Seamless Visions, Seamful Realities

Anticipating Rural Infrastructural Fragility in Early Design of Digital Agriculture

Gloire Rubambiza, Phoebe Sengers, Hakim Weatherspoon
Cornell University

Seamless Visions, Seamful Realities

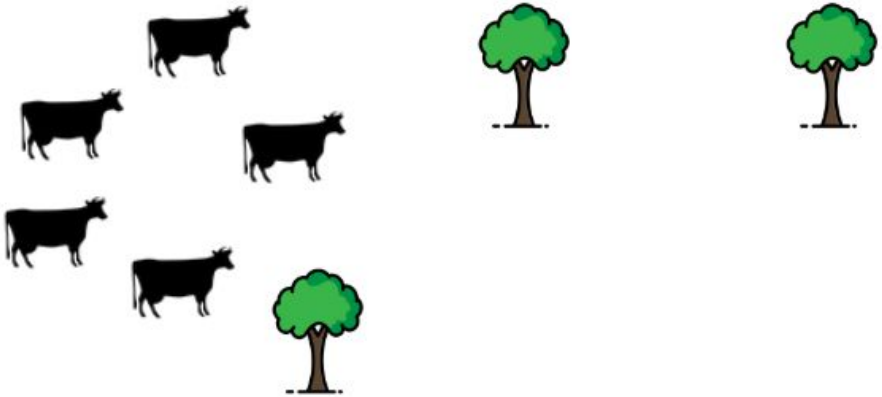
Anticipating Rural Infrastructural Fragility in Early Design of Digital Agriculture

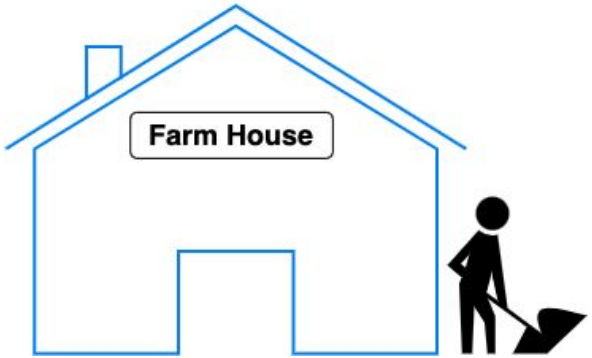
Gloire Rubambiza, Phoebe Sengers, Hakim Weatherspoon
Cornell University

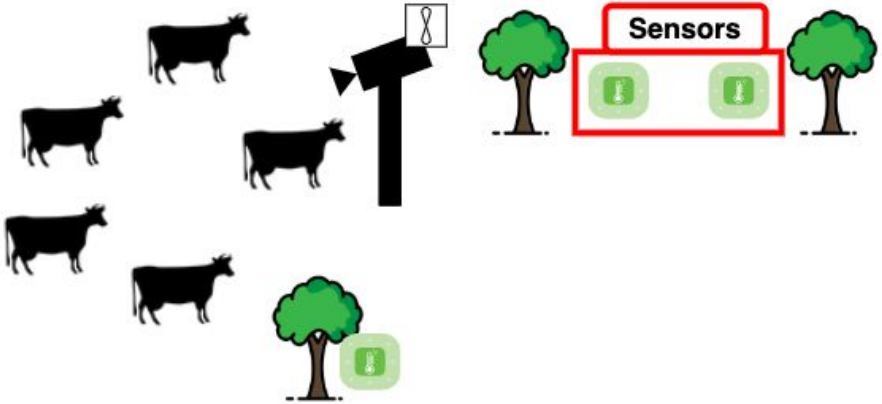
Addressing Rural Infrastructural Fragility

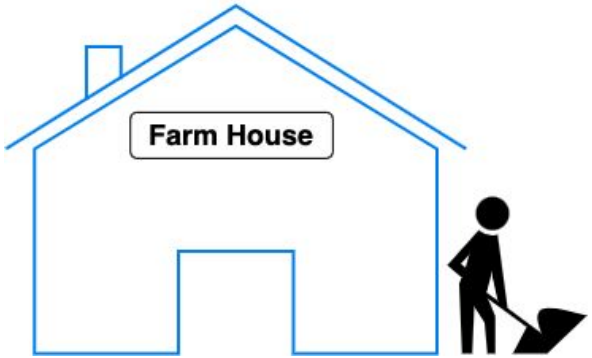
Thinking Relationally about Digital Inequality in Rural Regions of the US. Jenna Burrell. 2018

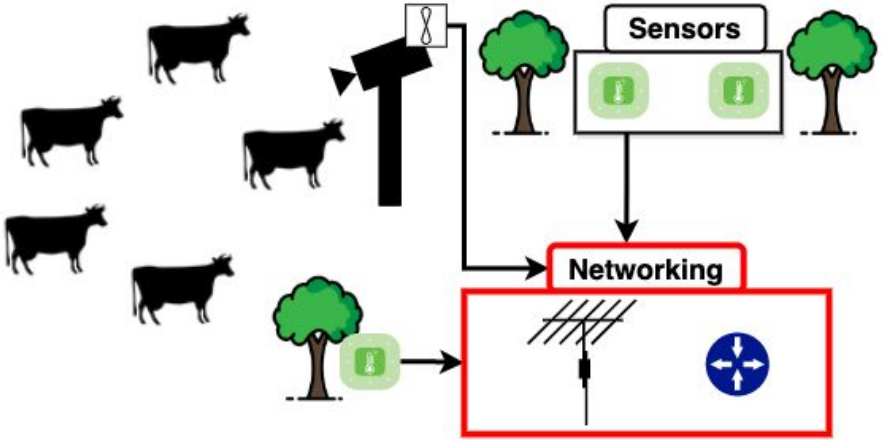
How does networking research reproduce infrastructure fragility?

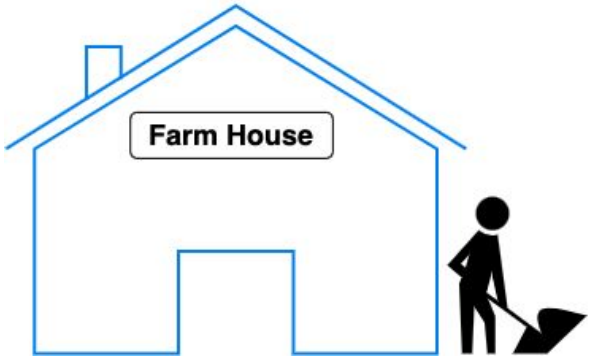


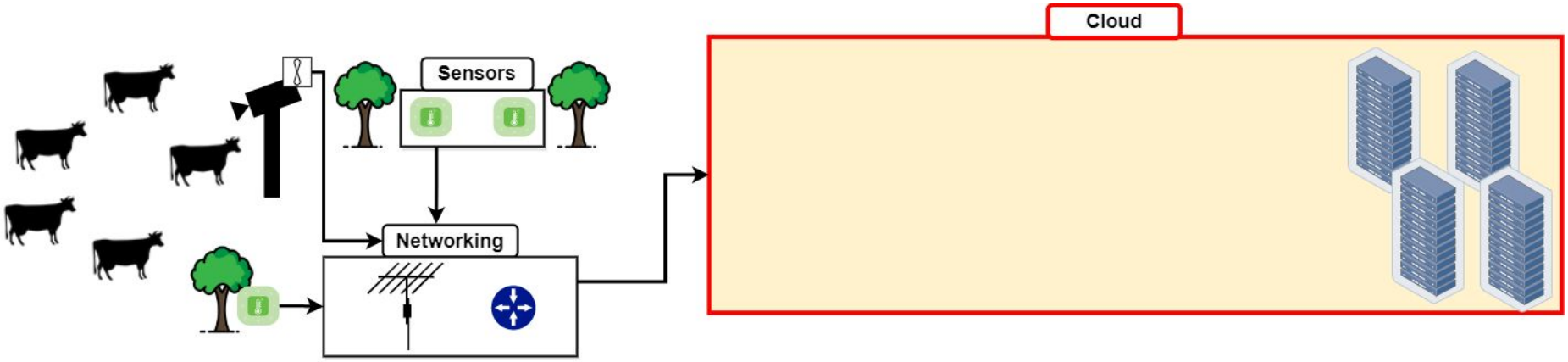

Farm House

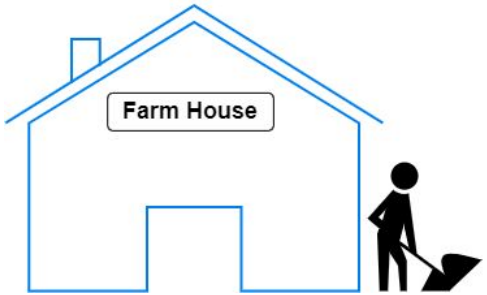

Sensors

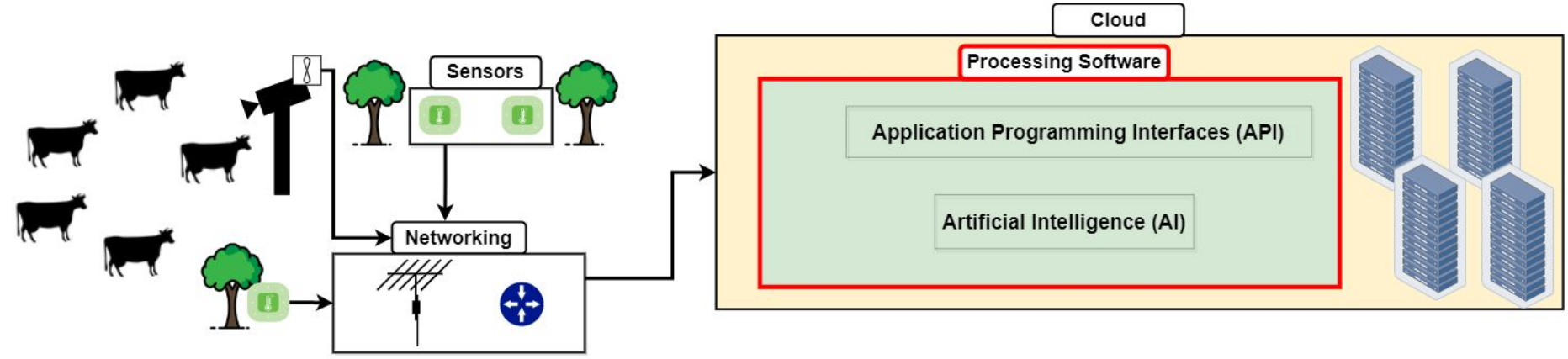

Farm House

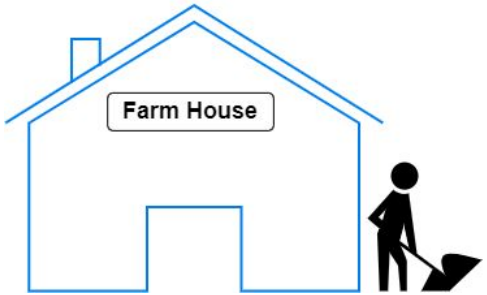

Sensors
Networking

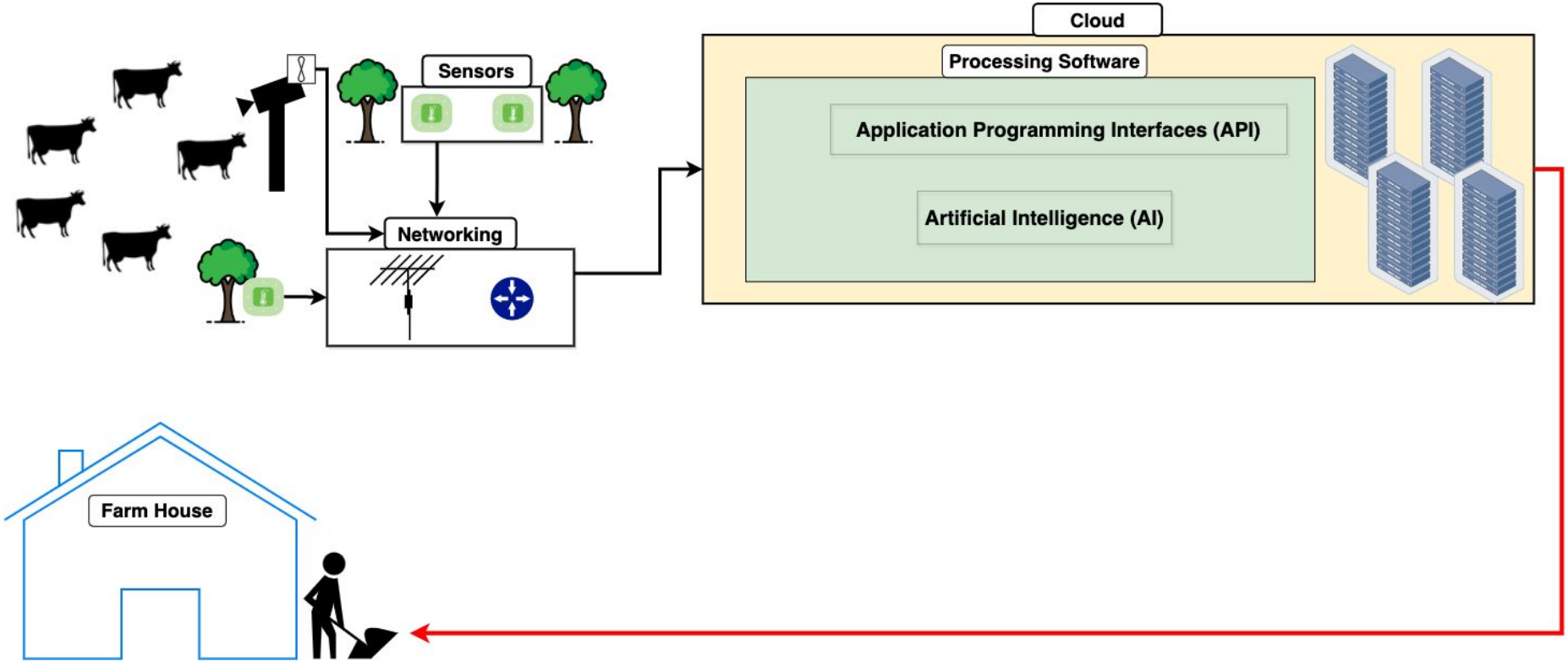

Farm House


Cloud
Sensors
Networking


Farm House


Cloud
Processing Software
Application Programming Interfaces (API)
Artificial Intelligence (AI)
Sensors
Networking

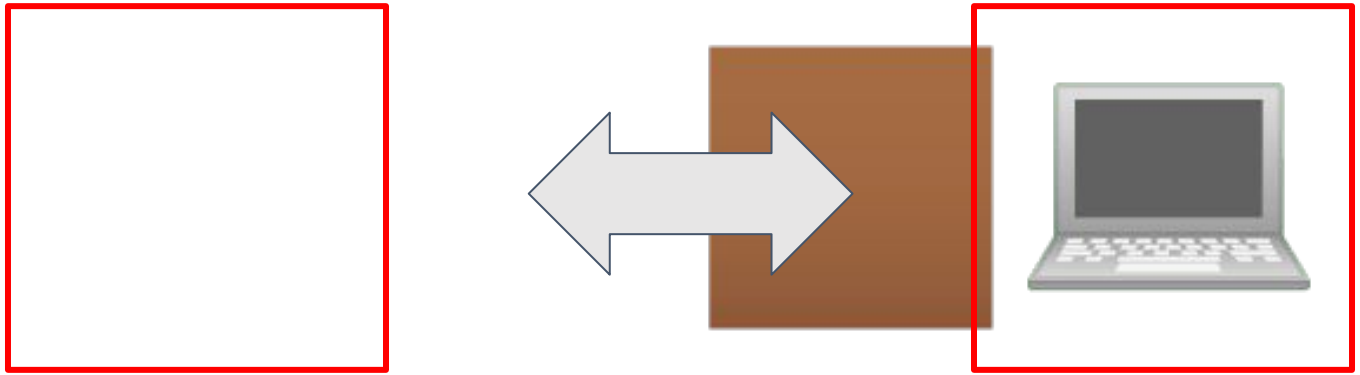

Farm House

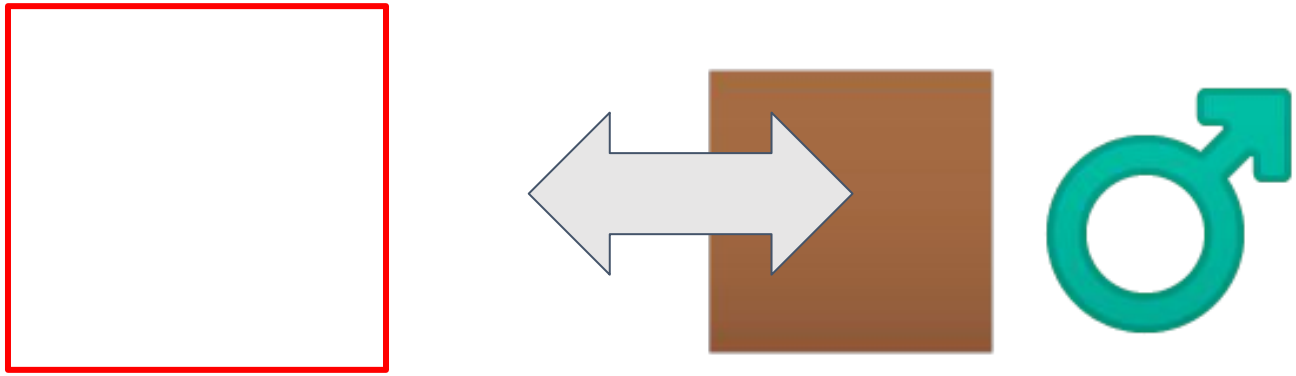

Cloud
Processing Software
Application Programming Interfaces (API)
Artificial Intelligence (AI)
Sensors
Networking
Farm House

Approach

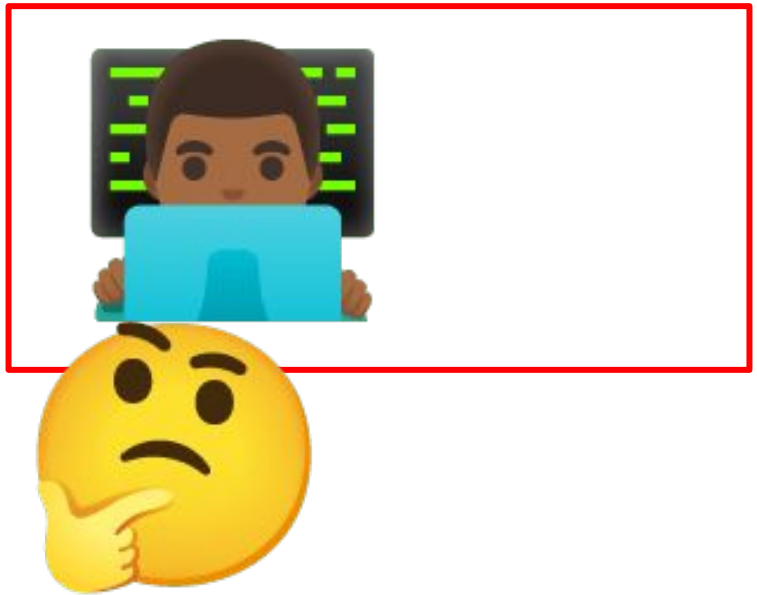
Values and societal considerations are built-in at the early stages

How Computer Systems Embody Values. Helen Nissenbaum. 2001





Technology Development with an Agenda: Interventions to Emphasize Values in Design. Katie Shilton. 2010



Toward a Critical Technical Practice: Lessons Learned in Trying to Reform AI. Philip Agre. 1997

Methods

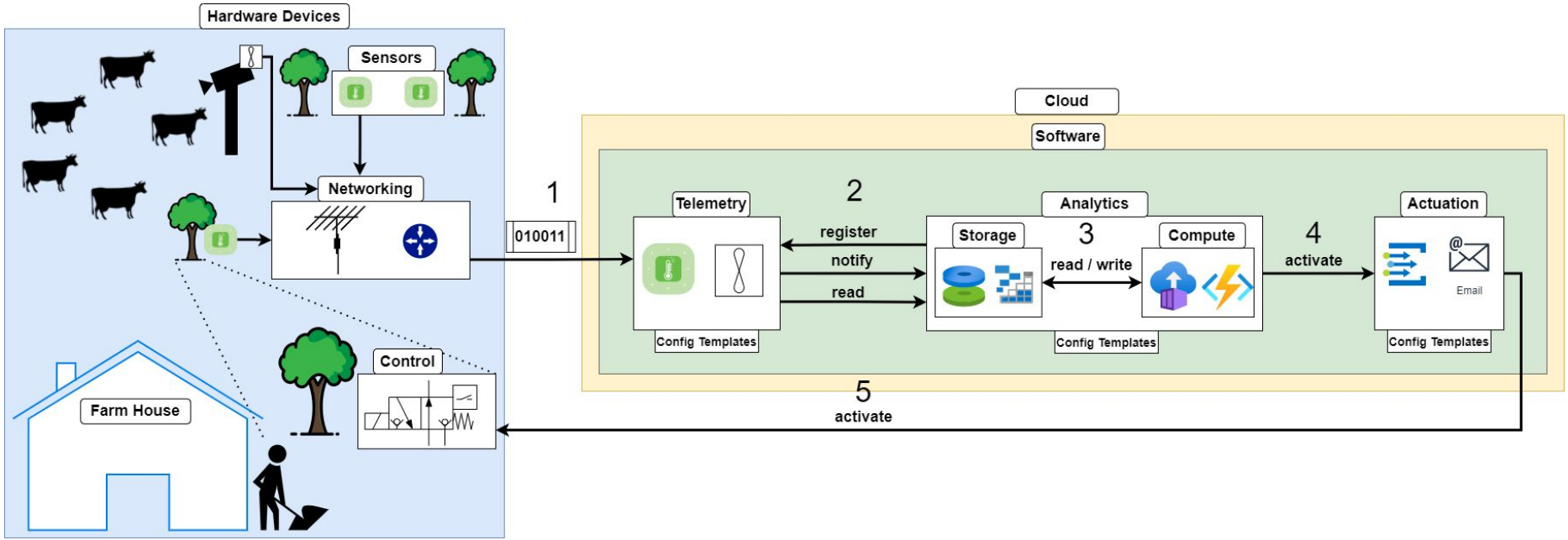
Research Questions

Anticipating potential fragility in rural networking infrastructure

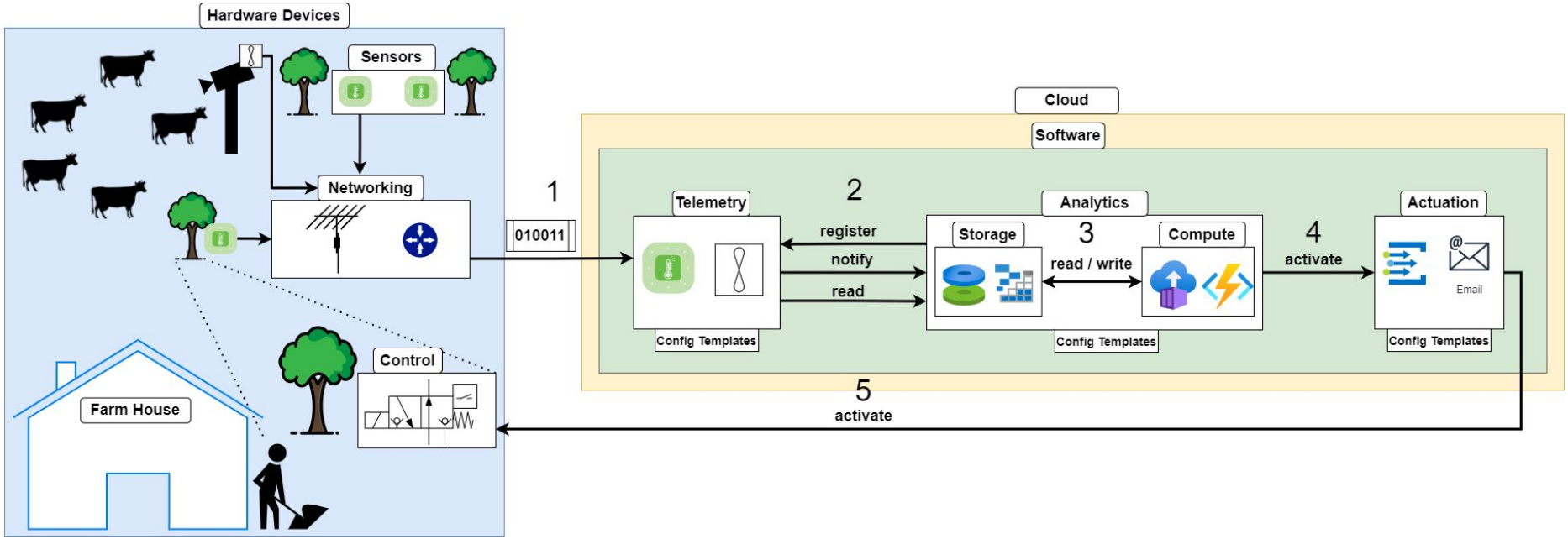
Anticipating potential fragility in rural networking infrastructure

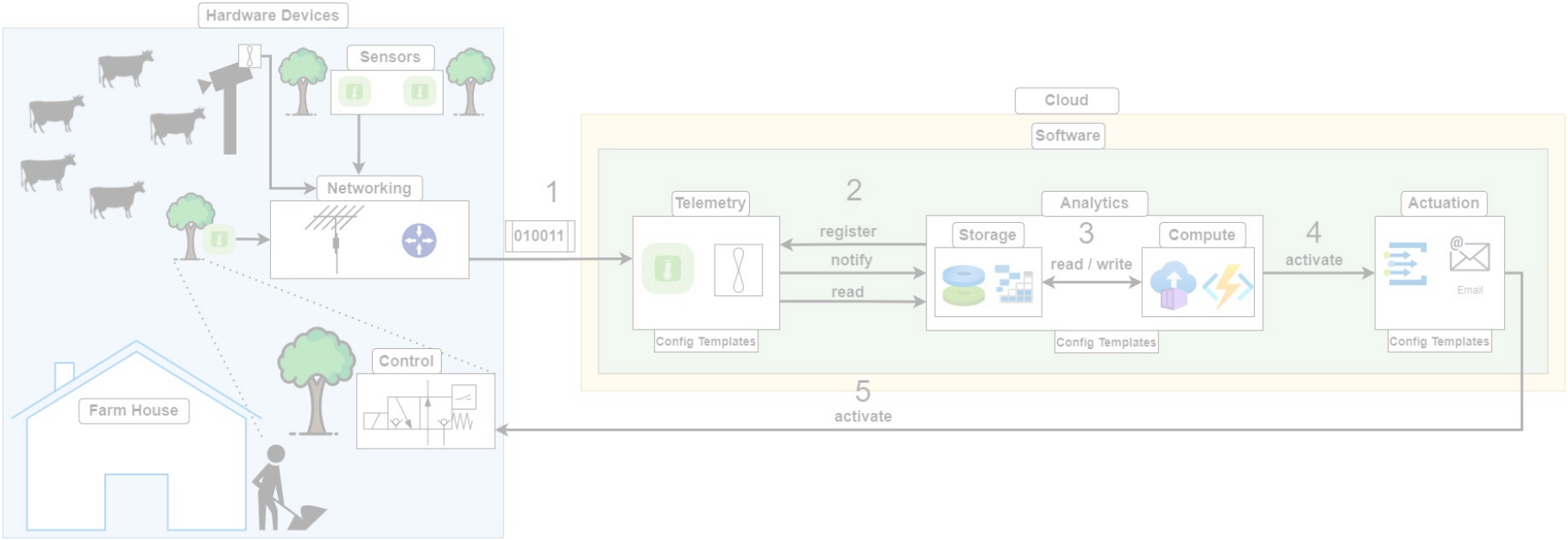
Consequences of early visions on eventual fragility of infrastructure

Case Study: The Software-Defined Farm (SDF)



Findings: Seamless Visions


Hardware Devices
Sensors
Networking
Control
Farm House
1
010011
Cloud
Software
Telemetry
2
register
notify
read
Analytics
Storage
3
read / write
Compute
4
activate
Actuation
Email
Config Templates
Config Templates
Config Templates
5
activate

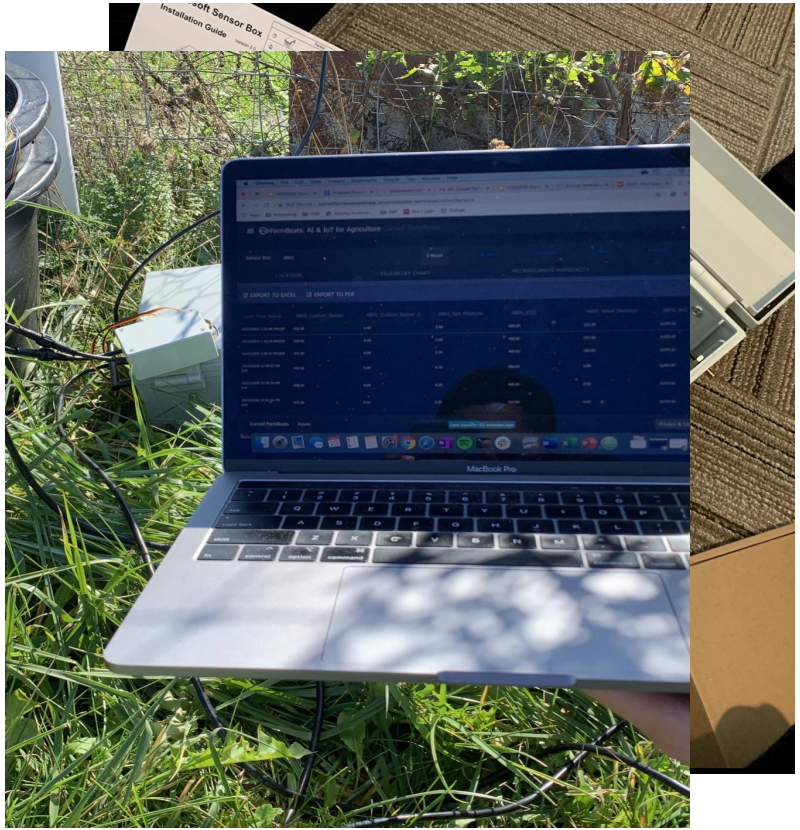


"<X> is one of the first products that actually delivers on the idea that **you install it, you put batteries in [the sensors], you go home and see the data**" (P5)

Findings: Seamful Realities

“**For the first week**, I was connecting into the debug pins, rather than the actual pins to communicate to it. And **I was pulling my hair** like why I’m not able to read anything when I send to **find out the version** command” (P2)

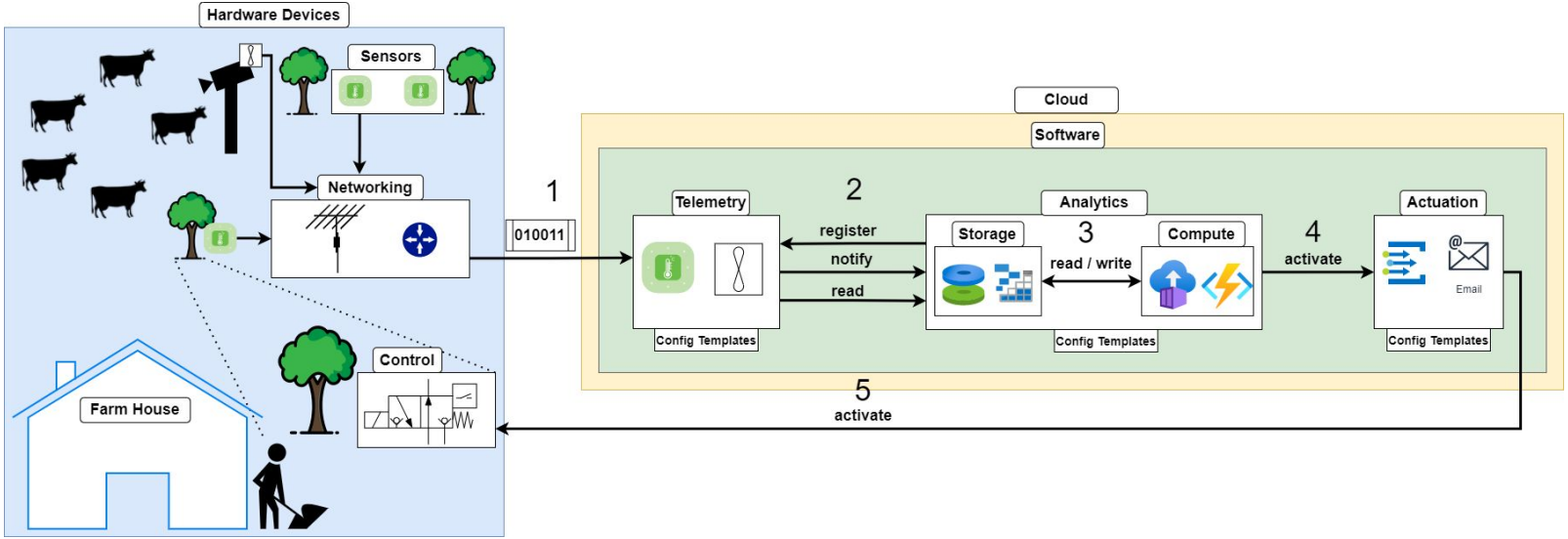
Installation Guide


Installation Guide
MacBook Pro

Installation Guide

Installation Guide

Maintaining Faith in Seamlessness Despite Seamful Realities


Hardware Devices
Sensors
Networking
Control
Farm House
1
010011
Cloud
Software
Telemetry
Config Templates
2
register
notify
read
Analytics
Storage
3
read / write
Compute
Config Templates
4
activate
Actuation
Email
Config Templates
5
activate

Disappearing Seams

Incidental work that does not contribute to generalizable knowledge claims

Hidden Seams

Our organizations shield us from geographical, financial, and other considerations

Distant Seams

Disciplinary separations place day-to-day farm realities out of our anticipation

Implications for Design

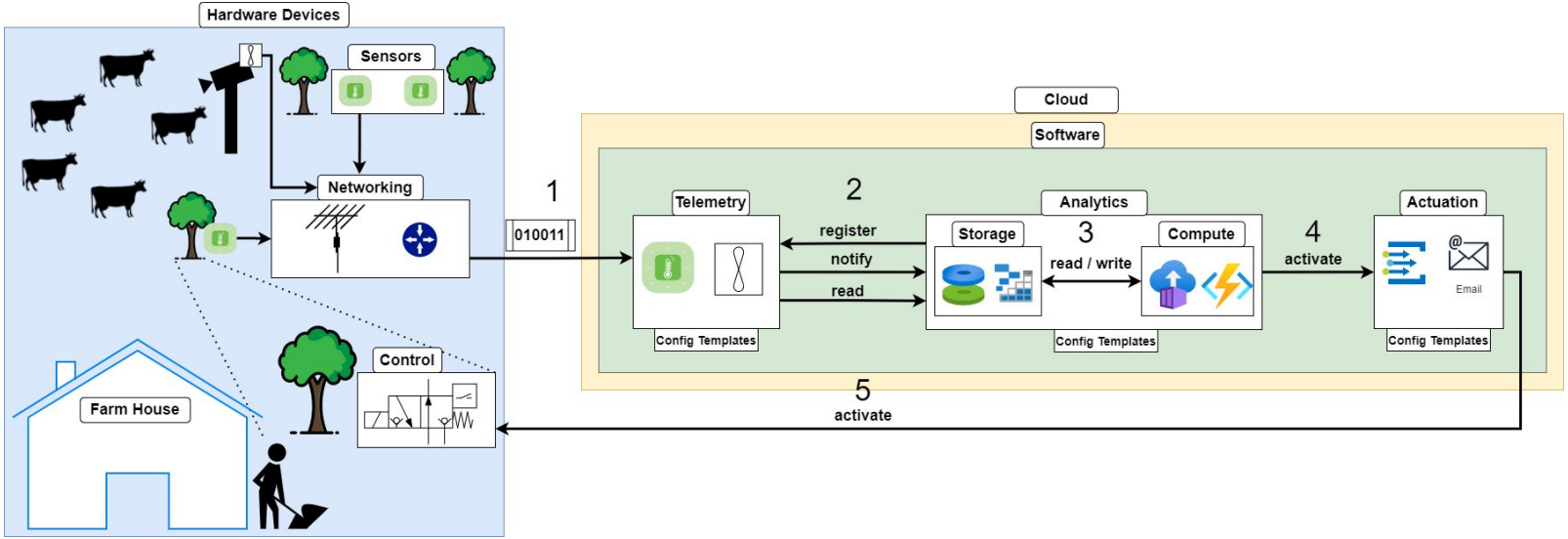
Aim for a more artful management of seams

Support the right to tinker

Document early grunt work and its effects

Bridge gulf between research labs and commercial farms

Conclusion


Hardware Devices
Sensors
Networking
Control
Farm House
1
010011
Cloud
Software
Telemetry
Config Templates
2
register
notify
read
Analytics
Storage
3
read / write
Compute
Config Templates
4
activate
Actuation
Email
Config Templates
5
activate

Gloire
Rubambiza
gloire@cs.cornell.edu

Phoebe
Sengers
sengers@infosci.cornell.edu

Hakim
Weatherspoon
hweather@cs.cornell.edu