ABSTRACT
This paper describes the motivation and background to conducting research in Mobile Autonomic Networks and poses research questions for the MobileHCI community to address.

Categories and Subject Descriptors
.5.2. [User Interfaces]: Evaluation/methodology, Theory and methods, User-centred design.

General Terms
Human Factors, Theory.

Keywords
Usability, Evaluation, Design, Mobile phones, Smartphones, Autonomic networks

1. MOTIVATION
An estimated 71 million smart-phone sales were made in 2006 with sales predicted to rise to around 1 billion units per annum by 2012.

2. SMARTPHONE POWER
Smartphones now provide the technical ability to perform anywhere many tasks that were previously only feasible on desktop systems or laptops. Smartphones, such as the Apple iPhone or Nokia N-series phones, offer the possibility of "anytime anywhere computing"

3. HARNESSING SMARTPHONE POWER
What if we harnessed the collective power of these Smartphone devices and made mobile autonomic networks (MANets) that could run powerful applications across these dynamically created networks e.g. create a network on the fly in a disaster recovery situation to get information out and help in. Or get public transport to work smartly based on the number of mobile phones in one area e.g. 3 phones detected send a taxi to pick people up, 63 mobile phones detected send a double-decker bus. This would be particularly useful if we think of these passengers attending major public events such as the Commonwealth or Olympic games.

4. MOBILE AUTONOMIC NETWORK
We are very familiar with the fixed network technologies that we use every day in our offices and homes e.g. LANs or Wireless networks.
Figure 3. Traditional Fixed Network

But what happens when we want to add another network or a new user to this fixed network? Network administrators must spend expensive time setting-up and configuring the network, and in the case of adding another network, they may need to shut down an entire network with loss of network service to all other users. A better solution to this problem, particularly for the use of the growing, ever mobile Smartphones, would be a network that would adapt, grow and shrink when needed i.e. an Autonomic Network. An Autonomic Network has the following properties:

- Self-managing
- Self-configuring
- Self-regulating

Figure 4. Mobile Autonomic Network

4.1 Derivation of Autonomic Networks

The Autonomic name comes from the analogy with the human autonomic nervous system which looks after involuntary actions, such as, heart beats or your intestines, digesting food.

When you exercise, your heart beats faster to pump the blood and oxygen around your body, i.e. It is self-managing, self-configuring, self-regulating.

4.2 Autonomic Control Loop

The control loop is fundamental to the whole way that the autonomic network operates - it collects some data, analyses the data then decides what to do and then acts on it.

Figure 5. Autonomic control loop

5. USABILITY

Limited MANets have already been built. These systems have been limited in scope and no one has assessed their usability. By there nature, MANets can be more flexible and dynamic than traditional networks. This should lead to better connectivity in terms of speed and loss of network, but will also lead to less predictability.

Figure 6. Smartphones on the move

Networks will change as users move around their environment, when users notice these changes will they understand why?

Or will autonomic networks feel much more unpredictable than conventional ones? Dobson et al state that:

“For a system, network, or service to be predictable and usable, there must be a clear link between adaptations and their environmental causes both in terms of causation and in the details of the way the adaptation supports working in the new context.”

6. RESEARCH QUESTIONS

This research will explore the usability of Mobile Autonomic Networks answering the following research questions:

- What are the usability issues in MANets?
- How do we design MANets to address these issues?
- How do we evaluate MANets?

7. ACKNOWLEDGMENTS

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8. REFERENCES


9. IMAGES

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