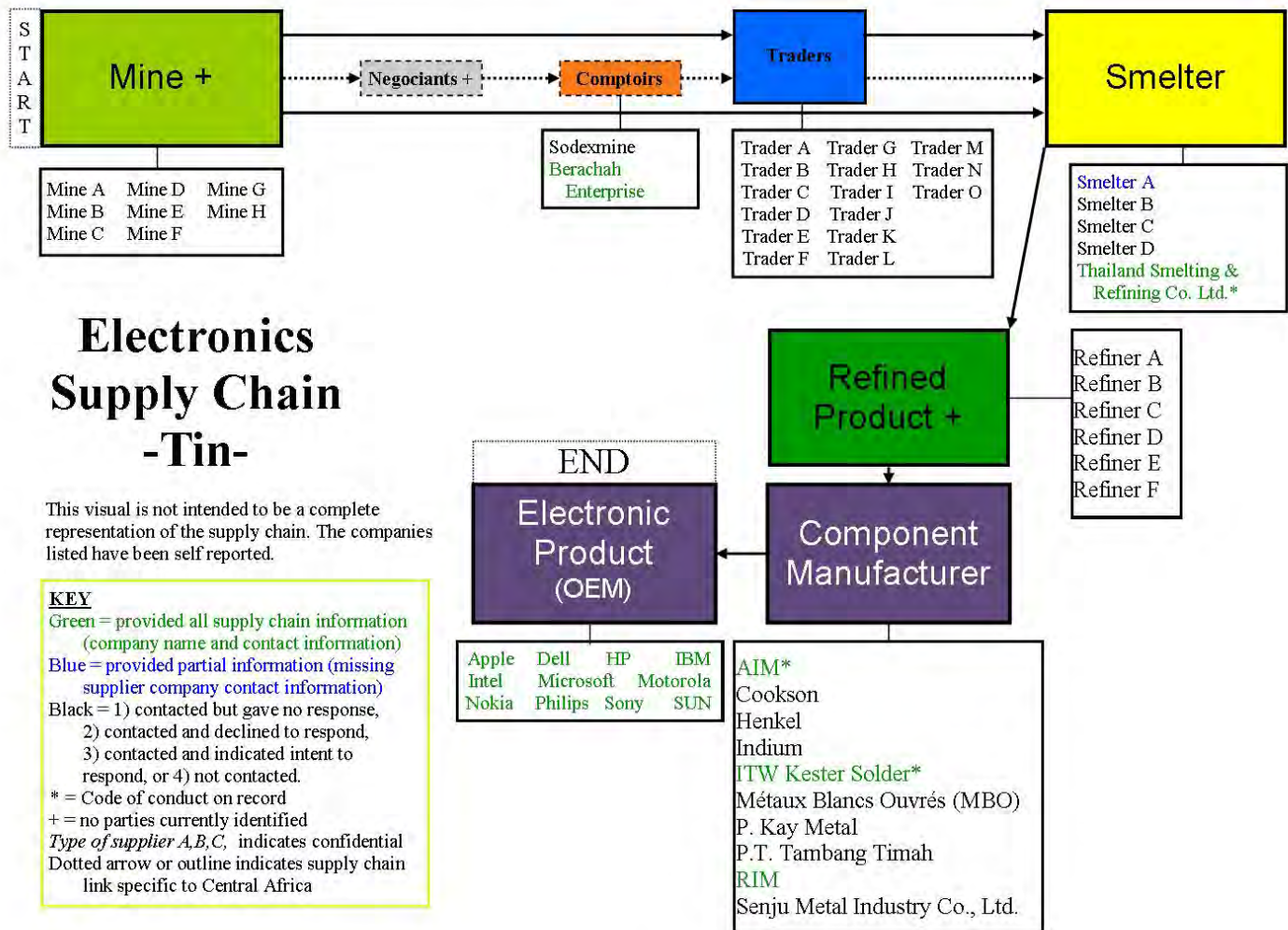
Attachment 1

Supply Chain Maps



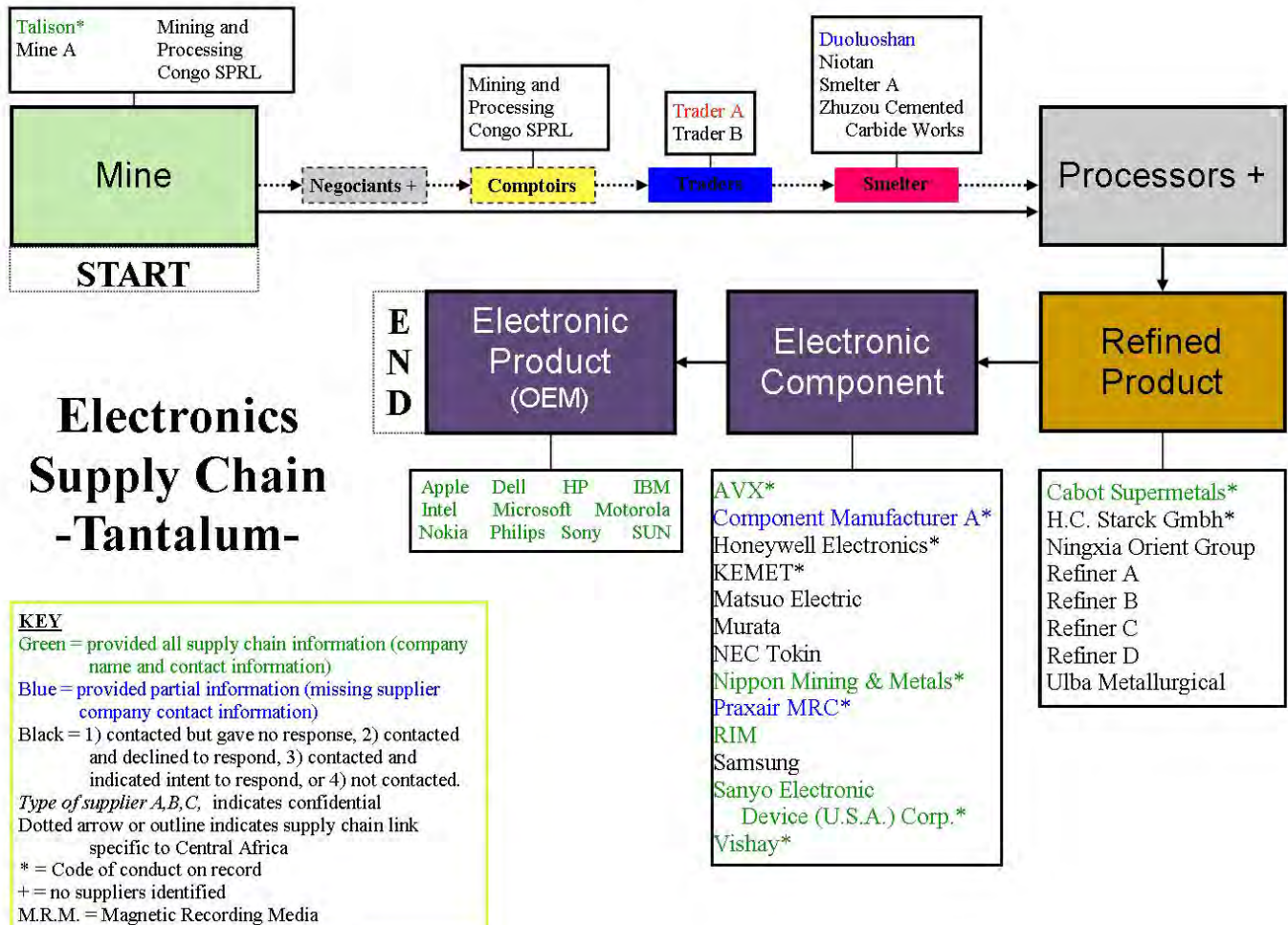
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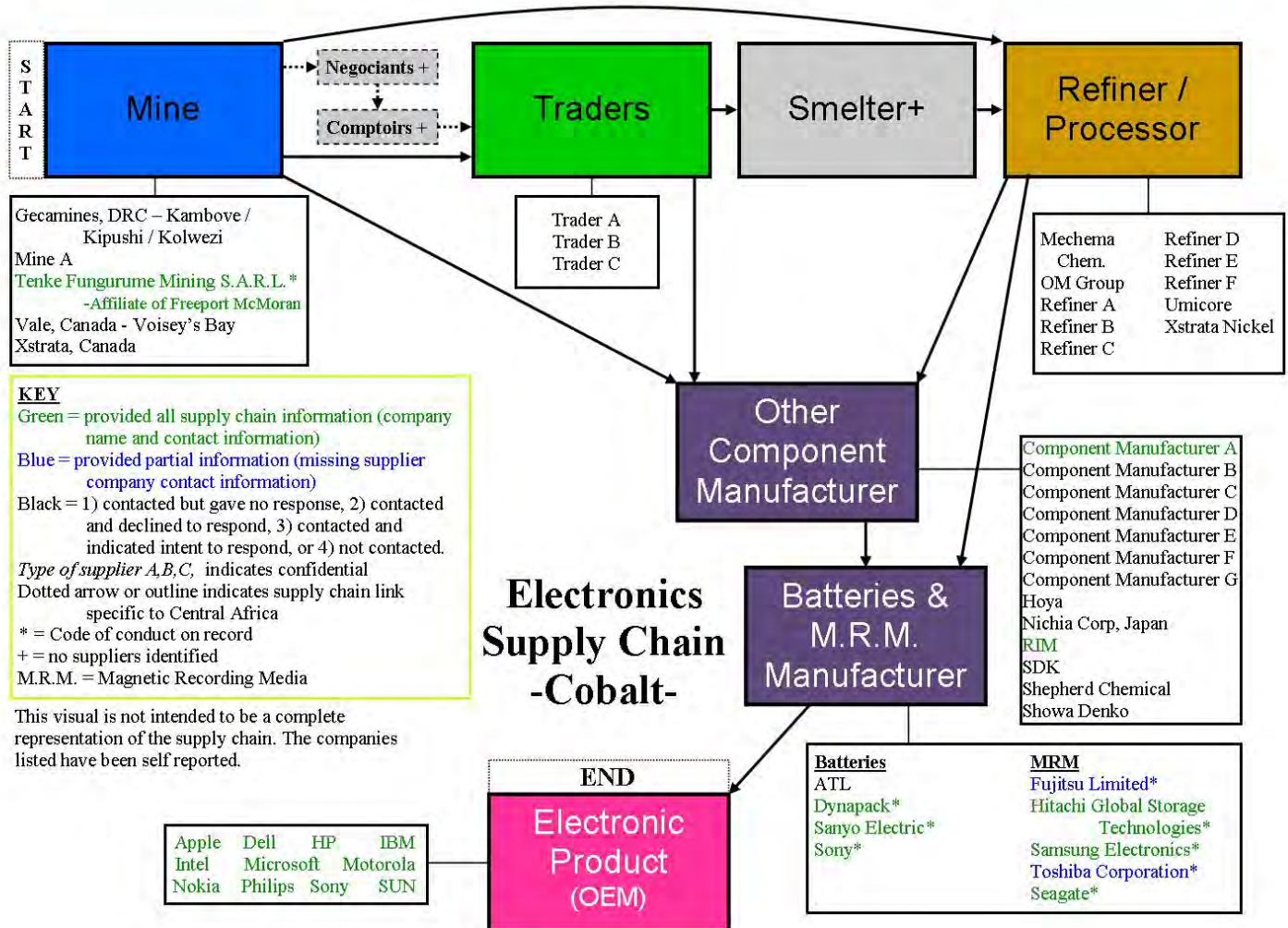
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February 4, 2010

February 17, 2010



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¹ For more information on EICC, please see <http://eicc.info/>.

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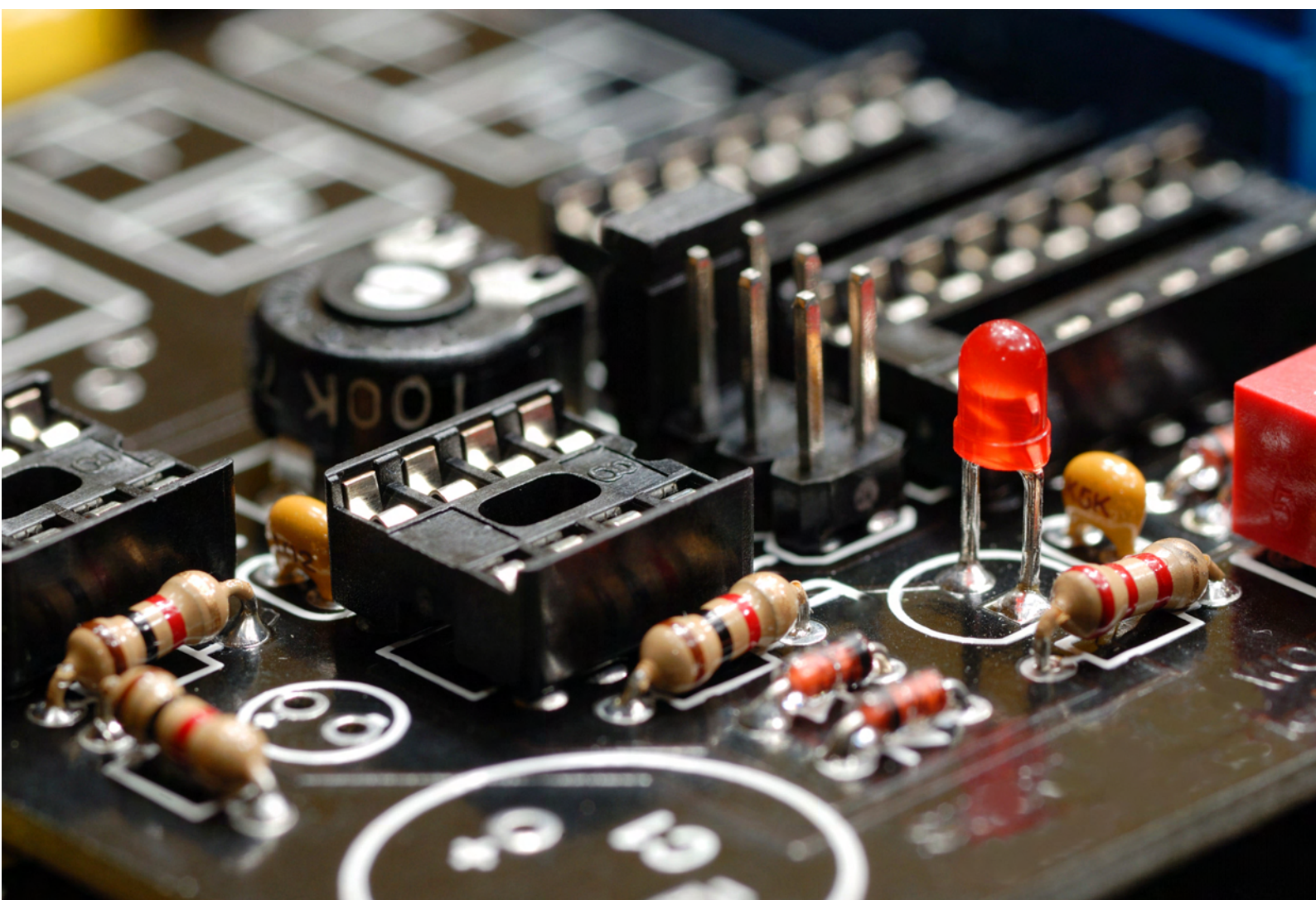
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Responsibility for this report—including contents, discussion, and conclusions—is solely that of RESOLVE.



RESOLVE