Systems Integration Breakout

Interfaces: interfaces are key to facilitating integration across systems

- Need rich interfaces to enable integration
- Integration across disciplines
- Can we use semantic web technologies to enable integration?
- Mashups are an example of data integration across services - can we use mashups of data
   produced by sensor systems?
- Web services also enable interoperability.
- Can we use open architectures to promote interoperability and integration?
- Will these techniques work in the context of sustainability?
        - Need to deal with bulk data transport; deal with unstructured data etc.

Inteoperability assumes that data is accessible. But data may be proprietary or data may be inside
a black-box and may need to inferred by observing other inputs.

Need to go beyond data integration - sustainable systems/CPS systems also have actuation.
So need to integrate across systems that actuate.

Need to design new distributed control algorithms across diverse systems.

Simulation: need to stitch/integrate simulation models of different types to understand
sustainability issues. Create workflows to allows simulation models to feed into one another.

Question: what are the unique system integration challenges in the sustainablity area that go
beyond generic sustainability issues?
 Issue #1: Need performance metrics across layer? What choices/interfaces do you provide?
Issues #2: Systems is this domain are more hetrogeneous than those in other domains and it is
more challenging to integrate.

Will standards help with integration?
  -- Too many players / stakeholders - each has its own standard, so no one uber-standard.

Granularity: granulatory of data is important : need to figure out what granulatiry is
appropriate. NEed to bridge across layers.

A specific problem that requires integration is to estimate the carbon footprint of a supply chain.
How do avoid double counting? How to attribute use to the right component?
CAn we use rules similar to that in the financial accounting domain?

Education issues: What kinds of system integration projects can we use in a sustainability
class? What tools are available for such projects?

Experimental infrastructure: can we build testbeds to conduct research on sustainability and system integration? - to try out new ideas and compare one technique to another on the same testbed.

Broader discussion on culture and sustainability:
Are out cultures geared towards consumption? Can IT help with promoting the notion of "less is more" - e.g., by providing data and insights into the benefits of conservation/less consumption.