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E-Waste Recycling in Latin America: Overview, Challenges and Potential

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e-waste swiss e-waste programme

Overview on the presentation

1. **A quantitative and qualitative glimpse at e-waste**
   - Global ICT trade and global e-waste quantities
   - E-waste Generation in Latin America

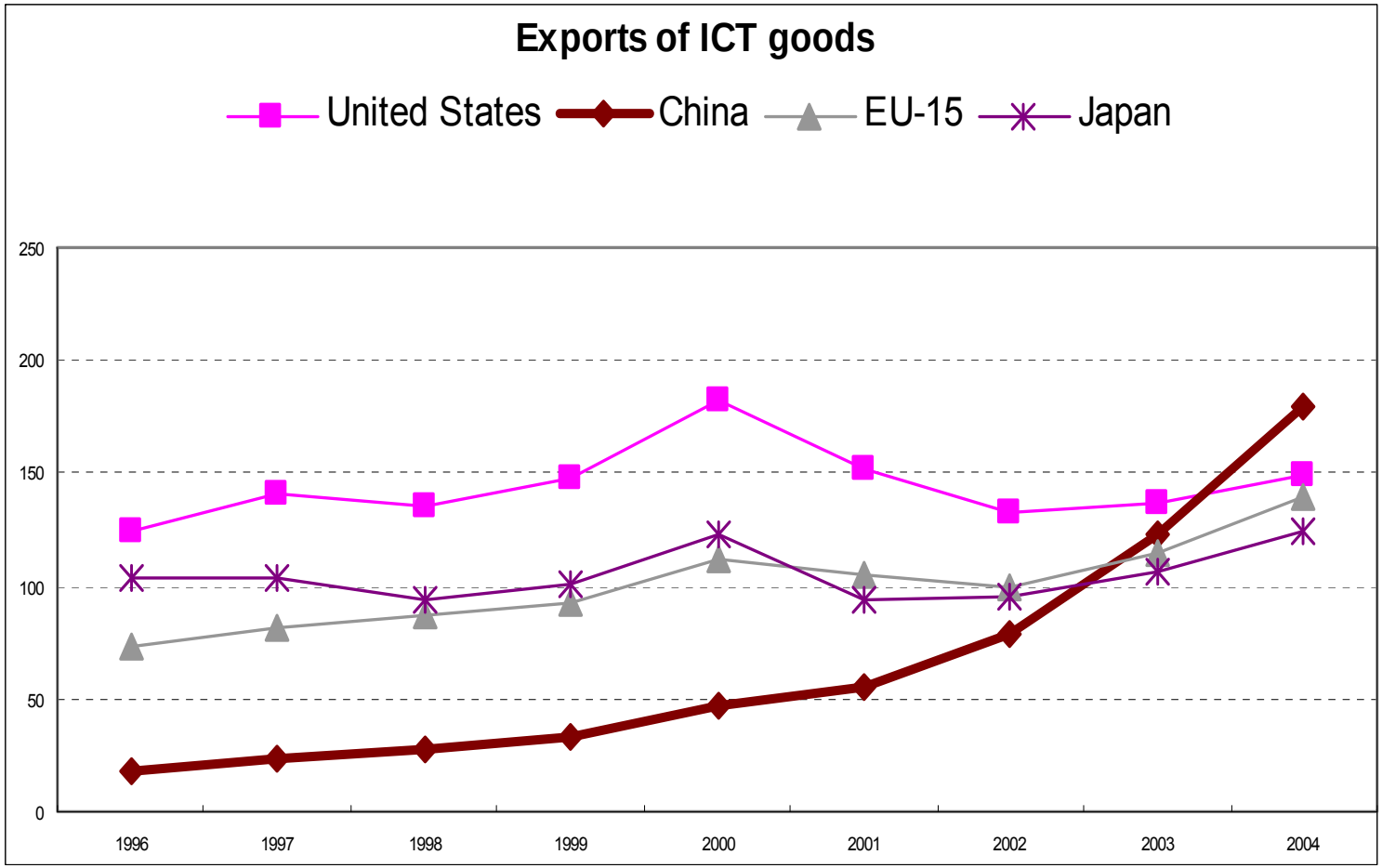
2. **Framework and infrastructure**
   - Global Framework and policy principles
   - Refurbishing and Recycling Infrastructure

3. **Mayor Challenges**
   - Policy and legislation
   - EPR in a Latin American context
   - Collection and recycling infrastructure

4. **Potential**
   - Social and Economic Potential
   - Running projects

A quantitative and qualitative glimpse at e-waste:

The explosion of international ICT trade

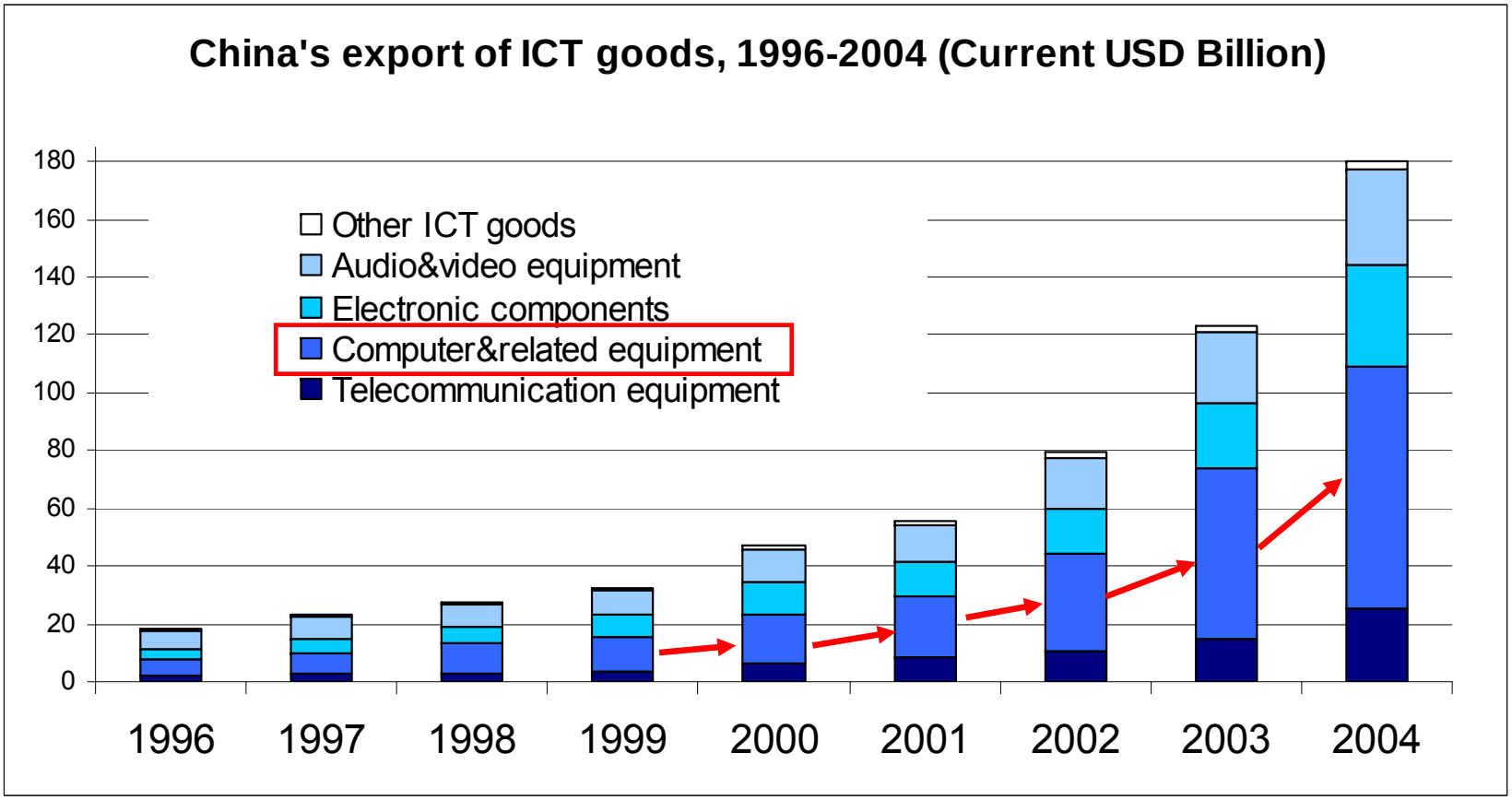


In billions of USD in current prices

Source: www.oecd.org

- The global production of Information and Communication Technologies (ICT) experiences the greatest expansion of history

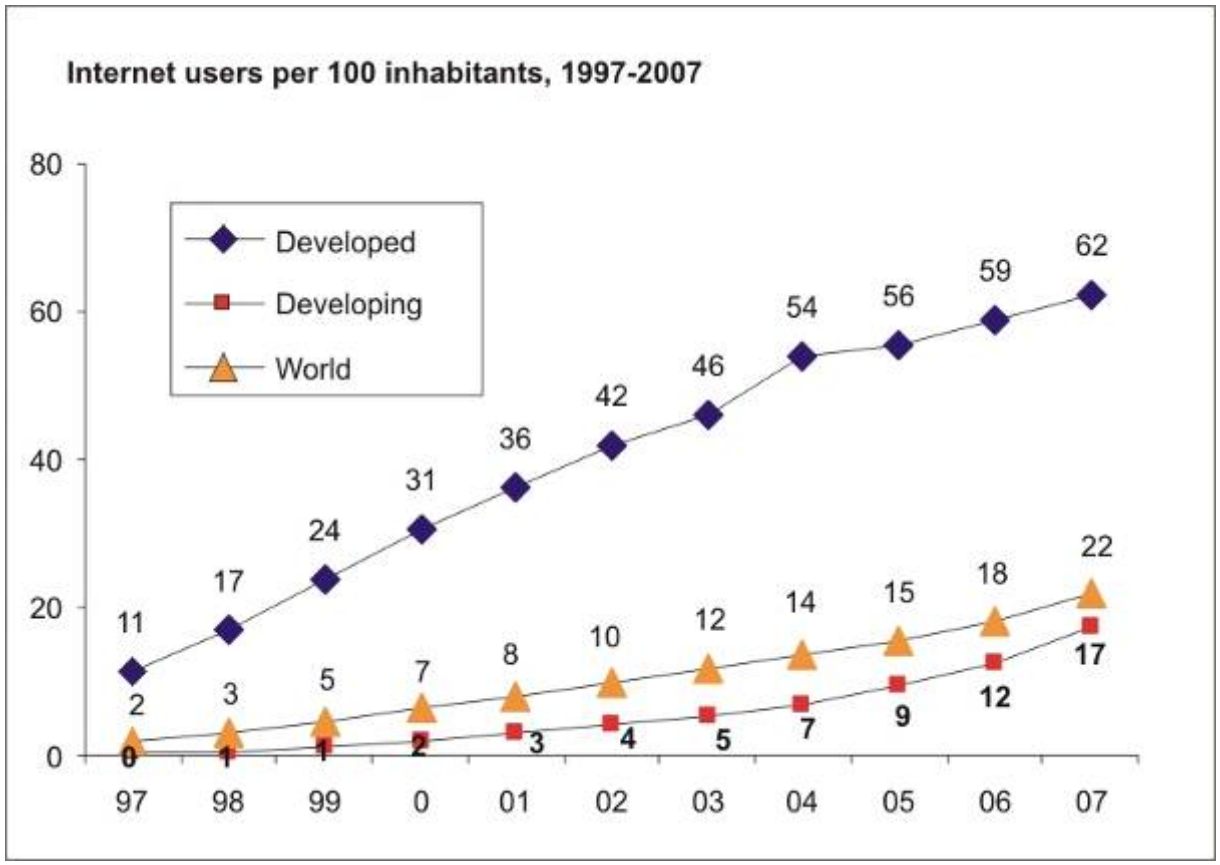
The role of China



source: www.oecd.org

- The highest growth of China's electronics export is induced by "computer and related equipment"

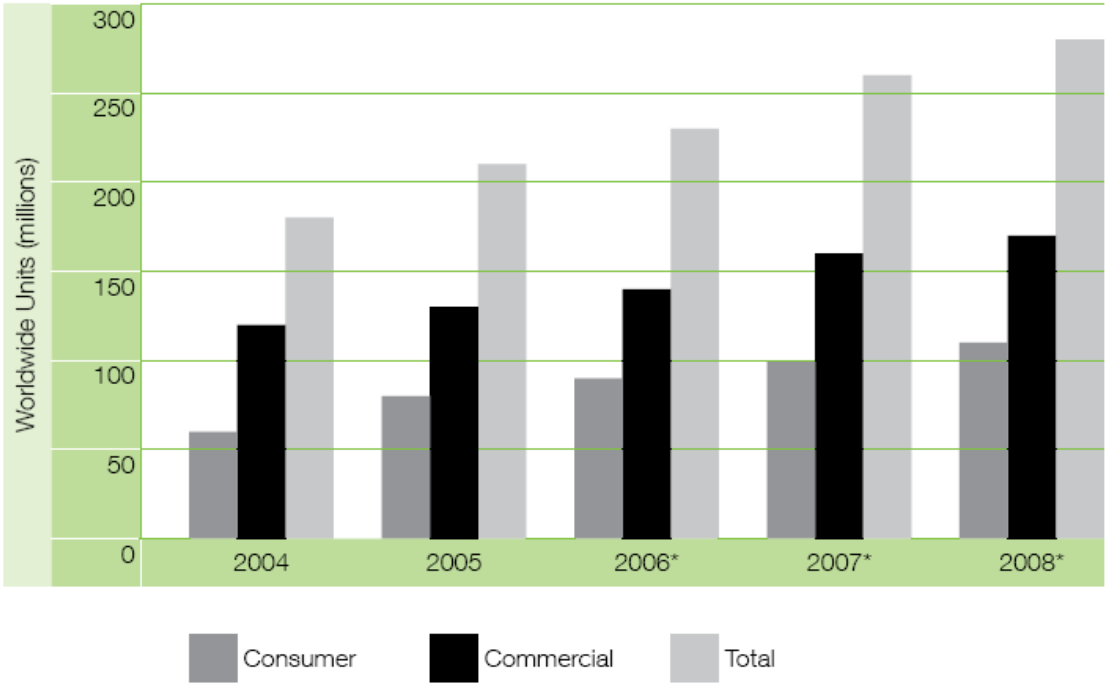
Developing countries are catching up



Source: www.itu.int/ITU-D/ict/statistics/ict/graphs/internet.jpg

- Internet users in developing countries grew from 2 to 17 per 100 inhabitants between 2000 and 2007, whereas in developed countries this increase was from 31 to 62 per 100 inhabitants in the same period

World computer sales 2004-2008



Source: IDC Worldwide

- The global sales of PC is still growing despite of a reduced growth rate in the US, the EU and Japan
- The markets in developing countries and the markets of laptops are growing faster than predicted

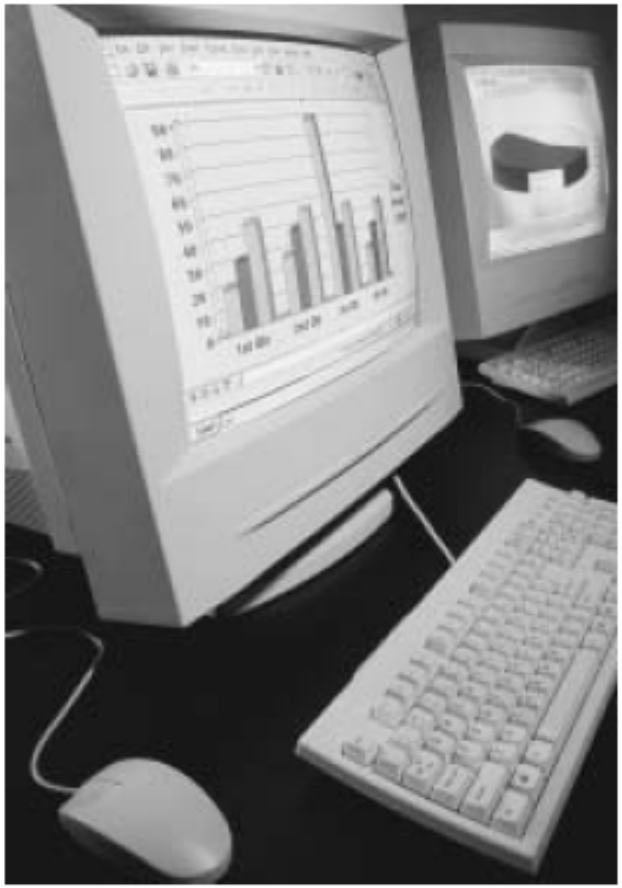
Global sales and estimated WEEE generation

	Units sold in 2006	Typical weight (kg) [32]	Typical life (years)[33*]	Estimated weight sold in 2006 (Metric Tonnes)	Estimated WEEE arising in 2010 (Metric Tonnes)	Estimated WEEE arising in 2016 (Metric Tonnes)
Computers	229.4 million [34]	25	7, (+/- 11%[35])	5,735,000	4,193,382	7,843,364
Mobile phones	1 billion[36].	0.113[37]	2[38] (+ 22%[39])	113,000	168,189	554,571
TVs	45.5 million (2005/6) [40]	30	10 (- 3%[41 42])	1,365,000	1,143,166	1,365,000
TOTAL	**1,274.9million**			**7,259,000**	**5,504,737**	**9,762,935**

Source: Greenpeace/Cobbing 2008

- Worldwide sales of TVs reached 45 millions 2006, of computers 230 Mio, and of mobile phones 1 billion
- The estimated 4.1 million tons of computer waste in 2010 contain about 64 tons of gold, 84’000 tons of copper, but also 264’000 t of lead and many other toxics (as Arsenic, Cadmium, Mercury and others)

The composition of a computer

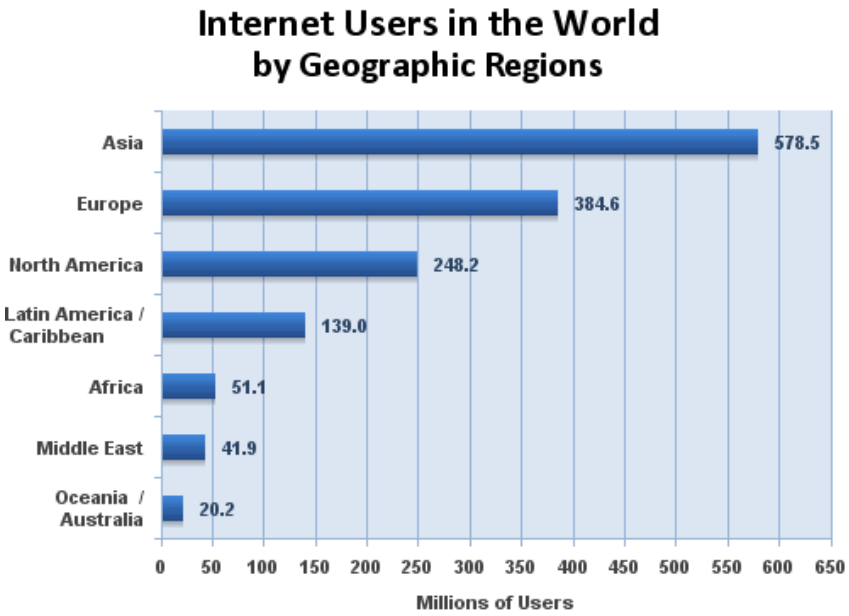


Nombre	% respecto al peso total	Uso/Emplazamiento
Plastico	22.9907	Con elementos orgánicos y óxidos distintos de la sílice
Plomo	6.2988	Juntas metálicas, escudo antirradiación/tubo catódico, PWB
Aluminio	14.1723	Estructura, conductividad/carcasa, TC, PWB, conectores
Germanio	0.0016	Semiconductor/PWB
Galio	0.0013	Semiconductor/PWB
Hierro	20.4712	Estructura, magnetismo/carcasa (acero), TC, PWB
Estaño	1.0078	Juntas de metal/PWB, tubo catódico
Cobre	6.9287	Conductividad/tubo catódico, PWB, conectores
Bario	0.0315	Tubo de vacío/tubo catódico
Níquel	0.8503	Estructura, magnetismo/carcasa (acero), TC, PWB
Cinc	2.2046	Pilas, emisor de fósforo/PWB, tubo catódico
Tantalio	0.0157	Condensador/PWB, alimentación
Indio	0.0016	Transistor, rectificadores/PWB
Vanadio	0.0002	Emisor de fósforo rojo / tubo catódico
Terbio	0	Activador de fósforo verde, impurificadora /TC, PWB
Berilio	0.0157	Conductividad térmica / PWB, conectores
Oro	0.0016	Conectividad; conductividad / PWB, conectores
Europio	0.0002	Activador de fósforo / PWB
Titanio	0.0157	Pigmento; agente de aleación / carcasa (aluminio)
Rutenio	0.0016	Circuito de resistividad / PWB
Cobalto	0.0157	Estructura, magnetismo / carcasa (acero), TC, PWB
Paladio	0.0003	Conectividad, conductividad / PWB, conectores
Manganeso	0.0315	Estructura, magnetismo / carcasa (acero), TC, PWB
Plata	0.0189	Conductividad / PWB, conectores
Antimonio	0.0094	Diodos / carcasa, PWB, tubo catódico
Bismuto	0.0063	Agente humectante en película gruesa / PWB
Cromo	0.0063	Decoración, endurecedor / carcasa (acero)
Cadmio	0.0094	Pilas, emisor de fósforo glugreen / carcasa, PWB, TC
Selenio	0.0016	Rectificadores / PWB
Niobio	0.0002	Elemento soldador / carcasa
Itrio	0.0002	Emisor de fósforo rojo / TC
Rodio	0	Conductor de película gruesa / PWB
Platino	0	Conductor de película gruesa / PWB
Mercurio	0.0022	Pilas, interruptores / carcasa, PWB
Arsénico	0.0013	Agentes impurificadores en transistores/PWB
Sílice	24.8803	Cristal, dispositivos en estado sólido / TC, PWB

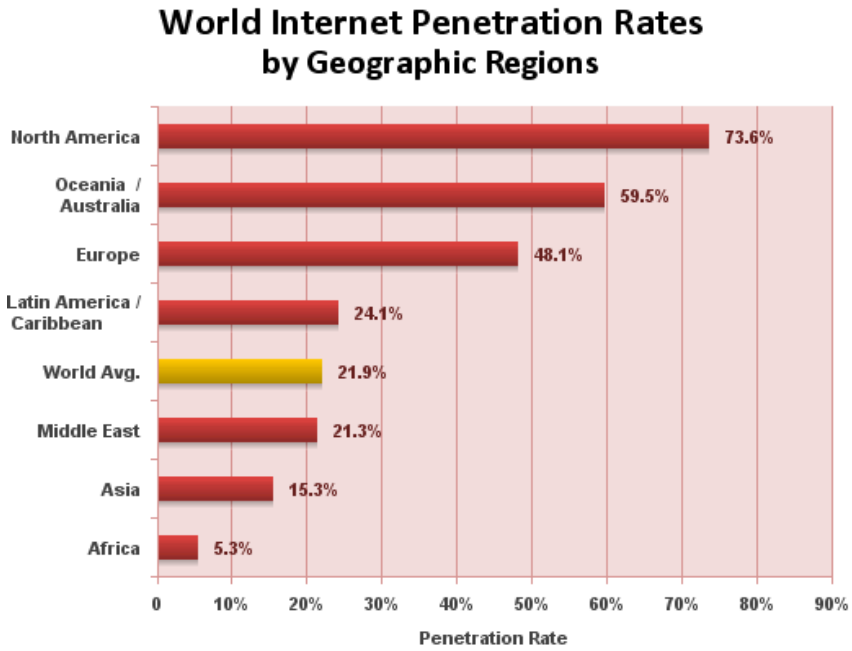
Microelectronics and Computer Technology Corporation (MCC). 1996. Electronics Industry Environmental Roadmap. Austin, TX: MCC.

TC = tubo catódico

Internet users and penetration rates



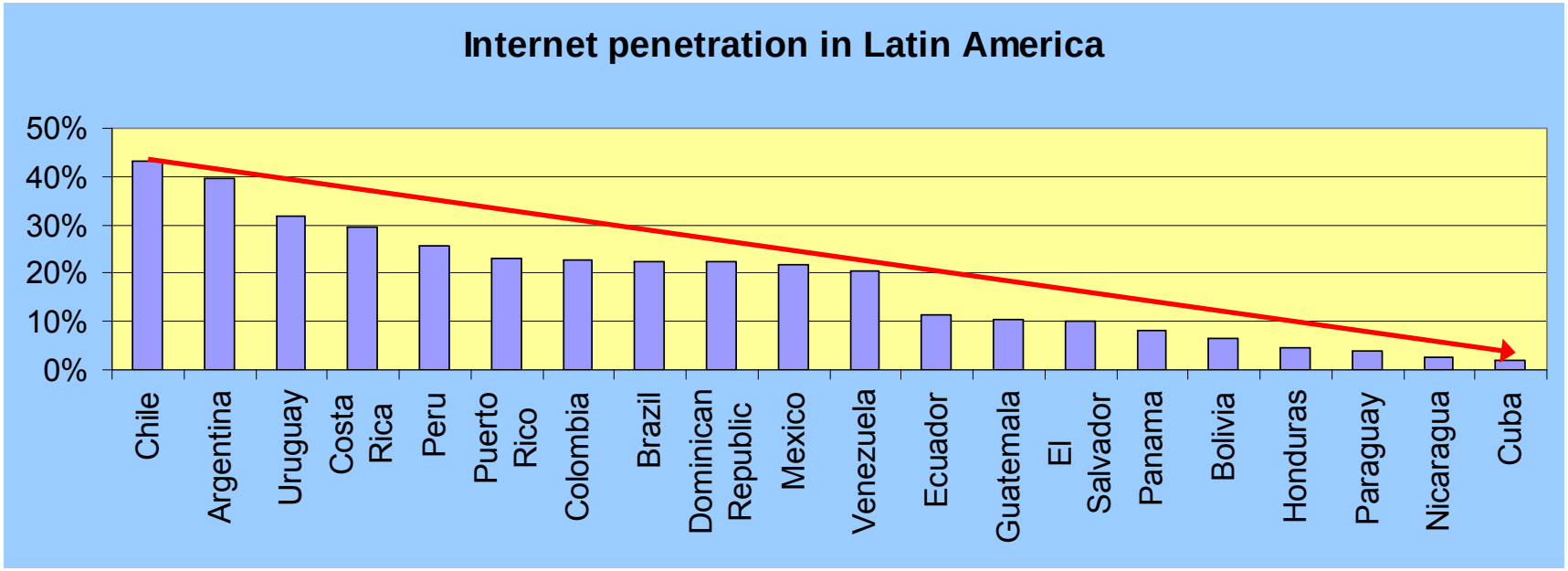
Source: Internet World Stats - www.internetworldstats.com/stats.htm
Estimated Internet users is 1,463,632,361 for Q2 2008
Copyright © 2008, Miniwatts Marketing Group



Source: Internet World Stats - www.internetworldststs.com/stats.htm
Penetration Rates are based on a world population of 6,676,120,288
for mid-year 2008 and 1,463,632,361 estimated Internet users.
Copyright © 2008, Miniwatts Marketing Group

- Latin America has higher internet penetration rates than the world average:
  - ➡ about 4 times the rates of Africa
  - ➡ about 1.5 times the rates of Asia

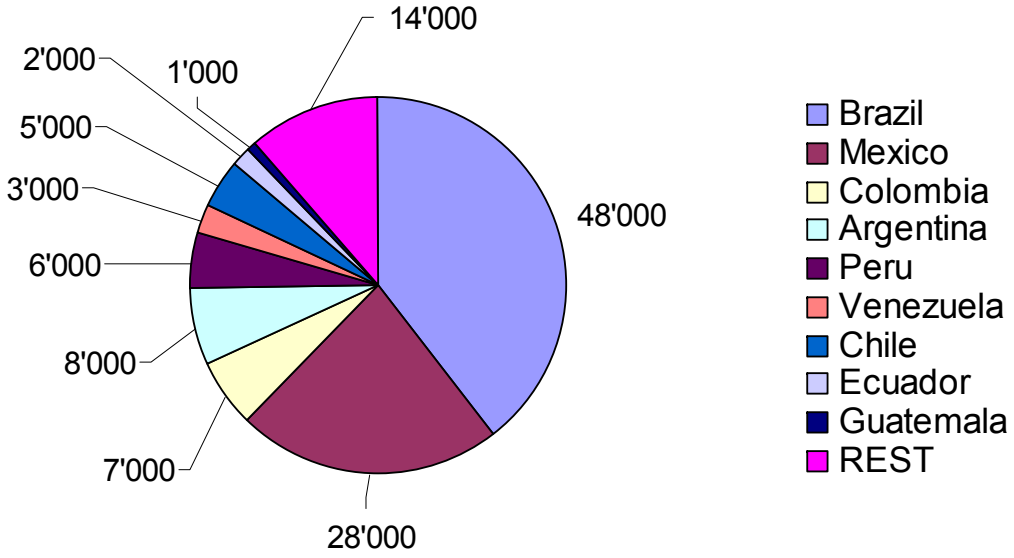
Internet penetration by country of Latin America



- Within Latin-America the range is wide:
  between around 40% (Chile and Argentina) and 2% (Cuba and Nicaragua)

Computer Waste in Latin America

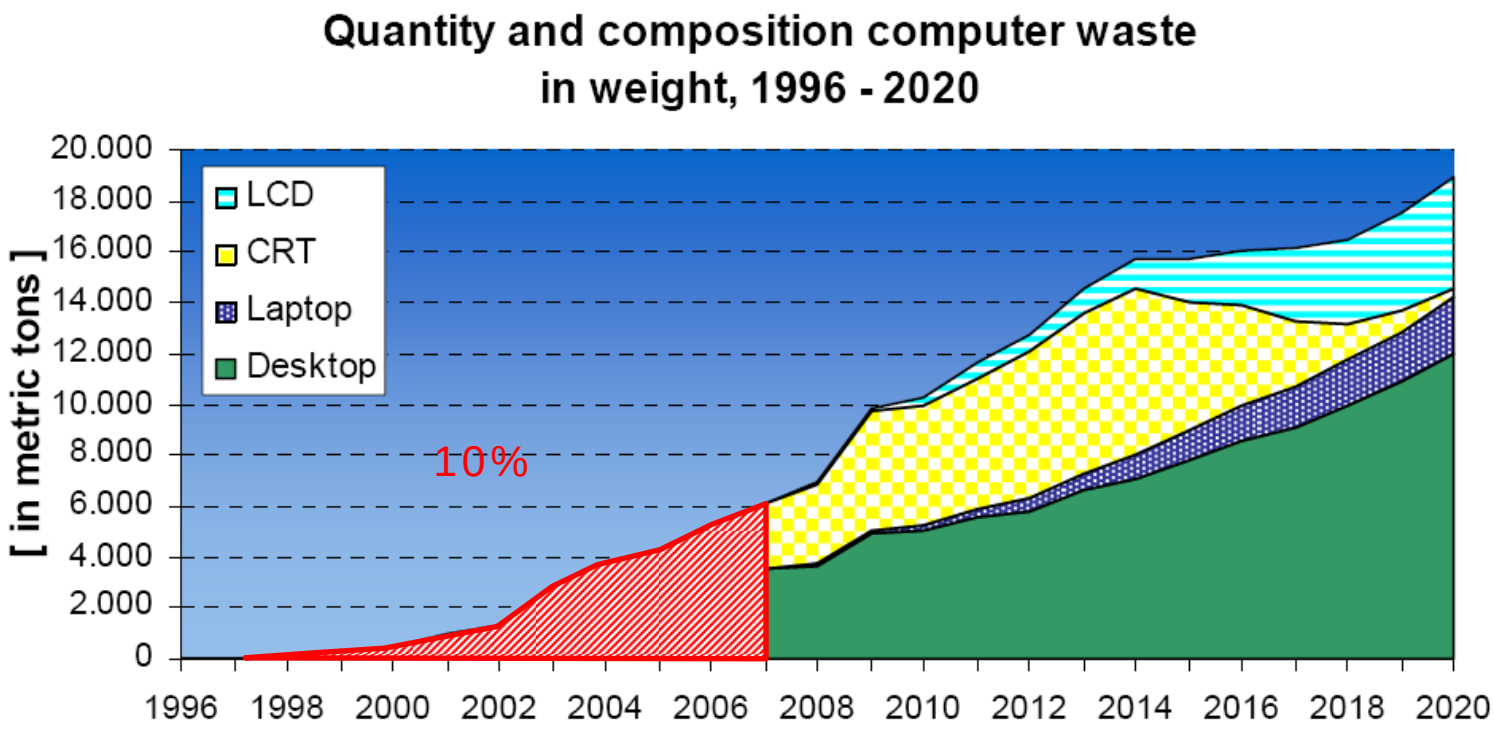
Estimated computer waste quantities Latin-America



Estimations by Empa

- An estimated 120’000 t of computer waste needs to be discarded in Latin America every year, a quantity which is estimated to triple by 2015
- Au, Ag and Cu contents together equal an actual economic value above 160 Mio USD per year
- Computer waste of Latin America equals about 1 % of yearly Cu and 3% of yearly Pb exports from Peru, these share will increase in the future!

The huge quantities still need to be disposed

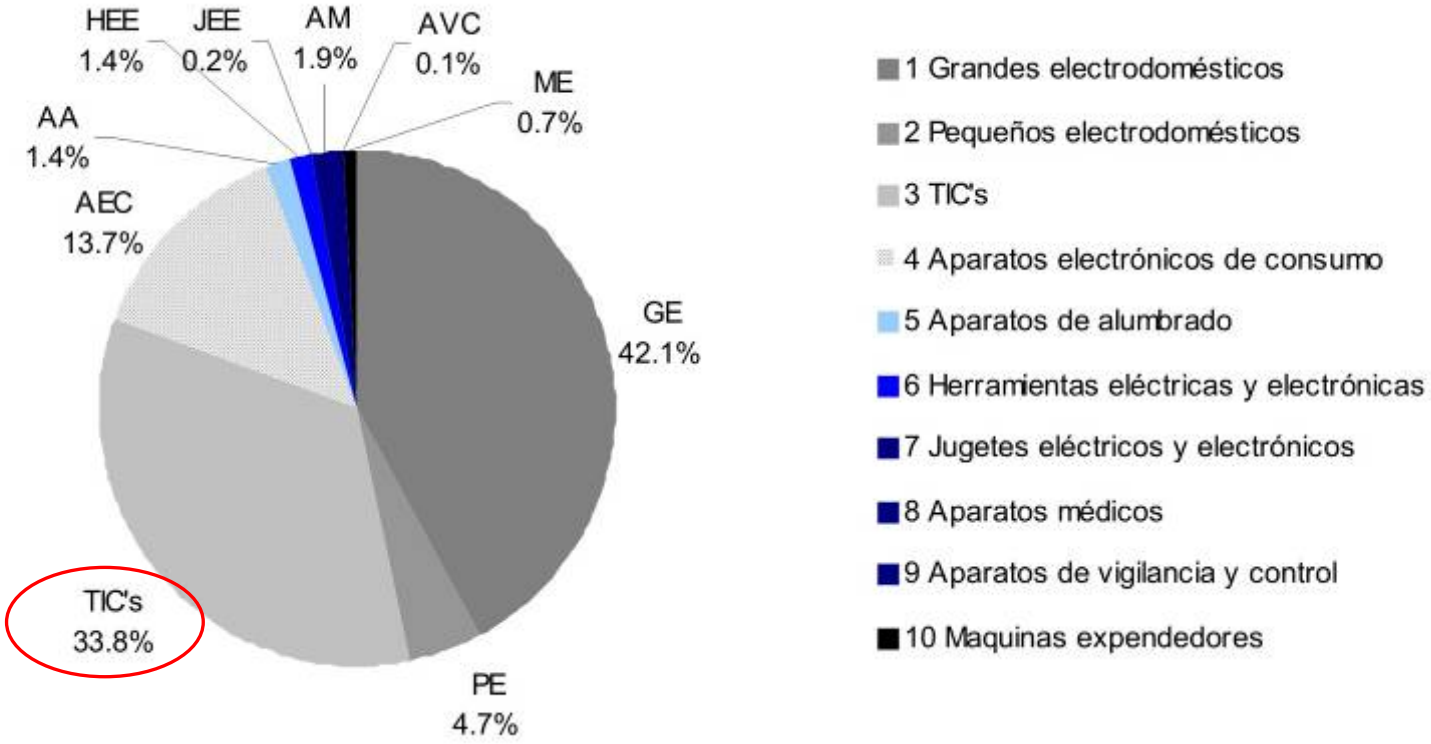


Source: Steubing 2007, SUR/EMPA

Example Chile:

- In the last 10 years only about 10% of the quantity of computer waste in the period 1997-2020 (23 years) have been generated, the other 90% are ahead

ICT waste and total e-waste



- ICT waste counts for about 34% of total WEEE in the European Union
- The same share reaches in Switzerland about 23%

Framework and infrastructure

Basel Convention (www.basel.int)

Basel Convention	Ban amendment
To secure the environmentally sound management of hazardous waste	To ban exports of hazardous waste from OECD countries to developing countries
■ Adopted 1989 ■ in force since 1992 ■ Status by Oct 2006: 168 ratifications of 170 parties ■ Absence of the U.S. and Afghanistan	■ Adopted 1995 ■ not entered into force yet ■ Status by Oct 2006: 63 ratifications of 170 parties ■ needs 75% ratification

EPR as a policy principle

DEFINITION OECD

EPR is a **policy principle** to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturers of the product to various parts of the **entire life cycle of the product,** and especially to take-back, recycling and final disposal of the product

Extended Producer Responsibility in a NON-OECD context, *Lindhqvist et al 2006*

EPR IMPLIES

- The **transfer of the responsibility** (physical and/or economical, complete or partial) ”upstream” to the producer and away from the municipalities
- The **provision of incentives** to foster environmental considerations in the design of the product

Reasons for an EPR

- **Limitations of systems operated by public authorities**
- **Internalization of environmental costs** along the entire life cycle of a product
- **Motivation** for
  - Eco-Design and efficient use of resources and materials (cleaner production and green products)
  - Easy disassembling for reuse and recycling
  - Elimination of hazardous substances

EPR Concepts

EPR Concepts	Examples
Take-back Programs	Mandatory take-back Voluntary take-back
Regulatory approaches	Minimum product standards Prohibition of certain hazardous materials or products Disposal bans Mandated Recycling
Voluntary industry practices	Voluntary codes of practice Public/Private Partnerships Leasing, servicing and labeling
Economic instruments	Deposit-refund schemes Advance recycling fee Fee on disposal Material taxes/Subsidies

Source: OCDE, 2001. Extended Producer Responsibility: A Guidance Manual for Governments

Legislative framework for WEEE in Latin America

- **Mercosur Policy Agreement** (2006):
  - …. to take measures *to ensure post-consumer responsibility by producers and importers*
- **OAS Santo Domingo Conference** (2006):
  - …. readiness to prevent and mitigate *negative effects associated with the use of ICT along the whole life cycle, particularly pertaining to an inadequate recycling*
- **Country WEEE legislations:**
  - Costa Rica: EPR as a policy principle
  - Mexico: Obligations on state level, but on national level still pending
  - Brazil: EPR introduced at state level, but not at federal level
  - Argentina: Project on specific WEEE legislation in preparation
  - Chile: Process has started
  - Peru: Draft of National waste legislation postulates EPR principle
  - Colombia: Legislation in preparation

Corporate responses

- **Computers**
  - Take-back program by Dell in Argentina, Brazil, Chile, Colombia and Mexico
  - Asset recovery services by Cisco and IBM
- **Cell-phones**
  - Take-back program by Nokia, Motorola and some service providers
- **Printer/Toner cartridges:**
  - Take-back program HP in Brazil, Chile, Colombia and Peru
  - Take-back program Lexmark in Argentina, Brazil, Chile and Mexiko

Recycling infrastructure

plataforma RELAC SUR/IDRC
e-waste swiss e-waste programme

In Argentina…

In Peru…

In Chile…

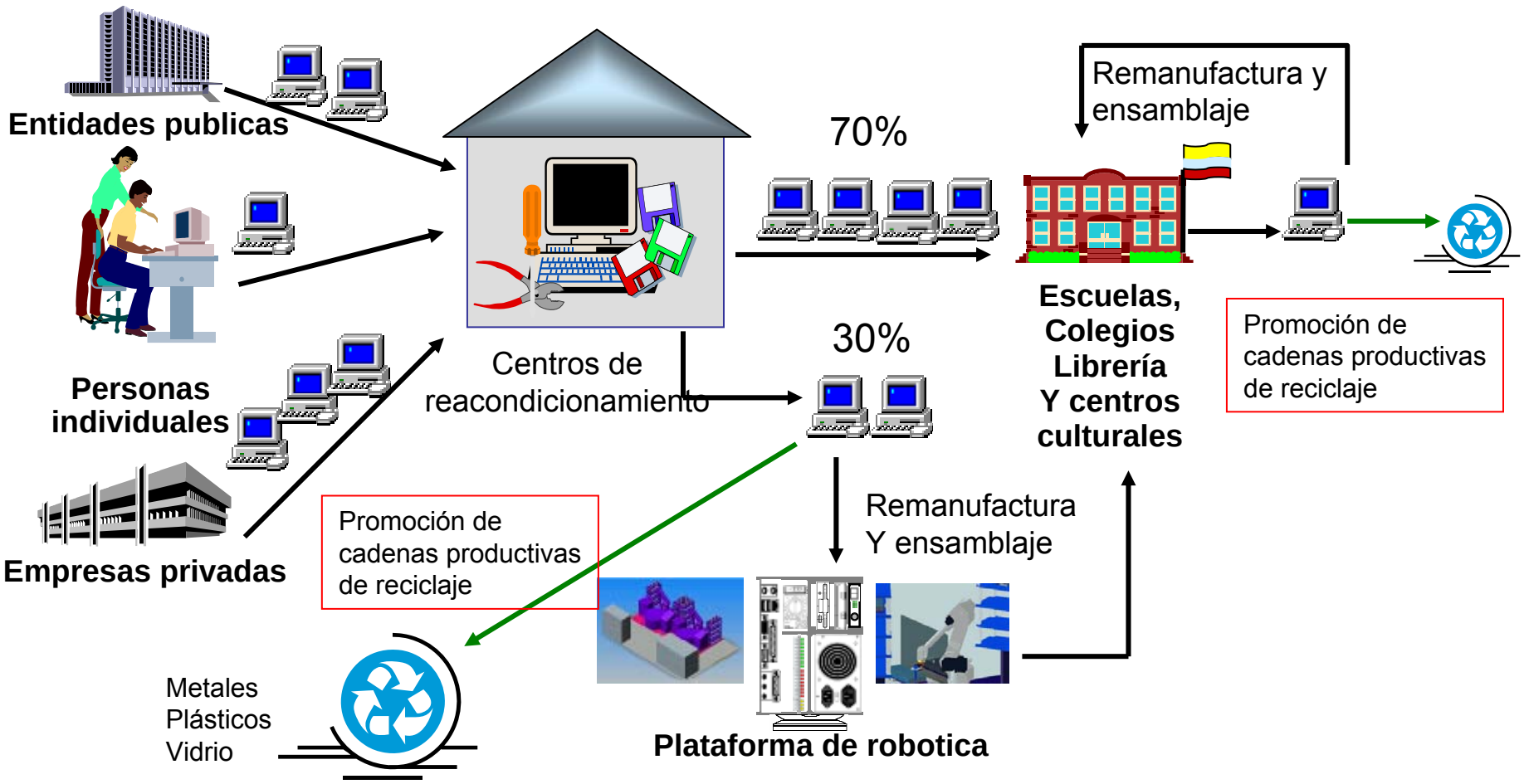
Refurbishment infrastructure

Example: Computadores para Educar (Colombia)


- Launched in 2000 by the Colombian Government
- 125.000 computers collected so far (from 1.700 entities)
- 77.000 computers , 6.800 printers reconditioned
- 8.960 schools benefited (2‘877‘000 pupils)
- Generation of 240 technical jobs

Refurbishment infrastructure

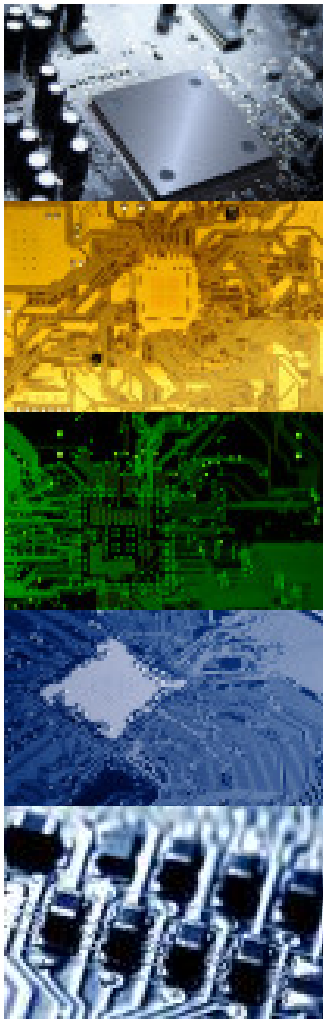
Example: Computadores para Educar (Colombia)



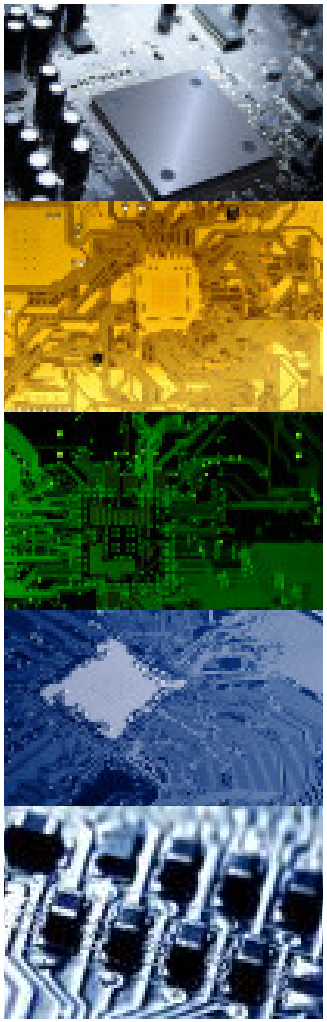
Mayor challenges

Mayor challenges

- **EPR in a Latin-American context**
  - EPR models need to be tailor-made to different levels of economy
  - Producer and importer associations have to be in the driving seats
  - “Collective responsibility”: Voluntary individual solutions will not catch-up with growing e-waste streams
  - Inclusion of non-branded computers (clones)
  - Intrinsic value of materials and financing of non-profit parts of a systems
  - Combination of refurbishment and recycling:
    - When is an integration useful?
    - Who should partner?
    - Should the government do recycling?



Mayor challenges



- **Policy and legislation**
  - Legislative process is slow and usually lags far behind actual problems
  - Enforcement is generally weak
  - Big countries (Brazil, Mexico) face structural challenges between federal and state level jurisdiction
  - Industrial lobbying against EPR
  - … but everybody waits for laws and regulations

- **Collection and recycling infrastructure**
  - How to integrate prevailing informality in recycling -> Risk that e-waste escapes from a future system
  - Logistics are complex and expensive:
    - Responsibility and financing
    - Effectiveness and efficiency
    - Decentralization vs. regionalization

Potential

Potential

- **Specific characteristics:**
  - High level of penetration of ICT equipment in comparison to other developing regions
  - High urbanization rate LAC 75% (Asia 40%, Africa 38%)
  - Rapid sales growths
  - Successful programs in social refurbishment (Colombia, Chile, Argentina etc.)

- **Social, environmental and economic potential:**
  - Eradication of potentially hazardous impacts: Relevant to health, safety and environment
  - Creation of jobs: 5'000 - 7'000 jobs *
  - Creation of economic activities: 100 - 200 companies *

*120'000 t/a computer waste

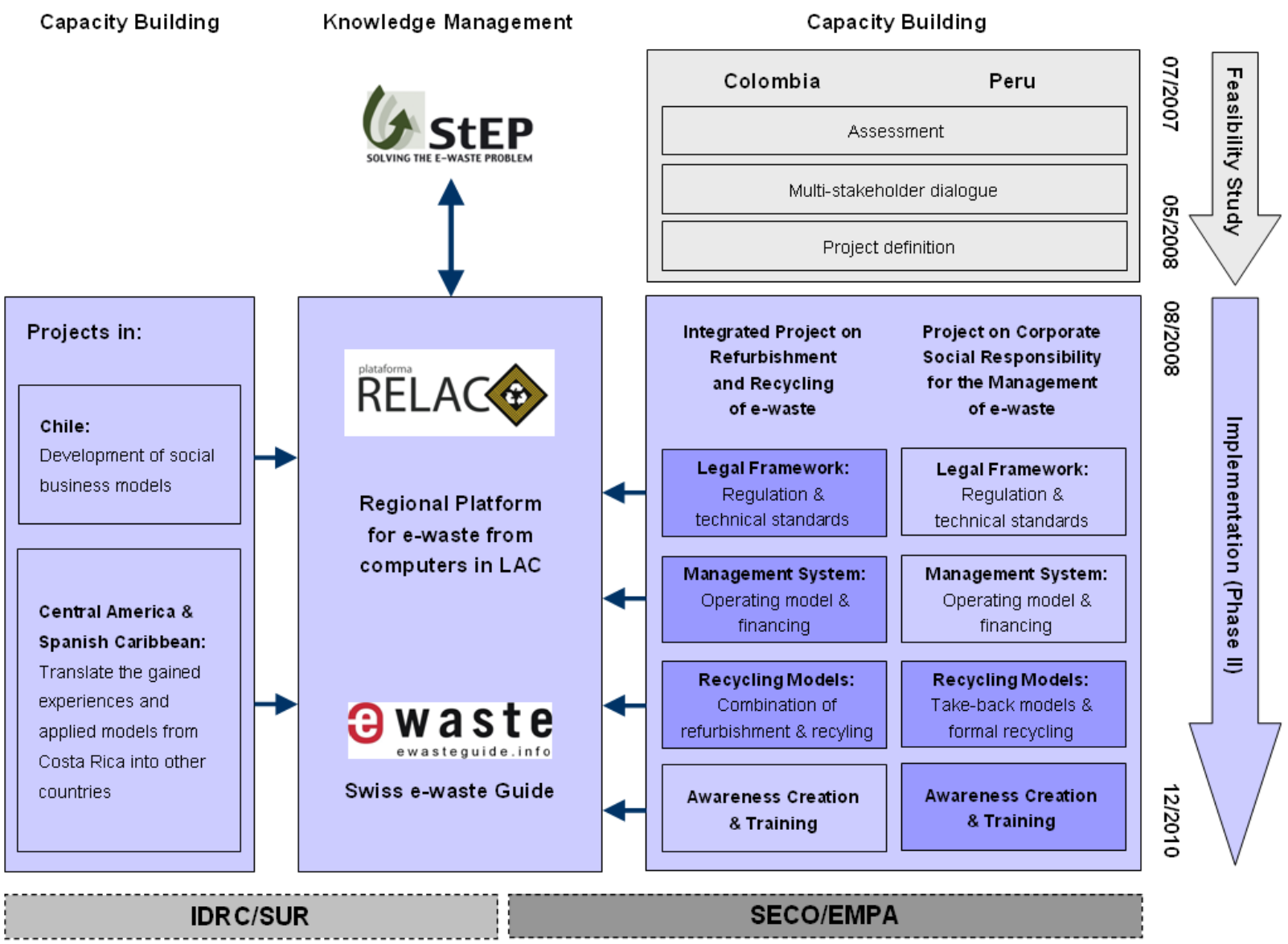
Potential

- **Aligning of policy frameworks and treatment standards:**
  - Regional logistics and recycling solutions (for example in Central America)
  - Quality assurance for OEMs
- **Harmonizing of operational schemes:**
  - Technology cooperation with experienced recycling companies in the US, Canada, Europe for better quality and higher economic yield
- **Control of Transboundary movements:**
  - Regional cooperation between PROs and Governments
  - Control of recycling companies

Running cooperation programs

- **Swiss e-waste programme:**
  - 2007-2010
  - Colombia, Peru, Brazil
- **Programme IDRC/Sur:**
  - Chile, Argentina, Costa Rica and Spanish Caribbean
  - Regional Platform RELAC
- **Dutch programme:**
  - Costa Rica
- **Mexican programme**

Programme of seco/Empa and IDRC/Sur



The Colombian Project as an Example

4 activity lines:

(1) **Legal framework:** Development of a legal framework and technical standards for the management and treatment of e-waste

(2) **Management of e-waste:** Development of management models and financing schemes for the management of e-waste

(3) **Treatment of e-waste:** Establishment of pilot plants for retake/collection and reuse/recycling, recovery and disposal of e-waste at local and national level

(4) **Awareness creation and training:** Elaboration of instruments for sensibilization, training and technical capacity building of different stakeholders

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