computers are bad

2021-06-02 a history of powerpoint

A brief interlude from the topic of GUIs to talk about perhaps one of the most infamous of all GUI programs, Microsoft PowerPoint.

PowerPoint is ubiquitous but often criticized in most industries, but I have never seen more complete use and abuse of PowerPoint than in military. I was repeatedly astounded by how military programs invested more effort in preparing elaborately illustrated slides than actually, well, putting content in them. And that, in a nutshell, is the common criticism of PowerPoint: that it allows people to avoid actual effective communication by investing their effort in slides.

Nonetheless, the basic idea of using visual aids in presentations is obviously a good one. The problem seems to be one of degrees. When I competed in expository speech back in high school my "slides" were printed on a plotter and mounted on foam core. More so than the actual rules of the event, this imposed an economy in my use of visual aids. Perhaps the problem with PowerPoint is simply that it makes slides too easy. When all you need to do is click "new slide" and fill in some bullet points, there's nothing to stop the type of presenter who has more slides than ideas.

Of course that doesn't stop the military from hiring graphic designers to prepare their flowcharts, but still, I think the basic concept stands...

As my foam core example suggests, the basic idea of presenting to slides is much older than PowerPoint. I've quipped before that Corporate Culture is *what people call their PowerPoint presentations.* Most of the large, old organizations I've worked for, private and government, had some sort of "in-group" term for a presentation. For example, at GE, one presents a "deck." Many of these terms are anachronistic, frozen references to whichever presentation technology the organization first adopted.

Visual aids for presentations could be said to have gone through a few generations: large format printed materials, transparent slides, and digital projection. Essentially all methods other than projection have died out today, but for a time these all coexisted.

Printed materials can obviously be prepared by hand, e.g. by a sign painter, and this was the first common method of presenting to slides. Automation started from this point, with the use of plotters. As I have perhaps mentioned before the term "plotter" is a bit overloaded and today is often used to refer to large-format raster printers, but historically "plotter" referred to a device that moved a tool along vectors, and it's still used for this purpose as well.

Some of the first devices to create print materials from a computer were pen plotters,

which worked by moving a pen around over the paper. HP and Roland were both major manufacturers of these devices (Roland is still in the traditional plotter business today, but for vinyl cutting). And it turns out that presentations were a popular application. The lettering produced by these devices was basic and often worse than what a sign painter could offer (but requiring less skill). What really sold pen plotters was the ability to produce precise graphs and charts directly from data packages like VisiCalc.

The particularly popular HP plotters, the 75 series, had a built-in demo program that sold this capability by ponderously outlining a pie chart along with a jagged but steeply rising line labeled "Sales." Business!

These sorts of visual aids remained relatively costly to product though until projection became available... large-format plotters, board to make things rigid, etc. are not cheap. Once you buy a single projector for a conference room, though, projection becomes a fairly cheap technology, even with the methods of producing slides.

The basic concept of projection slide technology is to produce graphics using a computer and then print them onto a transparent material which serves as film for a projector. There are a *lot* of variations on how to achieve this. Likely the oldest method is to produce a document using a device like a plotter (or manual illustration, or a combination) and then photographically expose it on film using a device that could be described as an enlarger set to suck rather than blow. Or a camera on a weird mount, your choice.

In fact this remained a very common process for duplication for a very long time, as once a document was exposed on film photochemical methods can be used to produce printing plates or screens or all kinds of things. There is a terminological legacy of this method at least in the sciences, where many journals and conferences refer to the final to-be-printed draft of a paper as the "camera-ready" version. In the past, you would actually mail this copy to them and they (or more likely their printing house) would photograph it using a document camera and use the film to create the plates for the printed journal or proceedings.

If you've seen older technical books or journals, you may have seen charts and math notation that were hand-written onto the paper after it was typewritten (with blank spaces left for the figures and formulas). That's the magic of "reprographics," a term which historically referred mostly to this paper to film to paper process but nowadays gets used for all kinds of commercial printing. This is closely related to the term "pasting up" for final document layout, since a final step before reprographic printing was usually to combine text blocks, figures, etc produced by various means into a single layout. Using paste.

For presentations, there are a few options. The film directly off the document camera may be developed and then mounted in a paper or plastic slide to be placed in a projector. If you are familiar with film photography, that might seem a little off to you because developed film is in negative... in fact, for around a hundred years "reversal films" have been available that develop to positive color, and they were typically used to photograph for slides in order to avoid the need for an extra development process. Kodachrome is a prominent example. Reversal films are also sometimes used for typical photography and cinematography but tended to be more complex to develop and thus more expensive, so most of us kept our terrible 35mm photography on negatives.

This approach had the downside that the slide would be very small (e.g. from a 35mm camera), which required specialized projection equipment (a slide projector). The overhead projector was much more flexible because the "film frame," called the platen, was large enough for a person to hand-write on. It served as a whiteboard as well as a projector. So more conference rooms featured overhead projectors than slide projectors, and there was a desire to be able to project prepared presentations on these devices.

This concept, of putting prepared (usually computer-generated) material on a transparent sheet to be placed on an overhead projector, is usually referred to as a "viewgraph." Viewgraphs were especially popular in engineering and defense fields, and there are people in the military who refer to their PowerPoint presentations as viewgraphs to this day. There are multiple ways to produce viewgraphs but the simplest and later on most common was the use of plastic sheets that accepted fused toner much like paper, so viewgraphs could either be printed on a laser printer or made by photocopying a paper version. When I worked for my undergraduate computer center around a decade ago we still had one laser printer that was kept stocked with transparency sheets, but people only ever printed to it by accident.

In fact, these "direct-print" transparencies were a major technical advancement. Before the special materials were developed to make them possible, overhead transparencies were also produced by photochemical means and use of a document camera and enlarger. But most large institutions had an in-house shop that could produce these with a quick turnaround, and they were still popular even before easy laser printing.

Not all projection slides were produced by photographing or copying a paper document, and in fact this method was somewhat limited and tended not to work well for color. By the '70s photosetting had become practical for the production of printing plates directly from computers, and it was also used to produce slides and transparencies. At the simplest, a photosetter is a computer display with optics that focus the emitted light onto film. In practice, many photosetters were much more complicated as they used shifting of the optics to expose small sections of film at a time, allowing for photosetting at much higher resolution than the actual display (often a CRT).

Donald Knuth originally developed TeX as a method of controlling a photosetter to produce print plates for books, and some of TeX's rougher edges date back to its origin of being closely coupled to this screen-to-film process. The photosetting process was also used to produce slides direct from digital content, and into the early '00s it was possible to send a PowerPoint presentation off to a company that would photoset it onto Kodak slides. Somewhere I have a bin of janitorial product sales presentations on slides that seem to be this recent.

The overhead projector as a device was popular and flexible, and so it was also leveraged for some of the first digital projection technology. In fact, the history of electronic projection is long and interesting, but I am constraining myself to devices often seen in corporate conference rooms, so we will leave out amazing creations like the Eidophor. The first direct computer projection method to become readily available to America's middle management was a device sometimes called a spatial light modulator (SLM).

By the 1980s these were starting to pop up. They were basically transparent LCD displays of about the right size to be placed directly onto the platen of an overhead projector. With a composite video or VGA interface they could be used as direct computer displays, although the color rendering and refresh rate tended to be abysmal.

I remember seeing one used in elementary school, along with the 8mm projectors that many school districts held on to for decades.

All of these odd methods of presentation basically disappeared when the "digital projector" or "data projector" became available. Much like our modern projectors, these devices were direct computer displays that offered relatively good image quality and didn't require any of the advanced preparation that previous methods had. Digital projectors had their own evolution, though.

The first widely popular digital projectors were CRT projectors, which used a set of three unusually bright CRT tubes and optics. CRT projectors offered surprisingly good image quality (late-model CRT projectors are pretty comparable to modern 3LCD projectors), but were large, expensive, and not very bright. The tubes were often liquid cooled and required regular replacement at a substantial cost. As a result, they weren't common outside of large meeting rooms and theaters.

The large size, low brightness, and often high noise level of CRT projectors made them a bit more like film projectors than modern digital projectors in terms of installation and handling. They were not just screwed into the ceiling, rooms would be designed specifically for them. They could weigh several hundred pounds and required good maintenance access. All of this added up to mean that they were usually in a projection booth or in a rear-projection arrangement. Rear-projection was especially popular in institutional contexts because it allowed a person to point at the screen without shadowing.

Take a close look at any major corporate auditorium or college lecture hall built in the '70s or '80s and there will almost certainly be an awkward storage room directly behind the platform. Originally, this was actually the projection booth, and a transparent rear-projection screen was mounted in the wall in between. Well-equipped auditoriums would often have both a rear projection and front projection capability, as rear projection required mirroring the image. Anything that came in on film would often be front-projected, often onto a larger screen, because it was simpler and easier. Few things came in on film that someone would be pointing at, anyway.

You may be detecting that I enjoy the archaeological study of 1980s office buildings. We all need hobbies. Sometimes I think I should have been an electrician just so I could explain to clients why their motor-variac architectural lighting controller is mounted in the place it is, but then they'd certainly have found an excuse to make me stop talking to them by that point.

The next major digital projection technology on the scene was DLP, in which a tiny MEMS array of mirrors flip in and out of position to turn pixels on and off. The thing is, DLP technology is basically the end of history here... DLP projectors are still commonly used today. LCD projectors, especially those with one LCD per color, tend to produce better quality. Laser projectors, which use a laser diode as a light source, offer even better brightness and lifespan than the short arc lamps used by DLP and LCD projectors. But all of these are basically just incremental improvements on the DLP projection technology, which made digital projectors small enough and affordable enough to become a major presence in conference rooms and classrooms.

The trick, of course, is that as television technology has improved these projectors are losing their audience. Because I am a huge dweeb I use a projector in my living room, but it is clear to me at this point that the next upgrade will be to a television. Televisions offer better color rendering and brightness than comparably priced projection setups, and are reaching into the same size bracket. An 85" OLED

television, while fantastically expensive, is in the same price range as a similarly spec'd projector and 100" screen (assuming ALPR here for more comparable brightness/color). And, of course, the installation is easier. But let me tell you, once you've installed an outlet and video plate in the dead center of your living room ceiling you feel a strong compulsion to use it for something. Ceiling TV?

So that's basically the story of how we get to today. Producing a "deck" for a meeting presentation used to be a fairly substantial effort that involved the use of specialized software and sending out to at least an internal print shop, if not an outside vendor, for the preparation of the actual slides. At that point in time, slides had to be "worth it," although I'm sure that didn't stop all kinds of useless slides to impress people with stars on their shoulders.

Today, though, preparing visual aids for a presentation is so simple that it has become the default. Hiding off to the side of slides is seen as less effort than standing where people will actually look at you. And god knows that in the era of COVID the "share screen" button is basically a trick to make it so people don't just see your webcam video when you're talking. That would be terrible.

There are many little details and variations in this story that I would love to talk about but I fear it will turn into a complete ramble. For example, overhead based projection could be remarkably sophisticated at times. You may remember the scene at the beginning of "The Hunt for Red October" (the film) in which Alec Baldwin gives an intelligence briefing while unseen military aids change out the transparencies on multiple overhead projectors behind rear-projection screens. This was a real thing that was done in important enough contexts.

Slide projectors were sometimes used in surprisingly sophisticated setups. I worked with a college lecture hall that was originally equipped with one rear projection screen for a CRT projector and two front projection screens, both with a corresponding slide projector. All three projectors could be controlled from the lectern. I suspect this setup was rarely used to its full potential and it had of course been removed, the pedestals for the front slide projectors remaining as historic artifacts much like the "No Smoking" painted on the front wall.

Various methods existed for synchronizing film and slide projectors with recorded audio. A particularly well-known example is the "film strip" sometimes used in schools as a cheaper substitute for an actual motion picture. Late film strips were cassette tapes and strips of slides, the projector advanced the slide strip when it detected a tone in the audio from the cassette tape.

Okay, see, I'm just rambling.