Information Sharing & ICT in Agri-Food Supply Chain Networks – a view from different perspectives

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The Netherlands
Sjaak Wolfert – who am I?

- MSc/PhD at Wageningen University, The Netherlands
  - Sustainable Agriculture: how to make it work? (2002)
- 2001 – now: senior scientific researcher at Agriculture Economics Research Institute (LEI-WUR)
- 2006 – now: President of the Dutch Society for ICT in Agriculture, Food and the Environment (VIAS)
- 2007 – 2009: President of EFITA
EFITA:
European Federation for Information Technology in Agriculture, Food and the Environment

Dr. Sjaak Wolfert
President
Role of EFITA

**what we are:**
- network of agri-ICT-professionals
  - science-based
  - practice-oriented
  - interdisciplinary
- NMO’s in 16 EU countries

**what we can (help to) provide:**
- state-of-the art RTD
- workshops, seminars
- living labs
- contact persons
- (EU)-funding
- dissemination of knowledge/information
- …
Joint International Agricultural Conference
6, 7 and 8 July 2009, Wageningen

www.jiac2009.nl

- research & education
- policy makers
- Agri-Food & ICT business

interaction
Research Group – Management & ICT in AFSCN

- Dr. Sjaak Wolfert
- Prof. Adrie Beulens
- Dr. Wil Hennen
- Drs. Cor Verdouw
- Dr. Marco Verloop
- Ing. Henri Prins
- Drs. Tim Verwaart
- Ir. Ruud van Uffelen
Key note

Business (process) is leading!
Presentation outline

Information Sharing in AFSCN
- Context and problem description
- Conceptual framework
- Some results from research
- Some experiences from the Dutch ‘KodA’ project
- Main challenges
- On-going developments: agriXchange
Driving factors in agri-food business

- Sector-specific characteristics include:
  - Fresh products
  - Seasonable production
  - Many SMEs, particularly at farm level

- Main challenges
  - ‘license to produce’
    - consumers & society
    - food safety and transparency
    - sustainability
  - Global competition (EU, WTO)
  - Demand-driven
  - Innovation: knowledge-based production

- Operate in multi-dimensional, dynamic networks
multi-dimensional Agri-Food Supply Chain Networks (AFSCN)

- information sharing for process control and communication
- ICT plays a crucial role
Trends for information sharing

- Information increasingly becomes a competitive factor
- Less focus on the product but more on the service
- Spatial data becomes more important
- Open networks in which users are more directly involved (see open innovation and living labs)
- Governments also part of open networks and stimulate re-use of public information
Problem definition by example for pesticide application

**government/society**
- environmental impact
  - reduce **environmental impact**

**food processor → consumer**
- residues
  - **reduce residues**

**farming**
- pest reduction
- reduced costs
- apply site-specific
  - [costs/ha]
  - [app/10m²]

business processes are driving!
Problem of information sharing

Problem of information sharing is NOT primarily about:

- software engineering
- database integration

but is about:

- integration of information that is generated by business processes
- information that is generated by an installed base of existing systems
- ICT and organizational issues that go hand in hand
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Framework for development

A. Analysis

B. Basic Design

Generic Integration Framework
- Technical Architecture
- Reference Information Model
- Technical Infrastructure
- Organizational Infrastructure

C. Iterative Implementation

Overall Development

Prototyping

Pilot A
Pilot B
Pilot C
...
Information Integration Analysis Framework

Adapted from Giachetti 2004
3-layered SOA architecture

- **business process management layer**
  - production process

- **business service layer**
  - get soil data
  - get field and crop data
  - send invoice
  - send product information

- **application service layer**
  - soil lab 1
  - soil lab 2
  - farm
  - accountant
  - market

Levels:
- **generic (EU) level**
- **interoperable (cross-country) level**
- **specific (national) level**
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Current situation arable NL: many point-to-points

- data suppliers
- research institute
- advisory service
- input supplier
- weather, cultivars, etc.

EDI-Teelt?

- farm
- farm management system
- operations
- ISOBUS
- processing industry
- transporter/collector
- products
- restriction
- product information
- markets

EDI-circle

- registration
- regulations
- government

Artik+ OAI-PMH

- knowledge
- advice
- monitoring data

EDI-Teelt

- p2p
- p2p
- p2p

fertilizers, pesticides, etc.

information

products

suppliers

registration

regulations

products
Problems

- choice of soft/hardware components is limited
- double investments in system components
- effort for collecting, converting and exchanging necessary data is large, while the possibility for making errors is high;
- difficult integration of scientific knowledge and farm-specific data
- decision-support is sub-optimal and as a consequence also decision-making;
- transparency and accountability requirements often lead to administrative burdens.
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KodA I&S: geo-fertilizer advice

LAI (GIS) map
- a) Basfood (ZLTO/CZAV)
- b) Loris (Agrifirm)
- c) Cropview (BLGG/Vexcel)

N advice process - EDI-Teelt+?

SOIL analysis - BLGG

N-advice (GIS) module - ‘Robin Hood’

1. field/crop (GIS) data
2. LAI (GIS) data
3. soil N data (general advice)
4. fertilizer map (ISOBUS?)
5. advice
6. fertilizer map

Initiate
Obtain field and crop data: BPMN to webservice

BPMN

Determine Field

Request Field Data from FMS

Receive Field Data from FMS

Determine Crop

Request Crop Data from FMS

Receive Crop Data from FMS

BPEL code web service
Keys for development

LAI (GIS) map
- Basfood (ZLTO/CZAV)
- Loris (AgriLim)
- Cropview (BLGG/Vexcel)

1. field/crop (GIS) data

2. LAI (GIS) data

N advice process
- EDI-Teelt?

3. soil N data
- general advice

4. advice

6. fertilizer map (ISOBUS?)

Initiate

SOIL analysis
- BLGG

N-advice (GIS) module
- ‘Robin Hood’

fertilizer machine

(GIS) farm management system

ICT-ensure 15 Jan 2009, France
Solving chicken-egg dilemma: a golden egg approach

Long-term vision: BPM/SOA architecture and Standards Organization

Co-ordinate Joint Initiatives (KodA, GeoFarmer, AgroXML, AgroEDI, etc.)
Living Lab Information Management in Agri-Food

ICT business

(existing) solutions

research & education

(existing) knowledge

agri-food business

problems

innovations

new knowledge

new solutions
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Main challenges

- How to construct sector-specific SOA-architectures based on reference information models, adopting existing, worldwide cross-industry standards?
- How to use business process management (BPM) concepts, including ‘best practice’ models, to allow flexible configuration of specific processes integrations?
- How to organize broad commitment (including the end of the chain!), to embed developments in sustainable institutional arrangements, and to let it grow organically? (Living Labs!)

- Concerted Action is needed for coordination and knowledge exchange in different sectors and in different countries at the international level
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**agriXchange** (proposal FP7-KBBE-CSA call 15-Jan-09)

Coordinate and support the setup of a sustainable network for developing a system for common data exchange in agriculture by

- establishing a platform on data exchange
- developing a reference framework for interoperability
- identify main challenges (SRA)

consortium of 14 partners from 11 countries (Sjaak Wolfert is coordinator)
Thank you for your attention!

Business (process) is leading!