INTRODUCTION
Crowd computing - like the crowd itself - builds on the idea that humanity is greater than the sum of its parts. With such roots, it is understandable how crowd computing has typically focused on finding common ground - mutual goals like improving teaching or audience understanding (Griswold, Rekimoto), communicating individually with audience members or simply making the variety of opinions in diverse crowds known. However, designing for mutual goals leads towards unnecessary centralization and compromise over the objectives of a crowd. As crowd computing attempts to virtualize the benefits created by a crowd, things are taken a step too far, and crowds become constrained to a mere subset of their possible sums.

We argue that in striving for inclusiveness, crowd computing makes the dangerous assumption that the full extent of crowd activity should be common knowledge. That is, opportunities for crowd computing exist where some people are not interested in – or even made aware of – the nature of the involvement of their peers. While power comes from the sum of our parts, by focusing on the biggest sums we lose raw power latent in the interactions made within a crowd’s countless like-minded subgroups. For instance, in many setups of backchannel systems (McCarthy, Rothberg, Rekimoto), all participants were aware of all possible communication options. By having these systems open to all, this creates a strong social pressure to conform their use to the goals of the whole. These pressures, of course, are not entirely negative – McCarthy’s work speaks directly to the concern of maintaining order in shared crowd computing - and common standards are different than common goals – but crowds have countless subgoals about which individuals should be empowered to discuss, grow and prosper.

While crowds ostensibly arise with some common goals, the very nature of crowds is that people will desire both public conversations and private conversations. This is because not everyone in a crowd has purely identical goals – in fact, a single individual may have multiple goals for the same conference. Conferences and organized crowds can get around with this by breaking up periodically, with such breaks often constituting the majority of the program – but those are limited to the divisions anticipated and/or approved by conference organizers. Moreover, some discussions occur that are essential, but private by nature – for instance, to cope with conflicts between those with different goals. Inevitably, critical activity is left to unofficial, unassisted environments.

We believe that for crowds with such divisions, not only is it difficult to predict the diversity of needs, but that some needs are too ad-hoc, niche, subversive or even plainly mundane to fight for the attention of all involved. Thus, it is critical to experiment with technology that assists crowds in organizing themselves. Historically this has been interpreted as “distributed computing”, but it is important to stress that we consider it an entirely separate matter if the actual system architecture is shared – what matters is whether the communication channels themselves are shared. In fact, we have found that basing these crowd environments on common infrastructures has distinct advantages – in a project creating a communication platform for a fashion trade show, having the show’s “stamp of approval” on the system seemed to lend a sense of political neutrality to the system, providing added incentive for use. Thus, we have focused on designing private crowd computing for public infrastructures.

Just as a good mayor would rarely limit the protests that occur in his town plaza, crowd and conference organizers should encourage technology that provides them safe harbor to allow rebellious sub-organization within their ranks. At the same time, the mayor is expected to maintain a sense of order – and just as illegal behavior is not tolerated in a town plaza, using a centralized technology gives crowd organizers the chance to draw a line of minimum acceptability along with any “kill switches” needed to back it up.

EXPERIENCES
Work being conducted in our group (Bisker) attempts to account for the emergent benefits from a crowd at motion and the ad-hoc social groups that result. As ubiquitous computing comes into maturity, it will be increasingly important to not only accept but also embrace the fact that subgroups are continuously created and destroyed throughout any public space. We have focused on mobile technology as a common platform for crowd computation,
which has an inherent element of privacy afforded by individual phone ownership.

PittiMobi, a system we have deployed for a fashion trade show, (Bisker) begins to explore this idea – a visitor uses his cellular phone to capture a 2-d barcode of an exhibitor, and is then linked to information about that exhibitor both on his phone and via a website social network. Ethnography showed that a critical element of this system was the mutual trust put by all of the visitors in the organizer of the show – this system only allowed for the nominal construction of private relations, not much more complicated than privately “friending” someone – but in the highly politicized world of fashion, users constantly asked if the exhibitor, other attendees, or even the show organizer themselves would be able to view who they chose to connect with. Interviews showed that an equally compelling feature was the ability to “bookmark” exhibitors without their knowledge – and expand those bookmarks into private communication channels if desired. This is particularly critical over a prolonged, multi-day event like our fashion show - where enough business is conducted at once that your friends can become your enemies.

As a corollary to this system for one-on-one communication, we also proposed the idea of a truly viral, ad hoc communication space. Rather than capturing each exhibitor and carefully nurturing individual relationships, A 2-dimensional bar code called an “Event Space” is requested by the user from the conference organizer to represent a topic that they wish to discuss. (Bisker) For example, a buyer may want to discuss dresses with a group of like-minded peers. Once the buyer runs into one of his peers, this barcode can then be displayed on the phone screen itself, and then photographed discretely by the other party. The phone would then interpret the URL displayed as an invitation to join the designated chat space, subscribe the user to that chat space, and then provide the peer the same ability the original buyer had to display the barcode on their phone for others to capture. This creates a viral effect, where the buyer’s friends essentially act as recruiters for other interested parties they might run into in the crowd. Our hypothesis is that the required face-to-face interaction needed to give access to an “Event Space” should allow conversation over that channel to be administered with the same level of intimacy as the interactions establishing them.

We experienced some administrative pushback on proposed implementations of “Event Spaces”, and decided to relegate it to theory until we could find a proper test environment. Malicious viral organization through this system might occur faster than a crowd organizer’s ability to reach a “kill switch”, and a certain amount of trust between conference organizers and attendees is needed for a system like this to ever be centrally deployed.

**EXERCISE – PRIVACY THREADS**

The exercise proposed for this workshop will attempt to test the pros and cons of a centralized body encouraging private, viral conversation – albeit with physical analogs. To do this, we have to not only acknowledge but also encourage the inevitability of side-conversations – that, one way or another, notes will be passed.

We’ll have ten to twenty stacks of post-it notes, each stack a different color. (If not commercially available, differently styled or purpose pads will suffice.) At any point during this workshop, if you would like to pass notes on some topic, feel free – reach into the bag and grab a stack. There’s just one catch – the color of a post-it note represents its privacy. Being passed a note on a pink post-it – or being passed a blank pink post-it gives you the right to demand to look at all pink notes of any other person. (That is to say, if I have any post-it note I can ask to see all of your purple post-its, blank or not.)

At the end of the workshop, this exercise should reveal some limitations and strengths of our ideas. In particular, we wish to ask:

* *Where someone showed a color to request access to your notes of that color, what did you assume about the person doing the asking?*

* *Were information exchanges generally two-way or one-way? Is crowd computing like this better suited for bulletin-board style announcements, or for two-way discussion?*

* *Were any post-it note colors intended to be less private than traditional note-passing? How was that conveyed? (People might announce they’re taking a pad and declare it “for anyone who wants to discuss X”, or they might display a note of that color prominently.)*

* *Now, let’s look at the flip of that - did any post-it note colors take on subversive topics? Feel free (but don’t feel forced) to share what such topics were. How did use of those colored notes seem to compare to the more mainstream ones? Moreover, how did you convey to others you were “trusted” with a post-it note of that color?*

* *Were you tempted to take post-it notes of another color without permission? Did anyone? (Ask anyone who says yes) why did you do so?*

* “Event spaces” propose that people want to keep the existence of a communication channel secret. Did anyone publically advertise what colors you had without advertising that color’s content? If so, how, and why?*

* Our lab’s work generally proposes that there are advantages to having a single source for all of these colored post-it notes. In what ways did the moderators take on a position of trust in running this exercise? How would that trust differ – and how might your behavior differ accordingly - if this were performed digitally?*

* Most importantly, did you feel you got more or less out of this workshop with this note system versus if we had just said, “Feel free to pass notes?” Why or why not? What about versus if we said nothing at all?*
REFERENCES


3. Joseph F. McCarthy, danah m. boyd, Digital backchannels in shared physical spaces: experiences at an academic conference, CHI '05 extended abstracts on Human factors in computing systems, April 02-07, 2005, Portland, OR, USA.
