Two case studies in the social construction of television technology

The following cases address turning points in television's history – moments when the interplay of material sciences, engineering, corporate interest and politics shaped the medium's technology. Since they are historical examples, we can look back and assess what happened, judging whether the best engineering solution won the day, or whether more complicated interactions among these factors ultimately gave form to technology. But our goal is not to be historical detectives; rather, it is negotiate among an array of aligned and sometimes competing interests to see how, if we were starting afresh, solutions might be formed. There are no right or wrong answers, but rather strategies, arguments and interdependencies that weigh heavily upon the engineering profession.

Pick one of the following cases: how would you (re-)frame the question? How would you go about analyzing the problem and weighing the importance of the various conflicting constituencies and views? What kind of data would you amass to support your case or counter competing arguments? And finally, what sort of solution would you advocate, why, and what consequences would you have to prepare to deal with?

Case 1: Public vs Domestic Television (derived from German broadcasting history, 1933-1939)

New, 180-line television service has just been introduced[1]. The new receivers are quite expensive, but like any new technology, the industry expects that economies of scale will alleviate the problem within a few years. The new Nazi government is concerned.

- Its populist wing of the government thinks that the new medium should not enter the world a plaything for the rich, while the lower and middle classes look on enviously. Moreover, they fear that this will both shape the programming that develops as well as the popular perception of the medium. So they are proponents of public television and cinema-style exhibition (even with big screens if possible) until prices are low enough for everyone to afford receivers.

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[1] For comparison's sake, current US television is 525 lines.

- The government's propaganda office agrees, but for a different reason: their studies have shown that propaganda received in public settings is more effective than when people can talk back in private, so they too prefer public, 'cinema-style' television.
- The electronics industry is split. They are nearing the end of a campaign to sell a radio to every German household, and their future depends on finding another 'best seller'.
    - One group within the industry argues that unless they scale up production, television will stay expensive, and the medium may 'die on the vine.' Moreover. This group thinks that they should aggressively promote the sale of their television – and thus German technological standards and infrastructure – to other countries (Latin America and Eastern Europe in particular), building in a growth market for the future. So cheaper, 180 line receivers (looking something like modified radios) are the way to go.
    - Another group argues that mass production of the new 405 line television is imminent and should be their focus. If they ramp up efforts to promote and produce cheaper 180 line television, they will slow down development of the new high-definition television from one to two years to three to five years. And they might alienate a public seeking a better quality image, and whose frame of reference for moving pictures is the film medium. [The other group sees this not as a danger but as an opportunity: a chance to accelerate product obsolesce and sell even more receivers.]
- The Post Ministry, looking forward to greater political influence and income from television receiver license fees, agrees, and wants to see mass acceptance of domestic television as soon as possible. They have strong alliances with the electronics industry, and want to consolidate their power while the new Nazi government is young.
- Television engineers are split. They want the medium to catch on and be accepted as a domestic medium; but they are also much more interested in higher definition television (405 lines); they want to be seen as socially relevant and enjoy the same respect as their radio counterparts – which might argue for quick cultural presence of their new product; but they also want to be seen as visionary, and they know how much better 405 line television can be. Some are nationalistic enough to want Germany to have the 'world's first' national television service, and yet pragmatic enough

to see the value of delay and a better system. Others are pragmatic enough to want the government technology development subsidies that are available, yet nationalistic enough to want Germany to have the 'world's best' television technology.

What should the engineers do? Make an alliance with the propaganda ministry and the populist wing of the party, and focus on large screen projection technologies? Or try to lower the cost of receivers, circumventing the concerns of the populists by making modified radios with small display tubes? This may not make their corporate bosses happy, since they seek profits; but it may have the added effect of easing public acceptance of the new technology, since it will seem familiar. Or should they redouble their efforts to make higher definition (405 line) systems, even if the increased costs will more or less force them into public 'cinema style' television? Which is better: political support or market support or technological progress? Government investment or market success? Alliance with sister media (radio or film) or independence and autonomy as a new medium? Each decision brings with it design implications, financial implications, and crucially shapes the future shape of the new medium.

Case 2: The US Picks a Television Standard (derived from the struggles among manufacturers, broadcasters and the FCC to settle broadcast standards between the 1940s through to the early 1950s)

[*background*] RCA was created as an AM radio patent monopoly holder during WW1, but gradually grew into a corporation of its own. RCA also aggressively acquired early television patents, achieving a near monopoly on technologies designed to broadcast at very high frequencies (VHF). But it did not control FM broadcasting, developed by Edwin Armstrong, nor did it control competing television technologies designed to operate at ultra high frequencies (UHF). FM radio operates at very high frequencies (VHF). RCA largely controlled the decisions made by the Radio Manufacturers of America (RMA), the broadcasting industry's lobby group. In 1941, the FCC accepted the RMA's recommendation that RCA's early 441-line television system be accepted for the nation. Two final points: the electronics industry was seen as a potential growth sector for the US economy in the post war years; and the post-war years were overshadowed by the government's suspicion and fear of Communist

subversion, and thus its deep concern with a controlled communications environment.

Other companies such as Columbia (owner of CBS) and Philco (Philo Farnsworth's old company) had other ideas. Using their patents designed to operate in the UHF spectrum, Columbia, Philco and others proposed a variety of alternatives to the RCA plan, ranging from 16MHz color systems, to high definition black and white systems of between 750 and 1000 lines. Even with these high-demand systems, UHF could support many more stations per market than VHF. RCA's preferred VHF spectrum, by contrast, would limited programming opportunities (the 13 channels theoretically possible in fact came with significant interference problems, meaning that the real number in any given reception area would be significantly less), and it would assure that competition to RCA's AM radio patents from FM would be minimized, since television broadcasting would be in direct competition with FM broadcasting.

Many engineers were consulted by the National Television Standards Council, which was charged by the FCC with making a recommendation. What was wisdom? A compromise of 525 lines black and white in the VHF spectrum or a high-definition color system in the UHF spectrum? The interests of RCA or the other companies allied against it? A vote for limited stations per market (VHF) or expanded stations per market (UHF)? Putting television directly in competition with FM radio, or giving the new type of radio spectrum within which to develop? Closing down opportunities for communication, or expanding them? Should engineers stick to the corporate interests of their employers, or strive to develop state of the art technologies? Could one argue for a pluralistic system with multiple standards (with precedents in recorded music with 33rpm and 45rpm records; or film with 35mm, 70mm, and 16mm formats; or print, with many different formats), or was a nationally unified system – such as that enjoyed by radio and the telephone – to be preferred? Should corporate interests, political power, or superior design and technological results be the determining factor?

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