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Mapping UNSW Impact
Global Development

Primary SDG	**12: RESPONSIBLE CONSUMPTION AND PRODUCTION**
Broad theme	Recycling e-waste to create valuable resources
Research	Creating microfactories in India where e-waste can be recycled into valuable resources
Impact region	India
Faculty	Science
School/Institute	Centre for Sustainable Materials Research and Technology (SMaRT Centre)
Academic	Professor Veena Sahajwalla
Project partners	ARC Laureate Fellowship
	Indian Academy of Science
Related SDGs	9: Industry, Innovation and Infrastructure
	11: Sustainable Cities and Communities
	1: No Poverty

Elevator pitch

UNSW has invented a microfactory that can efficiently form valuable metal alloys from discarded e-waste, helping India to reduce landfill, expand its recycling industry and create local jobs.

The Challenge: What do we about the alarming rise of e-waste?

Electronics is one of the world's fastest growing contributors to waste. The value embedded in e-waste is estimated to be more than $52 billion but the industrial world has yet to come up with a way to efficiently and economically tease apart the tangled and tiny amounts of resources in each piece of e-waste. Instead nearly 50 million tonnes of e-waste, much of it toxic, is being sent by ship to developing countries every year to be hand processed by poor communities, with volume increasing by 3-5 per cent every year.

E-waste contains gold, iron, silver, copper, platinum and palladium, as well as rare earth elements. In India, most e-waste is treated with chemicals in rivers, lakes or canals, causing irreparable damage to the environment, or it is sold in the market to scrap dealers who dismantle it.

India was the fifth largest producer of e-waste in the world in 2016, generating 1.85 million tonnes annually, according to a KPMG report. Computers account for 70% of this waste, with 12% coming from mobile devices. Megacities Mumbai, Delhi and Bengaluru are the biggest producers in the country. There is little awareness about e-waste recycling, a fact not helped by a lack of recycling equipment and skilled labour, and a fragmented and unorganised supply chain.

UNSW's solution: Recycle e-waste using microfactories

Veena has spent the last five years working with industry and partners sharing her vision for a future where we look to our waste for resources instead of digging up virgin materials from the ground. She and her team at SMaRT have invented the microfactory. Inside it, skilled workers and simple robots segregate e-waste and place it into furnaces burning at selective temperatures that separate the waste and form different kinds of metals, such as copper alloys and rare earth elements.

The microfactory can be configured to recycle different types of e-waste. They can also be set up in shipping containers or in mobile trucks, enabling recycling to be done close to the waste. This will create local jobs and it avoids the cost and time involved in shipping waste to large-scale recycling plants.

As part of her Jubilee Professor award from the Indian Academy of Science, Veena has been touring India promoting her microfactory solution to industry and academics. Feedback has been excellent, with everyone agreeing the technology is suitable for India and Indian researchers keen to partner with UNSW.

The Impact: Significantly expand e-waste recycling in India, creating jobs and saving the environment

India urgently needs a safe, low cost recycling solution for e-waste. Veena's flexible microfactory is well suited to India's fragmented market and has the potential to radically transform the country's recycling efforts. With the microfactory requiring minimal training, local communities can easily get involved and start their own microfactory business.

An e-waste microfactory prototype is currently being built at the SMaRT Centre and will be open to the public by January 2018. Veena says development of small scale microfactories across India are possible in the next two-to-three years, with microfactories specialising in different types of e-waste. She says a holistic solution is best, one that involves big and small companies, local communities, the not for profit sector, and existing collectors and businesses. She also sees synergies between a new microfactory industry and the Indian Government's 'Make in India' campaign.

Researcher

Scientia Professor and ARC Laureate Fellow Veena Sahajwalla is the Founding Director of the Centre for Sustainable Materials Research and Technology (SMaRT). She is also the inventor of 'green steel' technology that sees used car tyres used in the steel making process in place of coal, saving two million used tyres from landfill to date. When Veena looks at waste, she sees untapped value that can help us save the environment and create sustainable and local economies.

Ben Falkenmire 18.09.17