

The United Nations and E-waste

A Coordinated Approach to Tackling E-waste

Draft Report by the EMG Issue Management Group on E-Waste: Mon 13th March 2017

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Abbreviations

CFCs – chlorofluorocarbons

COP – Conference of the Parties

CRTs – cathode ray tubes

DFS – Department of Field Support

EEE – Electrical and Electronic Equipment

EMG – Environment Management Group

ENFORCE – The Environmental Network for Optimizing Regulatory Compliance on Illegal Traffic

ESM – environmentally-sound management

FAO – Food and Agricultural Organisation

GPWM – Global Partnership on Waste Management

HCFCs – hydrochlorofluorocarbon

ICCM – International Conference on Chemicals Management

ICTs – Information communications technology

IETC – International Environmental Technology Centre

ILO – International Labour Organisation

IMG – Issue Management Group

IMO – International Maritime Organisation

INTERPOL – International Criminal Police Organisation

ITU – International Telecommunication Organisation

MPPI – Mobile Phone Partnership Initiative

ODS – Ozone depleting substances

OECD – Organisation for Economic Cooperation and Development

OSH – Occupation, safety and health

PACE – Partnership for Action on Computing Equipment

PBDEs – brominated flame-retardants

PFOS – perfluorooctane sulfonate

POPs – persistent organic pollutants

SAICM – Strategic Approach to International Chemicals Management

SBC – Secretariat of the Basel Convention

SDGs – Sustainable Development Goals

SMEs – Small and medium enterprises

Step Initiative – Solving the E-waste Problem Initiative

UNCTAD – United Nations Conference on Trade and Development

UNDP – United Nations Development Programme

UN ESCAP – United Nations Economic and Social Commission for Asia and the Pacific

UNESCO – United Nations Educational, Scientific and Cultural Organisation

UNFCCC – United Nations Framework Convention on Climate Change

UNICEF – United Nations Children’s Fund

UNIDO – United Nations Industrial Development Organisation

UNITAR – United Nations Institute for Training and Research

UNU – United Nations University

WEEE – Waste Electrical and Electronic Equipment

WHO – World Health Organisation

CHAPTER ONE: Introduction and Background

a) The Global E-waste Problem

The use of products with either a battery or power supply is on the increase across the world. As an illustrative example, according to a study conducted by the United Nations University in 2013, an average Belgian household comprised 79 units of electrical and electronic equipment (EEE) in addition to 47 lamps/luminaires in 2013. These EEE cover a wide range from toasters, smoke alarms, CRT monitors, telephone sets, electrical tooth-brushes, coffee-makers, irons, electrical toys, ovens, TVs and computers, to internet routers, energy saving lamps, printers, fridges, microwave ovens, drills, high pressure cleaners and washing machines. The same study estimated that the total stock of these goods amounted to 276 kg per inhabitant.¹ This figure is expected to further increase due to technological innovations resulting in a variety of new devices available to households such as intelligent clothes, smart toys and tools, dispensers and ubiquitous medical equipment.

In 2012, an estimated 56.56 million tonnes of EEE were put on the global market.² When reaching their end-of-life, this equipment becomes waste electrical and electronic equipment (WEEE), or e-waste. According to the Step Initiative³ “e-waste is a term used to cover all items³ of electrical and electronic equipment and its parts that have

¹ Recupel, UNU, Ffact (2013): (W)EEE Mass balance and market structure in Belgium - see <http://i.unu.edu/media/unu.edu/news/39523/Recupel-Report-FINAL.pdf>

² UNU (2015): Global E-waste Monitor - see <http://ewastemonitor.info/download/global-e-waste-monitor/>

³ Step is an international initiative comprised of manufacturers, recyclers, academics, governments and other organizations committed to solving the world’s e-waste problem. The secretariat is hosted by UNU. By providing a forum for discussion among

been discarded by its owner as waste without the intent of reuse” (Step Initiative, 2014). E-waste is a complex and fast-growing waste stream that, as seen above, covers a large variety of products. The composition of this waste stream, that is, its constituents including toxics and its resource potential, varies significantly by product which makes e-waste very difficult to manage. Rapid product innovation, miniaturization and replacement, especially for information and communication technology (ICT) products and consumer equipment are fuelling the increase of e-waste. An internationally-adopted measuring framework that has been developed by the Partnership on Measuring ICT for Development (Baldé et al., 2015) estimates the total amount of e-waste generated in 2014 was 41.8 million metric tonnes (Mt), forecast to increase to 50 Mt in 2018. Looking at the spectrum of EEE, this e-waste was comprised of 1.0 Mt of lamps, 6.3 Mt of screens, 3.0 Mt of small IT (such as mobile phones, pocket calculators, personal computers, printers, etc.), 12.8 Mt of small equipment (such as vacuum cleaners, microwaves, toasters, electric shavers, video cameras, etc.), 11.8 Mt of large equipment (such as washing machines, clothes dryers, dishwashers, electric stoves, photovoltaic panels, etc.) and 7.0 Mt of cooling and freezing equipment (temperature exchange equipment).

Official e-waste take-back and appropriate processing legislation is organized only in a limited number of countries. Thanks to national e-waste regulation being in place in densely populated countries such as China and India, official take-back legislation covers around 4 billion people globally⁴. However, the existence of legislation does not necessarily imply successful enforcement or the existence of sufficient e-waste management systems. Most national take-back legislation does not cover all e-waste categories. In some countries, legislation exists for only one type of appliance, or the collection amount is low. Driven by these national laws, at least 6.5 Mt of e-waste was reported as formally treated by national take-back programs and schemes at the global scale (around 15.5% of e-waste generated in 2014). Besides national take-back systems, e-waste such as mobile phones, lamps and electrical toothbrushes is also disposed with mixed residual waste eventually treated together with other municipal wastes.

Regarding the collection of e-waste outside take-back systems, no harmonized data with good regional coverage exists to date. Furthermore, although a prominent issue, the transboundary movement of e-waste is not recorded by official sources. Estimates on the magnitude of transboundary movement range from 5% of total generated waste to 90%, though a recent study by INTERPOL focusing on exports from the European Union estimates it to be around 15%. In some developing countries, it is likely that all e-waste is collected outside take-back systems. In other developed countries, as much as one third of the e-waste market falls into this collection category.⁵ The impact on society and the environment of collection and recycling outside official take-back systems varies significantly as this sector is less regulated than the official take-back scenario.

Improper and illegal e-waste dumping is prevalent in most developing countries, irrespective of whether or not national e-waste legislation exists. Consumers, dismantlers and recyclers are often guilty of illegal dumping, particularly of “open dumping”, where non-functional parts and residues from dismantling and treatment operations

stakeholders, Step is actively sharing information, seeking answers and implementing solutions. See <http://www.step-initiative.org>

⁴ UNU (2015): Global E-waste Monitor - see <http://ewastemonitor.info/download/global-e-waste-monitor/>

⁵ *ibid*

such as open burning or acid baths are released into the environment. The annual supply of toxins from e-waste is comprised of 2.2 Mt of lead glass, 0.3 Mt of batteries and 4 kilo tonnes (kt) of ozone-depleting substances (CFCs).⁶ Whether the raw materials are recycled or the toxins lead to actual harmful emissions largely depends on their collection and treatment methods.

Further to the challenges at the end of the life cycle of EEE, the production of these goods is resource and energy-intensive also causing environmental impact through depletion of natural resources and climate change as a result of fossil fuel use. Research shows that the amount of fossil fuels used to produce a computer are equivalent to ca. nine times the computer's weight, while approximately half of the elements of the periodic table go into the production of a mobile phone including e.g. neodymium, terbium and dysprosium. While many of these rare earth metals are common in EEE, they are seldom found in sufficient amounts to be extracted economically.⁷ Considering that only 6.5 Mt of the 41.8 Mt of e-waste are documented and recycled with the highest available standards, the full potential of e-waste prevention, collection and treatment has not been explored. E-waste is a global challenge, not only due to EEE production being subject to global supply chains and the increasing generation of e-waste worldwide, but also because its proper treatment and prevention require the active engagement of a diverse set of actors, often spanning national borders and continents. In light of the above, the UN system also has a significant role to play in paving the pathway towards sustainable solutions for the global e-waste challenges we face.

b) E-waste and the 2030 Agenda for Sustainable Development

Outlining the 2030 Agenda for Sustainable Development, in September 2015 at the United Nations General Assembly in New York, the Sustainable Development Goals (SDGs) were adopted. 17 goals and 169 targets were set to be achieved within the next 13 years to end poverty, protect the planet, and ensure prosperity for all. Environment is embedded in each of the seventeen integrated goals, with e-waste specifically linking to a number of these targets – in particular 3.9, 8.3, 8.8, 11.6, 12.4 and 12.5. Increasing levels of e-waste globally pose challenges for the implementation of the 2030 Agenda for Sustainable Development requiring an efficient approach and coordinated action by the UN system to support countries in their efforts to manage their e-waste in a sustainable manner and to minimize the creation of e-waste.

The question of where and how UN and related entities could best contribute to supporting Member States and other stakeholders in achieving the areas in which e-waste relates to the SDGs, may still require some fine tuning. This may include establishing national laws, education and law enforcement pertaining to e-waste – and ensuring these are not simply guidelines; or, linking with governments and ministries, and establishing platforms in order to review existing national policies and e-waste management systems, to provide expertise on developing waste management schemes, preventive measures and infrastructure and sharing best practices.

In particular, targets 3.9, 8.3, 8.8, 11.6, 12.4 and 12.5 relate to the issues associated with e-waste. This relationship involves the link between deaths and illnesses, and hazardous substances across their life-cycle; decent work and

⁶ *ibid*

⁷ Kuehr & Williams (eds.) (2004): *Computers and the Environment. Understanding and Managing their Impacts.* Kluwer/Springer.

labour rights; air quality and municipal waste management; and, the reduction of waste generation through the waste hierarchy.

SDG Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination:

E-waste contains a number of hazardous components, which when dismantled and processed inappropriately, can threaten healthy lives through the contamination of water, soil and air. The design of electronic and electrical equipment should consider the absence of hazardous components, and dismantling and processing should be undertaken through environmentally sound activities. Currently, in some regions many dismantling activities are undertaken by primitive and crude means which cause damage to human health. For example, the process of open cable-burning to access copper leads to furans and dioxin emissions.

SDG Target 8.3: Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services:

In developing countries, a large percentage of e-waste collection and processing is undertaken by the informal sector – both unorganized and organized in different countries, yet always creative and sometimes even entrepreneurial. These jobs are not decent and the formalization of this sector is required in order to both, bring rights to these workers, and also to ensure the environmentally sound management (ESM) of e-waste.

SDG Target 8.8: Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment:

Formalization will first and foremost require recognition by the state, and the integration of these workers into a waste management system. By achieving this, labour rights are more likely to be protected. In some cases, worker organisation and collectivity, and social solidarity economics have led to e-waste worker groups being established. In some cases this has reduced the precariousness of employment for these workers.

SDG Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management:

Over half of the world's population lives in cities, which consumes an enormous 75% of the world's natural resources. The rapid urbanization witnessed across the globe is leading to the condensing of environmental and human health risks. The unsound management of e-waste in urban areas, such as low collection rates, disposal of e-waste through general household-bins and not by required separate collection, and the open burning and dumping, must be improved. In some cities, a move towards smart infrastructure and the use of ICTs for connecting communities and making waste collection more efficient is underway.

SDG Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment:

Currently, the e-waste management practices most common in developing countries involve open dumping or the use of other chemical processes such as acid baths to separate valuable materials in e-waste. During the production of EEE, there is little attention applied to eco-design which infers the absence of any life-cycle thinking. Hence, much EEE contains hazardous chemicals such as mercury or lead – which do not enable the durability of products. For some of these chemicals there are substitutes (alternatives) which are non-hazardous. But this does not apply for all chemicals yet.

SDG Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

By designing EEE which contains parts that are easily separable, that constitute recycled metals and that are not hazardous, it is possible to prevent waste generation at end-of-life. It is important that producers shift from planned and perceived obsolescence design and that consumers demand more durable products. In addition, recycling and reuse would be more easily achieved if producers were obliged to meet extended producer responsibility objectives. Currently, EEE is not designed with circularity in mind but instead linearity which fails to support prevention, reduction, recycling and reuse and instead supports a “throw-away society”.

c) About this Report

This report is a result of the work undertaken by the inter-agency Issue Management Group (IMG)⁸ on Tackling E-waste: Towards Eco-design and a Life-cycle Approach for E-products. The time-bound IMG was established in 2016 by the United Nations Environment Management Group (UN EMG⁹), against the background of a perceived need to strengthen collaboration among the many existing initiatives and active stakeholders in the UN system in the area of e-waste. In particular, the IMG follows-up on the SDG targets (3.9, 8.3, 8.8 11.6, 12.4 and 12.5), the Strategic Approach to International Chemicals Management (SAICM), the Basel Convention and the International Telecommunication Union’s (ITU) Connect 2020 Agenda.

The objective of the e-waste IMG has been to encourage further cooperation and synergies among UN entities, by strengthening the coordination of and promoting joint programmatic and policy initiatives in the UN system in its support to Member States in the area of e-waste and its environmentally-sound management based on a holistic life-cycle approach.

As part of its mandate, the e-waste IMG, with the support of the United Nations University (UNU), undertook a mapping exercise of prior and existing e-waste initiatives, and initiatives in the pipeline by the UN system. 23 entities were identified as active in e-waste by a desk-study prepared by the EMG Secretariat, whereby 154 e-waste initiatives in total were compiled, including sources of funding for e-waste, country programmes and projects, any collaboration and partnerships to tackle e-waste, reports, guidance, quantitative studies and inventories on e-waste

⁸ For a list of member agencies of the IMG, see [Annex XX](#).

⁹ The EMG is an interagency cooperation body on environment in the UN system that includes members from the specialized agencies, funds and programmes of the UN, the secretariats of the Multilateral Environmental Agreements, the Bretton Woods institutions and the World Trade Organization. The group is chaired by the Executive Director of UN Environment and UN Environment provides the secretariat to the group (see also www.unemg.org).

and any training and tools for e-waste practitioners. Furthermore, a survey aimed at the agencies active in the e-waste IMG was conducted to seek their views on the e-waste arena in the context of the UN system and the 2030 Sustainable Development Agenda.

This synthesis report brings together the results of the mapping exercise and the survey, shedding light on the many activities and stakeholders in the UN system in the area of e-waste from a life-cycle perspective, pointing to areas in the life-cycle process where efforts could be strengthened in the UN system and providing recommendations on how system-wide coordination and cooperation in the area of e-waste could be further strengthened.

The report is structured as follows:

Chapter 2 provides an overview of ways in which the UN system provides support to Member States covering all aspects and phases of the life cycle of electrical and electronic equipment, including the production, usage, repair, refurbishment, waste collection, dismantling, recycling and final disposal.

Chapter 3 presents examples of existing collaboration in recent and current e-waste initiatives, where UN organisations have worked together to tackle the e-waste issue, and highlights possible areas for streamlining e-waste initiatives.

Finally, chapter 4 offers an analysis of the data and information collected, a summary of the conclusions drawn based on the data, as well as a set of recommendations for how cooperation on e-waste in the UN system could further be strengthened.

CHAPTER TWO: E-waste across the United Nations System

As e-waste has entered the global agenda during the past decade and has led to substantial health and environmental problems such as those highlighted in chapter 1, its presence within the various activities undertaken across the UN system has increased considerably. This chapter begins by exploring prior, existing and proposed initiatives in place across the UN system to tackle the transnational and substantially globalising problem of e-waste. A total of 23 UN and related entities have been identified as being involved in tackling e-waste since 2002; whilst 154 notable initiatives by these entities have been recognised as corresponding to addressing wide-ranging concerns such as the environmentally-sound dismantling, recycling and disposal of e-waste, the transboundary movement of e-waste and the relationships between e-waste and, labour and human health.

1) Initial International Efforts

In response to the exponential growth in the amount of e-waste generated worldwide and international controversy over its export, recent decades have seen an escalation of used and end-of-life electronics regulations at the local, national, regional and international levels. These policies encompass provisions for the production of EEE, as well as the collection, treatment and export of discarded EEE. This section provides a brief overview of some of the key international processes relating to discarded used and end-of-life electronics.

1.1) Key International Processes and Agreements

At the international level

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)

Since 2002, the Basel Convention deals with environmentally sound management of e-waste including prevention of illegal traffic to developing countries and; capacity building for better management of e-waste worldwide. Details of the Convention are presented in the following. In 1998, Annexes VIII and IX were added to the Basel Convention by the fourth meeting of the Conference of the Parties (Decision IV/9 of COP 4), to provide further elaboration as to the wastes regulated by the Basel Convention as listed in Annexes I and III.

Montreal Protocol (1989)

The Montreal Protocol on Ozone Depleting Substances is an international treaty, came into force in 1989, aims to protect the ozone layer by phasing out the production and use of ozone depleting substances (ODS). ODS, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbon (HCFCs) as refrigerants are used in some refrigerators and air conditioners. The waste refrigerator and air conditioners will probably contain CFCs or HCFCs.

International Labour Organisation Convention on Chemicals 1990 - *Convention concerning safety in the use of chemicals at work*

Convention (No. 170) stresses the right of workers to information about the chemicals they use at work and imposes responsibility on suppliers and employers to provide information and training; whilst Recommendation (No. 177) sets standards for classification, labelling and marking, and chemical safety data sheets, and includes steps for employers to include measures such as monitoring of exposure, operational control, medical surveillance, first aid and emergencies preparedness, and close cooperation between workers and employers.

OECD Waste Agreement (1992)

An agreement among developed member countries that aims to control the transboundary movement of hazardous waste – wastes exported only for the purpose of material recovery. The Agreement established a framework for OECD member countries to supervise and control the transboundary movement of wastes within the OECD area.

United Nations Framework Convention on Climate Change (UNFCCC) (1994)

As part of the e-waste from toxic to green initiative, waste pickers in India are trained to collect electronic waste, such as computers and mobile phones, for safe disposal and recycling. By recycling raw materials from discarded electronics, natural resources are conserved and air and water pollution caused by hazardous disposal is avoided.. The initiative makes the waste pickers more resilient to poverty by providing green jobs that increase their incomes and protect them from the risks of exposure to toxins and heavy metals.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998)

Promotes shared responsibilities in relation to the importation of hazardous chemicals. The convention promotes open exchange of information and calls on exporters of hazardous chemicals to use proper labelling, include directions on safe handling, and inform purchasers of any known restrictions or bans.

Stockholm Convention on Persistent Organic Pollutants (2001)

The Stockholm Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment. There are a number of Persistent Organic Pollutants (POPs), in particular certain types of brominated flame-retardants (PBDEs), perfluorooctane sulfonate (PFOS) which are of concern in relation to EEE. The listing of e-waste therefore requires parties of the Stockholm Convention to take appropriate measures to eliminate releases of POP-PBDE from stockpiles and wastes.

The Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic Waste (2006)

The Declaration and decision IX/6 was adopted by the 9th meeting of the Conference of the Parties (COP9), and gave a mandate to the Basel Secretariat to implement a Work Plan for the environmentally sound management of e-waste. The e-waste Work Plan adopted by COP9 included activities in the following work areas: programmes of activities for the environmentally sound management of e-waste in Africa, in Asia Pacific and in South America; the Partnership for Action on Computing Equipment (PACE); and, the preparation of Technical Guidelines on transboundary movement of e-waste, in particular regarding the distinction between waste and non-waste.

International Conference on Chemicals Management (ICCM 1,2,3,4) (2006 – present)

A platform upon which to discuss and review progress in the implementation of SAICM since its adoption in 2006.

World Health Assembly Resolutions (2006 – 2016)

In 2006, Resolution WHA59.15 on the Strategic Approach to International Chemicals Management was agreed; in 2010 Resolution WHA63.25 on the improvement of health through safe and environmentally sound waste management was agreed; in 2014, Resolution WHA67.11 on public health impacts of exposure to mercury and mercury compounds was agreed; and, in at the 2016 World Health Assembly, the resolution on the role of the health sector on toxic chemicals and wastes was agreed.

Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes (2011)

The Declaration was adopted in October 2011 by the COP 10 to the Basel Convention t declared, among other things, to enhance the active promotion and implementation of more efficient strategies to achieve prevention and minimization of the generation of hazardous waste and other wastes and their disposal; to promote measures to achieve prevention and minimization of hazardous wastes and other wastes generated at source, and to; encourage

efforts undertaken at national level to measure and record progress in waste reduction, and to report such progress to the Basel Convention Secretariat.

Minamata Convention on Mercury (2013)

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury. The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil and water from a variety of sources. Controlling the anthropogenic releases of mercury throughout its lifecycle has been a key factor in shaping the obligations under the Convention.

At the regional level

Waigani Convention (South Pacific) (1995)

A treaty that bans the exporting of hazardous or radioactive waste to Pacific Islands Forum countries, and prohibits Forum island countries from importing such waste.

The Durban Declaration (Africa) (2008)

The Declaration called for an African regional platform/forum on e-waste alongside international bodies. The requirements of the Declaration are as follows: countries must review existing legislation, improve their compliance with legislation and amend existing legislation regarding e-waste management.

The Libreville Declaration (Africa) (2008)

The Declaration recognised that there is a need to further research the vulnerability of humans to environmental risk factors, and to establish policies to increase this understanding. Risk factors for poor health can arise from e-waste.

Bamako Convention on the ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (Africa) (1991)

Is a treaty of African nations prohibiting the import of any hazardous (including radioactive) waste. The Bamako Convention uses a format and language similar to that of the Basel Convention, but is much stronger in prohibiting all imports of hazardous waste. UN Environment undertakes the Convention Secretariat duties.

The Aarhus Convention (EU) (2001)

The Convention contains the Aarhus Protocol on Heavy Metals, which was one of the eight Protocols designed to address air quality issues within the EU.

The Waste Electrical and Electronic Equipment Directive (WEEE) (EU) (2003)

The Directive provides for the creation of collection schemes where consumers return their WEEE free of charge. These schemes aim to increase the recycling of WEEE and/or reuse.

The Restricting of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (EU) (2002)

The Directive restricts the use of six hazardous materials in the manufacture of various types of electrical and electronic equipment.

Regulation (EC) No 1013/2006 of the European Parliament and of the Council on shipments of waste (2006 (2016))

The Regulation pays attention to promoting safe waste shipments within the EU and with non-EU countries, setting up the enforcement of waste shipment regulation. The Regulation has recently been updated in line with further measures foreseen by the EC in its Circular Economy Action Plan to help ensure that the waste shipment regulation is properly implemented and that illegal shipments causing raw materials leakage are addressed effectively.

2) UN and Related Entities Active in E-waste Management

This section presents brief summaries of the entities mainly active in the area of e-waste. Based on the focus of their initiatives and replies to the survey, entities have been grouped within broad thematic categories as summarized in *Figure 1*. The categories below indicate the main thematic areas in which entities are active, and where their initiatives are most likely to interact with e-waste. Due to the diverse and crosscutting nature of entities' mandates and roles, a substantial number of initiatives will inevitably interact with more than one of the thematic areas below; for example, aspects of e-waste initiatives undertaken by one entity for example may well interact with areas other than the environment, including also health and sanitation, and legal aspects etc. Hence, it should be noted that some entities may be active under other categories, and that *Figure 1* simply aims to provide a general overview.

2.1) *Figure 1*. UN and related entities active in e-waste management by sector

Environment, Energy and Transport	Health and Sanitation	Agriculture and Labour	Development	Training, Research and Culture	Convention Secretariats and UN Coordination/Operations	Legal	Funding Mechanisms
IMO	WHO	FAO	UNDP	UNITAR	GPWM	INTERPOL	GEF
UN ESCAP	UNICEF	ILO	UNCTAD	UNU	DFS	WIPO	
UN Environment			WORLD BANK	UNESCO	BRS Secretariat		
			OECD		SAICM		
			UNIDO				
			ITU				

Although not currently a member of the IMG, nor part of the United Nations system, OECD has been included in *figure 1* due to their substantial involvement in e-waste activities, and similar presence at the international level. Whilst at the same time, also not being part of the UN system but being a member of the IMG, INTERPOL has been included due to its presence and interest in the e-waste arena.

2.2) UN and related entities' expertise and involvement in e-waste

1) International Maritime Organisation (IMO)

The IMO has developed Guidelines for the Development of the Inventory of Hazardous Materials (MEPC.269(68)) which provide recommendations for developing and inventory of hazardous materials to assist compliance with regulation 5 of the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships (2009). The objective of the Inventory is to provide ship-specific information on the actual hazardous materials present on board, in order to protect health and safety and to prevent environmental pollution at ship recycling facilities. The IMO can provide expertise related to the generation of e-waste on board maritime vessels, in the context of Annex V of the International Convention for the Prevention from Ships, and the 2009 Hong Kong International Convention.

2) United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

In 2016, an Informal Roundtable discussion was held by UNESCAP, with the aim for governments to hold initial discussions and share suggestions on developing and enhancing regulatory frameworks to tackle e-waste. Businesses were invited to share good practices in minimizing e-waste along the supply chain. Discussions were held on the main elements of a roadmap or guide on regional cooperation and national actions to enhance the adoption of Responsible Business Conduct (RBC) principles in the consumer electronics industry in general, and to improve cost-effectiveness through minimizing e-waste in particular. UNESCAP can provide expertise to overcome some of the region's greatest challenges by providing results-oriented projects, technical assistance and capacity building to Member States in areas including: sustainable development, transport and environment and development etc.

3) UN Environment

UN Environment plays both a normative and operational role in tackling the various life-cycle stages of EEE. These should be applied to the global, regional and national levels. Through these approaches, UN Environment can link the UN system to national government by providing advisory and technical assistance directly to the country level. UN Environment aims to soon publish a study 'The Long View - Exploring product lifetime extension', which provides recommendations on the opportunities available to consumers, private sector and government, of developed and developing economies, to address product lifetime extension – including EEE. Through product lifetime extension, the rate at which we use up (natural) resources and produce waste can be radically reduced, while at the same time the economic value, such as precious Earth metals in EEE, embedded in our products is preserved as much as possible. UN Environment offers expertise and knowledge related to life-cycle thinking and assessment, consumer information, sustainable life styles, value chain management, and eco-design and innovation regarding many products including EEE. Interventions include looking into the consumption patterns of EEE products to reduce excessive consumption (such as product lifespan, eco-labels), investigate strategies on how to minimize waste generation from source, through eco-design and eco-innovation etc.

IETC, in cooperation with partners, promotes Environmental Sound Technologies (ESTs) to manage waste in an environmentally sound way to minimization of significant adverse effects on human health and the environment. IETC can provide expertise on e-waste management based on the e-waste guidelines which have been developed by

IETC in the past – in particular the 3 E-waste Manuals. The IETC is in a position to link across the system by providing support for downstream e-waste activities, including on the technological practices of solid waste management (notably final disposal). E-waste management should become part of an 'integrated'/waste management structure. During 2017, IETC aims to develop a Study on E-waste Management in ASEAN Countries, with the objective of the study to analyse the current trends, management and gaps for E-waste and to drive recommendations for an ASEAN-wide strategy to improve e-waste management based on good practices, policies and technologies. 2017 Guidelines on the E-waste Management Technologies are also being developed by IETC based on the available techniques and technologies for E-waste management including collection, storage, and primary and secondary dismantling for resource recovery and proper disposal of E-waste.

4) World Health Organisation (WHO)

WHO has been involved in e-waste through involvement in initiatives in Latin America and with UNU, focussing on e-waste and its health impacts on e-waste. Alongside this area, WHO can offer expertise in the reduction of the impacts on health of vulnerable population of e-waste informal recyclers. From a health point of view, WHO focusses their work on working with health actors at global and local levels, to inform, monitor, build capacities and promote e-waste issues as an important factor of health conditions.

5) United Nations Children's Fund (UNICEF)

Currently, UNICEF focusses on e-waste issues internally through its life-cycle analysis of selected office assets, equipment and supplies. As part of its action plan to improve the eco-efficiency and environmental impact of its operations, UNICEF is planning to analyse the lifecycle of office assets (mainly cars) and office EEE to help identify the waste streams that have the greatest negative impact on children, and therefore identify priority areas for action. UNICEF has expertise to identify e-waste disposal sites which involve child labour and that affect the health of children, by supporting the drafting of policies to tackle the issue.

6) Food and Agriculture Organisation (FAO)

FAO offers expertise with regards to the use of EEE in agricultural production. Increasingly, FAO and its partners are deploying a wide range of EEE (e.g. mobile devices, drones, smart agricultural equipment and sensors etc.), in order to overcome pressing challenges in agriculture. Consequently, FAO ensures consideration for the sustainability of projects and software used, which is already becoming an important criterion for donors when deciding funding; for example, from the perspective of project life-cycle and software life-cycle. However, similar to DFS the mobile and field nature of their activities brings fresh challenges for internal e-waste management. After end-of-use in the field, there is little or no control regarding the disposal of e-waste. When FAO country offices sell used EEE to third parties, they give guidelines on its use and disposal.

7) International Labour Organization (ILO)

Since 2012, the ILO has undertaken a series of studies and produced a selection of corresponding reports exposing the interactions between labour and e-waste. These include: The Global Impact of E-waste: Addressing the Challenge

(2012); a 2013 joint study between the ILO and UN Environment focussing on the potential number of Green Jobs in waste management of PET, E-waste and cooking oils; a 2014 report on Tackling Informality in E-waste Management and a 2015 report on The Labour, Human Health and Environmental Dimensions of E-waste Management in China. ILO can provide expertise with regards to the interaction between e-waste and employment, including but not limited to the following areas: promoting youth employment, promoting transition to a formal economy, promoting health and safety at work, eradicating forced and child labour, promoting skills, social security and wage policies, promoting equality, promoting freedom of association and collective bargaining, and green jobs.

ILO's four strategic objectives pertain significantly to the end-of-life treatment stage, including treatment and recycling operations – specifically, as the ILO has undertaken research in these fields. ILO Conventions and Recommendations have aimed at tackling occupational health and safety in these domains, more specifically hazardous work in e-waste; and can link to the e-waste projects and programmes undertaken across the UN system. From a general perspective, ILO Recommendations can be used to formalise the recycling industry – in particular through '*Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204)*'.

8) United Nations Development Programme (UNDP)

UNDP supports countries in strengthening their e-waste management capabilities through research, innovation, institutional and regulatory means and can provide expertise with regards to end-of-life-treatment and final disposal activities. Because UNDP has local offices in most countries and is usually involved on import/export operations; it could provide reliable information and advice on these issues. Among other e-waste related initiatives, UNDP is currently involved in reducing unintentional persistent organic pollutants (UPOPs) and mercury releases from e-waste treatment, among other waste types, in Columbia. In addition, UNDP and Baidu launched the Baidu Recycle App in China, which connects individuals disposing of e-waste with dismantling and recycling companies; a result of the UNDP Asia-Pacific Innovation Fund. This strategic alliance aims to scale up *Baidu Recycle* by attracting key stakeholders in recycling and dismantling, as well as electronic manufacturers to build an internet-based nationwide e-waste management eco-system.

9) United Nations Conference on Trade and Development (UNCTAD)

Through its 2006 Trade and Environment Review: environmental requirements and market access for developing countries, UNCTAD reviewed recent developments in regulatory and other policy instruments in the EU, Japan and Switzerland, concerning e-waste in major markets and their implications for producers in developing countries. UNCTAD can provide expertise in supporting developing countries to access the benefits of a globalized economy more fairly and effectively, and helps equip them to deal with the potential drawbacks of greater economic integration.

10) The World Bank

Since 2010, The World Bank has been involved in e-waste through the Implementation of an Electronic Waste Pilot Project in Egypt and the development of a re-manufacturing site in Ethiopia. The World Bank, in cooperation with the Egyptian Ministry of Communications and Information Technology (MCIT), is working on creating a road map for

the implementation of an e-waste pilot project, including: economic incentives, collection strategy and the involvement of private sector and NGOs in e-waste management. Other e-waste initiatives have involved projects to tackle PCBs, including the PCB Management Project in Lebanon (2010-2015) and the PCB Management and Disposal Project in Nigeria (2010-2015).

11) Organisation for Economic Cooperation and Development (OECD)

Since 2007, OECD has been involved in, and can provide expertise on, waste and e-waste through various guidance, publications and policy fora – in the areas of extended producer responsibility and sustainable materials management. In addition, the 1992 OECD Waste Agreement among developed member states aims to control transboundary movement of hazardous waste, and establishes a framework for OECD member states to supervise and control transboundary movement of waste with the OECD area.

12) United Nations Industrial Development Organisation (UNIDO)

Since 2008, UNIDO, in line with its mandate to promote inclusive and sustainable industrial development, has been helping developing countries and countries with economies in transition to sustainably manage e-waste. It does so by advising governments on legal frameworks and identifying financing options to sustain the recycling system, taking all stages of the e-waste recycling chain into account – from collection to dismantling, recycling and final disposal. Through the Focal Area on e-waste management, UNIDO/GPWM are undertaking initiatives at the regional level (with priority areas in Africa- Tanzania, Ethiopia, Uganda and Indonesia) to establish solutions which involve local operators.

UNIDO can provide expertise on the support provided to sustainable recycling industries in developing countries and countries with economies in transition. Its mandate on the greening of industry is fully aligned with SDG-9. UNIDO is well placed to partner with governments, the business community and consumer associations; and could also provide expertise to Member States in environmental management, including on the implementation of MEAs. This helps upscale national e-waste management capacities with focus on POPs-contaminated fractions.

13) International Telecommunication Union (ITU)

By developing standards, raising awareness and collaborating with the ICT industry, ITU is committed to tackling the growing problems associated with e-waste. It promotes innovative ICT solutions in the domain of e-waste, and develops green ICT standards to reduce their negative impact. ITU develops reports, toolkits and educational material to raise awareness on e-waste among its member states, sector members and academia on e-waste. It also provides direct assistance in planning and implementation of e-waste management techniques. The underpinning of ITU's work falls under the ITU Connect 2020: A Global Framework for Action in the ICT sector, which includes Target (sustainability) 3.2 calling for the reduction of the volume of redundant e-waste by 50% by the year 2020.

Study Group 5 of the ITU Telecommunication Standardization Sector approved 9 new recommendations on green ICT standards and published 17 reports covering areas such as *e-waste*, sustainable ICTs and end-of-life management for ICT equipment. ITU has also been involved in various partnerships, fora and the publication of reports including:

the 2014 Partnership on Measuring ICT for Development; co-organisation of the 2003 and 2005 World Information Summit on the Information Society; and a joint study on the Sustainable Management of E-waste in Latin America. Recently, ITU launched "United for Smart Sustainable Cities" (U4SSC) in response to SDG 11.

14) United Nations Institute for Training and Research (UNITAR)

UNITAR has recently been involved in a Minamata Initial Assessment (MIA) and National Action Plan Development on Sound Mercury Management relating to e-waste, with the overall objective to support Sierra Leone with the ratification and early implementation of the Minamata Convention. Under the MIA project, the national mercury profile will be developed. The MIA profile will form the basis for the future measures and policy interventions required by Sierra Leone to implement the Convention. UNITAR can provide expertise in supporting the following: training, guidance development, legislation, licensing procedures and awareness creation around e-waste topics.

15) United Nations University (UNU)

UNU leads the Task Group on Measuring E-waste that develops guidelines on e-waste classification, reporting and indicators to assist the Partnership on Measuring ICT for Development. The StEP initiative is also coordinated by UNU. UNU started its work on e-waste in 2000 as part of its activities on strategic approaches towards sustainable development. UNU has since conducted a range of e-waste projects including country studies on quantifying and qualifying the e-waste challenge in e.g. the Netherlands, France, Belgium, Italy, Romania, the first Global E-waste Monitor and Regional E-waste Monitors for Latin America, East and Southeast Asia, the E-waste Academies with editions for young scientists (EWAS) and managers/policy makers (EWAM), studies on illegal e-waste shipments and projects on resource aspects associated with the production, usage and final disposal of electrical and electronic equipment. Moreover, UNU has advised several governments and the European Commission in developing e-waste policies. There are 4 areas of expertise in which UNU e-waste initiatives are present: "*quantification*", "*routes, flows and technologies*", "*policy and dialogue*" and "*capacity building*". In 2015 UNU also approached UN Environment, ITU and UNIDO suggesting the development of a UN-wide e-waste coordination body through something like "UN-E-waste".

16) United Nations Educational, Scientific and Cultural Organisation (UNESCO)

Since 2008, UNESCO has been involved in a number of e-waste related initiatives, including the first volume of The Entrepreneur's Guide to Computer Recycling in 2008. The aim here was to provide basics for starting up a computer recycling business in emerging markets. In 2012, a Guide to Help Pacific Reporters Produce News Items on E-waste was produced by the Secretariat of the Pacific Regional Environment Programme (SPREP) with UNESCO support. This initiative was prepared through numerous discussions with Pacific news reporters in order to meet their needs, to benefit Pacific media as well as wider community. In 2016, UNESCO collaborated with ITU and other UN agencies, developing a report on Sustainable Management of WEEE in the following Latin American countries: Argentina, Brazil, Bolivia, Chile, Columbia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. UNESCO can provide expertise in creating conditions for dialogue among civilizations, cultures and peoples, based upon respect for commonly shared values.

17) Global Partnership on Waste Management (GPWM)

E-waste management is a focal area of the GPWM, which was originally coordinated by UNIDO and now by ITU. Through its focal area on e-waste, GPWM can provide expertise on mainstreaming and disseminating environmentally sound management of e-waste in developing countries. The work plan for the focal area on e-waste proposes to develop sustainable business plans which will include an effective take-back system, a manual dismantling facility, local pre-processing activities and sound end-processing activities.

18) Department of Field Support – United Nations Peace Keeping (DFS)

Although DFS is not directly involved in e-waste initiatives outside of the organisation, as part of its mandate they have recognised particular aspects which may lead to higher volumes of e-waste being produced by the organisation's activities. DFS uses large amounts of electronic equipment, whilst in the regions where DFS operates and based on its significantly mobile nature, considerable challenges exist for e-waste management. For example, most governments where peace keeping operations are established, do not have environmental regulations for e-waste nor do they have proper means to manage, dispose and recycle it.

19) Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (SBC)

In 2002 the Basel Convention started to address e-waste issues – including: *Environmentally sound management, Prevention of illegal traffic to developing countries, Building capacity around the globe to better manage e-waste; and Partnerships*. The Secretariat can provide expertise developed through the MPPI and PACE initiatives, which respectively cover guidance and guidelines on the ESM of used and end-of-life mobile phones, the collection and refurbishment of mobile phones etc.; and ESM of used and end-of-life computing equipment, the testing, the refurbishment and the repair of used computing etc. Transportation and final disposal are the broad scope and objective of the Convention. The e-waste work plan adopted by COP9 in 2008, included activities in the following work areas: programmes of activities for the environmentally-sound management of e-waste in Africa, in Asia Pacific and in South America; PACE and the preparation of Technical Guidelines (interim) on transboundary movements of e-waste, in particular regarding the distinction between waste and non-waste.

20) Strategic Approach to International Chemicals Management (SAICM)

SAICM's overall objective is the achievement of the sound management of chemicals throughout their life cycle so that by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health. The SAICM Secretariat provides backing to the e-waste-related work on Hazardous Substances within the Life Cycle of Electrical and Electronic Products (HSLEEP), which facilitates the expertise of UNIDO, the Basel, Rotterdam and Stockholm Conventions and UN Environment IETC in leading activities on tackling the presence of hazardous substances throughout the life-cycle of EEE.

21) INTERPOL

INTERPOL, through the Countering WEEE Illegal Trade (CWIT) Project, examined the movement of e-waste within and out of Europe – with the aim of providing a set of recommendations to support the European Commission, law enforcement authorities and customs organisations for countering the illegal trade of e-waste in and out of Europe. This was a multi-disciplinary consortium funded by the European Commission, carried out in partnership alongside organisations including UNU, WEEE Forum and INTERPOL. Based on its experience in the illegal movement of e-waste, INTERPOL can provide expertise in countering the illegal trade, possession, transportation and handling of e-waste and its pollution of the environment.

22) World Intellectual Property Organisation (WIPO)

WIPO has been involved in e-waste through the publication of its Patent Landscape Report on E-waste Recycling Technologies in 2013, undertaken in cooperation with the Basel Convention. Related to initiatives such as the Patent Landscape Report, WIPO can provide expertise and knowledge on areas relevant to patenting and innovation on specific technologies in various domains – including on e-waste.

23) Global Environment Facility (GEF)

GEF is a partnership for international cooperation where 183 countries work together with international institutions, civil society organizations and the private sector, to address global environmental issues. It has provided funding for a number of projects relating to e-waste – the majority of which have come through its 4th, 5th and 6th replenishment phases between (2006-2018).

3) UN system support for Member States on tackling the e-waste problem

This sub-section addresses the views of survey respondents on the support which the UN system could provide to Member States in their efforts to tackle the global problem of e-waste. According to responses, suggestions have been assigned to nine topical areas.

Pay more attention to specific LIFE-CYCLE STAGES by...

“Addressing design and production (before-end), equally as much as addressing end-of-life treatment and final disposal (after-end); developing and setting a coordination mechanism among organizations and their partners to ensure at least one UN agency takes ownership for each stage of the EEE life-cycle and appoint a lead agency to coordinate the global efforts regarding that particular stage, and; researching the health, environmental and socio-economic aspects arising throughout the life-cycle of EEE.”

Develop PUBLIC-PRIVATE PARTNERSHIPS by...

“Enhancing collaboration with suppliers, producers, distributors and treatment facilities into the work of the UN system; furthering engagement with the private sector and encouraging them to contribute resources (technical expertise and financial) to support e-waste management and national levels through PPPs”.

Increase COMMUNICATION WITH CONSUMERS by...

“Establishing a platform with EEE producers to provide consumers' feedback/advice on current and future practices; developing guidance on the marketing of the use of EEE to the consumer, and; overseeing the consumption pattern related to the use of EEE and generation of WEEE to help address the problem more efficiently”.

Mobilise FUNDING RESOURCES by...

“Mobilising resources through existing environmental funding agencies such as GEF to support eligible developing countries establish structures and mechanisms for the sound management of e-waste at national level”

Develop and improve NATIONAL LEGISLATION by...

“Promoting issues of e-waste management globally including facilitating the development of enabling legislation at national levels; working with governments/ministries to push for sustainable end-of-life and final disposal policies (e.g. the extended producer responsibility principle of the EU Directive, take-back schemes etc.) and necessary infrastructure”.

Strengthen STANDARDISATION AND COMPANY OBLIGATIONS by...

“Identifying trusted and certified companies worldwide, capable of performing environmentally-sound management of e-waste; supporting the development of clean supply chains, which are auditable, measurable and traceable; providing support in the development of Extended Producer Responsibility (developed and developing countries); establishing uniformity across various existing guidelines and standards in the domain of EEE and WEEE”.

Develop further TECHNICAL GUIDANCE by...

“Considering refurbishment and repair, risk prevention and minimisation, environmentally-sound management, preparation of materials for reuse, recycling or disposal, record keeping and measuring performance, and green procurement for public/private institutions”.

Increase QUANTIFICATION AND DATA work by...

“Identifying the severity and scale of the global e-waste problem by tracking the quantity of generated WEEE annually across a given space. This will help understand where intervention is required along the life-cycle”.

Coordinate and maintain KNOWLEDGE AND EVIDENCE by...

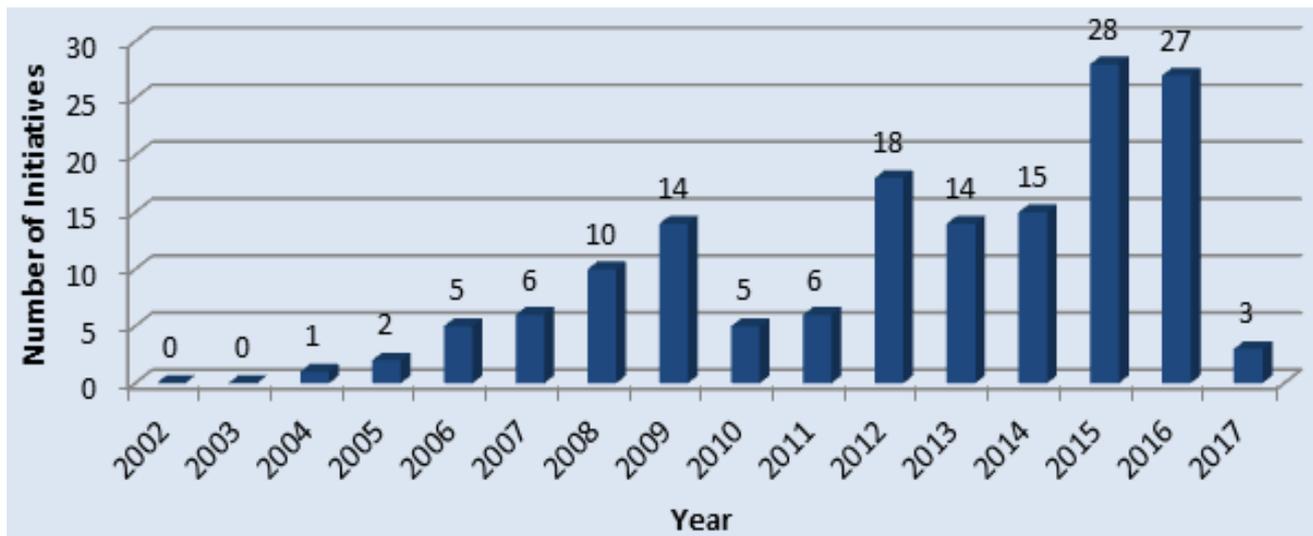
“Advocating priority at the international level for sustainable consumption and production patterns; pooling existing information on various UN and related entities who are addressing in one way or another each step of the EEE life cycle, and harmonizing these key efforts”.

4) The number and characteristics of UN and related entities' e-waste initiatives

4.1) E-waste initiatives by UN and related entities overtime

Based on mapping responses, data suggest that there has been a steady increase in the attention paid to e-waste by the UN system since 2004 – with a short period of decline during 2010 and 2011. However, from 2012 to the present day, the number of e-waste initiatives has continued to grow with reasonable strength. *Figure 2* below presents an overview of the 154 identified UN initiatives, divided across a period of fifteen years from 2002-2017. Each date provided represents the date in which an e-waste initiative started.

Figure 2. E-waste initiatives across the UN by date

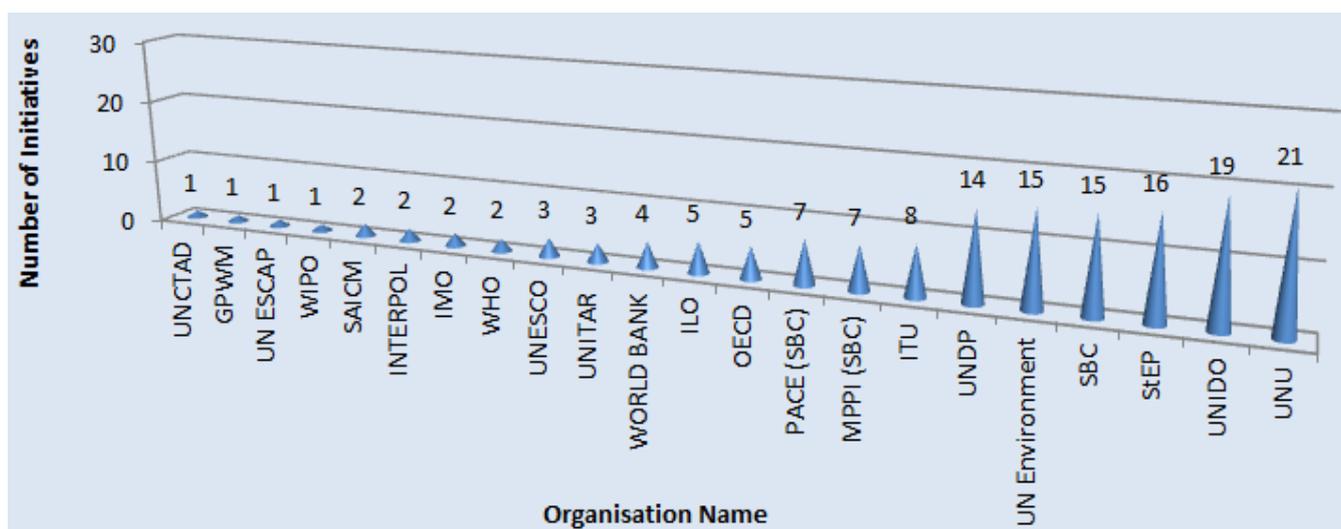


As the findings are presented throughout this report, any presentation of the data will include initiatives which were undertaken or in the pipeline between 2004 and 2016 – as indicated in *figure 2* above. With this timescale embodied throughout the report, prior, existing and potential e-waste initiatives are thus included in the presentation of all findings. By including past and completed initiatives throughout this report ensures that notable and prominent practices and experiences undertaken by UN and related entities become part of this mapping and learning process with regards to e-waste.

4.2) The number of e-waste initiatives

In *figure 3* below, the number of initiatives are provided, by UN and related entities, as recognised as active in tackling e-waste. Those most active include UNU and the UNU-led StEP Initiative, the Secretariat of the Basel Convention (SBC), ITU, and the Global Environment Facility (GEF) implementing agencies comprising UNIDO, UNDP and UN Environment. DFS and FAO are left absent from this section and *figure 3* due to their initiatives focussing on internal, corporate e-waste management rather than providing direct support to Member States on e-waste matters. GEF has also been left absent, as it is involved in funding e-waste initiatives rather than in their implementation.

Figure 3. Number of initiatives implemented by UN and related entities

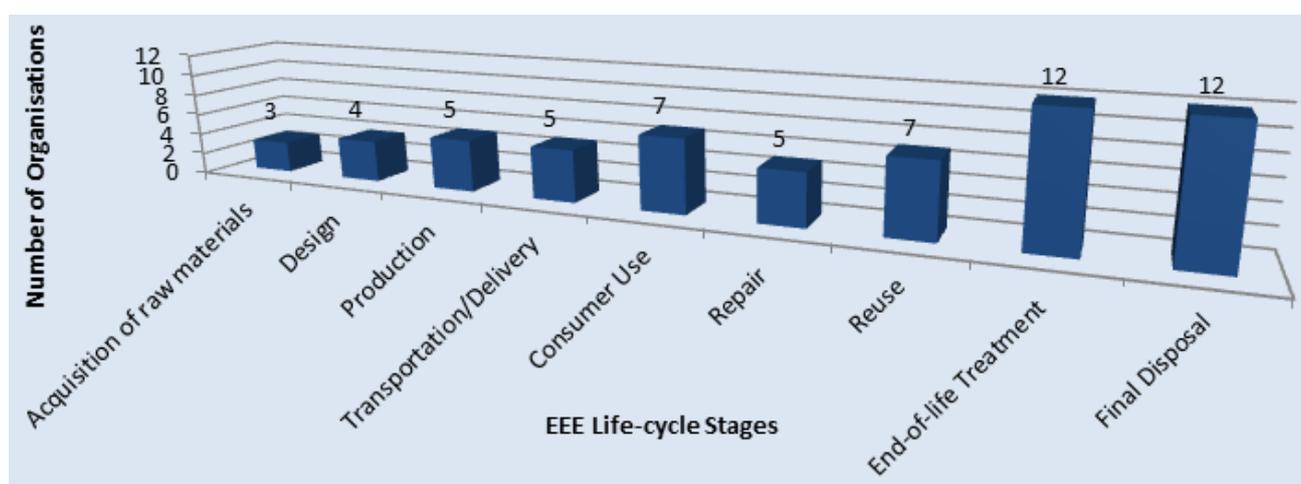


E-waste initiatives across the UN constitute an array of characteristics including various types and focus. Predominately, initiatives concentrate on addressing or directly tackling the environmentally-sound management of e-waste (such as the PACE Guidelines on Environmentally Sound Management of Used and End-of-life Computing Equipment), whilst only a small number address issues such as extended producer responsibility or the materials used in – and the design – of EEE (for example the OECD Guidance on Extended Producer Responsibility – Guidance for Efficient Waste Management). With regards to the type of initiatives found across the UN system, the three most common types include the development of guidelines and manuals, country or regional projects or studies and reports; an example being Guidelines on E-waste Management Technologies currently under development by IETC.

4.3) The characteristics of e-waste initiatives

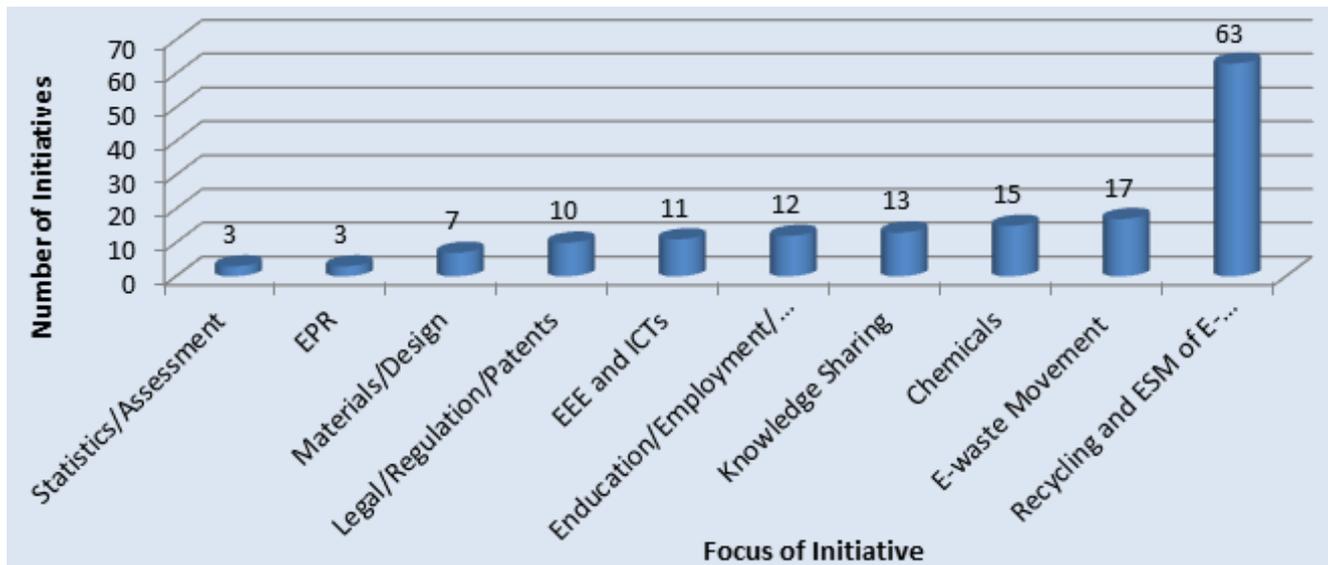
To gain a better understanding of the involvement at different stages of the EEE life-cycle, UN and related entities were asked to select the life-cycle stages of EEE which apply to the work of their organisation in tackling e-waste. Those responding to the survey (see *Figure 4*) suggested substantially more interest in the later stages of the life-cycle, especially including end-of-life treatment such as recycling, and final disposal of e-waste. At the same time there is less attention paid to stages at the beginning of the life-cycle, such as those involving the acquisition of raw materials and the design of EEE, which chiefly arise before the production stage.

Figure 4. E-waste initiatives by life-cycle stage



The distribution of initiatives across the life-cycle of EEE, as identified in *figure 4*, are reflected also in *figure 5* below which is based on findings from the preliminary mapping exercise; both graphs suggest a shift towards the end life-cycle stages. In *figure 5* there are a significant number of UN system e-waste initiatives on the facilitation of environmentally-sound management techniques for e-waste (i.e. end-of-life treatment and final disposal), of which 63 have been identified. However, a significantly lower number of e-waste initiatives in the area of product materials and design have been identified.

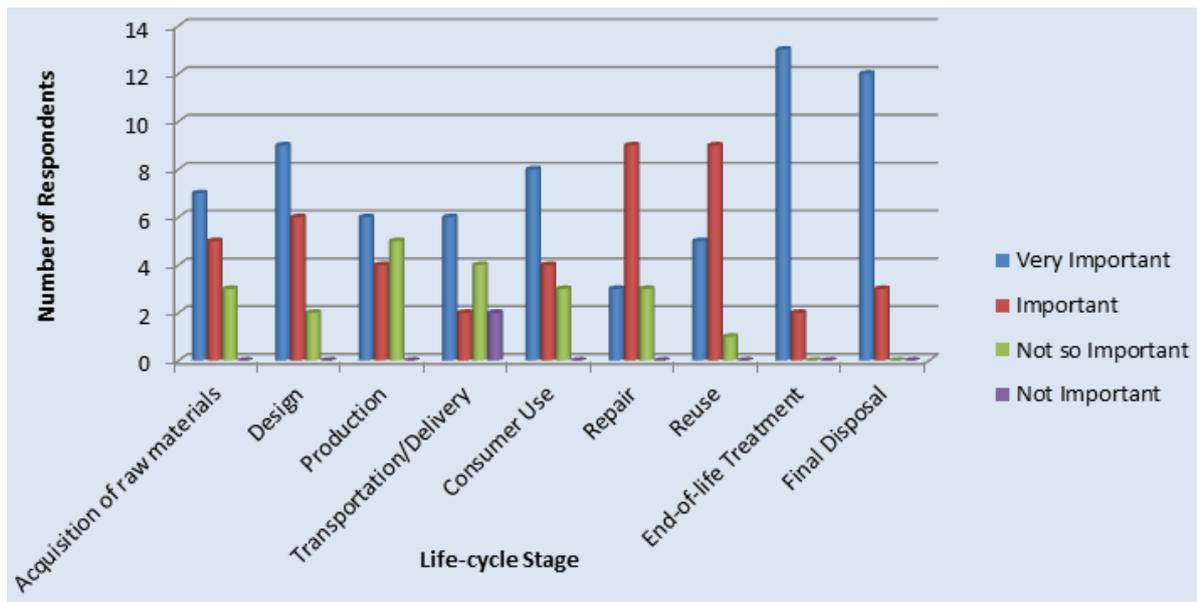
Figure 5. Number and focus of UN system-wide e-waste initiatives



There is a substantial focus on the environmentally-sound management (Recycling and ESM of E-waste), with much of the UN system involved in this domain, whilst there is less attention paid to developing statistical analysis and assessment of country e-waste flows and characteristics. UNU has undertaken a number of detailed country studies to quantify the e-waste issue, such as regional monitors in Europe, North America, Latin America and East and Southeast Asia plus a Global E-waste Monitor. Similarly, focus by the UN system on issues such as extended producer responsibility (EPR) and the design and materials used in EEE, is relatively limited in comparison to recycling and ESM of e-waste. Perhaps the nature of the UN system, its traditions and mandate encourage UN entities to tackle e-waste problems which have closer ties to poverty alleviation and development, rather than issues associated with production and design, and the business models of large EEE manufacturers. Thus, these approaches may lead to significantly more attention being delivered towards developing local and national strategies, waste management systems and environmentally-sound e-waste recycling technologies in developing countries.

In order to gain a better understanding of the general view of those involved in e-waste across the UN system, survey respondents were presented with 9 stages of the life-cycle of EEE and were asked to select what level of importance they believe should be allocated across the UN system to each of these. The term importance refers to the general belief that more effort should be placed on a particular life-cycle stage by the UN system. Most respondents noted that end-of-life treatment and final disposal are the most important – whilst in comparison, fewer respondents believe it is very important to address the repair and reuse of EEE, implying that addressing the earlier stages is not as important as the end of life-cycle stages.

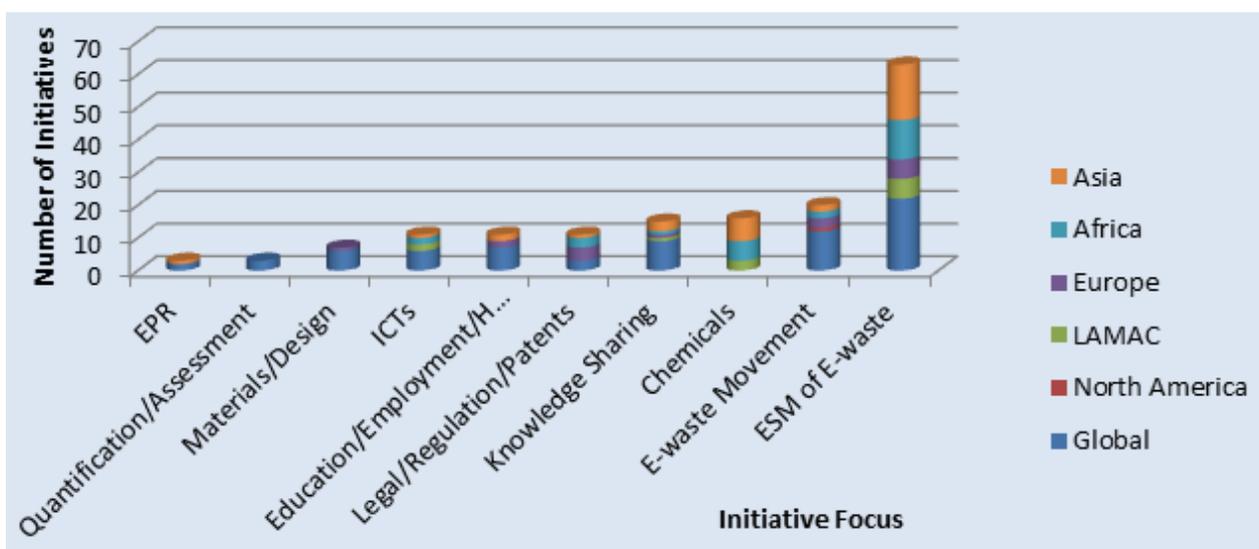
Figure 6. Level of importance by life-cycle stage of EEE



By building on the observations above, *figure 7* below provides an overview of the focus of initiatives broken down by region of the world, and their frequency globally. Initiatives with the aim of facilitating the environmentally-sound management (ESM) of e-waste are predominately undertaken at a regional level in Asia and Africa.

There is also significant attention towards ESM at the global level, through initiatives such as guidelines and manuals. Initiatives with the aim of tackling the movement of e-waste mostly occur at a global level, whilst many chemicals-focused initiatives are carried out in African countries. Europe sees slightly more attention paid towards materials and design, legal, regulation and patenting, and e-waste movement over other focal areas. This could be a consequence of the design and production of EEE, and the legislative and regulatory systems for e-waste being present in more economically developed European countries – in comparison to developing countries worldwide.

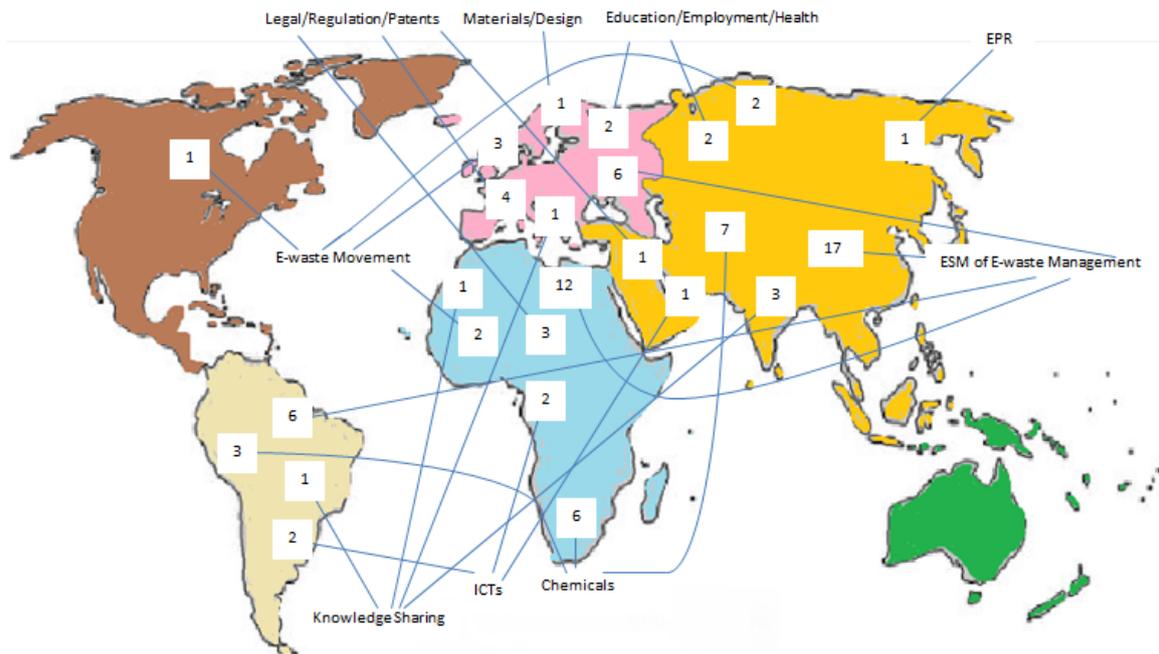
Figure 7. Focus of e-waste initiatives by region



The information provided in *figure 7* has been presented in a more visually in *figure 8* below, showing the frequency of each category according to the focus of e-waste initiatives by region. For example, for those focussing on the

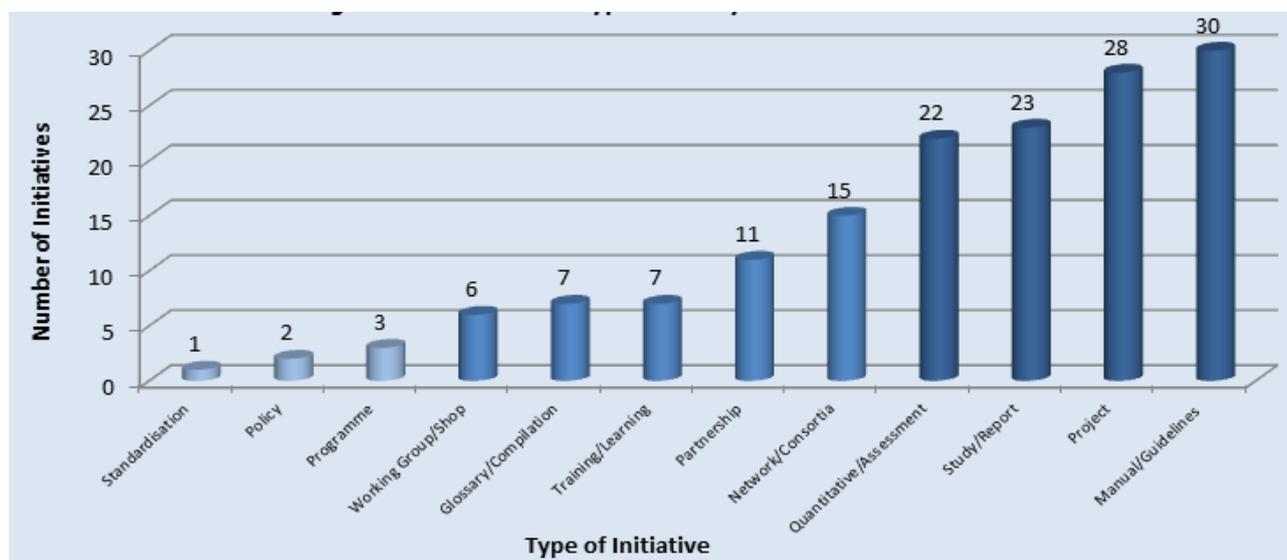
environmentally-sound management of e-waste, in Asia there have been 17 notable initiatives; whilst in Africa there have been 12. Only regional initiatives are included below; regions being depicted by different coloured segments.

Figure 8. Regional spread of e-waste initiatives by focus



Whilst the ‘focus’ of e-waste initiatives in *figure 5* previously, is defined by the overall issue in which initiatives address or aim to tackle regarding e-waste, below in *figure 9* the ‘type’ of initiatives refers to the outcome or the nature of that e-waste initiative. This may for example include a normative set of guidelines or manuals on the ESM of e-waste, or a workshop or training event on chemicals; or a partnership developed specifically to share knowledge around e-waste. The type of e-waste initiative chosen by UN and related entities to address a particular e-waste issue is important as a particular issue could be addressed more effectively through one approach but less through another. For example, an in-country educational and capacity building workshop inviting members of the private sector and local entrepreneurs may be more effective at addressing issues associated with extended producer responsibility, as opposed to developing normative manuals and guidelines for example.

Figure 9. Number and type of UN system-wide e-waste initiatives



The most frequent type of initiatives include manuals and guidelines, country or regional projects, studies leading to reports, and quantitative studies and national assessments of the domestic e-waste situation in a particular country; whereas, the least often undertaken initiative types are those aimed at addressing standards for the design of EEE, and policies and programmes directly associated with addressing e-waste management at the national level. Marginally more attention is given to cooperative and interactive initiatives including working groups/workshops, training and learning, partnerships, and network and consortia.

4.4) UN system support for work on tackling e-waste at the different life-cycle stages

When asked to provide information on how the UN system could further support work on tackling e-waste with regards to the specific stages of the life-cycle, survey respondents offered the following suggestions. These suggestions have been grouped into the key areas of the life-cycle of EEE.

Addressing the ACQUISITION OF RAW MATERIALS by... *“Developing guidelines in order to promote the recycling of discarded e-waste to regenerate certain materials which will reduce the need for the acquisition of raw materials; by identifying responsibly sourced raw materials and backing this up with appropriate policies”, and; by advising on the possible human health and environmental risks posed by raw materials used in EEE”.*

Addressing DESIGN by... *“Increasing product lifespan, eco-design (reducing constant upgrade of devices) and eco-labelling”, and; by enhancing collaboration among agencies and sharing of expertise in the development of standards for ICTs”.*

Addressing PRODUCTION by... *“Supporting the greening of the manufacturing industry”, and; by reducing the use of hazardous materials during production of EEE”.*

Addressing the TRANSPORTATION AND DELIVERY by... *“Encouraging governments to develop and support local EEE design and manufacturing, in order to reduce emissions from its global transportation and delivery”.*

Addressing CONSUMER USE by... *“Encouraging large companies and organisations, including the UN system, to develop internal policies which incentivize staff to better care for EEE, in order to increase its lifespan and purchase greener products, supporting good end-of-life treatment, and; by developing more national-level policies across countries to encourage the responsible consumption of EEE”.*

Addressing REPAIR by... *“Influencing and supporting local governments to develop local repair businesses, for example through providing training and education, and tax breaks for local repair businesses, and: by building upon or maintaining initiatives such as the PACE, which has paid particular attention to the repair of used and end-of-life computing equipment”.*

Addressing REUSE by... *“Phasing out the idea of planned obsolescence incorporated into the design of EEE, and building upon or maintaining initiatives which have an important expertise on the topic of reuse”.*

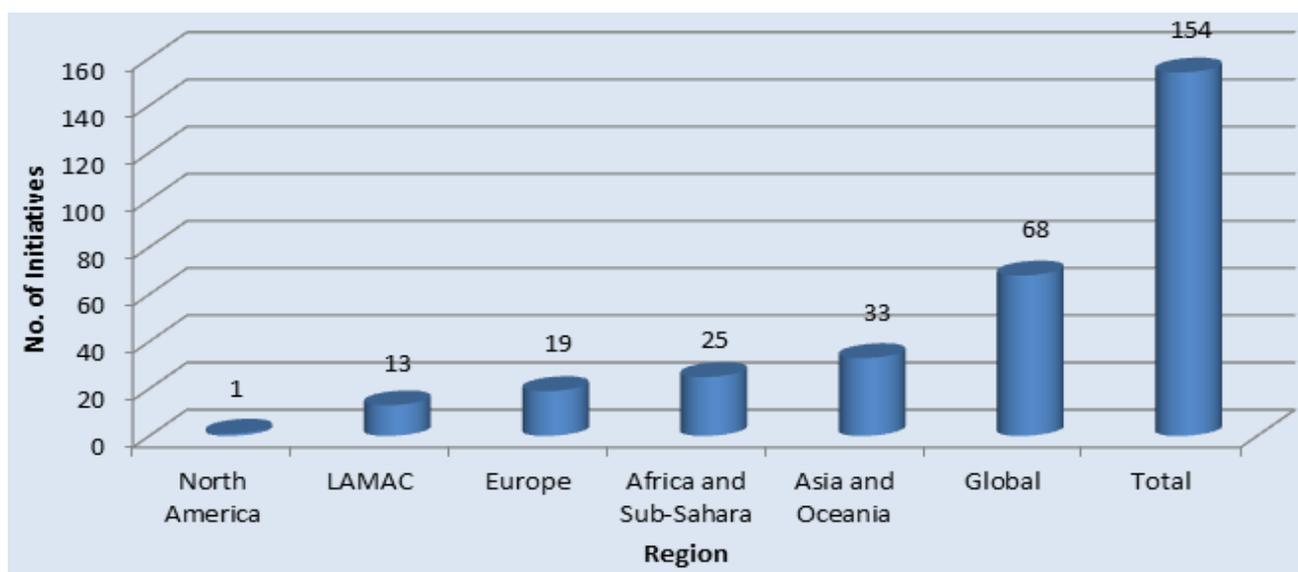
Addressing END-OF-LIFE TREATMENT AND FINAL DISPOSAL by... *“Building upon or maintaining initiatives in developing and sharing technological practices for the environmentally-sound management of solid waste;*

integrating more, e-waste management into national solid waste management infrastructure; and also building upon or maintaining the policies in place to protect the most vulnerable users from the effects of e-waste mismanagement, and; utilizing the potential of the three GEF implementing agencies (UNIDO, UN Environment and UNDP), in tackling e-waste at this particular stage”.

5.) Geographical Distribution of UN and Related Entities' e-waste Initiatives

Observing the collected data from a geographical perspective and building on the presentations in *figure 7* and *8* previously, it is possible to separate the 154 identified e-waste initiatives by country and major regions. Applying the categorization of regions by the World Population Prospects (UNDESA), *Figure 10* shows the distribution of specific country projects, studies, workshops and in-country partnerships etc., carried out by entities that either take place in or aim to improve the situation in those respective regions. Worldwide, 5 regions have been categorised including: North America, Latin America and the Caribbean (LAMAC), Europe, Africa (including Sub-Saharan Africa) and Asia (including Oceania). A global category has been added to the right which includes e-waste initiatives that produce international standards, guidelines and manuals etc.

Figure 10. UN e-waste initiatives by region



The African and Asian regions have received a substantial proportion of regional-focussed initiatives, which is likely to have been boosted significantly by e-waste initiatives such as the Basel Convention Secretariat's E-waste Africa Programme and the E-waste Asia-Pacific Region. For example, between 2008 and 2012 the Secretariat collaborated with a number of other implementing entities and partnerships including PACE and the Swiss Federal Laboratories for Materials Science and Technology (EMPA) etc., with the aim of enhancing environmental governance of e-waste and creating favourable social and economic conditions of partnerships and small businesses in the African recycling sector.

The Secretariat's focus in Asia-Pacific region originated from the Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic Waste, adopted at the 8th Conference of the Parties (COP8) of the Basel Convention. As part of the mandate stemming from this Declaration, the Secretariat developed activities aimed at assisting Parties to develop national inventories of e-waste; national e-waste management plans and formulate e-

waste policies; regulatory frameworks and strategies for implementation; as well as develop pilot projects on collection and recycling of e-waste involving public-private partnerships.

Thus far, Latin America and the Caribbean (LAMAC), has attracted somewhat less consideration, whilst waste activities in Europe and North America have so far mainly been centred on either a detailed analysis of the present situation for improving national policies and collection or transboundary shipments leaving these regions to the global South. However, mapping and survey responses do suggest that since 2014/2015, attention is increasingly turning to the e-waste problem in the LAMAC region; for example, through the strengthening of national initiatives and enhancement of regional cooperation for the environmentally-sound management of persistent organic pollutants (POPs) in WEEE led by UNIDO. Other examples include a UNU/StEP Initiative E-waste Academy for Managers in 2014, held in El Salvador, in cooperation with the Basel Convention Regional Center for Central America and Mexico. The week-long Academy focussed on the sharing of insights on urban mining and fostering international collaboration.

The data hence show a substantially global spread of UN initiatives to tackle e-waste. Nevertheless, there are notable characteristics which pertain to both the particular countries and regions which receive attention and support relating to e-waste management, and also that various entities are involved more frequently in certain countries and regions than others. In addition to *figure 10*, these characteristics associated with a focus on particular countries and regions, have been visualised further in *figure 11* below.

Figure 11. A Map of Notable Country-specific e-waste Initiatives

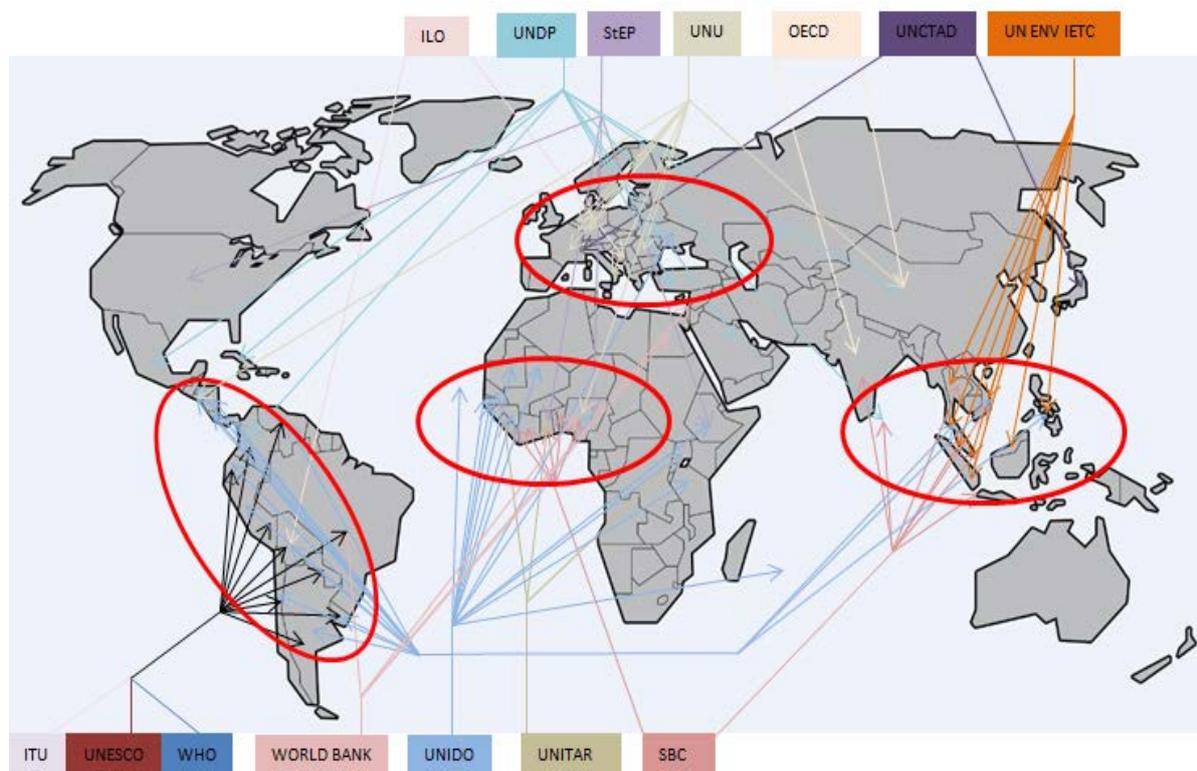


Figure 11 highlights a grouping of four main regions hosting the countries of particular and repeated focus by UN and related entities. These regions include: Eastern Europe, Western Africa, Southeast Asia and Latin America and the Caribbean. The entities represented in *figure 11* include those who have been, or are involved in, e-waste initiatives

paying attention to a specific country – whilst UN and related entities who have only undertaken initiatives either at a global or supranational level, are not included.

There are a number of reasons which may influence the characteristics of the distribution of e-waste initiatives. For example, Western and Eastern African countries receive significant attention in comparison to central Africa possibly because of the arrival of shipped e-waste to port cities on either coast. Parts of the Asian continent maybe receiving substantial attention as a result of a rapidly rising population, increased consumption of goods including EEE and general widespread economic development. Some Asian countries are also leading in the global production of EEE. Other possible reasons for particular attention to e-waste attention in specific countries or regions may relate to the conditions attached to applying for GEF funding – which require countries to have the resources to implement the multilateral environmental agreements such as the Stockholm Convention on Protecting Human Health and the Environment from Persistent Organic Pollutants.

CHAPTER THREE: Collaborations and Partnerships

Tackling particular e-waste issues often requires considering a wide range of perspectives, including interactions with labour, health, the environment, logistics, regulations, chemicals, management practices and consumer preferences and cultures etc. Many informal e-waste dismantling and recycling practices are undertaken which expose workers and their surroundings to hazardous substances, whilst at the same time there are often limited environmental regulations at the national level which concern environmentally-sound management practices for e-waste. In addition to this, many products contain hazardous substances which pose significant damage to human health and the environment when interacting with workers during crude and primitive e-waste processing practices. There is also sign of global consumption of EEE further increasing and no change of preferences of consumers shifting away from frequent purchasing of the most fashionable devices – inevitably leading to more e-waste in the long-term. In considering these perspectives when tackling e-waste, strengthening collaborations and partnerships may be an important step forward – including the sharing of expertise and monetary resources.

This chapter takes a look at the strengthening of collaborations and partnerships among UN and related entities and other stakeholders. Section 3.1 focusses on some existing prominent international collaborations and partnerships, whilst also providing an overview of the composition of these across the 154 identified e-waste initiatives. Section 3.2 looks specifically at the response by individuals on the potential for e-waste collaboration and streamlining of projects and programmes.

3.1) Collaborations and partnerships

3.1.1) Existing notable collaborations and partnerships

A number of partnerships and collaborations across the UN system have been formed between UN organizations and other public and private sector stakeholders. However, as some previous notable partnerships have come to a close, such as the Basel Convention Secretariat's Mobile Phone Partnership Initiative (MPPI) in 2011 and its Partnership for Action on Computing Equipment (PACE) in 2017, the UN system may look for new areas of

collaboration around prominent topics on the e-waste agenda. The following list provides an overview of collaborations and partnerships across the UN system and other stakeholders. This information has been gathered based on a preliminary mapping and the responses of those who completed the survey, and includes notable prior and existing collaborations and partnerships.

Solving the E-waste Problem (Step) Initiative:

Initiated in 2004 and formally launched at the UN Secretariat in New York in 2007 the Step Initiative is an international initiative which was created to develop solutions to address issues associated with e-waste from an applied, but science based point-of-view. It acts as a multi-stakeholder platform with members including UN organisations, EEE manufacturers, dismantlers, recyclers, academia, NGOs and governments. A number of tools have been produced by Step which include Business Plan Calculation Tools; Guiding Principles; White & Green Papers, E-waste Academies, Webinars, and a Global E-waste World-Map including an overview of existing legislations and policies.

Partnership for Action on Computing Equipment (PACE):

Launched at the 9th meeting of the Conference of the Parties to the Basel Convention (decision IX/9), in Bali 2008, PACE is a multi-stakeholder partnership established to address the environmentally-sound management of used and end-of-life computing equipment. The partnership aims to: promote sustainable development through efforts to repair; refurbish and reuse computing equipment worldwide; and to find incentives and methods to divert end-of-life personal computers from land disposal and burning into environmentally sound commercial material recovery/recycling operations. PACE also aims to develop technical guidelines for proper repair; refurbishing and material recovery/recycling; the transboundary movement of used and end-of-life computing equipment; and to end the shipment of used and end-of-life computing equipment to countries. PACE is expected to satisfactorily complete its mandate during the Basel COP in May 2017.

Mobile Phone Partnership Initiative (MPPI):

The MPPI was formally established at the 6th Conference of the Parties to the Basel Convention in Geneva 2002. The overall objectives of MPPI was to achieve better product stewardship; to make consumer behaviour more environmentally friendly; to promote the best reuse, refurbishing, material recovery, recycling and disposal options; and to mobilize political and institutional support for environmentally sound management. The main achievements of the partnership include the completion of five guidelines on: the refurbishment of used mobile phones; the recovery and recycling of end-of-life mobile phones; raising awareness on design considerations of mobile phones; the collection of used and end-of-life mobile phones; and the transboundary movement of collected mobile phones. The final MPPI guidance document was adopted in its entirety by the tenth Conference of the Parties to the Basel Convention, held in Colombia in 2011.

Partnership for Measuring ICT for Development:

The Partnership on Measuring ICT for Development is an international, multi-stakeholder initiative launched in 2004 to improve the availability and quality of ICT data and indicators, particularly in developing countries. Through its work, it helps policymakers produce statistics that were crucial to informed decision-making. It hosts the following international members: ITU, OECD, UNCTAD, UNDESA, UNESCO Institute for Statistics, UNEP/SBC, UNU, World Bank; and at the regional level: ECA, ECLAC, ESCAP, ESCWA, Eurostat. The e-waste group is coordinated by UNU.

Global Partnership on Waste Management (GPWM):

E-waste management is a focal area of the GPWM, which was originally coordinated by UNIDO and now by ITU. The e-waste focal area attempts to mainstream and disseminate environmentally sound management of e-waste in developing countries, the work plan for the focal area on e-waste proposes to develop sustainable business plans which will include an effective take-back system, a manual dismantling facility, local pre-processing activities and sound end-processing activities. These activities shall be undertaken in close cooperation with other partners working in this field.

Strategic Approach to International Chemicals Management (SAICM):

Adopted by the International Conference on Chemicals Management (ICCM) in 2006 in Dubai, SAICM is a policy framework to foster the sound management of chemicals, including those used in the production of EEE. SAICM was developed by a multi-stakeholder and multi-sectoral Preparatory Committee and supports the achievement of the goal agreed at the 2002 Johannesburg World Summit on Sustainable Development of ensuring that, by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health. The SAICM Secretariat is administered by UN Environment and constitutes the Dubai Declaration on International Chemicals Management and the Overarching Policy Strategy, and the Global Plan of Action.

SAICM has produced a Compilation of Best Practices on Hazardous Substances within the Life-cycle of Electrical and Electronic Products (HSLEEP): In its resolution III/2 on emerging policy issues, the second International Conference on Chemicals Management (ICCM2) called for a number of actions related to hazardous substances within the life cycle of electrical and electronic products. The Secretariat continues to coordinate work on HSLEEP, share information and increase awareness on the need to address hazardous substances in electronics through the participation on and share of knowledge at regional and international forums.

United for Smart Sustainable Cities (U4SSC):

The "United for Smart Sustainable Cities" (U4SSC) was launched in response to Sustainable Development Goal 11: "Make cities and human settlements inclusive, safe, resilient and sustainable". This initiative is supported by 17 other United Nations Agencies. The U4SSC will primarily advocate for public policies to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities. Within the framework of its smart city agenda, this initiative also explores the potential of balancing ICT integration into urban services with the management of e-waste in smart sustainable cities.

UNIDO partnerships with the private sector

UNIDO has formed partnerships with a number of entities from the private sector, including Microsoft (since 2006), Samsung (since 2012) and Dell (since 2014). The aim of these partnerships is to pool expertise to promote innovative uses of ICT that foster entrepreneurship in African SMEs; to design and implement effective e-waste management and electronics employment opportunities in Cambodia; and to create awareness, build capacity and engage in knowledge sharing and policy advocacy with regards to sustainable e-waste management.

3.1.2) Composition of existing collaborations in e-waste

As shown in Figure 12, from the 154 initiatives identified in the mapping exercise, a total of 139 are understood to have involved collaborations, i.e. the involvement of one or more entities. The majority of e-waste initiatives undertaken by the 23 identified UN and related entities have involved work alongside external stakeholders from the public sector – this stands at 68 (49%); whilst a lesser number of initiatives have involved private sector stakeholders – this stands at 50 (36%).

External public sector stakeholders are entities which are neither part of the UN system nor driven by profit or involved in business activities; for example, this might include NGOs, academia or government ministries etc. Examples of private sector collaborations on the other hand include, among others, the Solving the E-waste Problem (Step) Initiative, UNIDO's involvement with Microsoft, Samsung and DELL, and the Partnership for Action on Computing Equipment (PACE) under the Basel Convention.

When observing the composition of existing collaborations among UN and related entities only, it is evident that there are significantly less e-waste initiatives with these characteristics – this stands at 21 (15%). This suggests that there could be more collaboration across the UN system in sharing expertise and coming together during e-waste initiatives and projects. One particular example of UN only collaboration is the global survey on e-waste's impacts on children, undertaken in cooperation between WHO and UNU. Adding to this, from the total 139 identified e-waste initiatives as hosting some form of collaboration, there are 42 (roughly 30%) which involve UN and entities working alongside each other, and the public and private sectors at the same time.

Figure 12. Characteristics of existing collaborations in e-waste

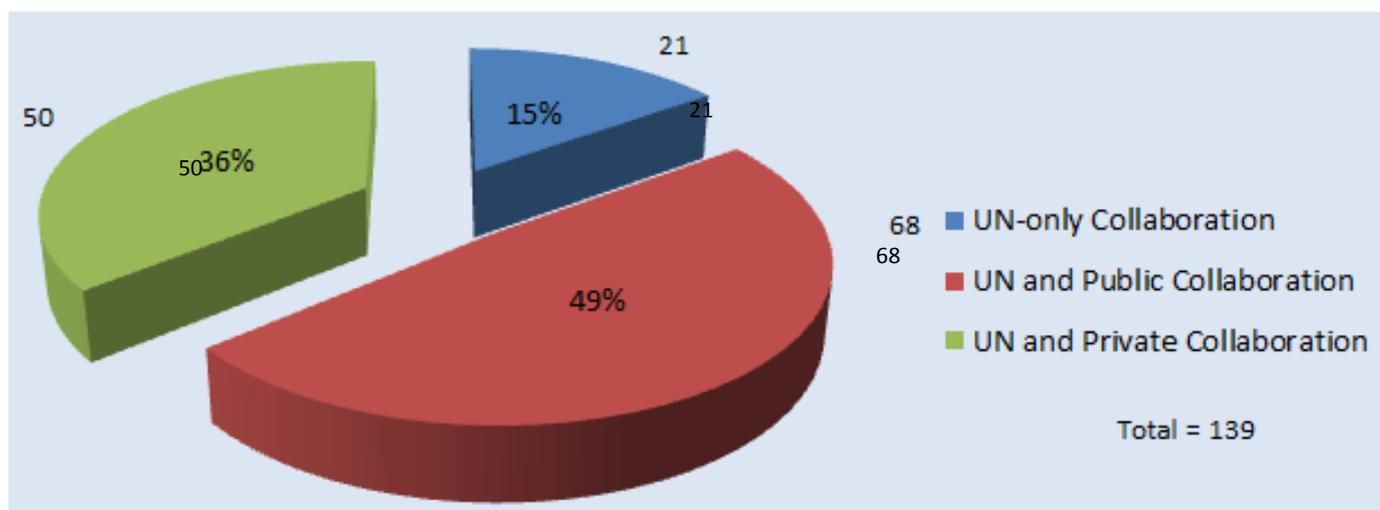
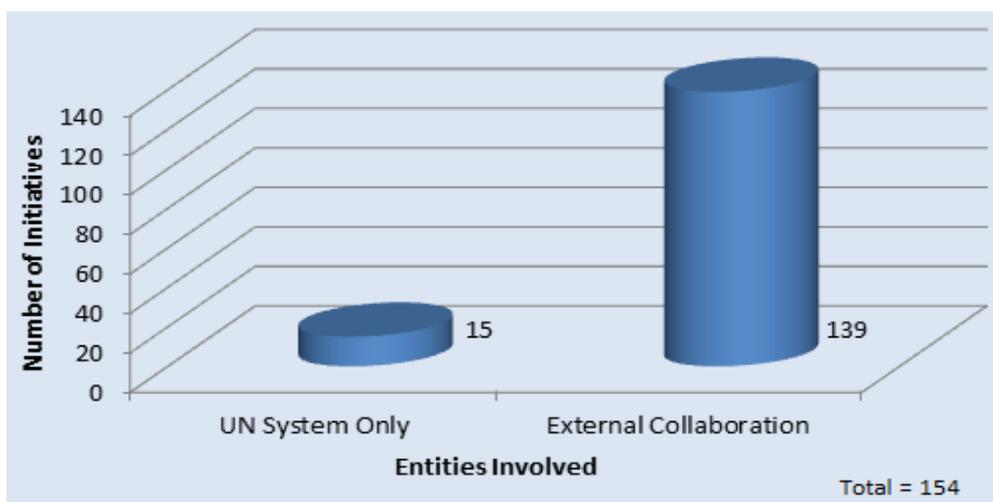


Figure 13 highlights a stark difference between UN system-only collaboration and e-waste initiatives undertaken alongside external stakeholders. With reference to the substantially lower levels of collaboration among UN and related entities, it is not clear what the reasons are regarding the unexploited potential for such collaboration. However, a greater involvement of public and private collaboration over UN system collaboration, may be linked to the propensity for entities to outsource tasks and specialised roles to external consultants, and public and private stakeholders – thus challenging the complete ownership of e-waste initiatives by the UN. The different entities active in e-waste across the UN system could benefit from increased UN-UN collaboration, which may be more likely to capture the mutual benefits of fellow UN entities’ skills and expertise in specific areas.

Figure 13. UN system only vs. UN and external collaboration



3.2) E-waste collaboration and streamlining projects and programmes

Based on survey responses, this section provides an overview of opportunities for collaboration and streamlining of projects and programmes in the area of e-waste from the point of view of respondents. UN and related entities have provided information on collaborations which they identify as being possible across the UN system and with other stakeholders. Various respondents throughout have made reference to the cooperation of larger programmatic UN entities in collaborating around a particular issue such as in the context of establishing legislative, fiscal and institutional frameworks at the national level.

Survey respondents were asked to provide suggestions on how areas of collaboration could be developed for e-waste projects and programmes across the UN system, and how initiatives could be better streamlined, for example by sharing data, knowledge and expertise. A number of respondents addressed the idea of a core set of entities acting more closely together, the integration of e-waste initiatives, building on the ideas of prior and existing partnerships, and bringing e-waste into an integral part of the projects and programmes of UN entities. A range of examples and approaches were provided and have been developed in the two sections below.

3.2.1) Mandating e-waste by UN entities

As addressed in Chapter 2, across the UN system there are currently a number of UN entities involved in tackling e-waste and beside this, limited coordination of e-waste initiatives. None of the UN entities working in this area have

assigned e-waste as a primary component of their mandate. In order to address some form of lead or coordination on the UN system's approach to tackling e-waste, there is scope for specific institution(s) to be allocated with particular mandates corresponding to e-waste.

While the main focus of many UN entities is on poverty eradication and the promotion of economic and sustainable development, the projects and programmes of these entities may occasionally involve issues related to e-waste. There may be a need to incorporate the issue of e-waste as an integral part of relevant programmes of the respective UN entities dealing with the environmentally-sound management of e-waste, including hazardous wastes.

The challenge of e-waste is highly diverse and can be considered from a number of different perspectives, as mentioned earlier. Tackling this challenge may warrant some form of dissemination into the key components which require attention – e.g. design and production, chemicals, labour, e-waste shipment, and technologies used in its recycling and treatment etc. – and then be effectively aligned across the mandates of each UN entity.

In a similar context to the nature of the e-waste challenge, there are also rather diverse approaches carried out through UN e-waste initiatives. Often these initiatives could either be dissimilar or alike in their methods, but under both circumstances they may not have the means to best share data, knowledge and expertise based on an entity's experiences. In order to catalyse these elements, working groups which represent multiple UN entity focal points could be established. These working groups might be headed by the UN entity whose mandate best aligns with the goals and results of that particular project on e-waste. Through the working group, there would be the facility to share data, knowledge and expertise.

3.2.2) Coordinating and streamlining work towards e-waste:

In 2005 the United Nations General Assembly invited the Secretary-General to launch work to further strengthen the management and coordination of UN operational activities. One of the key recommendations as a response to this, was that the UN system should "Deliver as One" at country level with one leader, one programme and one budget. In the interest of enhancing system-wide coordination and streamlining initiatives, there may be scope for organising the UN system's work on e-waste by utilising this framework.

By following the framework on delivering as one, the UN system could develop areas of collaboration to share experiences in supporting countries to strengthen their e-waste management capabilities through research, institutional and regulatory regimes, and to pilot innovative and environmentally-sound ways of collection, recycling and disposal in the framework of assisting developing countries to implement the Stockholm Convention on Persistent Organic Pollutants and Minamata Convention on Mercury. In the interests of UN entities themselves, a central service designed to sustain any kind of partnerships on research and capacity building, which could perform and align policy-relevant e-waste research and capacity building, may provide a platform for supporting UN entities.

The sharing of data, knowledge and expertise may help solicit the streamlining of e-waste initiatives and overcome a silo approach to tackling e-waste, which might be present across various spheres of the UN system. Establishing methods and procedures to share information not just within the boundaries of the UN system, but also with

external stakeholders, could be of significant benefit to other areas of society, the private sector and the international community. For example, addressing issues such as the sharing of UN expertise in the area of statistics and information on EEE and e-waste movements, collection and disposal; as well as econometric analysis of industry profits and financial exchanges with the law enforcement community may prove to be very helpful for combatting illegal e-waste trade etc. Some mechanisms as such have existed or still exist, like PACE or the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), which could be utilized, replicated or built on to share data, knowledge and expertise.

Focussing on the roles of specific UN entities, there may be scope in the context of e-waste for agencies such as UNSD, UNDP, UNIDO, UNEP, UNU, ITU and ILO to work closely and join forces regarding their respective mandates and expertise. One possible avenue to streamline projects and programmes to tackle e-waste could be to establish an effective clearinghouse mechanism for the sharing of information – perhaps through a strong information database, using an existing significantly active UN entity to perform this role as an international hub. In addition to this, the possibility may exist for UN entities to promote the issue of e-waste when assisting countries through the United Nations Development Assistance Framework (UNDAF).

Other proposals for coordinating and streamlining work towards e-waste have advocated the establishment of a UN inter-agency coordination mechanism for e-waste. This UN inter-agency mechanism could be linked to the United Nations High-Level Committee on Programmes (HLCP) with the purpose of fostering greater cooperation and information sharing among UN entities, including external stakeholders, involved in e-waste work at any stage of the lifecycle. The mechanism could include several work streams, including on policy and legislation, on the ground implementation, standardization, and research and capacity building, each with an assigned lead agency. Similar suggestions propose having an umbrella entity to administer the consolidation of UN entities' e-waste initiatives.

CHAPTER FOUR: Analysis and Recommendations

1) Analysis and Conclusions

To conclude, United Nations organizations have addressed e-waste related issues in a number of different ways since 2002. To date more than 20 UN organizations are active in this domain, having been involved in more than 150 initiatives globally. The scope covered by these activities is wide, stretching from policy development, statistical work and training to the out-designing of hazardous elements from products. From a regional perspective, the majority of e-waste initiatives is undertaken with a focus on the African and Asian regions; whilst there is less focus on Europe and very little in North America and the Australian continent. In recent times, since 2014/2015 the Latin American and Caribbean regions have seen increasingly more attention in the area of e-waste.

The Asian and African regions receive substantially more focus as a result of the curative nature of many present approaches to e-waste management. The current focus of UN e-waste initiatives is on addressing primitive and often crude recycling practices, which are not environmentally sound due to the negative externalities arising from emissions entering the ground and the air, the wasting of resources and damage to workers' health.

The majority of e-waste initiatives (66%) are carried out through UN-public sector collaboration, whilst e-waste initiatives undertaken through UN-private sector collaboration account for 18% of initiatives. The results of the mapping exercise and survey suggest a need to engage more with the private sector and to address business responsibility in the production of EEE.

When observing the entire life-cycle of EEE from design and production to final disposal, it is evident that the majority of initiatives which aim to tackle e-waste focus on the end-of-life treatment through the recycling and final disposal stages. However, there is a need to address the full life-cycle of EEE, including related issues such as product life-span, extended producer responsibility and consumer use. These are important areas as both the fashion cycle and life-span of many products containing electrical and electronic components are likely shortening. The responsibility may lie with official equipment manufacturers in extending product life-cycles, and in addition to this, extending their responsibility beyond the end of use by consumers. At the same time, opting for the newest technologies and most recent fashion at the lowest possible price remains entrenched within the behaviour of many consumers, impacting the reparability of many machines and therefore also contributing to an ever increasing e-waste mountain.

The mapping exercise has indicated that e-waste initiatives in the UN system tend to focus on the end-of-life aspects and therefore almost entirely correspond to the environmentally-sound management of e-waste; for example, through the sound dismantling, recycling, disposal and technological advancement of these methods. Whilst these management methods are important components in relieving the negative externalities implied for both human health and environmental conditions as a result of e-waste, the source of the problem – the generation of e-waste – is only addressed to a lesser degree by the UN system. Looking at the scope of existing e-waste initiatives, less attention is given to the acquisition of raw materials, design and production, and repair/reuse/refurbishment of EEE. This is not due to a lack of interest in this life-cycle phase, but can be traced to the complex stakeholder structure and business interests surrounding the e-waste arena.

The UN system may look to advise member states and provide support for strategies on incentivizing more inclusive and socially sustainable business models, small and medium enterprises developing repair and refurbishment businesses and take-back schemes by official equipment manufacturers. Survey responses suggested a move towards reducing or eliminating tax on such business operations in order to increase the economic efficiency of actors, of all sizes. Also the re-use of used equipment could be supported by a depreciation system, which equals brand-new and used machines in their value due to the service the machines provide and not the actual cost for purchasing those. In addition to supporting new business models for repair and refurbishment, the UN system might consider supporting member states – and supranational entities such as the EU – in tracking and containing the movement of precious and rare-earth metals used in EEE. The development of repair and refurbishment services can provide an opportunity for containing these movements, by reengineering these metals into new products. Survey respondents had expressed the need for the UN system to support member states in identifying the link between e-waste and natural resource exploitation through means such as raw material mining. Consequently, there lies a need

to move from raw mining practices towards urban mining practices – repair and refurbishment being primary examples.

A stronger emphasis on the design phase of EEE would require stronger collaboration with the private sector which could possibly offset other priorities for partnerships. Closer collaboration between UN entities and industry actors is sometimes further challenged by legal interpretations of the extent to which UN agencies can engage in externally and privately-funded projects. Despite these conditions, the successful implementation of the integrated Sustainable Development Goals requires a more up-scale approach, looking more closely at the EEE supply and its reverse supply chain. This would imply putting more emphasis on increasing collection rates of e-waste in more developed countries in the EU, North America, Japan and Australia as well as on the design and reuse of EEE. Essentially, current e-waste work is significantly less preventive and more curative, missing an overall long-term strategy and therefore limited in its sustainability.

Despite the multitude of activities that UN entities are engaged in to address the e-waste challenge, analysis points towards a considerable potential for improvement. Through a more coordinated and synergized approach, competency within the UN system could be maximized while agencies would jointly work towards sustainable solutions in a harmonized way. The results of the mapping illustrated that the e-waste work within the UN family is not only limited to agencies focusing on environment and waste-related issues. By looking at e-waste from a life-cycle perspective, the scope of actors involved is considerably enlarged, and the multitude of approaches needed to contribute to sustainable solutions is highlighted.

The mapping exercise and survey also indicated that the UN has a role to play in informing member states about relevant e-waste issues by means of expanding national data collection and information sharing, for example on national e-waste flows and characteristics; and also compiling and sharing good and bad e-waste management practices. Such interaction between the UN system and member states would involve encouraging and prioritizing waste and e-waste matters by global leaders. Some suggestions put forward point towards advising ministries and other governmental stakeholders on e-waste matters and tying the negative impact of e-waste to the sustainable development goals. As it stands, precisely measuring statistics of the quantities, flows and impact of e-waste will likely improve countries' knowledge of their e-waste situation and lay the ground for appropriate countermeasures

As we look ahead, other key areas of importance relating to the global e-waste problem see the need for strengthening national waste and e-waste regulations and establishing e-waste management systems at the national level. In some cases, solid waste management systems may exist yet their primitive nature considering only basic household waste streams often exclude the management of e-waste – both domestically and commercially generated. This is often due partly to the technical nature of handling, storing and treating/disposing of e-waste. Thus, the control of e-waste management and shipment may perform more effectively with the incorporation of e-waste into national solid waste management plans.

Dedicated funding schemes and an overall strategy to address the e-waste problem in a holistic way, taking into consideration all the phases of the life-cycle of EEE is missing. Most UN initiatives in the area of e-waste have so far

been entirely externally funded by project-sponsoring industry and governments, bilateral development cooperation and the European Commission. The only remaining significant funder of e-waste-related projects from within the UN is the Global Environment Facility (GEF). As there has been no specific replenishment phase for the direct attention of e-waste by the GEF, all of recent e-waste related initiatives backed by GEF funding have come under the Chemicals and Waste, and the POPs replenishment phases. However, currently discussions are underway on the topic of focusing the next replenishment on e-waste. While funding for e-waste work is important in itself, such schemes also help to harmonize action, make efficient use of available resources and expertise and coordinate activities.

As this synthesis report comes to a close, a number of forward looking recommendations have been developed which reflect the findings taken from the mapping exercise and survey, addressed through this document. The recommendations have been divided into three areas; those entailing substantive support for member states, those proposing how to enhance collaboration, and those which aim at addressing gaps in the characteristics and geographical spread of UN e-waste initiatives.

2.) Recommendations

2.1) Substantive support

2.1.1 *One policy and guidance on country-level issues*

The UN system may wish to consider developing a guidance document which includes ‘one package’ advising on how to move towards addressing key country-level issues associated with e-waste. These issues have been addressed throughout this report, and include but might not be limited to: nation-wide consumer and commercial commitments through enhanced awareness and incentives; increasing domestic and commercial e-waste collection rates at the municipal level; expanding member states’ understanding of their current e-waste situation through widening research on national data and e-waste flows; strengthening national legislation on e-waste and incorporating e-waste into existing solid waste management systems. The guidance document could further address how the UN system supports the implementation of these key country-level issues.

2.1.2 *Engaging global leadership*

The UN system may wish to consider engaging global leadership in order for a constructive and unified approach to be developed towards tackling e-waste, and to help ensure political and funding commitments, and the commitments of large industry leaders.

2.2) Enhancing collaboration across the UN system

2.2.1 *A United Nations inter-agency coordination mechanism*

The UN system may wish to consider a United Nations inter-agency coordination mechanism to cater for the e-waste challenge from a life-cycle perspective. The mechanism could add value to UN initiatives by fostering greater cooperation and information-sharing, internally from within the UN system and externally with other partners from

governments, business/industry, academia and NGOs. The scope shall encompass all aspects of e-waste: the production of EEE and their usage and final disposal and recycling of waste electrical and electronic equipment.

The mechanism could complement and add value to existing programmes and projects by facilitating synergies and joint efforts. In practice, this will maximize system-wide coordinated action and coherence, as well as effectiveness of the support provided to Member States in their efforts towards achieving the time-bound goals, targets and actions related to its scope of work as agreed by the international community, particularly those items contained in the SDGs. Through the mechanism, the United Nations system would act as a "One UN". The momentum created by this will be continued in order to help Member States deliver on international agreements and take them further towards sustainable solutions.

Towards this overall recommendation the inter-agency mechanism could be formed by various programmes that will focus on key aspects in conjunction with the different stages of the EEE life-cycle. It could therefore address policy and legislation, on the ground implementation, standardization, and research and capacity building. The mechanism could establish means for facilitating inter-programme flow of information and coordination.

2.2.2. Including private sector involvement

The UN system may wish to consider increasing its involvement with the private sector. The UN system already works closely with the private sector in a number of areas to address various aspects of the global e-waste problem. However, there are significantly more non-private actors involved with the work of the UN, which suggests a difficulty in engaging private sector actors still remains. In the context of EEE and e-waste, and in the interests of considering all stages of the life-cycle – including design and production, increased involvement of official equipment manufacturers will be important in order to develop extended producer responsibility and to facilitate the designing-out of waste.

2.2.3. A platform for sharing data, knowledge and expertise

The UN system may wish to consider the development of a platform built for the purpose of sharing data, knowledge and expertise with the aim of making information on e-waste initiatives of all types and focus available to all entities across the UN system – information could also include the possibility for training and sharing of resources online.

2.3) Addressing gaps in the characteristics and geography of UN e-waste initiatives

2.3.1 Addressing the full life-cycle of EEE

The UN system may wish to consider building on this report and the supporting mapping exercise and survey, by developing a roadmap for addressing the full life-cycle of EEE. Build a strategy to best align UN entities' specific skills based on their current agendas, mandates, and recent and current involvement in the e-waste arena whilst also enhancing action in those stages – predominately early on in the life-cycle – in order to ensure sufficient expertise is also allocated there.

2.3.2 Addressing developed countries in UN e-waste initiatives

The UN system may wish to consider inviting UN entities to collectively expand the scope of their geographical focus to more frequently include developed countries. Since the majority of e-waste is sourced from most developed economies, UN entities may consider strategically aligning their e-waste initiatives to address a number of areas in these countries such as, but not limited to: cooperation with law enforcement and customs authorities to address the transboundary movement of used and end-of-life EEE leaving developed countries; establishing policies to enhance national consumer awareness of the damaging effects of their e-devices; enforcing policies on take-back schemes for official equipment manufacturers in developed countries.

To some extent, the life-cycle of EEE as we see it (design and production towards end-of-life treatment and final disposal), can be mirrored in the geographical distribution in which EEE is first generated and then disposed of – i.e. design and production occurs in developed countries, and end-of-life treatment and final disposal occurs in developing countries. This analogy is supported by the findings of this report, which as part of this recommendation puts forward the possibility for the UN to increasingly expand the scope of its geographical focus to include developed countries also. The strategic areas mentioned above may constitute some of the ingredients to be used in expanding this geographical scope.