Longitude Example: What is the lesson?

**What do these have in common:**
- Knowledge that “DNA is a double helix”
- Software
- Digital music

Public Goods:
- **Nonrivalness:** High cost to create; zero cost to distribute or use. What is the efficiency conclusion?
- **Nonexcludability:** If the good is nonexcludable, IP will not work!!
Private Goods: The competitive market is efficient

price = marginal cost: Why is that efficient?

What if a template must be developed?
Information Goods: the market doesn’t work

(What is the price with free entry?)
(What is the price with intellectual property?)
(Isn’t public funding better? Why or why not?)

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What does IP do?

• First, IP creates (as a legal matter) excludability.
  – Does this “solve” the public goods problem?
  – What about nonrivalness?
• Second, IP provides at least a weak efficiency test as to whether the value of investment exceeds cost
• Third, IP does a bad job of delegation
  – It does not privilege the more efficient firms
  – It does not regulate entry and duplication
• Fourth, IP leads to deadweight loss
• Fifth, concentrates costs among the users
Intellectual Property: Compared to what?
Public Sponsorship?

• 1840’s, photography: A patent buy-out.
• 1960’s and 1970’s Super Sonic Transport
  Public support for private enterprise.
• 1700’s and 1800’s Lyons’ weavers
  Prizes in a guild
• Napoleon: Food preservation
  Invention for the public good
• NIH, NSF: Researcher-initiated projects
• NASA: Targeted government objectives
Prizes are complicated

- Targeted objectives versus scarce ideas
  Lyons (scarce ideas, leading to blue-sky prizes)
  Napoleon’s food-preservation (targeted)

- Scarce ideas: A single inventor has an idea. He must decide whether to invest in it.

- An idea is a pair \((v,c)\) where \(c\) is the cost of making the idea an innovation and \(v\) is per-period profit.
  (Review the market diagram above, where \(v\) is the area under the demand curve.)

- Investment is efficient if \(v > c\).
Prizes

• Should the prize depend on cost? (for example, prize=cost?)
  Problem 1: what is cost? There is no incentive for an inventor to step aside for a more efficient inventor.
  Problem 2: What if cost exceeds value, \( v < c \)? Inventors have no incentive to leave out inefficient innovations.

• Should the prize depend on social value? (for example, prize=v?)
  Seems fine when a single inventor has an idea, but couldn’t it also lead to a cost-duplicated race?

• Which rule do patents follow?
  Is the patent linked to the cost of invention? (no)
  To the value of the invention? (yes)

• Patent buy-outs: Photography, Hyatt and celluloid
  The patent becomes a prize and deadweight loss disappears!
  How does this ensure that the value of the prize is linked to the social value of the invention? (Because that is true of patents.)
Prizes: Bottom line

• If the value of the invention (or the size of the new market) is known to the prize giver, then a prize is better than a patent because it can avoid deadweight loss.

  This advantage of prizes over patents is tempered by the problem that a prize may impose costs on non-users.

• However there are many ways to make sure that the prize depends on the social value of the invention.

  (1) Lyon textiles: Link the prize to adoption rate.

  (2) Allow patents, and let the public authority buy the patent. Buy-out price is at least the value of the patent.

  (3) Ask the users! There are many clever ways to do this.

• A problem shared by both patents and prizes:

  The money is given after the money is needed, so the innovator must often find a backer.
Targeted objectives: another problem for prizes
What if there is more than one idea to solve HIV?

- Firms 1, 2 have ideas \((v_1, c_1), (v_2, c_2)\):
  Invest in idea-1 if \((v_1 - c_1) > (v_2 - c_2)\)

The best idea is not necessarily the lower-cost idea.

- Suppose we auction the right to invest in this market, much like taking bids for a contract to build a house. Outcome?
  This will get us the lower-cost inventor, not the better investment.

- The auction would work if the bidders would collect the entire value \(v - c\). Is this possible?
Choosing among Ideas: Prototype contests

• In this situation, the innovation czar (think Pentagon and fighter jets) cares about quality as much as about cost.

• There is no easy way to ascertain the net value $v-c$ before seeing the innovation, hence, a prototype contest.

• Prototype Contest: firms develop prototypes; sponsor chooses.
  Second best solution! The Pentagon pays for two prototypes

• Why might the prototype contest not work?
  If each firm knows it might be “voted off the island” after the prototypes are inspected, it might not invest.

• Solution: The Pentagon can commit in advance to a large prize for the winning prototype. Then it is worthwhile to build the prototype even if the builder might lose the contest.
  Nuance: the firms might be asked to “bid” for these prizes, contingent on winning, because the bids contain information.