Sunlight for Communication

# Societal problem

In this information age, communication is central but is taking a toll on the earth.

By 2013, we were already using 50% more energy moving bytes than moving airplanes around the world. Moving information is rapidly becoming more important, and more expensive, than moving physical objects.

Our societies face a major challenge: How can we satisfy our ever-growing demand for communication but in a sustainable manner?

# Societal values & Innovation

Sustainability is the defining principle of our work.

Any new technology we develop must leave no ecological footprint, or as Bill Gates puts it “we need to go all the way down to zero”. My research helps with meeting that goal by using a free, abundant and natural resource to provide communication: sunlight.

Instead of consuming energy for communication – as with current radio technologies (Wi-Fi, Cellular, Bluetooth) – we are using existing energy (sunlight).

Moving information boils down to moving energy. Your smartphone transforms your calls, videos and apps into small pieces of information (ones and zeros); and the radio transmitter in your phone (Wi-Fi or 4G) sends these ones and zeros in the form of energy bits. Sending one energy bit is not much of a burden, but we send trillions every day. And communication demands are growing rapidly. Over the next three years, we will triple the number of devices connected wirelessly, from 8 billion to 24 billion--without including smartphones, tablets and computers.

By using sunlight, we eliminate the costs associated with the middle-man (no radios). We do not need to consume energy, we simply reflect energy to transmit information. This is how European armies communicated wirelessly in the 17th century, by using mirrors. Nowadays, thanks to smart materials – such as smart glass – we can obtain similar changes in reflections, but without you noticing them!

**Example**: You are visiting Amsterdam and you want the map of the city on your phone, but you don’t want to use your data plan to download the map (no radios). You go to any tram or bus station. The glass panels in the stations are smart materials. Sunlight impinges on the glass, and the glass’ surface absorbs and reflects light (like a mirror) to send energy bits of information. These changes in reflection are so fast that your eyes will not perceive them. You simply get your phone out, point it towards the direction of the glass panel and the light sensor in your phone gets the map by decoding the energy-bits reflected by the panel.

My vision for a future society is to cover our buildings, cars, people, or any other object, with smart materials. In that way we can transform the surfaces of our cities into active elements that can communicate in an eco-friendly manner: Cities that get sunlight and reflect back information.