Food System Informatics:
From molecular to planetary ...
From agricultural innovation to food system transformation

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Our mission: to ensure access to healthy food and to promote the vitality of agriculture today and for future generations.

Our vision is a food system that:

• is innovative, adaptive and profitable
• provides healthy food for everyone
• promotes prosperity and equity for people working in agriculture and the food system and for their communities
• improves the environment and human health
• builds awareness and understanding of the food system
• engages public participation in policy decisions affecting food and agriculture

Our commitment: every farm, every ranch, and every community in California will be healthier in the future than it is today.

Note ...
Entry points: food, health
Vision and commitment: empirically verifiable
What do we mean by “food system”?

One definition:

“the set of activities and relationships that interact to determine what, how much, by what method, and for whom food is produced and distributed.”

Food Systems Perspective
... opens options and reveals possibilities

Adapted and modified from a graphic by Michelle Grant, World Food Systems Centre, ETH Zurich
Sustainable Sourcing Graph Database

- Multinational Private Sector (15)
- International Public & NGO Sectors (10)
- Livelihoods Approach (12)

44 Integrated Issues of Sustainable Sourcing
6 Capital Groups
2000+ Indicators of Sustainable Sourcing

With significant support from Mars, Incorporated
Also Kraft Foods and ongoing interest from Barilla
Mars, Incorporated vision for this work...

• Goal is to help stakeholders in the food industry make more sustainable decisions for sourcing of raw agricultural materials (from field to factory)

• Useful for any commodity in any location

• Open access: outputs reside in precompetitive space
Graph database of issue-to-indicator linkages

Yes, IT’S COMPLEX!
Molecular heuristics: consider DNA

Source: The New York Times
Seeking tractable patterns in complex realities: theories, models, visualizations.
From base pairs to ontological triples (subject, predicate, object)

Drivers

is a (+/-) driver of

(+/-) influences

Resource stocks & flows

is a (+/-) driver of

(+/-) Is a resource stock of
(+/-) Is a resource flow for

Flows of Food System Services

(+/-) directly affect human well-being through

Human Well-Being

(+/-) provides physical supply of food for
(+/-) provides social and economic supply of food for
(+/-) provides sufficient food for
(+/-) provides safe food for
(+/-) provides nutritious and healthful food for

Food system informatics: ontologies = backbone, controlled vocabularies = building blocks
Drivers

Resource stocks & flows

Human well being

Earth System Science

Breeding

Agronomy

Resource economics

Soil and Water Science

Agricultural economics

Consumer science, Food economics, Marketing, Food science, Nutrition, ...

Flows of food system services

Health and sanitation systems
Education systems
Social security systems
Safety nets

System boundaries
Cross-system links

Meta system of information systems

Climate systems
Political systems
Science & technology innovation systems

Energy system

System boundaries
Cross-system links

Earth System Science

Breeding

Agronomy

Resource economics

Soil and Water Science

Agricultural economics

Flows of food system services

Health and sanitation systems
Education systems
Social security systems
Safety nets
Food System Informatics & Technologies

Source: Matthew Lange, IC-FOODS, Dept of Food Science and Technology, UC Davis
Food systems as social networks: Structuring information on actors and relationships

Drivers
- Development policy shapers
- International organizations
- Food consumers

Human Well-Being
- Social advocates
- Labor unions
- Certifiers
- Food retailers
- Food consumer organizations
- Community organizations
- Development policy shapers

Resource stocks & flows
- Input providers
- Certifiers
- Development policy shapers
- Food manufacturing companies
- Farmers & ranchers
- Commodity buyers
- Finance & risk management

Flows of Food System Services
Biologically Integrated Orchard Systems (Almonds)

Adapted from KD Warner, 2007 *Agroecology in Action*, p. 176
Legitimacy
ASI strives for a base of diverse stakeholders in terms of race/ethnicity, gender, geographic region, urban/rural, socioeconomics, age, etc.


For background: