

# SCIENCE IN ACTION

THE WRITINGS OF BRUNO LATOUR

# From scientific truths to science at work

- This 1987 book is his attempt to discover exactly how science works
- Latour undertakes this investigation by not listening to what philosophers say about Truth, not listening to what sociologists say about Society, and not listening to what scientists say about Nature, but instead to observe the scientists at work. Find out what they do, and not what they say.
- Latour starts with analyzing technical papers, as those consume a great portion of most scientists' time. He decomposes the dense tangle of references, citations, and figures and explains how this tangle is necessary as a defense against those who would attack the paper. By referencing and citing others, the scientist mobilizes an army against those who would attack him.



# Tracing scientific work in a web of connections

- Latour goes on to make several more striking observations about how science is actually done. He spends some time studying how science gets funded, tracing out the vast web of connections that must hold for science to actually take place.
- And he describes this web by noting how the scientist must convince others that their interests are aligned with his. He must convince the company that funding his research will lead to tangible benefits in their product. He must convince the government that his research can make better weapons, or save lives.
- Ironically enough, the more esoteric the subject, the more networking has to occur to allow it to happen at all. Thus, the "purest" of sciences such as particle physics that would seem to be the most remote from everyday interests, has to do the most work to convince people that it is necessary

# The making of 'black-boxes' or established 'truths'

- Another interesting concept he follows is the idea of black boxes.
- He labels scientific theories as black boxes that are used as the bases for other theories. For instance, we treat the idea of DNA as a double helix as a fact now that all biology experiments now must take into account.
- Latour dives back into history, using *The Double Helix* by James Watson, to examine the period when nobody knew how DNA was structured, to remind us that this was not always a "fact". We claim that Watson and Crick just discovered what was in "nature", but Latour points out that we only agreed on what was in "nature" after several competing scientists had pounded each other's theories to mush.



# What are 'blackboxes'?

- In science, computing, and engineering, a black box is a device, system or object which can be viewed in terms of its inputs and outputs, without any knowledge of its internal workings. Its implementation is "opaque" (black). Almost anything might be referred to as a black box: a transistor, an engine, an algorithm, an institution or government.
- The opposite of a black box is a system where the inner components or logic are available for inspection, which is most commonly referred to as a white box (sometimes also known as a "clear box" or a "glass box"<sup>[1](#)</sup>)

# Who does science, the scientist or the lab director?

- Latour also brings up some interesting questions about who actually does science. When we think of scientists, we think of the lonely researcher, alone at his workbench, separate from the rest of society.
- However, Latour demonstrates that this picture is incomplete. He traces the itinerary of a laboratory director as he flies around the world, talking to government officials to drum up more funding, talking to journal editors to convince them to open up a new section for submittals, talking to companies to refine their instruments to make the research that his lab does more effective.
- Is this lab director doing science in the colloquial sense? Certainly not! But when the researcher in the lab uses the extra funding to buy the new improved instruments to get results for a paper to be published in the new section of the journal, it becomes clear that the director is indispensable to science.



# Science is produced by a network of actors

- So who is actually doing the science? Latour answers the question by noting that because science must enlist many social actors in order to happen. So, in a sense, everybody is contributing to science. Governments through their funding, companies through their instruments, etc.
- He mentions the more typical theory that a genius scientist comes up with a brilliant theory which steamrolls its way across society, forcing millions of people to follow in its wake.
- He contrasts this with his theory that the millions of people are enlisted before the theory ever comes into existence, through various re-alignment of interests performed by the scientist. Since the people already have an interest in the research succeeding, once it does produce a theory, it is no wonder that it sweeps across society so fast.

# ARAMIS OR THE LOVE OF TECHNOLOGY

- Aramis was a proposed public transit system in France, one that would combine the best aspects of the train and the automobile. It was designed to be a point-to-point train system, with small cars that would pick you up at your home and take you directly to your destination with no stops in between.
- To do this involved many technology leaps, such as “nonmaterial coupling”, where two train cars would act as a train without any physical connection (so that a car that was speeding out of a stop could hook up to the train in front of it, and another car could drop out and stop without stopping the whole train). It sounds like a fantastically cool system



# The death of a technical project

- The project existed in various forms from 1970 to 1987, through several iterations of prototyping and proof of concept. The technology even worked - the book has some great photographs from the final testbed of cars actually travelling together without being connected physically.
- But Aramis never made it to the real world. And this book is the tale of a sociologist hired to find out “who killed Aramis?” - what was the fatal flaw in the project or in the management of the project that prevented Aramis from achieving reality?

# The literary style and structure of Aramis

- Latour takes an interesting approach to the book, using a form that he calls *scientifiction*, a cross between narrative and history, of culture and technology. His protagonist is a young engineer working with the sociologist to figure out the history of Aramis and where things went wrong.
- Interspersed throughout the work are interview excerpts from people they talk to, as well as impersonal observations from the author himself. Plus there are bits where Aramis itself speaks and asks to be born. These different authorial voices are distinguished by typeface to distinguish each.



# Interfacing and engineer with a sociologist

- The book is fascinating because the sociologist and his engineer intern interview all the various parties involved with the Aramis project, and trace it through its various ups and downs, and the number of different viewpoints is astounding.
- Everybody has a pet theory of why the project eventually failed, but none of them seem to match up with what happened. If it had really been a critical technical failure, it would have been caught much earlier in the process.
- If certain people had the antipathy towards Aramis that others suggest, it would never have been approved to go forward with the final full trial. If it was all just politics, that doesn't quite sync up either. It's a conundrum.

# Aramis- a chronicle not of technological failure but failed compromises

- Latour brings out all of this and presents it to the reader. His authorial viewpoint sections also point out the negotiations that are taking place in the design of Aramis.
- As new people get involved, the vision of Aramis changes as do the requirements (“The only way to increase a project’s reality is to compromise, to accept sociotechnological compromises.”). He points out that in a successful project, these requirements eventually converge and a physical thing actually gets built which sets the technology into a concrete reality.
- In Aramis, that never happened; the requirements shifted on a yearly basis depending on which branch of the government was involved, and where they were trying to build it



# Re-telling stories of success and failure

- “If we say that a successful project existed from the beginning because it was well conceived and that a failed project went aground because it was badly conceived, we are saying nothing. We are only repeating the words “success” and “failure”, while placing the cause of both at the *beginning* of the project, at its conception... All projects are stillborn at the outset. Existence has to be added to them continuously, so they can take on body, can impose their growing coherence on those who argue about them or oppose them.”

# The contrast between Aramis and VAL

- Those projects that succeed are those where the actors involved agree on a coherent vision of what they are building, or alternatively where one of the actors is strong enough to impose their vision on others. This did not happen in Aramis.
- There was actually a nice compare and contrast project that Latour uses, called VAL, which was an automated rail system built during the same timeframe by the same company. That was an instance where the desires of the company matched up with the desires of the city where it was to be built, and the project went smoothly and VAL came into existence. It's interesting to see how things went differently in the two cases.



# Technology is embedded in social and cultural contexts.

- Latour's emphasis that technology is always embedded in a social and cultural context, and that the technology does not bring itself to life, but requires real people (the sociologist in the book repeatedly emphasizes following the actors) to invest in it, both fiscally and emotionally. And following the trail of negotiations and compromises as Aramis moved from phase to phase, with new interests being brought aboard at each stage, was a fascinating mystery hunt for Latour to try to solve.