Handout 1: What is Technology?

In discussing the *philosophy of technology*, one natural place to start is by defining what a "philosophy of technology" attempts to achieve. There is definite agreement concerning what a philosophy of technology is **not**. It is not idle or wild speculation, it isn't the ability to know how to use a technology, it isn't the ability to describe a technology in detail (e.g. how its parts work), and it isn't simply giving the history of technology, e.g. who invented what and when. This kind of interaction with technology is best left to fortune-tellers, engineers, historians, and other folk. But what is a *philosophy* of technology?

1. What is a Philosophy of Technology?

One way of approaching this type of goal is to look at what *philosophers* of technology or those who philosophize about technology do. Essentially, philosophers of technology (1) raise a variety of very abstract, general, difficult, yet practical questions about the nature of technology, (2) try to give answers to these questions, and (3) give reasons and arguments in support of their answers, and (4) criticize alternative answers by raising objections.

In this class, we will do the same. We will offer arguments for various positions by giving reasons or premises (P) and raise objections (O) to these arguments. Here is an example:

ARGUMENT	**OBJECTIONS**
HUMANS AS ONLY TOOL-USER ARGUMENT **P1** Humans use technologies. **P2** Animals do not, and perhaps cannot, use technologies. **C** Therefore, tool-usage, the use of technologies is one thing that separates humans from animals.[1]	**O1**: P1 is false because [insert justification here] **O2**: P2 is false because [insert justification here]
P = refers to premise or reason **C** = refers to Conclusion	**O** = refers to objection

As a first stab then, we might try to define a philosophy of technology using what we will call *The Big Picture Definition*. The big-picture approach tries to capture what is **essential** about the topic. For example:

> **Big Picture Definition of the Phil. Of Tech.** = A branch of philosophy concerned with fundamental questions about technology.

As a start, this is a great definition and it captures a lot about what a philosophy of technology aims to do, but it has a few problems.

[1] See Oakley, K. P. 1976. *Man the Tool-Maker*. University of Chicago Press.

O1: many fields of study deal with questions about technology and some of them are fundamental in nature, e.g. whether certain technologies are possible, cost-effective, etc.
O2: The definition does not give us an idea of *what topics or what questions* are dealt with.

These problems suggest a contrastive definition.

Contrastive Definition of the Phil. Of Tech. = A branch of philosophy that neither deals with topics concerning the philosophy of biology, the philosophy of science, questions concerning right and wrong (i.e. not ethics) nor with topics concerning knowledge (i.e. not epistemology).

O1: It is a negative definition. The definition tells us what a philosophy of technology *is not* but it doesn't tell us what a philosophy of technology *is*.
O2: It does not give examples of what topics a philosophy of technology addresses
O3: It isn't accurate as a philosophy of technology covers some of the same topics as a philosophy of biology, etches, epistemology, etc.

In thinking about the two definitions above, here is a definition of the *philosophy of technology* that tries to capture the positives and avoid the problems with the above definitions:

Hybrid Definition of the Phil. Of Tech. = Df. A central branch of philosophy that addresses fundamental questions about the nature of technology. Some of these fundamental questions include:

QUESTIONS ABOUT TECHNOLOGY	TYPE OF QUESTION
what is technology?	metaphysical
are certain technologies, certain uses, or the development of certain technologies morally good or bad?	ethical
how do technologies shape how and what we know about the world?	epistemological
how technologies influence political systems and individual autonomy?	political, sociological
how does technology shape our understanding of what it means to be human?	anthropological
do technologies promote human flourishing?	economic / aesthetic
the impact technologies have on culture?	sociological

This definition seems to draw on some of the strengths of the previous definitions, gives a hint of some of the topics involved in the philosophy of technology, and offers a positive definition. However, there are two drawbacks to the definition-by-example definition:

O1: it is incomplete in that it does not give a comprehensive list of topics covered by philosophy of technology
O2: it does not offered a *criterion* indicating which topics belong to the philosophy of technology and which do not.

CDQ: So, can we define a philosophy of technology?

2. What is Technology?

Provisionally, we might say that "technology" refers to two things.

Technology as Activity: it refers to a kind of *activity*, namely the usage, creation, modification, alteration, and knowledge of tools, machines, or systems *that* are employed to achieve some specific function.
Technology as Artefact: it refers to a collection of *objects* that include tools, machinery, gadgets, weapons and toys.

CDQ: Let's try to get a clearer sense of what we mean by "technology". Take a moment to write down a list of technologies on the left-hand side and a list of properties belonging to technologies on the right-hand side.

TECHNOLOGIES (EXTENSION)	PROPERTIES OF TECHNOLOGY (INTENSION)

3. Five Misconceptions about Technology

Misconception #1: Using or constructing technologies is a distinctly human activity

Some have taken tool use or the creation of technologies to separate human beings from animals. The argument goes something like this:

HUMANS AS THE ONLY TOOL-USER ARGUMENTS

P1	Humans use technologies.
P2	Animals do not, and perhaps cannot, use technologies.
C	Therefore, tool-usage, the use of technologies is one thing that separates humans from animals.[2]

The use of "technology" in the above argument is ambiguous. On the one hand, let's suppose that what is meant by **"use technologies"** in **P1** is to *use any object as a tool*, i.e. to use some object that is not one's own body for some purpose.

> **O1**: P2 is false because animals certainly use tools.
> Examples: orangutans use leaves as gloves to gather spiny food, bonobos use tool for personal hygiene, gorillas use branches as walking sticks and to test water depth, capuchin monkeys crack nuts with stones, mandrills use tools to clean their ears, macaques tools to pry open oysters, elephants use branches to swat flies, bears use rocks to exfoliate their skin, etc.

On the other hand, building a nuclear power plant is different from picking up a rock and using it to break an egg. Thus, let's suppose that what is meant by **"use technologies"** is *creating and using a tool in some sort of novel way that goes beyond simply using something found already in nature.*

[2] See Oakley, K. P. 1976. *Man the Tool-Maker*. University of Chicago Press.


Figure 1: Paper Wasp Queen (Wikipedia, GNS)

O2: **P2** is still false for it is not the case that only human beings *create technologies*.
Examples: a variety of creatures build *structures* either for shelter (habitats), to catch prey, or to communicate. For example, beavers build dams, bees make hives, termites make large cathedral-like mounds.
O3: P2 is false as animals also refine material in nature. Some structures are built with a *variety* of different materials while others make use of *processed* materials.
Example 1: the Long-tailed Tit constructs its nest with over 6,000 pieces of lichen, feathers, spider egg cocoons and moss
Example 2: Paper wasps gather wood and mix it with their saliva to build hives with paper pulp.[3]

Misconception #2: A technology is simply a tool used for achieving a specific purpose

We might ask the following (I think somewhat strange) question:

> What do technologies mean?

In considering an answer to this question, let's consider the following:

> **A1:** The meaning of these technologies (as artefacts) is signified by their purposes.
> Examples: Nuclear power plants are for creating energy, hammers are for driving nails or associated construction tasks, the latest telephone is for communicating via SMS, MMS, or voice.

O1: Technologies have flexible uses
Example 1: What is the meaning of "a pencil"?
Example 2: Coat hanger.

O2: The meaning of technology is not limited to the immediate task for which it is used. It also tells a *story* about its users by doing any of the following:
(1) Signifies what people deem *important*
Example 1: Giant football stadium vs. dilapidated English building
(2) Technologies convey what *image* or *impressions* they want to convey
Example 1: A hybrid car vs. a huge gas-guzzling truck
Example 2: Flip phone vs. latest iphone
(3) Technologies express cultural achievements and represent systems of knowledge
Example: Stonehenge
Example: Touch screen computers on campus vs. fixed stone installations

Misconception #3: Technology is something new, older than writing

When people hear the word "technology", they often think of the latest invention (what are sometimes called "high technologies"). But the latest invention today will be considered a primitive

[3] Hansell, Michael Henry (2007). *Built by animals: the natural history of animal architecture*. Oxford University Press. pp. 76-77.

(even natural) tool by human beings 100 years from now. Humans have been creating and using technologies for hundreds of thousands of years.

The use and development of technologies is older than writing!

TOOL USE IS OLDER THAN WRITING

2.6 million years ago	Early humans (pre *Homo sapiens*) developed stone toolkits (e.g. stone tools for cutting)
1.76 million years ago	Early humans developed handaxes
400,000 to 200,000 years ago	Middle Stone Age humans made projectile points for spears and other projectile weapons. In addition, tools were developed to scrape various materials like animal hide and wood.
Flash forward a couple hundred thousand years!	
7000 B.C.	Proto-writing or picture-symbol systems emerged
3000 B.C.	The earliest writing systems (e.g. "proto-Elamite") emerged

Misconception #4: Technology is applied science

It is often thought that technology emerges out of pure science. The impression is *scientists propose new ideas, these ideas get tested in experiments, and engineers and inventors use these ideas to construct technologies that operate in accordance with these new ideas.*[4] But this is not always the case. That is, the creation and use of certain technologies has sometimes *preceded* and *provoked* scientific knowledge.

Example 1: (Newcomen Steam Engine). Around 1712 Thomas Newcomen created the first steam engine for pumping water. Newcomen was not a scientist, but instead an ironmonger (involved in various aspects of the manufacture and supplier of iron). One of the difficulties associated with mining is that water collects in the mind and the water must be removed. Newcomen thus devised the steam engine as a practical way of pumping water out. While various devices were previously employed to use steam to produce mechanical work and Denis Papin had proposed a model for such a machine, according to Nye (p.10) Newcomen was not influenced (or even aware of Papin's work) and instead developed the engine through "trial and error of practical experiments" (p.11).
Example 2: Wright Brothers (not scientists). Invented and built the first successful airplane

Misconception #5: Technology is a distinctly male-driven discipline

Technology is often understood as a male-driven discipline due to the disparity between men and women in technical fields like engineering and that many of the most famous inventions were by men. This might lead some to say that (1) men are just better at technology than women, (2) technology is a uniquely male area of work.

[4] See Cyril Smith in Rhodes, Richard. 1999 *Visions of Technology*, p.331

O1: Women have played a role in the development of technology and creation of numerous technologies.[5], [6]
Examples 1: the circular saw (Tabitha Babbit, 1810)
2. liquid paper aka White Out (Bette Nesmith Graham, 1958)
3. COBOL, one of the first computer languages (Grace Murray Hopper)
4. Windshield wiper (Mary Anderson, 1903)
5. Nystatin, the first fungus-fighting drug (Rachefl Fuller Brown and Elizabeth Lee Hazen, 1950)
6. Kevlar (Stephanie Kwolek, 1964 while working for DuPont)
7. medical syringes (Letitia Geer, 1899)
8. and many others!

O2: Part of the reason women have not been involved in certain technical fields like engineering has to do with their exclusive from higher education. At least in the United States, during the 19th century women were neither encouraged nor allowed to pursue advanced degrees. Today, however, there are a number of incentives and societies that encourage women to enter into technical fields, e.g. The Society of Women Engineers (SWE) and IEEE Women in Engineering (WIE).

[5] Women were responsible for making ale in the 1300-1600. See Bennett, Judith M. 1996. *Ale, Beer and the Brewster in England: Women's Work in a Changing World, 1300–1600*. Oxford University Press.
[6] See Oldenziel, Ruth. 1999. *Making Technology Masculine: Men, Women, and Modern Machines in America*. University of Amsterdam Press