Day Three - Emerging drivers that can help us develop new innovations and technologies.

How do we use emerging technologies to support some of the interesting work that we are already doing?

Using remote sensing and affordable technologies to work in urban agriculture

Not long ago, the technology required to deploy and operate remote sensing resources in agriculture was limited to organizations that had deep pockets and strong information technology and computer expertise. The shift to simpler, easier-to-use and much more affordable technology, much of it open sourced, now allows even small producers to use these technologies to enhance their productivity.

Here are a few examples of remote sensing and affordable technology that can be used in smaller urban agriculture and local food operations. Not only are they much cheaper but, more importantly, they can be used by people without deep expertise and experience in computers and IT.

Examples of the use of sensors in urban agriculture:

Raincloud by Cultivar

"RainCloud is supporting a bottom-up agriculture movement by putting mobile and smarter water management in the palm of your hand with a web connected irrigation system and application platform. RainCloud links your mobile device to lawns, gardens and plants by combining automated water valves, professional quality soil sensors, a wifi enabled programmable computer and custom web applications. With RainCloud, Cultivar is striving for hardware, communication and information systems that are flexible and support the evolution of environmentally responsible precision agriculture, mobile lifestyles and community co-operation.

Imagine a future where locally sourced, small-batch natural food is as prevalent and at your fingertips as today's pre-packaged and processed meals. Let's replace (package food) chains with (fresh food) networks.

At Cultivar, we see this resulting from an era of educated and connected producers and consumers. We think RainCloud can help support this type of community.

Currently, RainCloud is a Minimum Viable Product (MVP). That is, if you have a modest technical skillset, you can connect RainCloud to your home network, control it from the web and begin enjoying the educational and lifestyle benefits of Information Age lawn and garden management."

(**http://ecultivar.com**) (watch the short video that is on the front page)

HarvestGeek

"An open-source, wireless, Internet of Things Greenhouse monitoring and automation system for your farm or garden. The tools allow you to:

- Monitor your garden's conditions in real-time

- Automate and control equipment remotely

- Set custom alerts via SMS, E-Mail or Twitter

- Compare your results and learn from others"

(**http://www.harvestgeek.com**) (watch the short video that is on the front page)

Apitronics

"Apitronics is a start-up that is making wireless sensor and automation networks better and more affordable for agriculture. We offer an open platform that is flexible and expandable making it suitable for anything from a garden, a thousand-acre farming operation, or any other environmental monitoring and automation application.

Our architecture is extremely modular consisting of Bees that can be "plugged" into any sensor and actuator, allowing the same device to be a weather station, an irrigation controller, or a control system for a greenhouse. Multiple Bees are coordinate by a single Hive which is a gateway device plugged into the user's router. This device is a local coordinator for the entire network and preserves functionality without internet connectivity, making the Apitronics platform more robust and reliable than other cloud-based solutions.

The result is hardware that is easy to use as an out-of-box solution for farmers or as a prototyping platform for developers. We also provide our own consulting services where we can make modifications for your particular application.

All the hardware and software source is open for modification and reuse, by hobbyists and for-profit businesses alike. Everything from circuit schematics, bill of materials,

environmental enclosure designs, and all the software on the hardware itself is maintained as an open-source project.

Our platform emphasizes making it easy to deploy wireless devices in harsh environments. Features include:

- **field-ready devices:** running efficiently on a battery, Bees can be recharged via solar panels or wall warts
- **modular plugs with customizable sensors and switches**: a waterproof connector allows you to easily attach or detach an array of sensors and switches
- **local databasing and web app**: a gateway manages the wireless network and provides a browser-based UI – the system is protected against internet connectivity failures"

(**http://apitronics.com/how-it-works/**)

(watch the video created by the developers for their Kickstarter campaign - **http://www.kickstarter.com/projects/lthiery/apitronics-wireless-platform**)

Many small producers and gardeners perceive that the use of technologies such as remote sensing is too expensive and difficult. However, the shift to simpler, easy-to-use and, perhaps most importantly, lower cost solutions may be changing this assumption.

Discussion:

Is there value in using technologies such as remote sensing in our urban agriculture and local food operations?

How can these technologies, or local variations be developed and deployed locally?