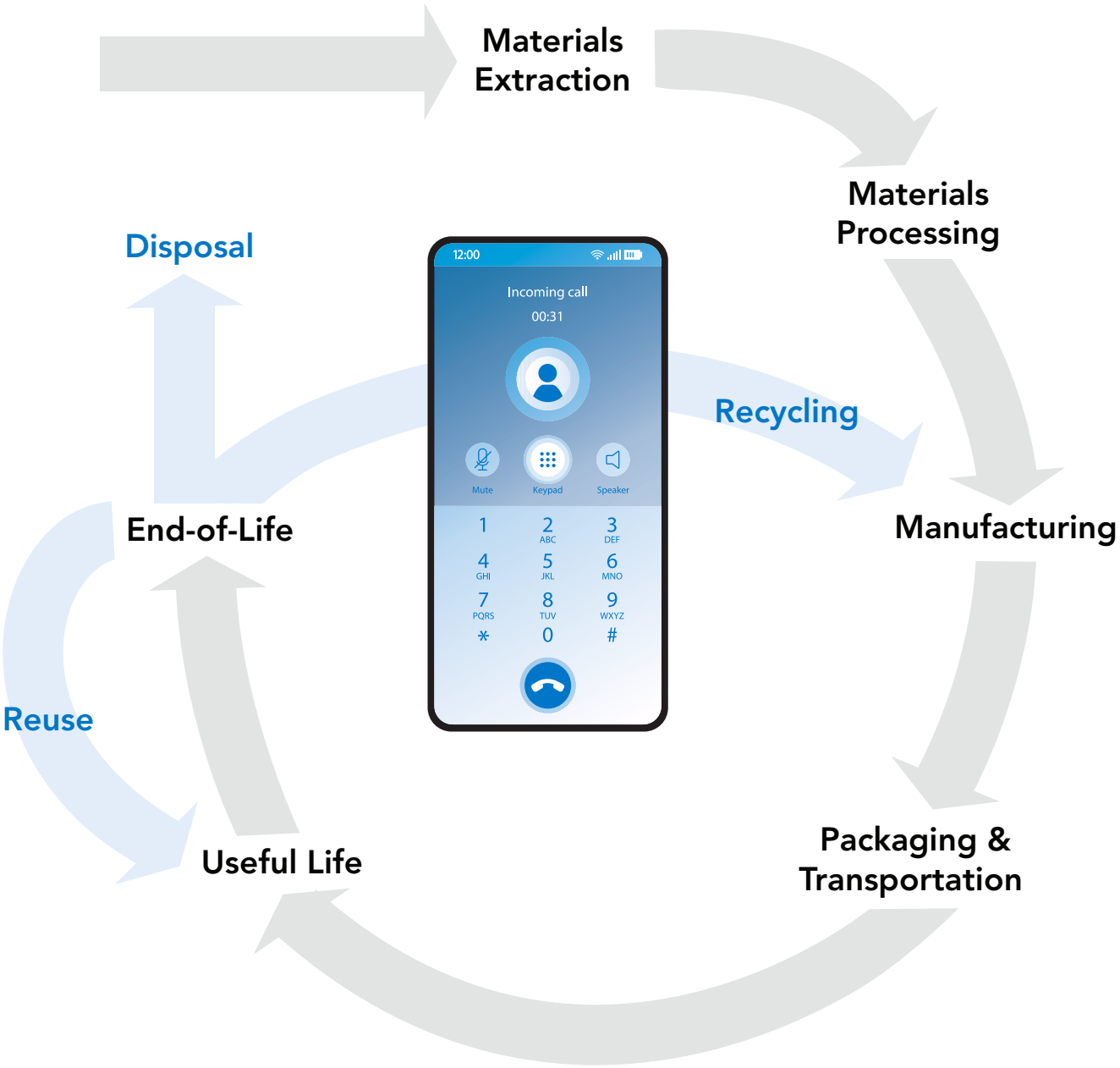
The Life Cycle of a Cell Phone

The following life cycle has been adapted from the Environmental Protection Agency's (EPA's) resources on the life cycle of a cell phone.



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Cell phones consist of nine basic parts, each of which has its own life cycle:

The Nine Basic Parts of a Cell Phone

1. Circuit board/printed wiring board
2. Liquid crystal display (LCD)
3. Battery
4. Antenna
5. Keypad
6. Microphone
7. Speaker
8. Plastic casing
9. Accessories (such as adapters, headsets, carrying cases, and decorative face plates)

The Six Phases of the Life of a Cell Phone

Phase 1: Materials Extraction

A cell phone is made up of primarily three types of materials: 40 percent metals, 40 percent plastics, and 20 percent ceramics and trace materials. Three main components of a cell phone are circuit board (brain of the phone), liquid crystal display (screen), and the battery (energy source).

The circuit board controls all the functions of the cell phone and is made from raw materials including copper, gold, lead, nickel, zinc, beryllium, tantalum, coltan, and other metals. The production of the board requires sand and limestone for fiberglass and crude oil for plastic many of which are "persistent toxins" that can stay in the environment for long periods of time, even after disposal.

The liquid crystal display (LCD) works as a display screen by becoming opaque (hard to see through) when electric current passes through it. The contrast between the opaque and transparent areas forms visible images and characters. Various liquid crystalline substances, such as mercury, a potentially poisonous substance, are used to make LCDs, which also require the use of glass or plastic.

The rechargeable battery is the power source of the phone. Several types of batteries are used in cell phones: nickel-metal hydride (Ni-MH), lithium-ion (Li-Ion), nickel-cadmium (Ni-Cd), or lead

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acid. Some of these batteries contain nickel, cobalt, zinc, cadmium, and copper. Li-Ion batteries use lithium metallic oxide and carbon based materials, all mined from the earth.

Phase 2: Materials Processing

Raw materials must be processed before they can be used to make products. In cell phones:

- Crude oil is mixed with natural gas and chemicals to make plastic;
- Copper is mined, pulverized, heated, and treated with chemicals and electricity to extract the pure metal used in the cell phone. The purified copper pieces are shipped to a manufacturer where they are converted into wires and sheets.

Phase 3: Manufacturing

The basic shape of the circuit board is made up of plastics and fiberglass, which is then coated with gold plating. The board carries several electronic components, connected with circuits and wires (primarily made of copper) that are soldered to the board and secured with protective glues and coatings. LCDs are made by sandwiching liquid crystal between layers of glass or plastic. Batteries consist of two electrodes, made from two different metals, and a liquid substance, called electrolytes.

Phase 4: Packing and Transportation

Cell phone parts and the finished products are packaged and transported. Transportation by truck, train, or planeall require burning of fossil fuels, which can contribute to global climate change. While packaging protects products from damage, decorative packaging can be wasteful. Packaging consumes valuable resources, such as paper (from trees), plastic (from crude oil in the earth), aluminum (from ore), or other materials, all of which require energy and can result in waste. Recycled materials can be used for some packaging.

Phase 5: Useful Life

It is estimated that on average people replace their smartphone once past the age of 2.75 years. The life of a cell phone can be extended by taking care of it—protecting it from damage, avoiding dropping it, and keeping it out of extreme heat and cold and away from water and other liquids. Extending the life of a cell phone even by a year could reduce many tons of e-waste.

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Phase 6: End of Life

Donating or recycling cell phones when you no longer need or want them extends their useful lives, and prevents them from ending up in the trash where they can potentially cause environmental problems.

Reuse

Many organizations — including recyclers, and electronics manufacturers — accept working cell phones and offer them to schools, community organizations, and individuals in need. Reuse gives people, who could not otherwise afford them, free or reduced cost access to new phones and their accessories. Plus, it extends the useful lifetime of a phone.

Recycle

Electronics recyclers are springing up everywhere! Today, many stores, manufacturers, and recycling centers accept cell phones for recycling. Some rechargeable batteries can also be recycled. When rechargeable batteries are recycled, the recovered materials can be used to make new batteries and stainless steel products. You can google to search for local contacts that recycle and refurbish cell phones. For every million cell phones recycled, 35,274lb of copper, 772lb of silver, 75lb of gold, and 33lb of palladium could be recovered.

Disposal

The rate at which cell phones are discarded is more than 150 million phones each year, resulting in more than 78,000 tons of e-waste! Cell phones that are thrown in the trash end up in landfills or incinerators (burned). Because cell phones contain metals, plastics, chemicals, and other potentially hazardous substances, one should always recycle, donate, or trade in one's old cell phone. It's free and easy. Phones that are thrown away waste energy and result in the loss of valuable resources.