Designing touch screen voting systems:

a rich picture exercise.

Name: Pavel Gokin

Course: HF 770 Prototyping

Instructor: Chauncey Wilson

Collecting the data.

My primary source of data was the Internet in general and the ACM digital library in particular. The papers and articles found there provided information about the design and use of voting systems, as well as the entities influencing or influenced, directly or indirectly, by the system. Some of the stakeholder concerns came from my personal experience and educated guessing. This is, of course, not how I *would* collect the data for this rich picture if I were doing it as a "real" project. Ideally, the insights would come from contextual interviews of the stakeholders as outlined in Monk and Howard's article (Monk & Howard, 1998, p. 22). Thus the concerns addressed by the design would be real user concerns (albeit reported rather than observed) rather than what I, the designer, *think* the concerns were.

Touch screen voting systems (VS) share most of the same stakeholders with all types of voting machines. The exceptions here are the stakeholders that come into play due to the electronic nature of the data collection. For example, the Secretary of State office, where voting system vendors have to escrow the source code of their systems (Dill et al., nd, 2.3). However, some design *issues* and stakeholder *concerns* are unique to touch screen VS. Let's look at the stakeholders and their concerns, expressed in their own words.

Primary / core stakeholders.

1. **The voter.** This one is obvious. However, it may be useful to break this stakeholder into sub-stakeholders. Here's why. Voting systems must be usable by all citizens 18 years of age or older. This includes not only "normal" voters, but also the elderly, disabled, uneducated, poor, and minorities (Bederson, 2003, p. 145). Each group has additional concerns on top of the ones it shares with all of the voters.

a. Concerns common to **all voters**, in their own words, include:

   i. "Will I be able to figure this thing out quickly?"

   ii. "Will my vote be properly recorded and counted? How will I know?"

   iii. "Will my vote be kept anonymous?"

b. **Disabled**:

   i. "Will I be able to see the screen? Will I be able to use the system without seeing anything?" (low/no vision)

   ii. "Will I be able to reach the controls?" (stature, wheelchair)

   iii. "Will I be able to indicate my selection properly?" (motor)

c. **Elderly**. In addition to having physical disabilities, the elderly are particularly distrustful of technology. They often need written proof of important transactions (i.e. paper social security checks).

   i. "Will I get a paper receipt or some written confirmation of my vote?"

   ii. "Will I have enough time to do everything comfortably?"

d. **Low literacy** users:

   i. "Will I be able to understand the instructions/choices?"

e. **The poor and racial/ethnic minorities**:

   i. "I can do this much better in Spanish!"

   ii. "Will they even count my ballot?"[1]

2. Poll workers. Poll workers are the people who deploy and manage the systems. Their concern stems from the fact that they have minimal training on the system and, therefore, may not be able to troubleshoot problems or answer questions (Bederson, 2003, p. 145):

[1] "… because poor and ethnic and racial minorities were more likely to cast their ballots on outdated systems, their votes were among the least likely to be counted" (Bederson, 2003, p. 145).

a. “Oh no! Election night is tomorrow and we only got these things this morning! How will I ever learn how to use it, let alone help someone if they have a problem?”

3. **The VS’s UI designer.** This role may physically reside inside the system vendor’s organization (and influenced by it), but it also has its own concerns.
    a. “How can I design the interface so that it meets the requirements least expensively and do so without working nights and weekends to meet the deadline?” The problem here is three-fold: (i) requirements may stress functionality required to pass certification rather than assure a usable product (FEC’s fault); (ii) the pressure to cut costs may mean that some of the users’ needs will be sacrificed; (iii) personal time pressure means that the designer may not have enough time to come up with the best solution.
4. **The VS’s programmer.**
    a. “How can I program this thing so that it meets the requirements and what shortcuts can I take so that I get it all done while *only* working nights and weekends to meet the deadline?” The programmer’s problems are similar to those of the designer: too little time to care about the user experience.

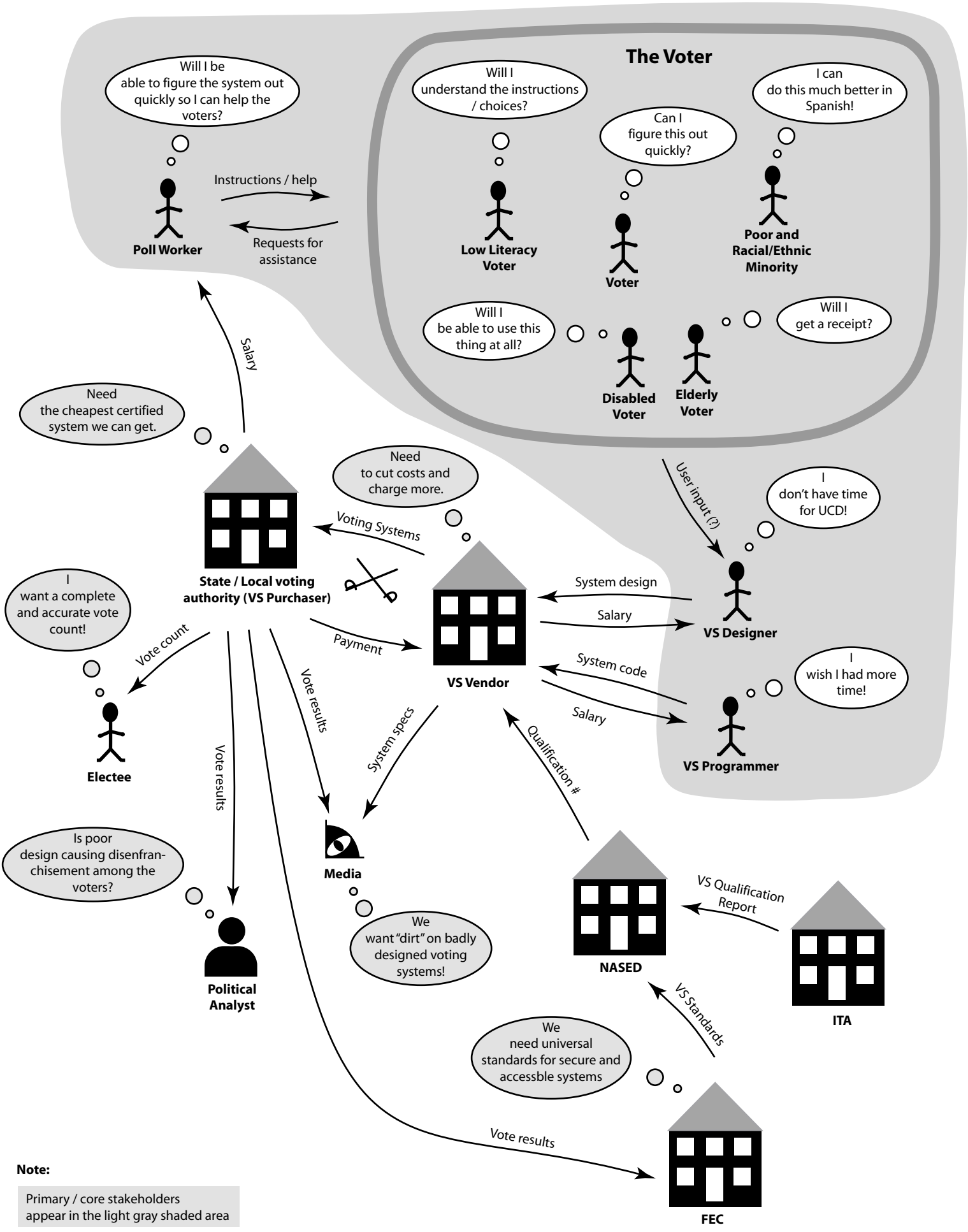
Secondary stakeholders.

5. **The management team of the VS vendor.** Their concern is, among others:
    a. “We need to design a system that will pass qualification by the ITA.”
    b. “How can we design, manufacture and sell the system most profitably?”
    c. “Who has the deepest pockets to pay for our state of the art system?”

6. **State and local authorities who purchase the system**. According to Bederson et al. "state or county purchasers are usually more concerned about cost than usability" (Bederson, 2003, p. 145):
    a. "Who's got the cheapest NASED-certified system?" *Note that this concern is in conflict with the VS vendor's need to charge as much as possible for the systems.*
7. **The Federal Election Committee** (FEC) creates voting system standards (VSS):
    a. "We need a system that's secure, reliable, and accessible."
8. **The Independent Testing Authority** (accredited by the National Association of State Election Directors (NASED)) qualifies VS for use in elections (Coggins, 2004, p. 35):
    a. "Does this system meet the qualification requirements?"
9. **Electees.** To quote/paraphrase Al Gore:
    a. "We need a complete and accurate count!"
10. **The Media.** Would they ever love to dig up some "dirt" on a system that a disabled veteran could not use and was thus disenfranchised!
    a. "Are there systems out there that are not secure or accessible?"
11. **Political Analysts.** They too like to talk about chads.
    a. "Will the new systems again threaten our Democracy?"

The Rich Picture.

The diagram on the following page places (a) all the stakeholders, (b) their concerns, and (c) their relationships to one another. The relationships are defined by the information or material goods they exchange. The voter stakeholder is "exploded" into its subgroups. Direct stakeholders appear in the shaded area.



Note:

Primary / core stakeholders appear in the light gray shaded area

Discussion.

Obtaining concerns. Since I didn't interview the stakeholders, many of the concerns are based on my assumptions about the stakeholders. Therefore, those concerns may not be real. For the same reason I can only guess the exact language to use in the concerns thought bubbles. An interesting alternate strategy could have been to omit unverified concerns. In this case the resulting rich picture would point to information gaps requiring more research.

Which concerns to include. Even if all concerns are identified we must keep in mind that some affect the system about which we're trying to make a rich picture while others don't. In general, identifying concerns that have an impact on the design of the touch screen voting system was difficult. This was especially true for indirect stakeholders. In addition, choosing concerns that seem to have an impact on the system being designed and ignoring the others may have caused me to omit an important concern that may have a significant impact on the system.

Direct vs. indirect stakeholders. Where to draw the line? The way I dealt with this problem was to classify as direct stakeholders all entities that physically interact with the system or whose decisions have a direct impact on a particular voting system.

A possible alternate approach. In their paper, Monk and Howard illustrate two approaches to indicating process flows between stakeholders in a rich picture: illustrating the flow of data and the flow of influence. While I chose to illustrate the flow of data or information, the influence flow approach could have provided some interesting insights as well. I could have placed the system itself in the center of the diagram and represented the ways in which the different stakeholders influenced the system using process arrows. These influences, combined with concerns, could then be used to create system requirements.

Bibliography.

Bederson, B. B., Lee, B., Sherman, R. M., Herrnson, P., Niemi, R. G. (April, 2003). Electronic Voting System Usability Issues. *CHI 2003*, April 5–10, 2003, Ft. Lauderdale, Florida, USA.

Dill, D.L., Mercuri, R., Neumann, P.G., & Wallach, D.S. (nd). Frequently Asked Questions about DRE Voting Systems. Retrieved on February 14, 2006 from: http://www.verifiedvoting.org/article.php?id=5018.

Coggins, C. (November, 2004). Independent Testing of Voting Systems. *Communications of the ACM*, October, 2004, 47(10), pp. 34-38.

Monk, A., & Howard, S. (March-April, 1998). The rich picture: A tool for reasoning about work context. *Interactions*, pp. 21-30.