Agri-Supply Chain Management

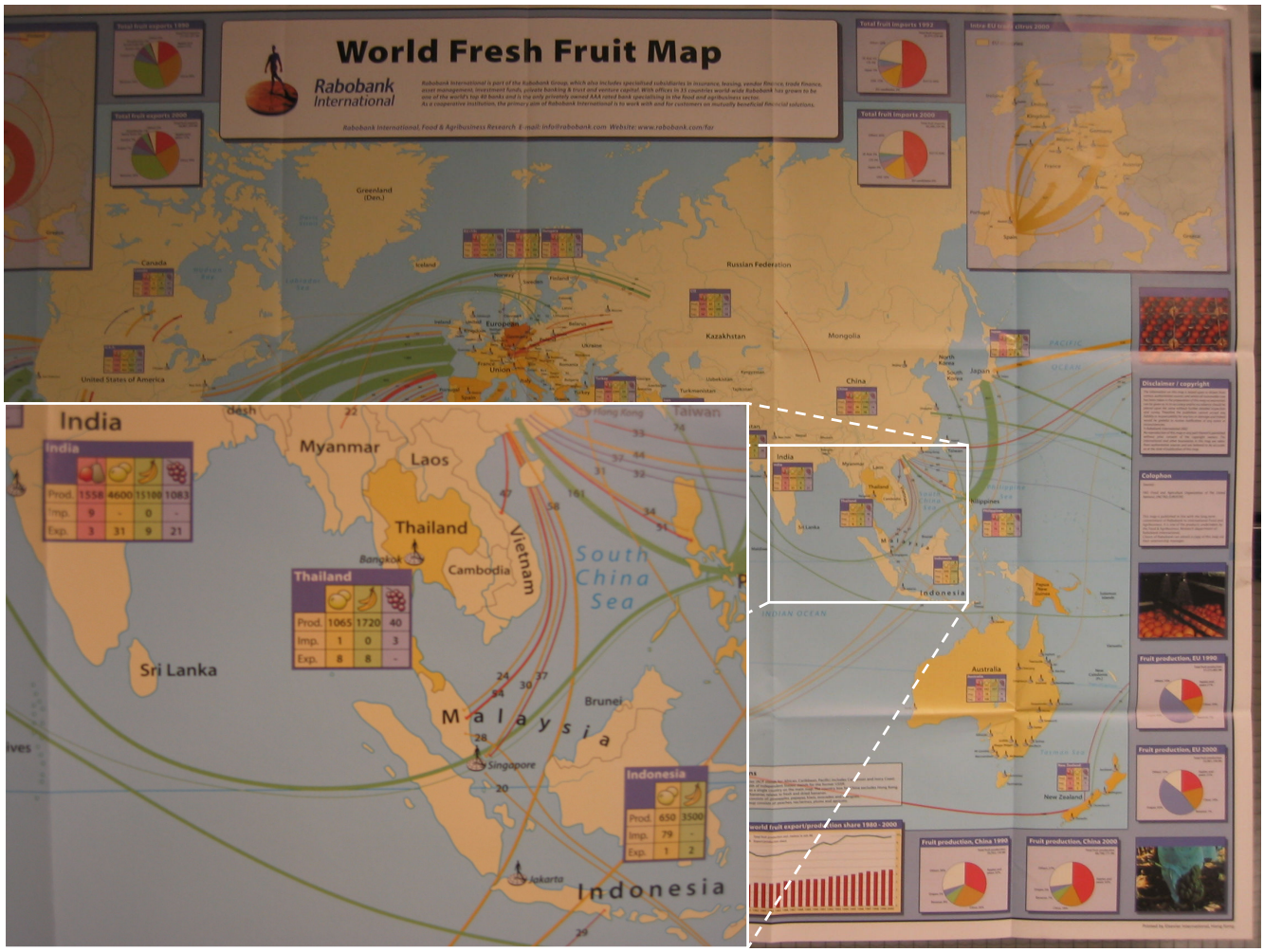
Toine Timmermans
Wageningen UR
Quality in Chains
toine.timmermans@wur.nl

Agenda

- Introduction
- Developments & Consumer Trends in Europe
- Opportunities for export of Asian Fruits
- Post-harvest Technology
- Examples of Integrated Projects
- Conclusions
- Discussion

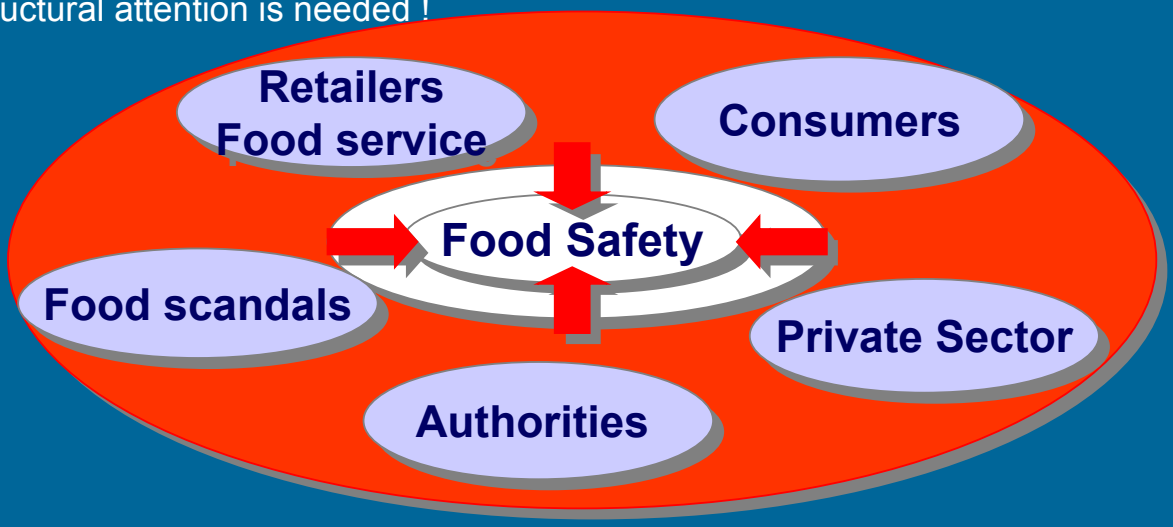
Wageningen University & Research Centre

	Wageningen University	8 research centres	2 research stations
Type of research	Fundamental	Strategic	Applied
Employees	2900	3100	900
Students	4650		
PhD	1006		



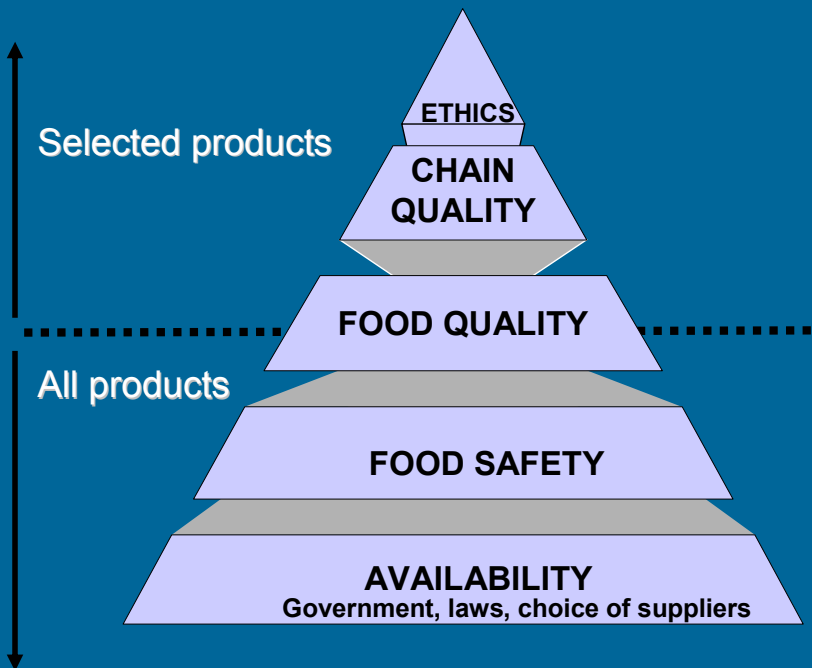
Food Safety: just a few words

EU Food Safety is Complex (GAP, Codex, General Food Law, Haccp, etc.), Reports of Exceedance of Maximum Residue Levels (MRLs) for pesticide residues in products from Thailand.
Structural attention is needed !

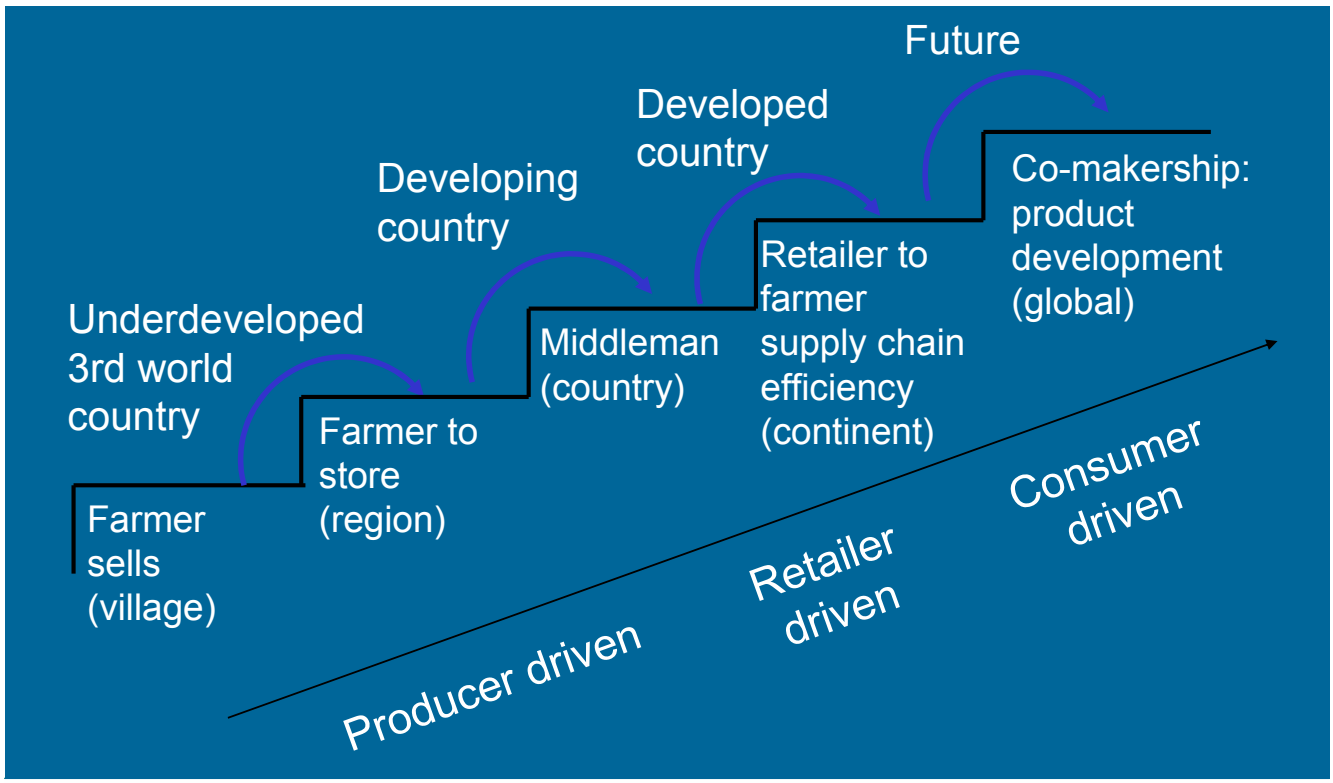


Quality management as systems innovation

- From licence to produce towards licence to deliver
- From retail backwards quality management is forced upon every single link in the chain.
- Autonomous control in Control upon control system



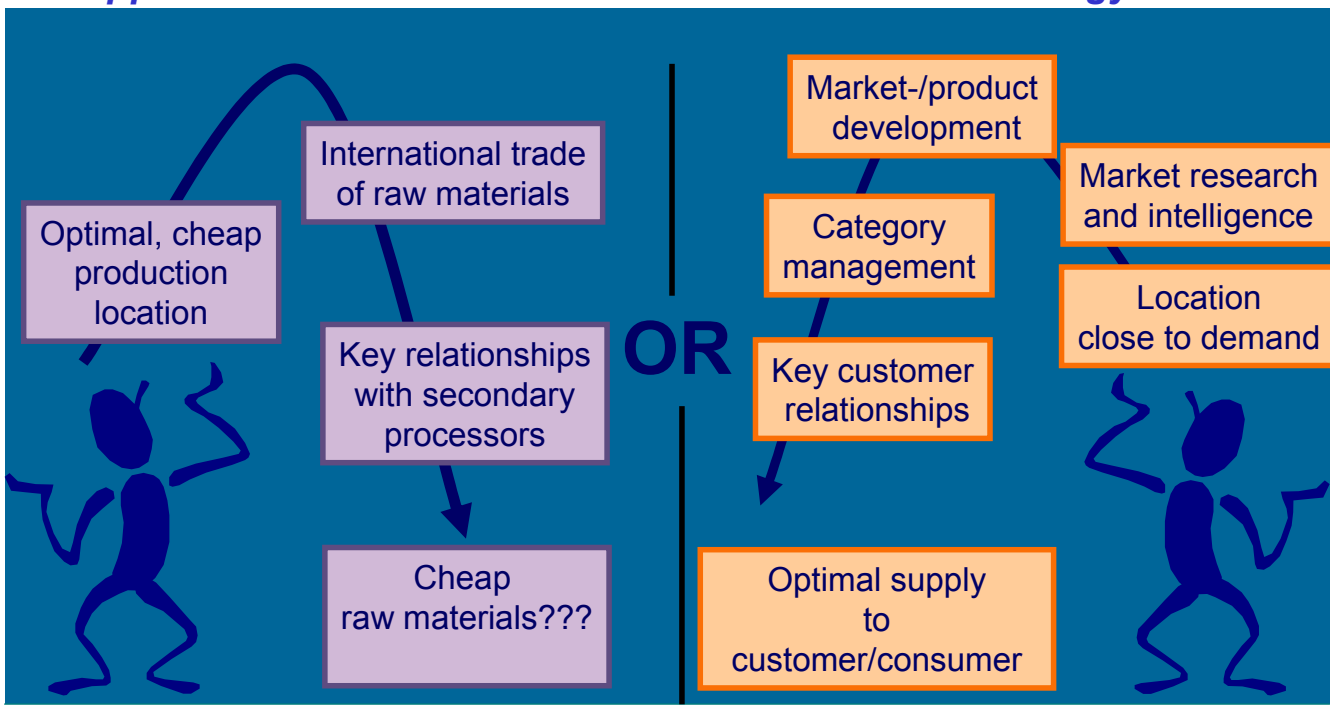
Development of relationships



Choice: Market strategy

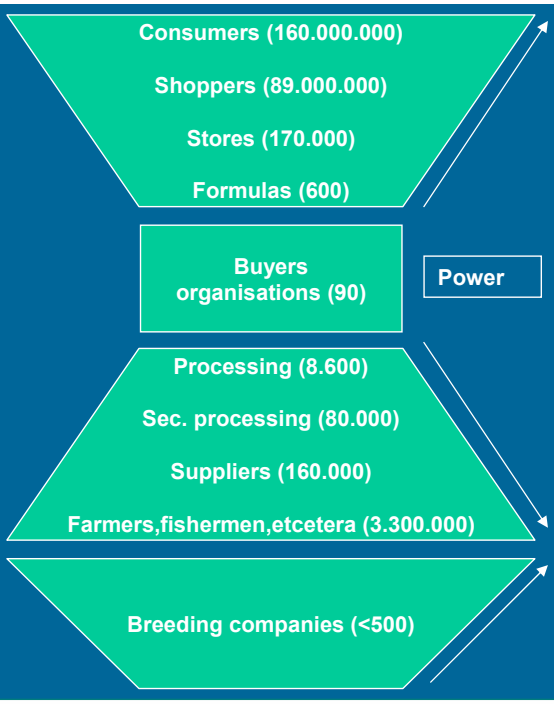
Produce as raw material supplier ?

Produce by a market-oriented, demand driven strategy?



Power in the agrifood chain in Europe

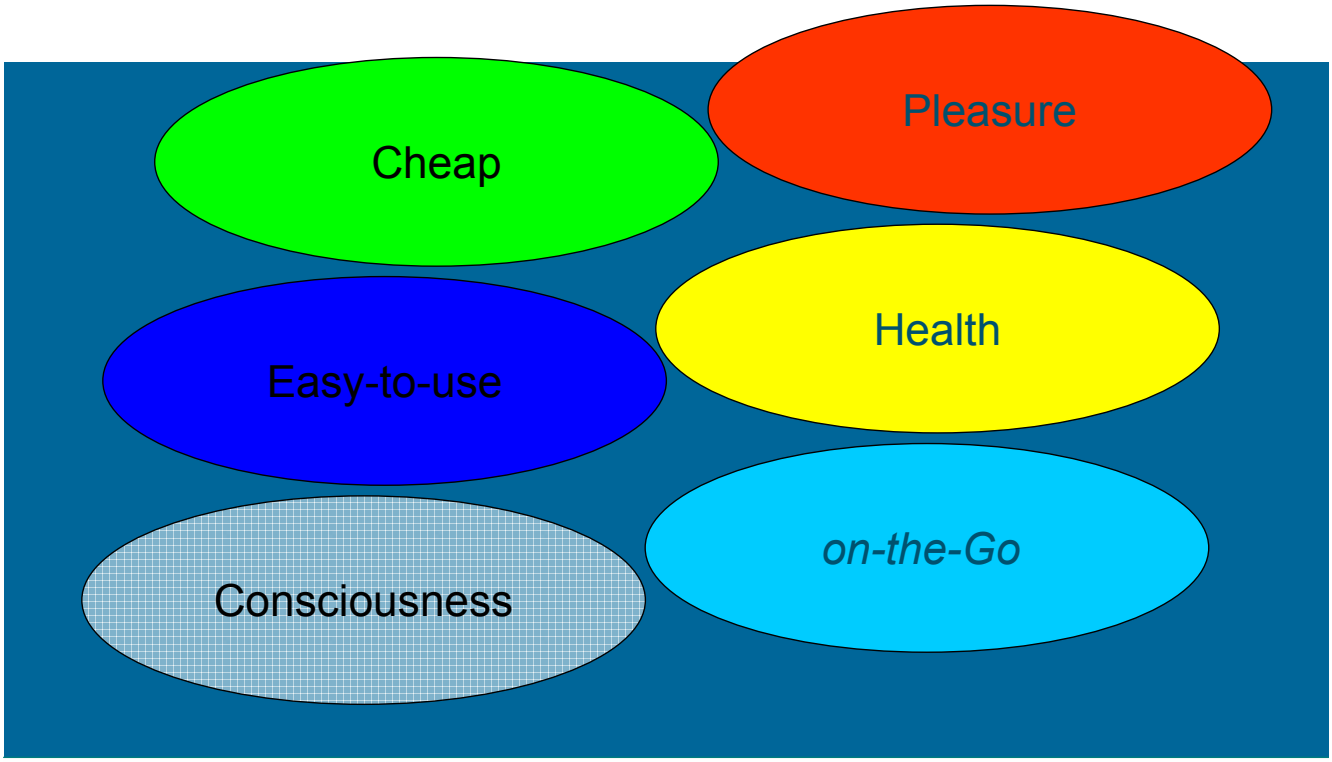
Supply Chain Funnel Europe, J.W. Grievink



- Retail and buyers organizations center of power & control in the chain.
- Processing industry and trading organizations leading in product innovation
- Breeding companies will gain influence (forward integration)

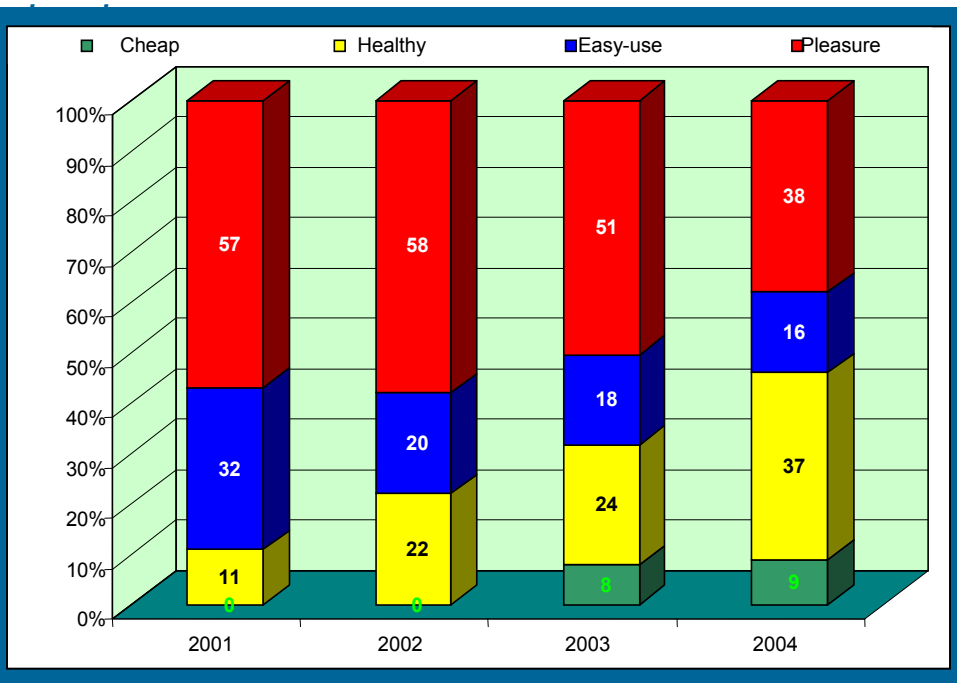
Trend in retail: “From dryware to fresh”

Market trends in food (Europe)

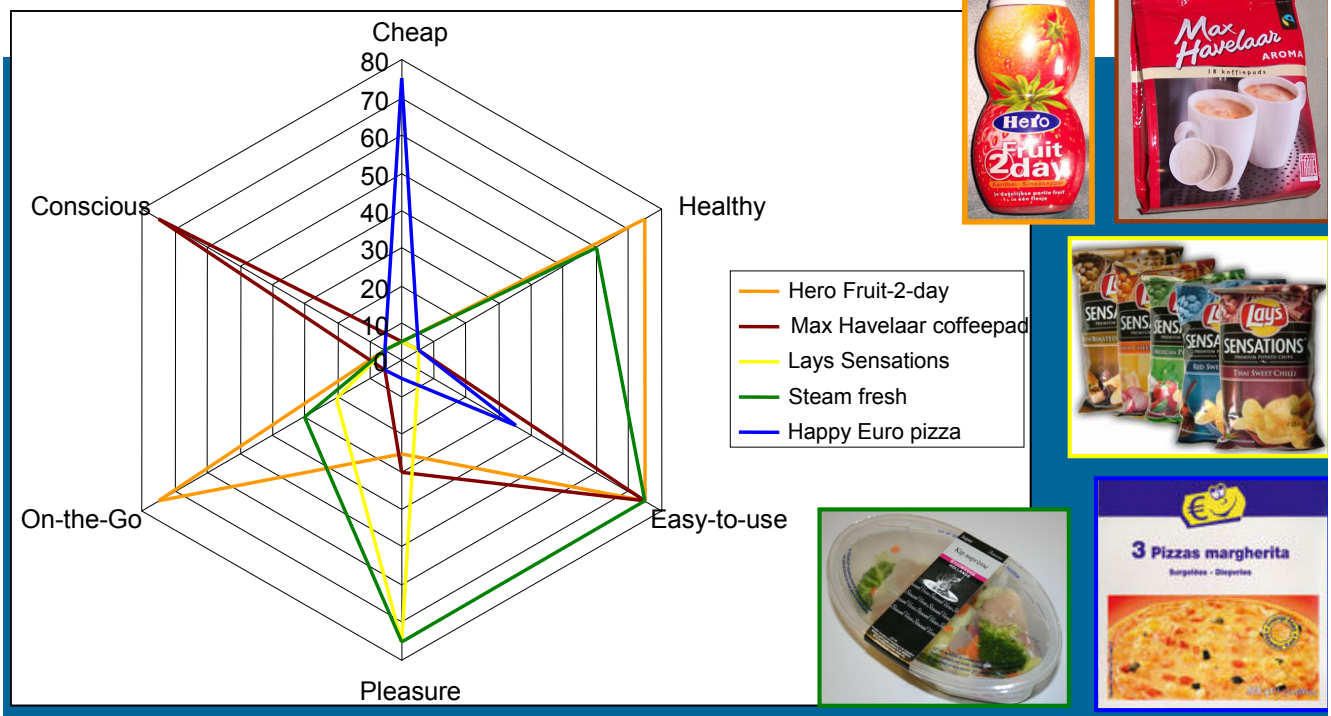


Development of consumer trends

Top 20 of most successfull food introductions in the



Combinations are more successful



Fruit consumption

- Fruit consumption levels are low (and tend not to rise)
- Shares of organic & fair trade increase
- Fresh cut fruit salads & healthy/"easy to use" grows
- Most successful (processed) fruit products: branding & marketing

Opportunities for export of Asian Fruits

- Sustainability & Consciousness
  - Max Havelaar/Fair Trade
  - Organic
- Fruits are healthy
- Local taste & local supply chain organization
- Added value activities (pre-processing, product innovation, ready to eat concepts, packaging, traceability, chain certificates)
- Scale of operations, compliance with food-safety standards and pricing always will be important
- Crucial will be the ability to build partnership relations

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Post-harvest Technology

- Long term Storage
- Packaging Technology
- Cold Chain Management
- Energy efficient transport
- Quality Measurement

- Integral Logistic Solutions

  Session IV: Safety & Quality Assurance

  Fresh Logistics

Post-harvest Technology

Research facilities

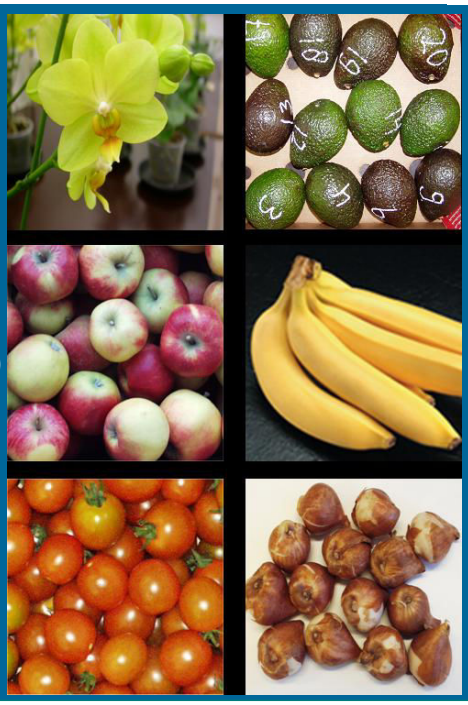
Long Term Storage with SmartFresh

SmartFresh:

An expanding new technology in storage and agro-distribution

Examples of current use:

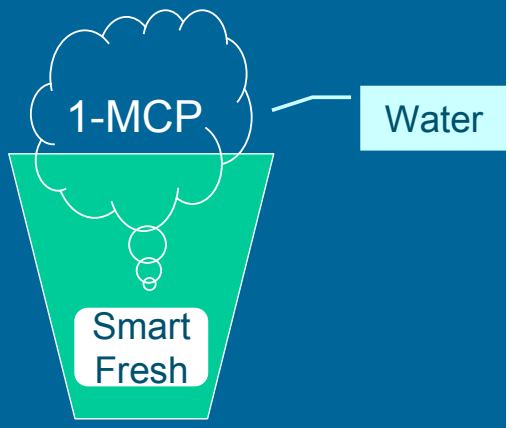
- apple storage (Europe, USA, New-Zealand, China)
- avocado transport (South Africa)
- banana shelf-life (USA)
- kiwi (Chile)
- tomatoes (South-Europe)
- ornamentals (USA)



Long Term Storage with SmartFresh

SmartFresh = 1-MCP

- Damp
- Treatment during 24 hours
- At room temperature: 10-14 days effect
- At low temperature: long-term effect
- 1 treatment after harvest in storage room



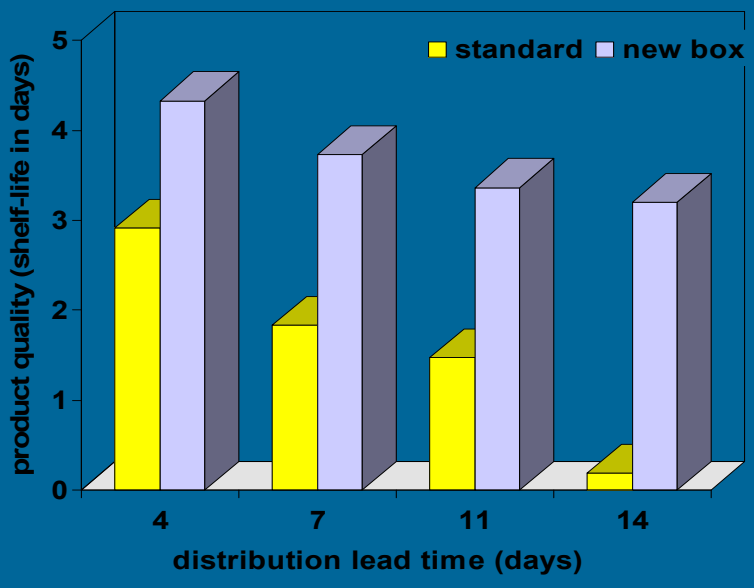
Packaging of perishables

- Complex mix of demands and wishes
  - Distinctive/attractive: shape, prints, material,
  - Protective: mechanically, biologically
  - Food safety: cooling; hygiene (anti-microbial)
  - Legislation: (GFL) - tracing and tracking
  - Logistics: modular/stackable/ machineable
  - Sustainable: low weight/recyclable/compostable
  - Cost effective !!!

Special solid board box for bell peppers

Modified Atmosphere Packaging = MAP

Air freight replaced by sea freight

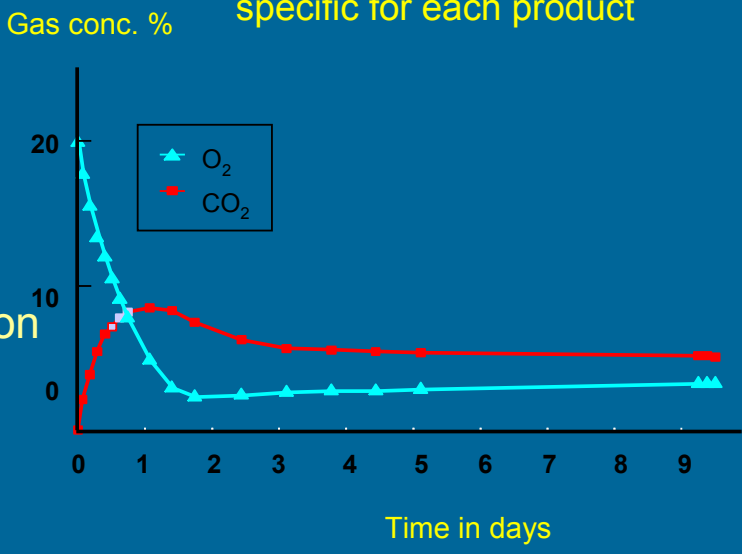


Quama = Equilibrium MAP

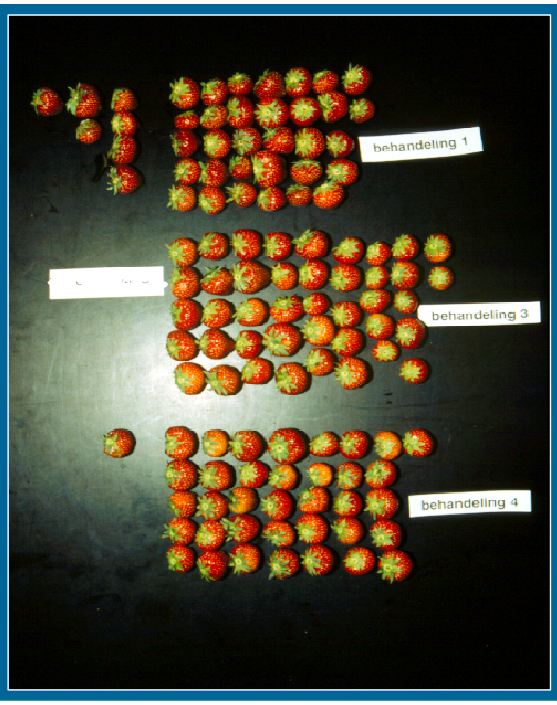
Effect MAP on fruits and vegetables:

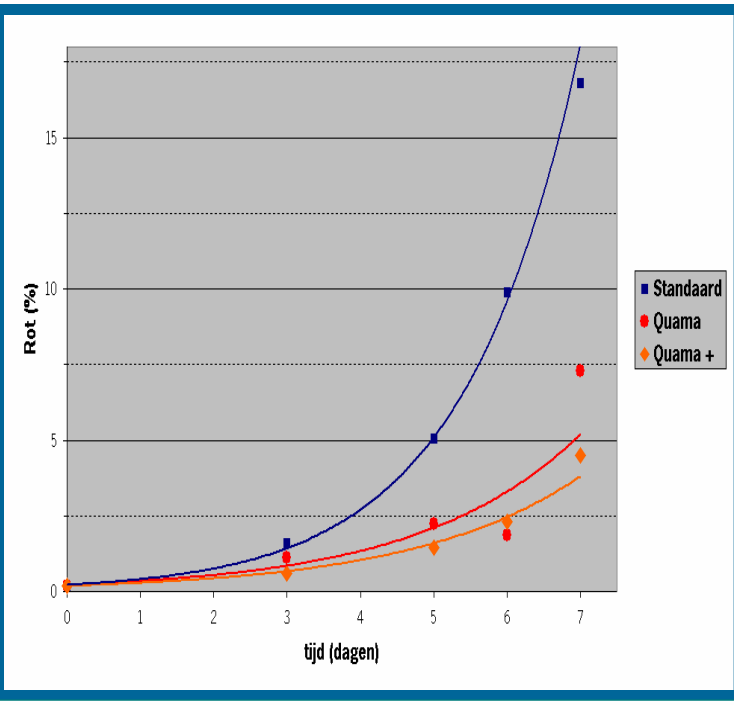
- Slows down ripening proces
- CO_2: Anti microbial action
- Low O_2 minimizes enzymatic discoloration

Optimal eq. gasconc. is specific for each product

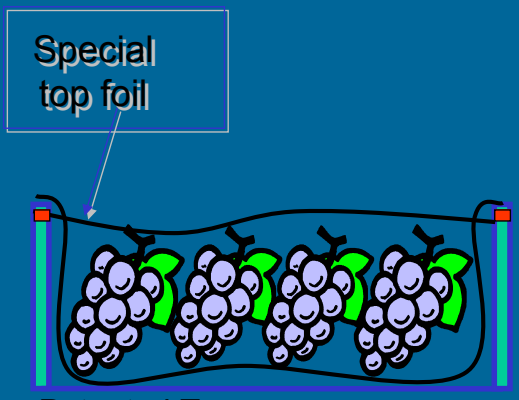


Strawberry and Quama: storage 8° C





Quality effect: no SO2 pad included



Equilibrium ma-packaging: consumerpacks

MA-packaging concept for a range of fruits and vegetables:

- The natural respiration builds up a protective atmosphere
- Matching of respiration and gas permeability of the packaging

Modified Atmosphere Packaging

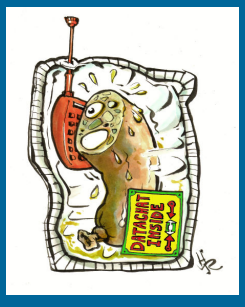
- MAP concept is beneficial in various distribution chains
- Packaging development needs a chain perspective
- Wageningen-UR step-by-step method: from idea, laboratory test to real world implementation
- Knowledge of quality behavior of fresh products in distribution chains is key issue

RFID^{+} - Datachat as futuristic integrated concept

RFID^{+}
This is RFID with extra information about fresh products, e.g. shelf life

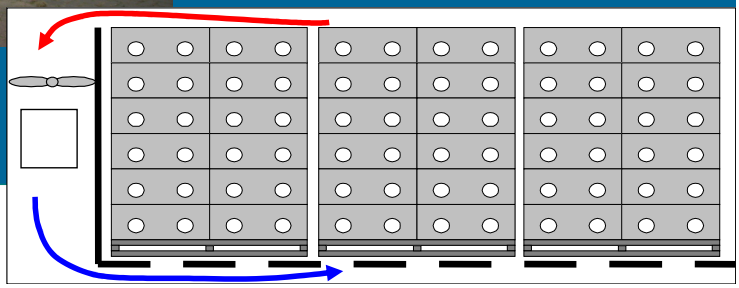
- Name
- Location
- How are you?

Aim
To reduce shrinkage and OOS by better stock control



- ID (barcode)
- Location
- Shelf life

QUEST: Energy reduction in reefer transport



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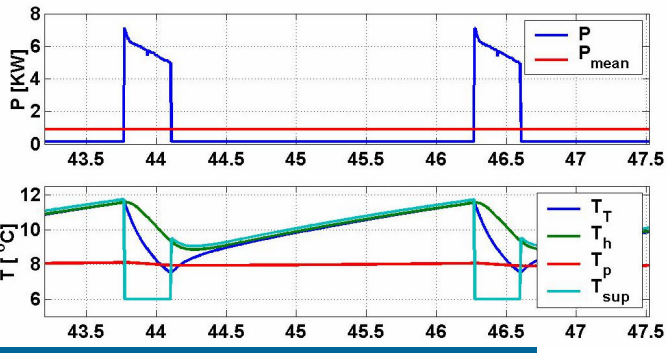
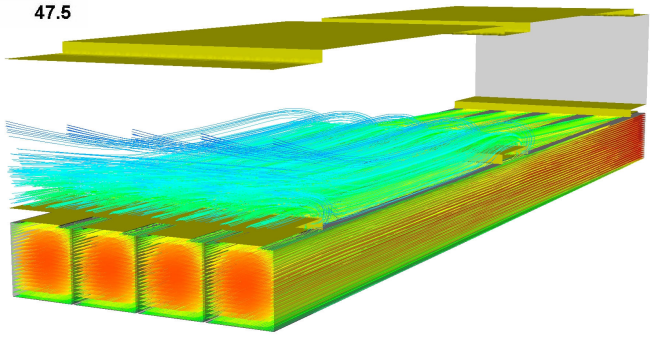
Modeling toolbox



Network model



distributed model

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Controlled avocado ripening

Goal:

To ripen avocados on demand in automated system

Task:

Develop an avocado ripening controller that manipulates storage temperature of avocados such that the given desired firmness is reached

Avocado Ripening Model

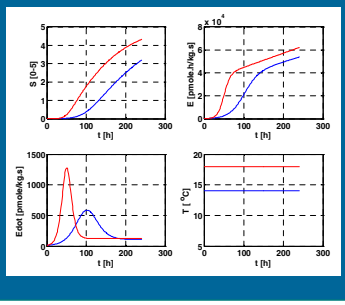
The Avocado Ripening Controller needs

- to estimate the firmness from ethylene production
- to know the expected firmness path at a chosen temperature

Task:

Develop an Avocado Ripening Model that describes:

the ethylene production and firmness of ripening avocados as a function of time and temperature



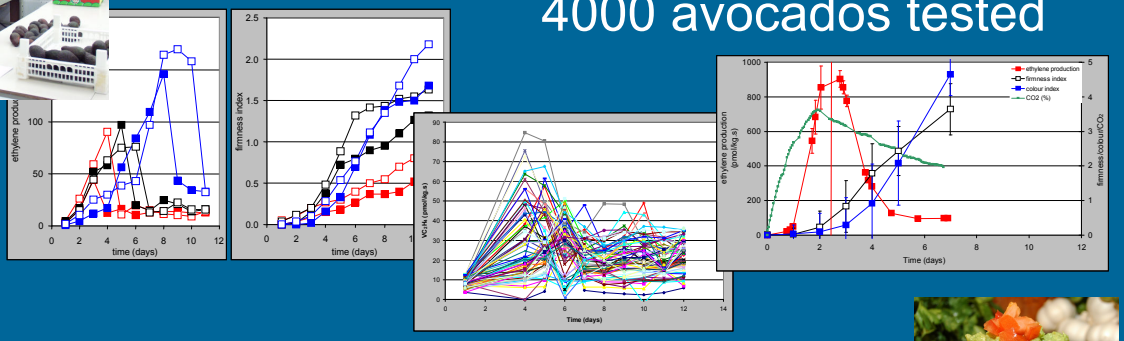
Product research for avocado ripening model

8000 ethylene production measurements

7000 colour measurements

7000 firmness measurements

4000 avocados tested

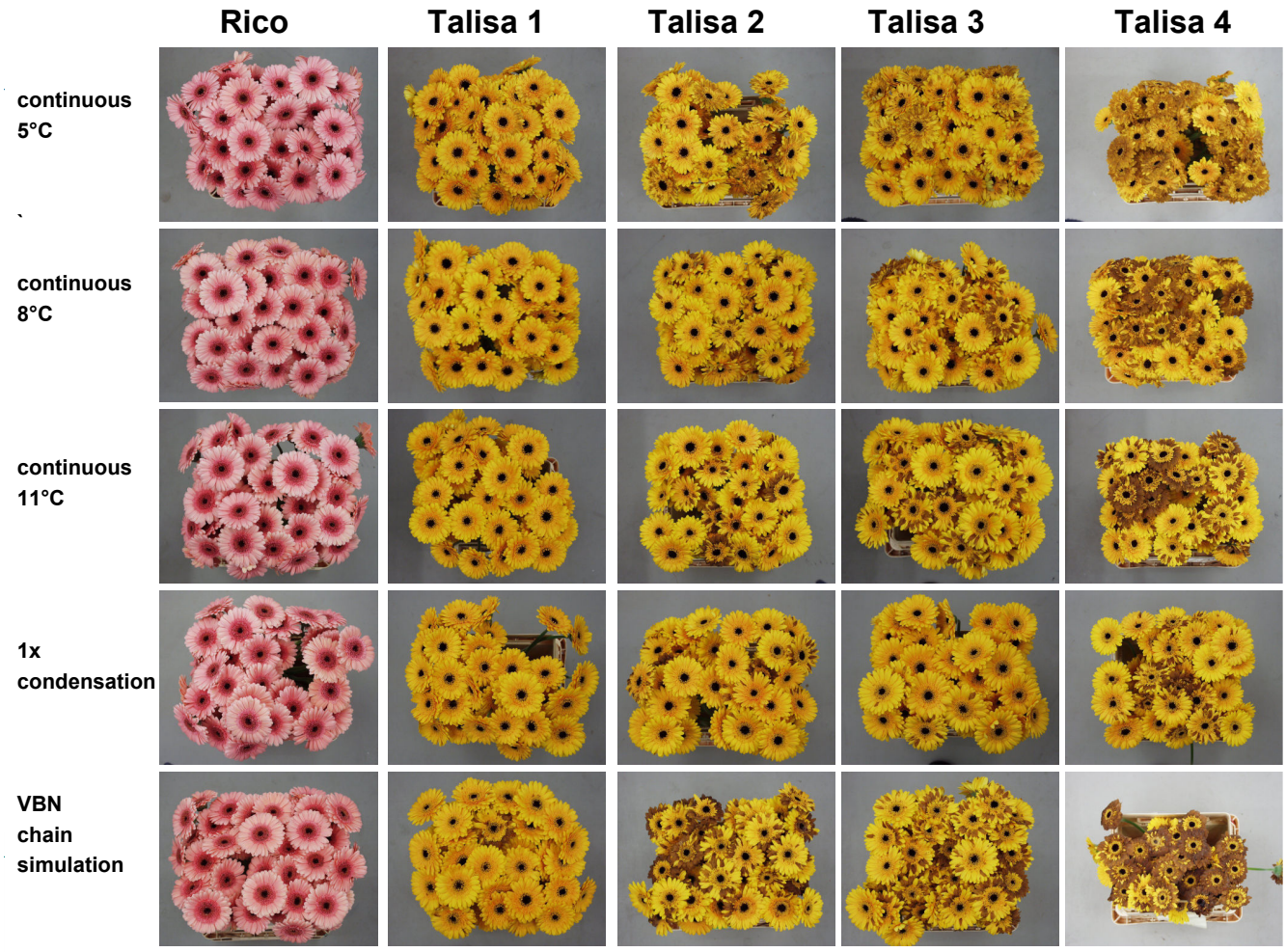


Cold Chain Management

Productschap Tuinbouw

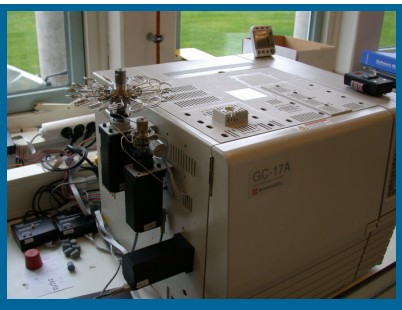
Some Results of Keepability & Cooling project for Dutch commodities:

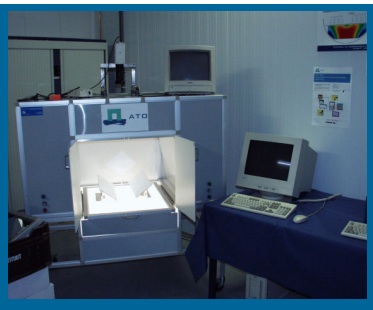
- Is cooling necessary ? YES
- Is condensation bad ? NO, if the quality is good
- Is slower cooling possible? YES
- Optimal temperature is the best: cooling always better
- Product with bad (initial) quality cannot be “rescued” with cooling
- After harvesting up to 48 hours to achieve optimal temperature
- Temperature changes can be tolerated
- Condensation with bad product shows product specific effects



Quality Measurement


Biochem. Analysis


Gas Analysis


Computer imaging


Firmness


Colour


Acid titration

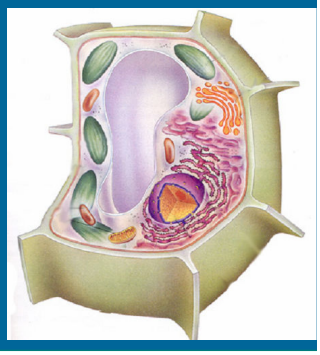
Quality Measurement: Initial post-harvest quality

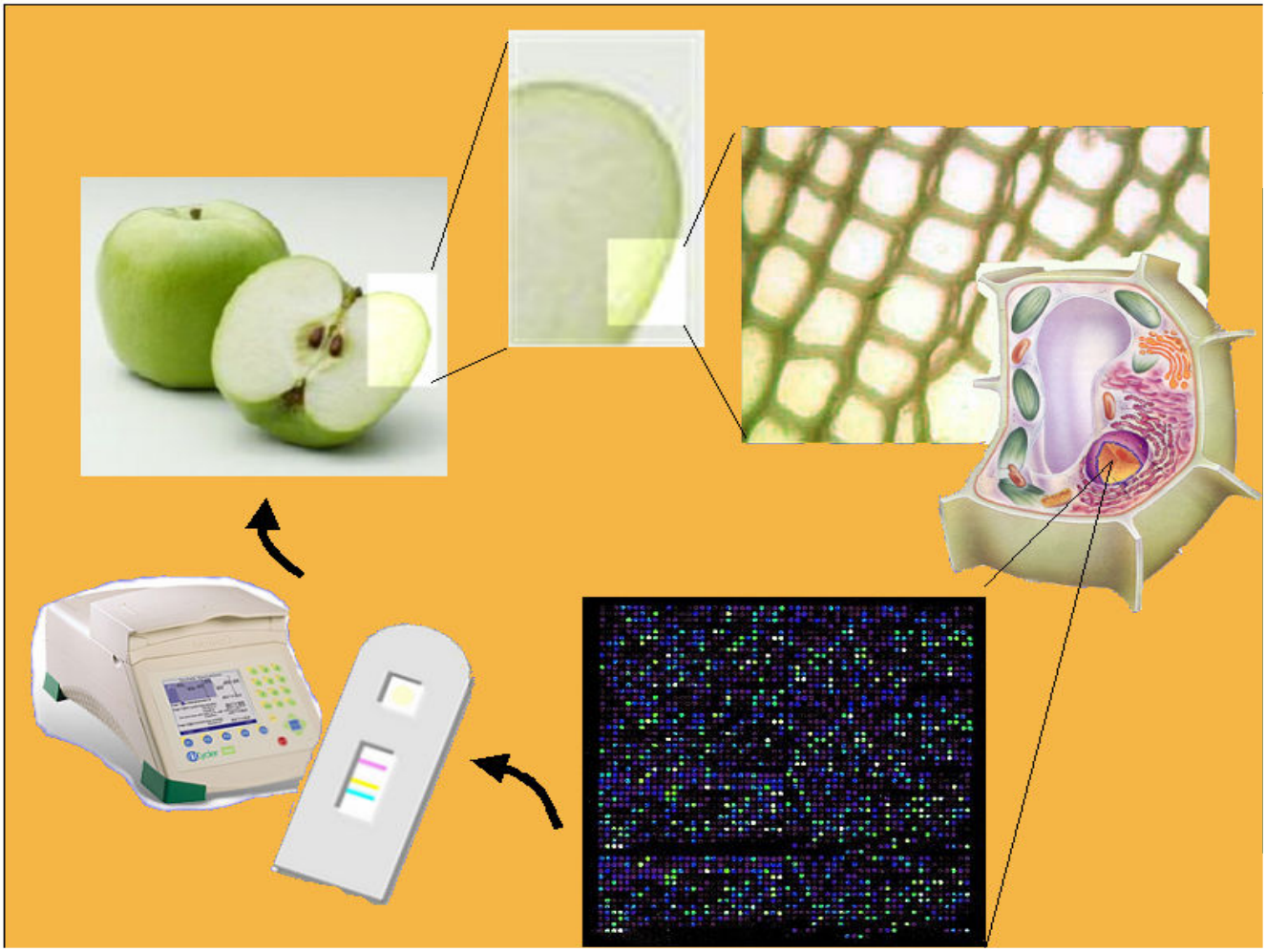
Present

- Measuring *effects* of biological processes
  - Secondary signal
  - Too late for acting

Using genomics

- Measuring *initiation* of cellular processes
  - indication of physiological status
  - early warning -> mRNA



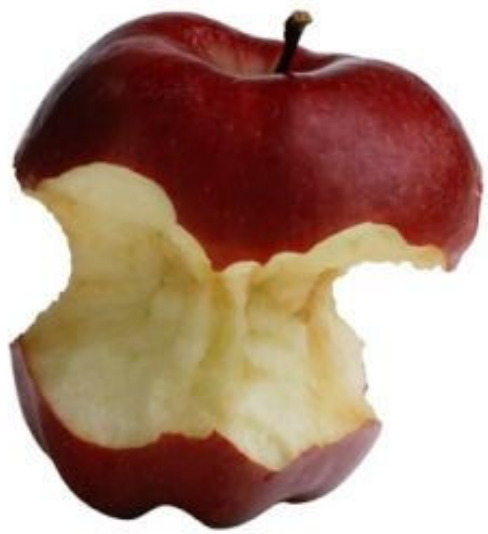


Translate genomics info into quality test

- Combine selected genes into quality sensor
- Optimal test format depends on
  - test environment
  - customer demands
  - nr of genes needed



Example: Storage quality apples



- Apples are stored for months
- Sometimes taste/health profile deteriorates
- AFSG developed test for early prediction of mealiness in Cox apples

Batch can be sold before quality decay starts

Role of modeling & simulation

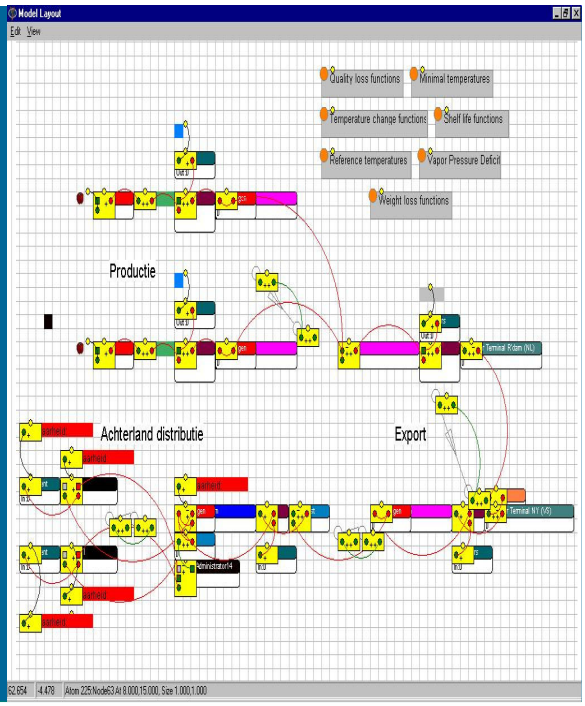
Robust Network design using the Supply Chain Optimiser

Simulation package

- Chain-wide
- Quality progress
- Chain - product - combinations

A mirror to reality

- Optimum chain design
- To judge situations before they are implemented in practice



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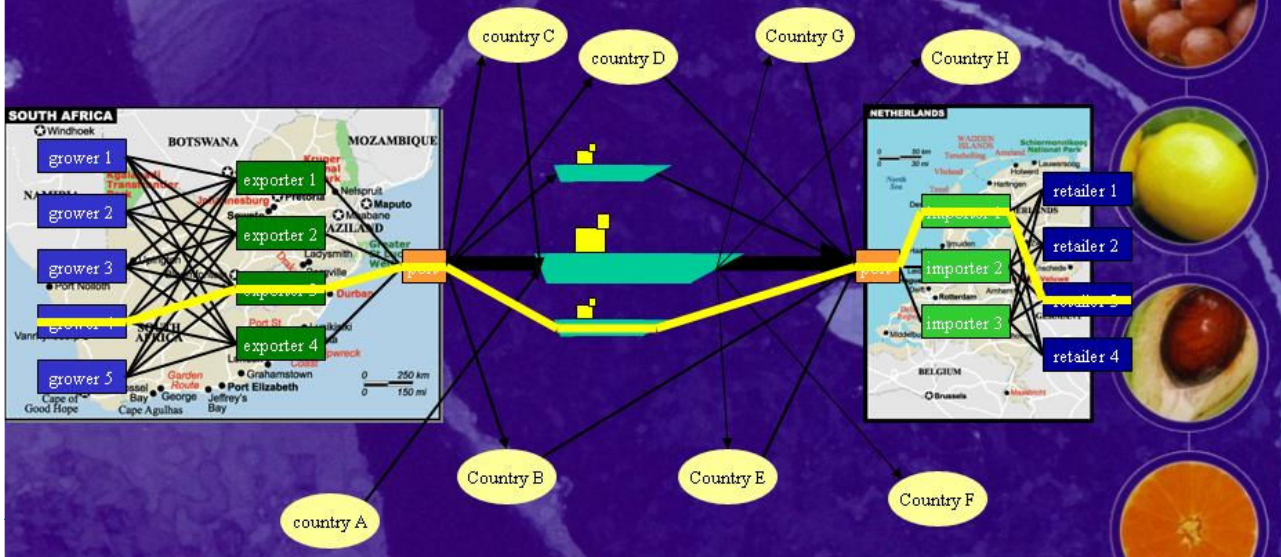
FRUITFUL

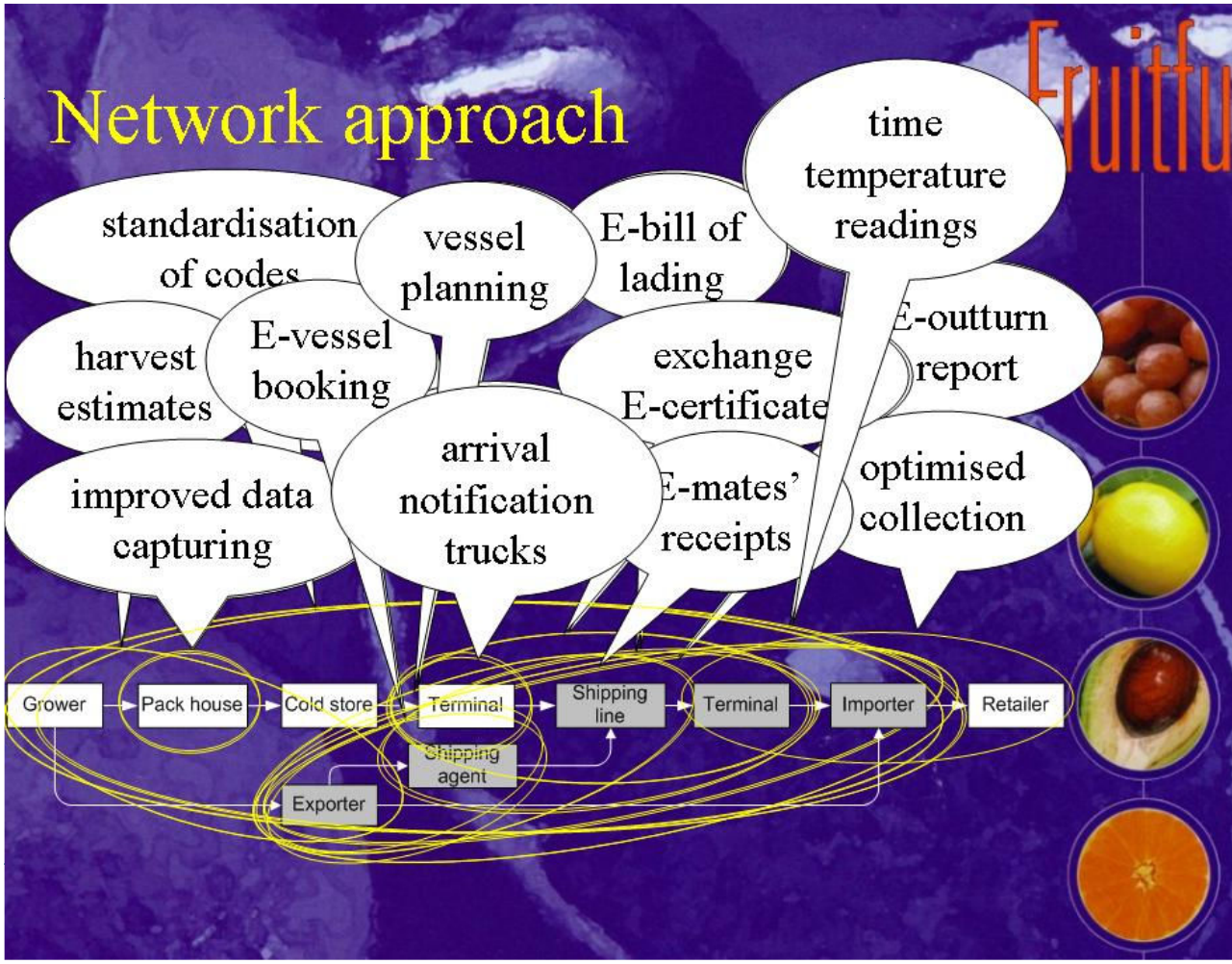
Improved information exchange fruit supply chain South Africa -Netherlands

Fruitful



Network approach

Fruitful



Chain in pictures

Fruitful




Conclusion

Fruitful

- Better understanding of each others functions within the chain
- First steps have been made towards more integrated information exchange
- Both knowledge institutes and industry partners created a platform for further improvements

ISAFRUIT

Full project title

Increasing Fruit consumption through a transdisciplinary approach leading to high quality produce from environmentally safe sustainable methods.

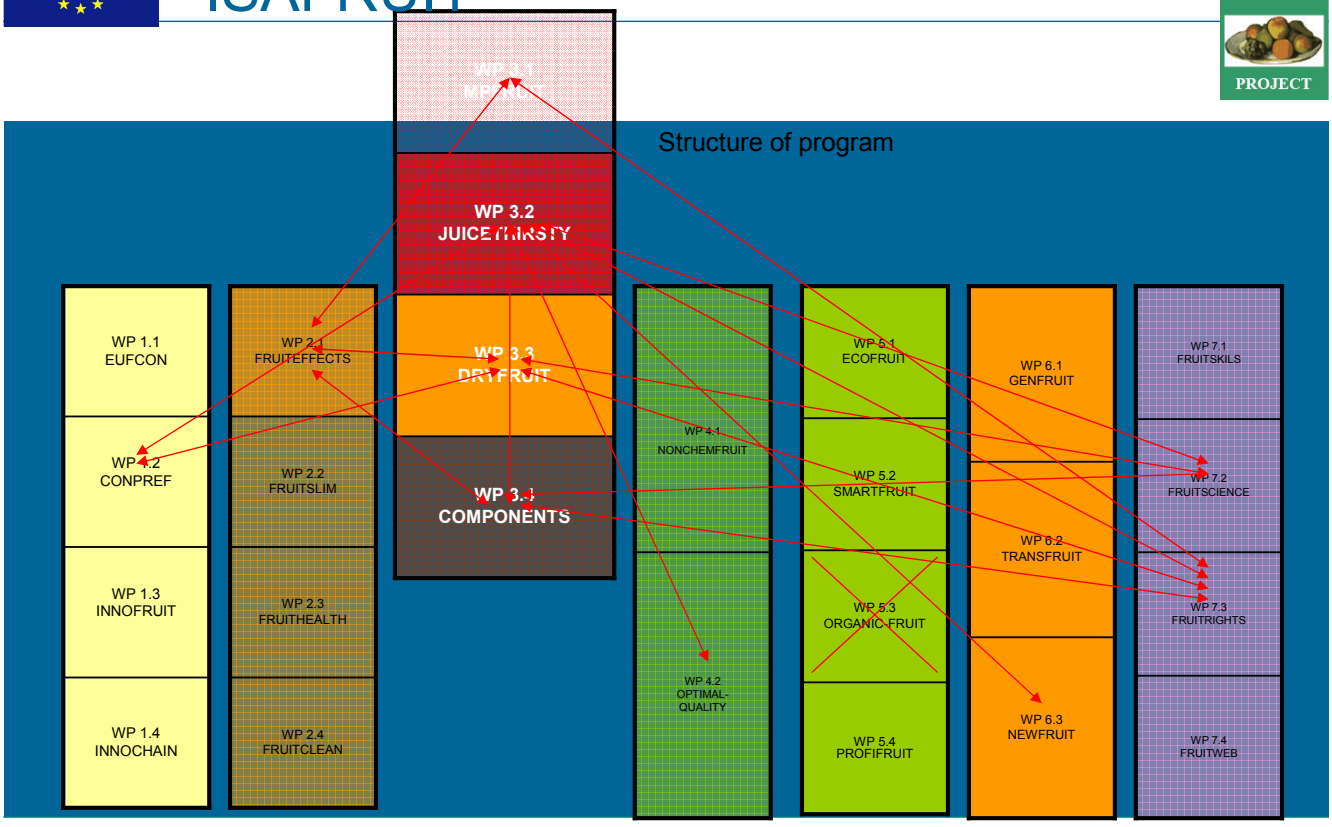
62 partners, 200 research staff, 16 countries, budget 21.1 MEuro, runs from 2006 to 2010.

www.isafruit.org

www.isafruit.eu

ISAFRUIT

Structure of program



Conclusions & Recommendations (1)

- There are opportunities to increase export to the European market; especially with a demand driven strategy
- Insight in the Market & Consumer trends is essential
- Food-safety, price and efficiency are basic requirements
- Added value makes the difference (robustness, innovation, local processing, chain certification and branding)
- Partnerships in the chain are crucial

Conclusions & Recommendations (2)

- Use the latest developments in post harvest R&D: technology, scenario analysis, protocols, quality certification
- Organize international arenas for interaction with stakeholders
  What is the level of ambition and is there a corresponding budget ?
- Essential role of private sector and entrepreneurs
  Technology is available, it is setting out a strategy, invest & organize

Thanks you for your attention!

Questions ?