All of the following can be found in the Computer Supported Cooperative Work section of the online proceedings.

Tak Woo presented the Yarn system for synchronous collaboration. Like many of the collaboration systems presented at the conference, a unmodified Web browser is used simply to coordinate the initation of some sort of collaboration, in this case, a collaborative meeting scheduler. Once there, you either

- `xhost +` the ``collaboration server'' to let the collaboration client into your domain, and take a snooze as X commands cross, say, the Pacific (these guys are from Australia); or
- download and compile a copy of their collaboration client on your local machine, which is much faster, but can be arbitrarily difficult.

The other approach (which they didn't bother to implement) requires the user to periodically give a ``reload'' command to their browser, a terrible kludge at best.

Ronald Scharf presented a teleoperation scheme for controlling an integrated circuit tester that is basically a scanning electron microscope adapted to see voltages and time. These are terribly expensive, yet terribly useful, and it makes sense to have just a few of them around and make it possible for many engineers to have infrequent access to them.

So after arranging for your chip to be placed in the tester, you fire up your favorite browser, which presents you with the latest image of the chip along with a waveform for the signal being observed. If you want to look at different signal, you simply press a button to change the view.

The problems they have with this is ensuring only one person is using it at a time and ensuring only the people they want to use it may use it. They also don't have any way of steering the probe using design data. Something else must tell you where a particular net is on the wafer.

The Mercury project at USC was one of the neatest things presented. They placed a teleoperated robot on the Web, one which could move in three dimensions and blow a quick burst of compressed air. The idea was to simulate the exploration of a nuclear test site (the robot actually sits in a disused corner of their laboratory, and looks at a completely fabricated, but physical, environment).

A problem they faced was limiting the use of the robot. They solved this by giving random tokens to people in a queue, and imposing an energy quota on the operator, limiting the amount of time he or she could spend controlling the robot.

Another clever aspect, and one which places them into the realm of collaboration, is the ability of users to add to a running, world-visible log of what they find. In this way, other ``researchers'' can see what their colleagues have done.

The Upper Atmospheric Research Collaboratory presented an example of teleoperation on a much larger scale. They developed a scheme for researchers from around the world to control a Greenland-based radar system for atmospheric observation. They have an n-way chat system, and allow graphs to be annotated, all in a collaborative (i.e., more than one user) environment.

Ruth Lang of SRI presented their COMET synchronous collaboration system. She drew the distinction between the existing asynchronous collaboration environment of the Web (people can put things there for

and *synchronous collaboration* such as shared editors and so forth.

The COMET system uses pseudo X servers to allow existing X applications to be used in a collaborative envrionment. A single copy of an application is started, with its display pointed toward a clever X server that talks to all the collaborators and mimics the single user that the application expects. On each collaborator's end, another clever X server displays broadcast X commands and intercepts events as necessary. Floor control is done through simple ``I'm typing now'' rules.

This seemed like the most well-though-out and well-fleshed-out system in the bunch.

Judith Donath presented her Sociable Web project, which, like Will Hill's work (see my HCI comments), is an attempt to bring the sense of other people to the net.

It relies on a modified client that is capable of sending ``I'm here'' and ``I'm leaving'' message to the server. The server, then, can keep track of all the users viewing a particular page, and can serve as a coordinator should two people visiting the same page wish to interact through a ``talk'' session (she suggests a hypertext-aware version of talk that would allow URLs to be easily exchanged).

The problems I see with this is that her sense of where you are is a little narrow-minded. I can't imagine many netsurfers would spend much time at a single page, although a single server or a group of pages seems possible. Additionally, she spoke of the possibility of ``virtual location,'' which would allow you to be looking at one page, yet be registered as being at another.