

# Development and transfer of applicable knowledge for Metropolitan Food Security

A perspective from  
Dutch trade and agri-industry

**Jan Hak**

CEO QuaTerNes  
President GMV/FME and NAFTC

Wageningen, 3 October 2013



QuaTerNes



# QuaTerNes

Focus on Development



- **Create sustainable entities with partners**
- **Support market oriented agri-food chains**
- **Improve values for stakeholders**
- **Partner in think-tanks and platforms:**
  - ✓ Agro-Food Systems Manufacturers (GMV – FME)
  - ✓ Metropolitan Food Security (MFS)
  - ✓ Netherlands Agro, Food & Technology Centres (NAFTC)



## Summary



QuaTerNes

“We cannot solve our problems with the same thinking we used when we created them”

Albert Einstein



# Metropolitan Food Security

**Twice as Much Food • Twice the Quality • Half the Resources !**

- Provision of input, know-how and network access locally
- Industries, Academia & Education systems, Governments and Thematic organizations

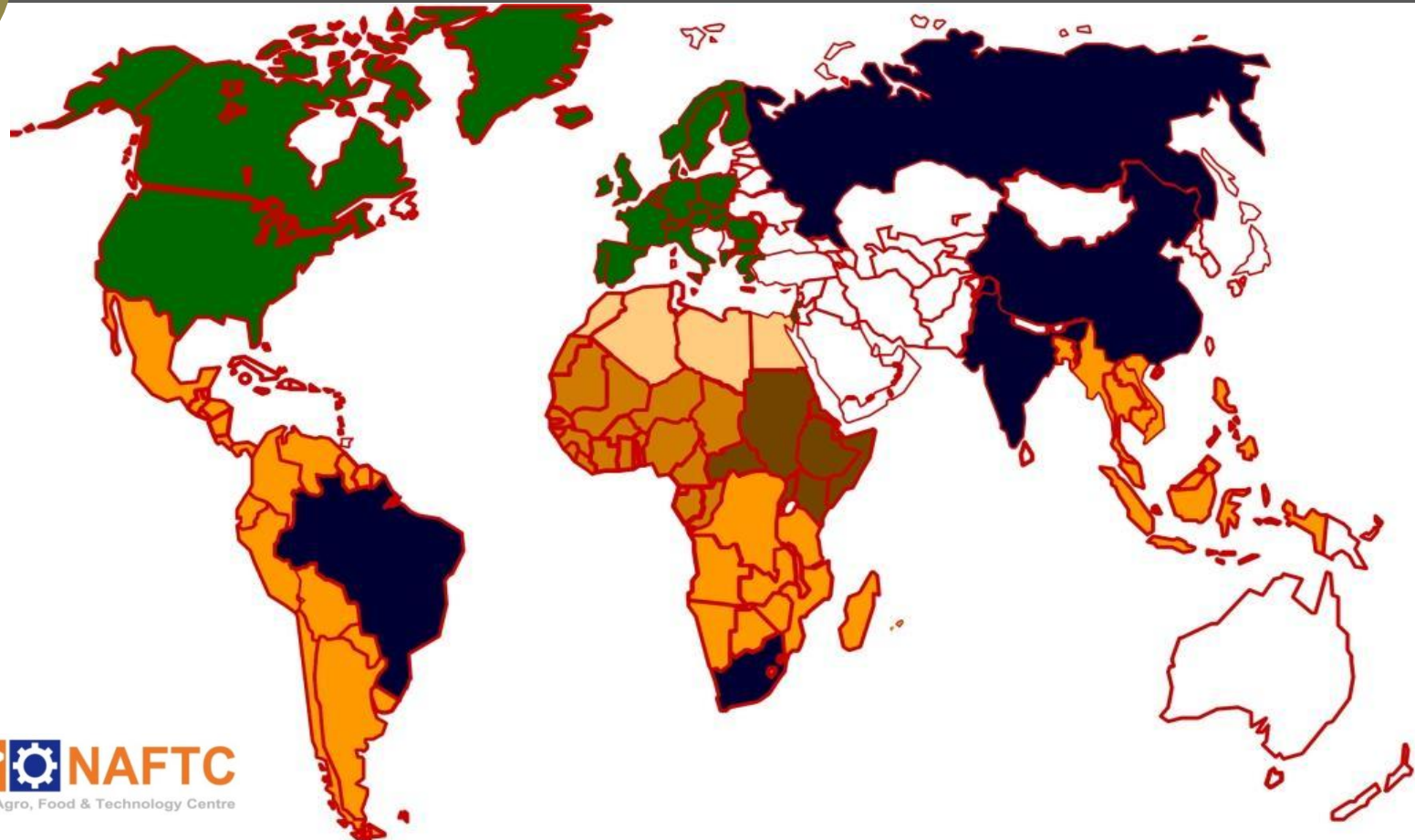




# NAFTC: Netherlands Agro, Food & Technology Centers



QuaTerNes



- **Emerging:** Brazil, Russia, India, China, Southern Africa
- **Frontier:** Northern, Eastern, Western Africa, South East Asia, Mid & South America
- **Innovation:** Western Europe, USA/Canada, Israel



# NAFTC

Dutch Expert Centers



- Potatoes
- Fruits Vegetables
- Horticulture
- Liquid Foods
- Dairy
- Animal Protein
- Bakery
- Confectionery
- Packaging
- Biobased Systems
- Cold chain & Logistics







# NAFTC

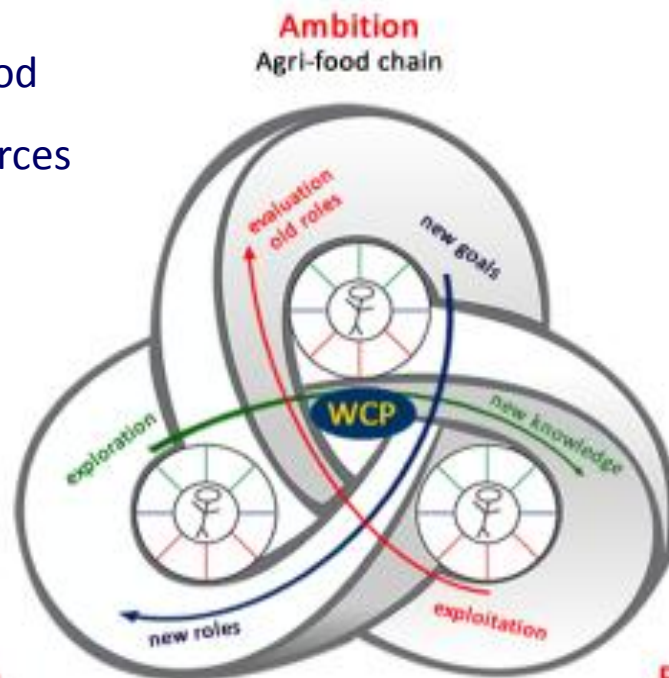
Ambitions



QuaTerNes

- Economic and efficient production of sufficient, safe and nutritious food
- Sustain and enhance natural resources
- Meet cultural and social (food) demands of society
- Maintain viable farming enterprises and contribute to sustainable communities

**Innovation**  
R&D, Education



**Performance**  
Systems, Technology



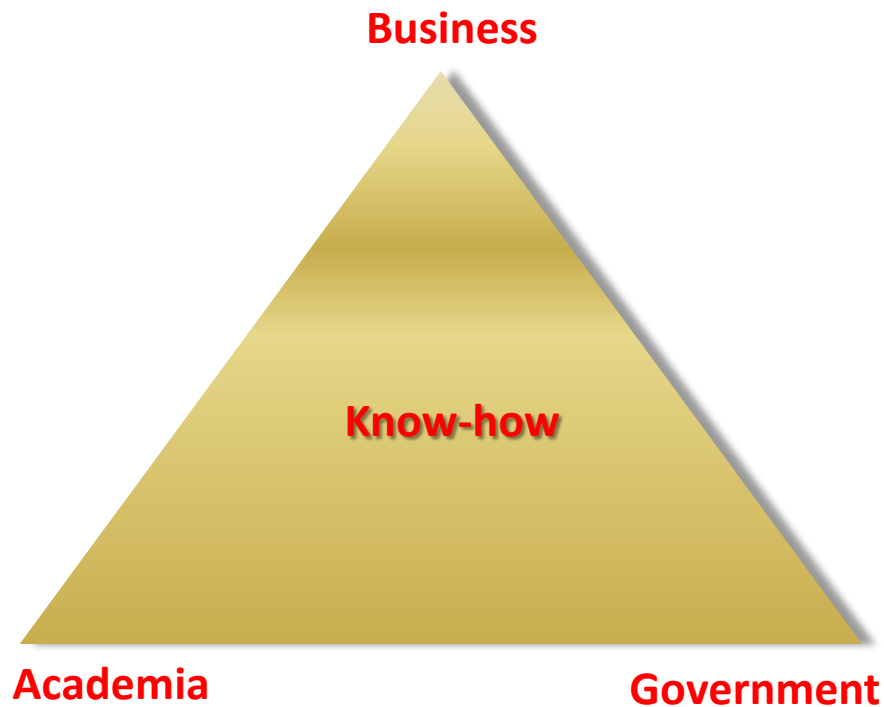
**NAFTC**

Mission



QuaTerNes

- Dutch Hi-Tech Agro, Food and Technology Products for sustainable developments in agriculture, aqua culture, horticulture, water and food
- Supporting members and partners world wide
- Cooperation in Dutch Golden Triangle







## The Netherlands



QuaTerNes

- **World Leading Technology Companies**

*Turn-over 2012: EUR 18 billion in high tech systems, 42% outside the EU  
(80% poultry, 70% cheese and > 50% potato processing systems)*

- **World Leading Food Companies**

*Turnover 2012: EUR 87 billion in agri-food products;  
(2<sup>nd</sup> Largest world exporter)*

- **High-Tech in Agro-Food, Horticulture and Water:**

**“Powered by Dutch Technology:  
Food, Health and Living Environment”**



Powered by

**DUTCH  
TECHNOLOGY**



# Dutch Excellence

- **Location near the sea:**
  - ✓ Prevalence of diseases
  - ✓ Fertile soils - Absence of rocks, flatness of land
- **Climate**
- **Long tradition of growing**





## Dutch Excellence



QuaTerNes

- High skill level farmers
- Advanced technological level
- High degree of mechanization





## Dutch Excellence

- **Strict quality inspections, certification (NAK)**
- **First-rate knowledge and various research institutions**
- **Hundreds of 'growers' study clubs**
- **Innovation!**







## Focus on Innovation

### Nutrition and health



### Sensory and structure



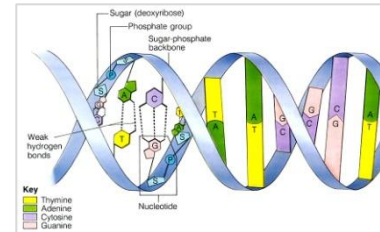
### Bio ingredients and functionality





# Focus on Innovation

## Genomics



## Precision agriculture



## Advanced processing and logistics



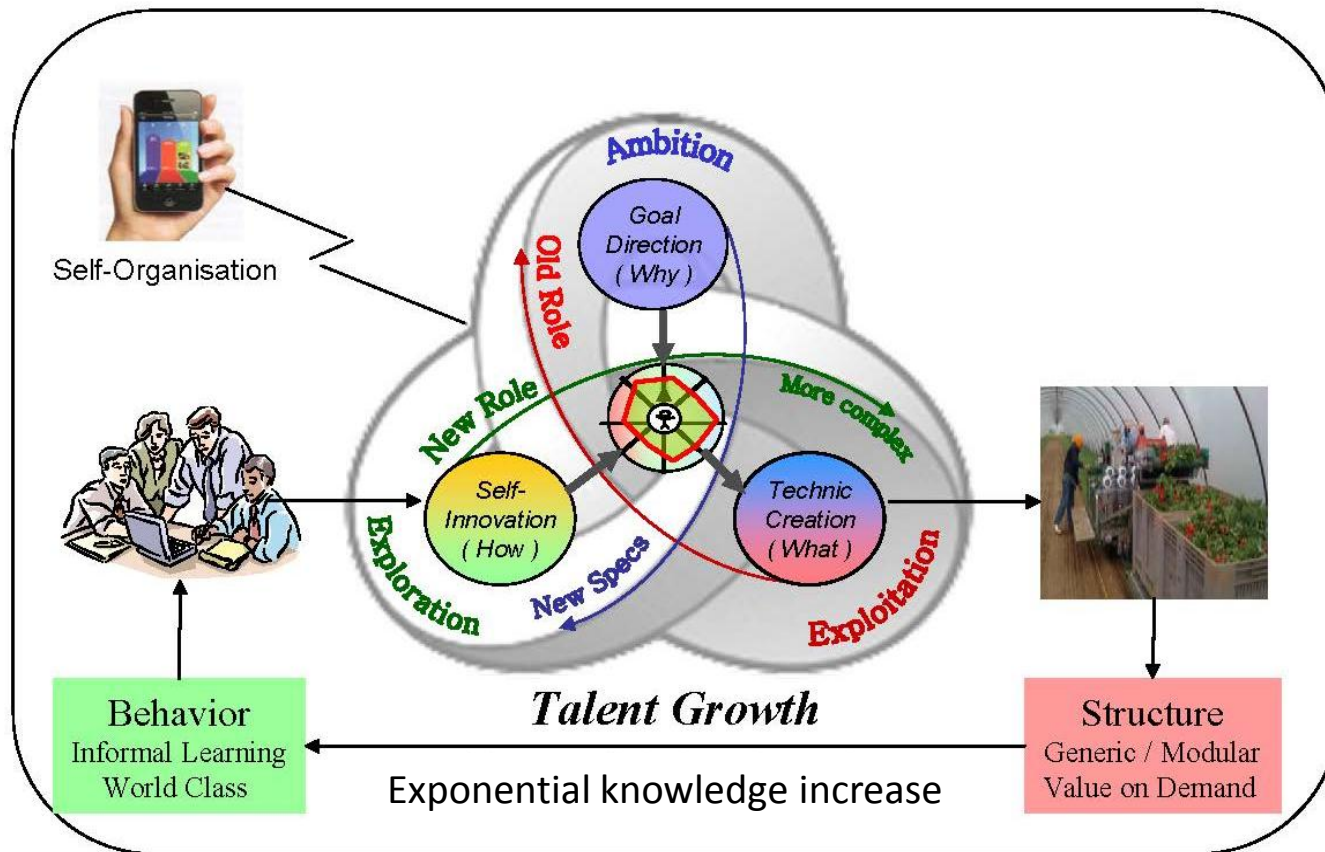


# Actor Model

## Talent Growth



QuaTerNes



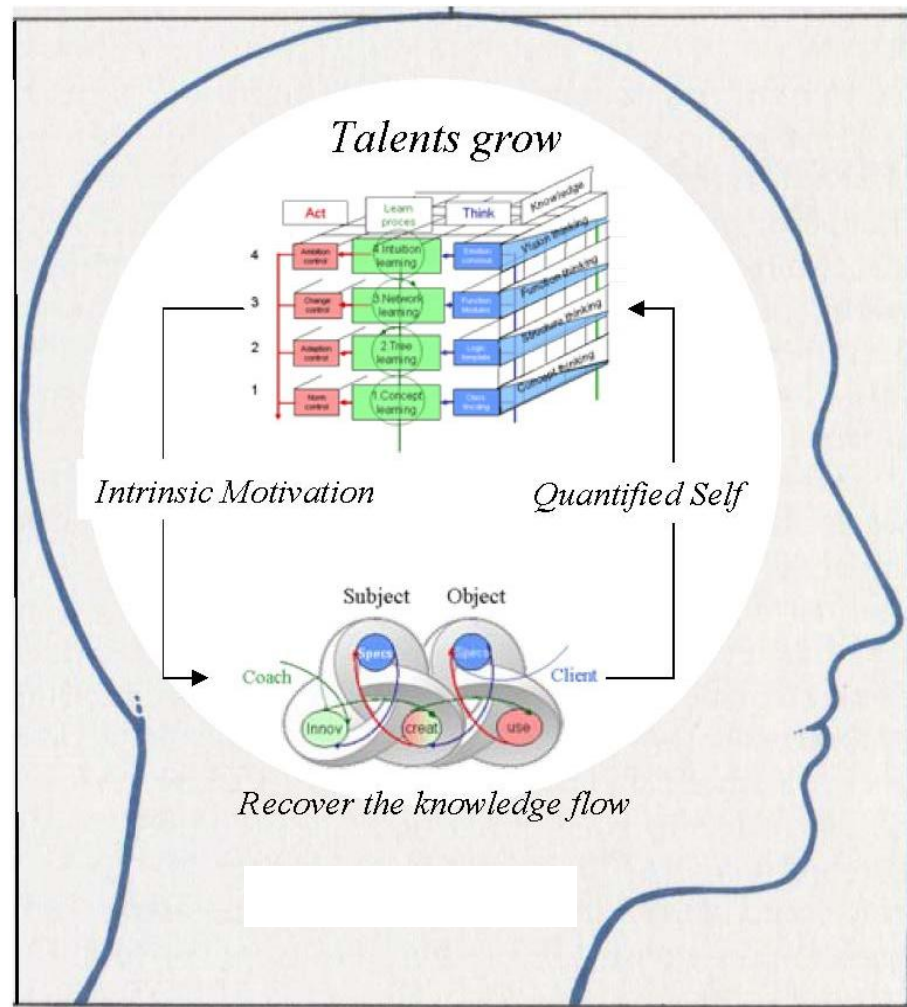


# Activity Model

## Intrinsic Motivation



QuaTerNes





# Developments

## Primary Material

Clean room systems, gen technology



## Cultivating

Drip irrigation, crop rotation, management



## Harvesting

Low damage lifting and handling





# Developments

## Storage

Storage climate control, conditioning



## Processing

Energy, efficiency, by-products, waste



## Packaging, distribution

CO<sup>2</sup> footprint, cross docking, MFS





# Trends



QuaTerNes

## Freshness



## Technologies



## Packaging



## Society







# Freshness



QuaTerNes

- Packaging differentiation by "Green" aspects
- Innovator: Best practices in fresh produce
- Intelligent and active packaging
- Freshness Phobia





# Packaging

- **Functionality and Sustainability**
- **Sustainable Packaging**
- **Paper-based Packaging**
- **Stand-up Pouches**
- **Bio-plastics**

**Finding the balance**

**Focus on recyclability**

**Keep the Molecule in Play**

**Maximum Flexibility,**

**Sustainability and Convenience**

**A viable eco-friendly solution?**



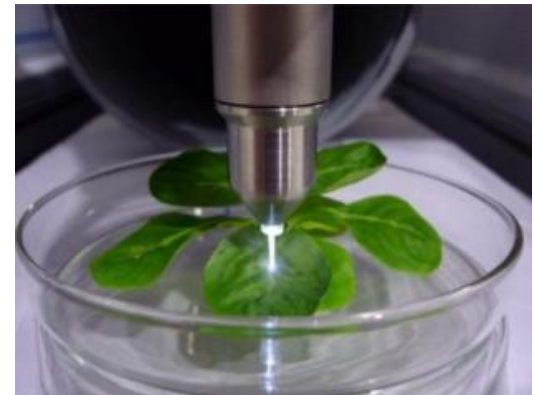


# Technologies



QuaTerNes

- **Pulse Electric Field (PEF)**  
*High voltage pulses*  
*Lengthens storage life*
- **Ultra High Pressure (UHP)**  
*High Pressure conservation with pressure up to 1,000 MPa*  
*Disables micro-organisms and enzymes*
- **Cold Plasma**  
*Cold gases with electrical charge*  
*Disinfect the surface*







# European Society



QuaTerNes



## Needing social cohesion (and safety)

- Especially older generation
- In more individualistic world



## Increasing suspicion (decreasing authority)

- Especially young generation
- Towards: institutions, banks, large corporations

*(According to Wim Lageweg, MVO-2011)*



# European Society

## Needing “Roots and Wings” (and origin)

- Especially cultural “creatives”, self determination
- Regional identify, interest in origin and process



## Stressing sustainability

- Especially awareness of scarcity



## Increasing transparency

- Especially sharing knowledge
- Pressure on media, social media





# Globalization



QuaTerNes

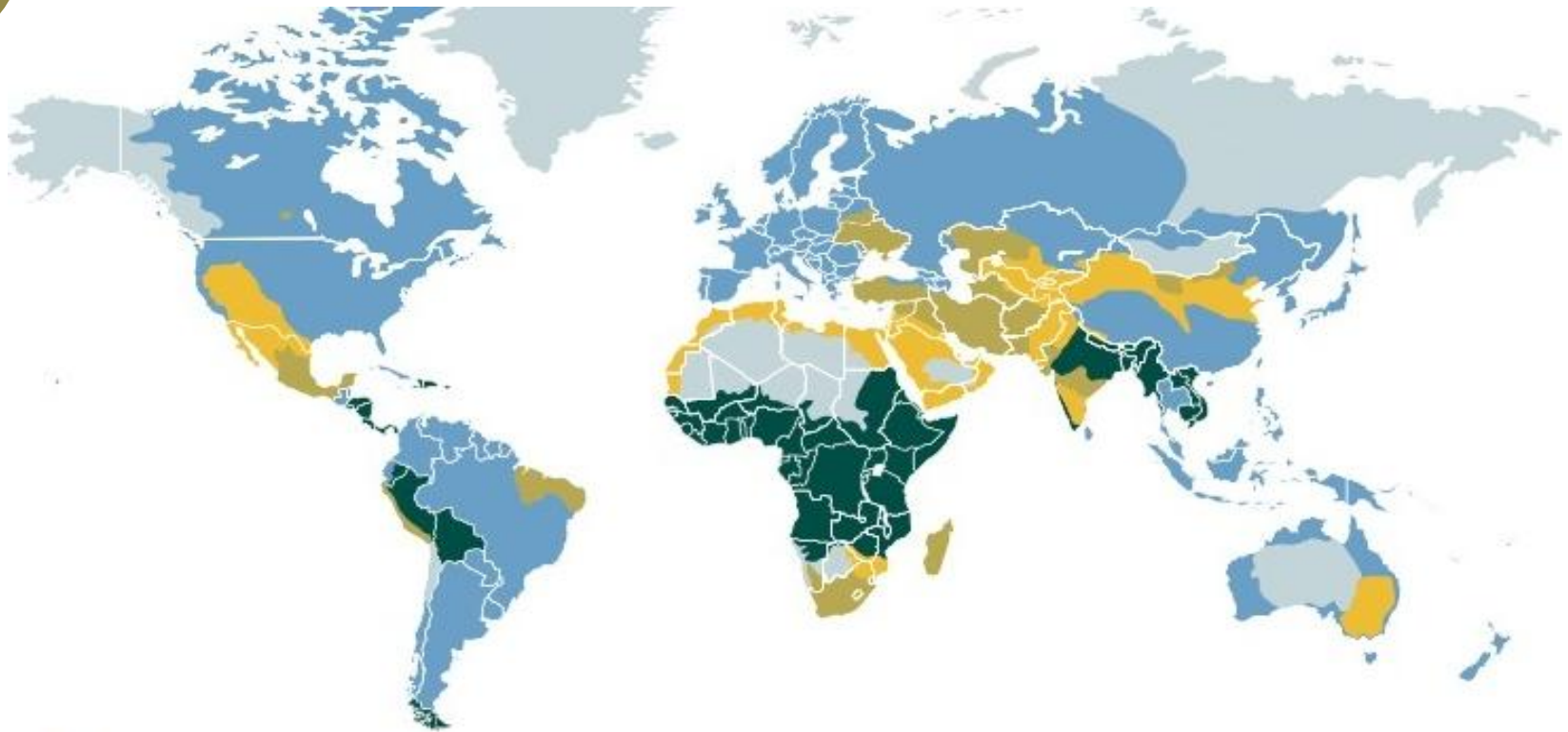
- Growing importance of China, India and Africa  
(demand outside Europe doubled in 10 years)
- Global shift in consumption of food products
- Impact of urbanization on food demand and supply
- Equipment manufacturers and system integrators, acting global
- Increased competition:  
buying power major retail and food service chains



# Water, Ecology and Weather



QuaTerNes



- Sufficient water available. (Temporary drought can occur)
- Water scarcity expected in the future (More than 60% of available water is being used)
- Physical water scarcity. (More is used than responsible. Future water supply in danger.)
- Economic water scarcity. (Sufficient water available, but men and means lack to make maximum use of it)
- No data known.

Source: 'Hightech Agrosystems', ABN AMRO (2012)

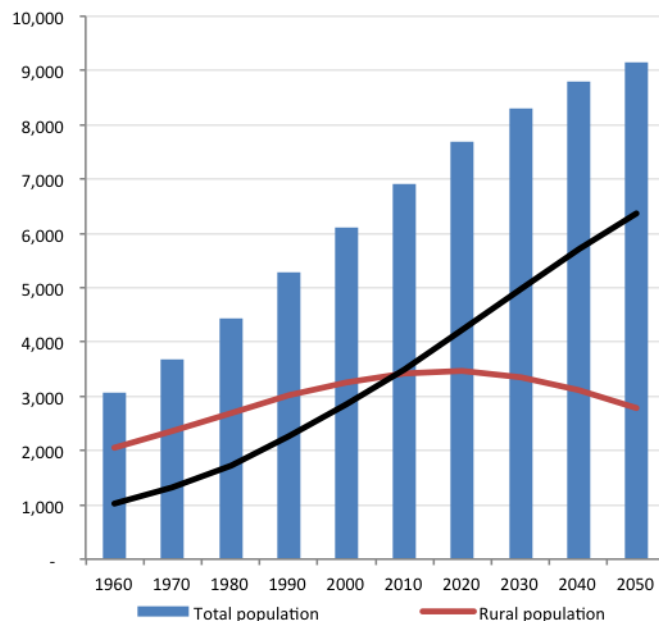


# More People, Less Land

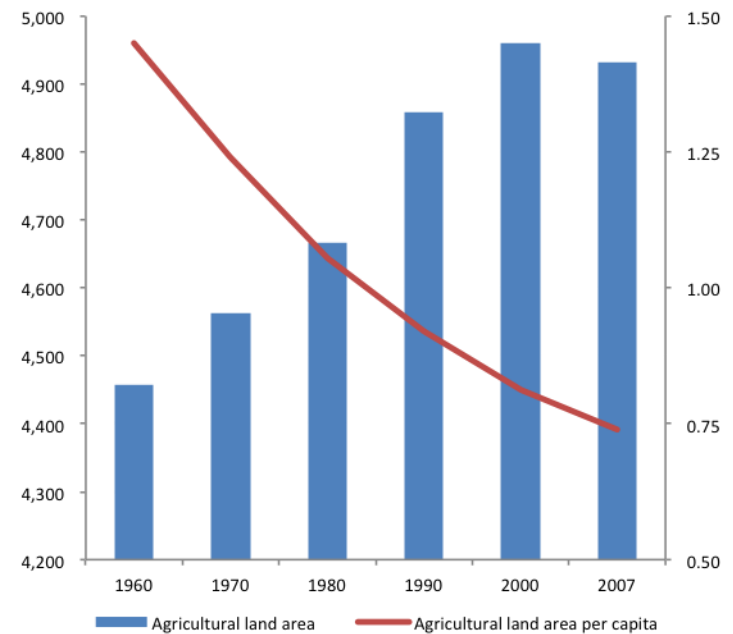


QuaTerNes

Global population (in millions)



Agricultural land (1,000 ha)



**90% of population growth will occur in  
Sub-Saharan Africa (one billion or 49%)  
and Asia (900 million or 41%)**

Source: FAO Stat, 'Framework for an Inclusive Food Strategy', Rabobank (2012)



# Urbanization in Africa

- Continent of States

- Continent of Cities





## Social Transformation



QuaTerNes

- **Rapid urbanisation** > radical transformation of lives > driver and consequence of economic growth.
- **Rural remoteness** > urban centrality
- **Breakdown of social & economic village structures** > frantic individual search for replacement > energy emerging in spaces left empty (not created) by government.
- **Disappearing old rural networks** > individual actors > “fend for yourselves” > surge for individual entrepreneurship (creating individual businesses)





QuaTerNes

## Economic Growth (2010-2025)

**Growth: 75% comes from emerging economies, 82% from large cities**

**Emerging 440 cities are poised to deliver close to half of global GDP growth**

Contribution to global GDP and GDP growth  
%

- Emerging 440
- Other emerging large cities
- Emerging small cities and rural areas
- Developed 160
- Other developed large cities
- Developed small cities and rural areas

**GDP, 2010**

100% = \$63 trillion RER<sup>4</sup>



**GDP growth, 2010-25**

100% = \$50 trillion RER<sup>4</sup>



Source: MC Kinsey Global Institute, June 2012



# Top 20 Hotspots for growth by 2025



QuaTerNes

**TOP 20 HOT SPOTS FOR GROWTH BY 2025** CITYSCOPE RANKINGS BY GROWTH, 2010-25

Emerging regions  
Developed regions

| Rank | Elderly, higher-income consumers <sup>1</sup> | Young entry-level consumers <sup>2</sup> | Laundry care products <sup>3</sup> | Commercial floor space <sup>4</sup> | Municipal water demand |
|------|---|--|------------------------------------|-------------------------------------|------------------------|
| 1    | * Shanghai                                    | Lagos                                    | São Paulo                          | New York                            | Mumbai                 |
| 2    | * Beijing                                     | Dar es Salaam                            | Beijing                            | Beijing                             | Delhi                  |
| 3    | Tokyo   | Dhaka                                    | Rio de Janeiro                     | Shanghai                            | * Shanghai             |
| 4    | * Tianjin                                     | Quagadougou                              | Shanghai                           | Los Angeles                         | * Guangzhou            |
| 5    | Mumbai  | Khartoum                                 | Mexico City                        | Tokyo                               | * Beijing              |
| 6    | São Paulo                                     | Ghaziabad                                | Moscow                             | Washington, D.C.                    | Buenos Aires           |
| 7    | Osaka   | Sanaa                                    | Bangkok                            | Dallas                              | Kolkata                |
| 8    | * Chongqing                                   | Nairobi                                  | Istanbul                           | São Paulo                           | Khartoum               |
| 9    | Delhi   | Luanda                                   | Manila                             | Guangzhou                           | Dhaka                  |
| 10   | * Nanjing                                     | Baghdad                                  | Johannesburg                       | Chicago                             | Istanbul               |
| 11   | * Guangzhou                                   | Kampala                                  | Belo Horizonte                     | Houston                             | Dallas                 |
| 12   | New York                                      | Ibadan                                   | Porto Alegre                       | Tianjin                             | Pune                   |
| 13   | Seoul   | Lusaka                                   | Buenos Aires                       | Moscow                              | Las Vegas              |
| 14   | * Hong Kong                                   | Kinshasa                                 | Tianjin                            | Atlanta                             | Karachi                |
| 15   | * Wuhan                                       | Kano                                     | Tehran                             | Miami                               | São Paulo              |
| 16   | Kolkata                                       | Abidjan                                  | New York                           | Hong Kong                           | Hyderabad, India       |
| 17   | * Shenyang                                    | Abuja                                    | Foshan                             | Mexico City                         | Lagos                  |
| 18   | Los Angeles                                   | Bamako                                   | Santiago                           | Shenzhen                            | Moscow                 |
| 19   | Toronto                                       | Chittagong                               | Shenzhen                           | Phoenix                             | * Wuhan                |
| 20   | Ahmedabad                                     | Port Harcourt                            | London                             | Istanbul                            | Manila                 |

1 GROWTH IN POPULATION AGED 65+ WITH HOUSEHOLD INCOME > \$20,000 AT PPP.

2 GROWTH IN POPULATION AGED ≤ 14 WITH HOUSEHOLD INCOME \$7,500-\$20,000 AT PPP.

3 PREDICTED GROWTH IN CONSUMER SPENDING ON LAUNDRY CARE PRODUCTS BASED ON A CITY-LEVEL MARKET DEMAND GROWTH MODEL.

4 INCLUDING REPLACEMENT FLOOR SPACE.

SOURCE: MCKINSEY GLOBAL INSTITUTE ANALYSIS



# Consumer Preferences

## Function of Food



QuaTerNes

- **WHAT** Calories → "experience" → nutrition & health, variety
- **WHEN** Regular → grazing and snacking
- **WHERE** In-home → out-of-home
- **WITH WHOM** Social → individual
- **HOW PREPARED** From scratch → ready-to-eat, heat and eat





# Diversification, From food to fashion to pharmaceuticals



QuaTerNes



## Pharmaceuticals

*Functional foods,  
Pharmaceuticals*



## Fashion

*Flowers, Flavors,  
Fragrances*

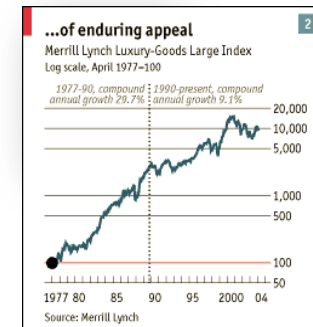
## Food

*Fodder, Food Crops,  
Vegetables, Fruits*

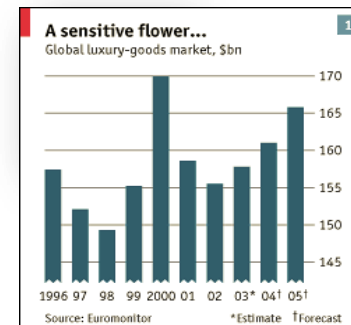


## Energy

*Fuel, Fibers*



*A 100-fold increase  
between 1977 and 2005*



*World spending on luxury goods  
in 2005: US\$ 165 bln*





## Power shift to retailers and food service



QuaTerNes



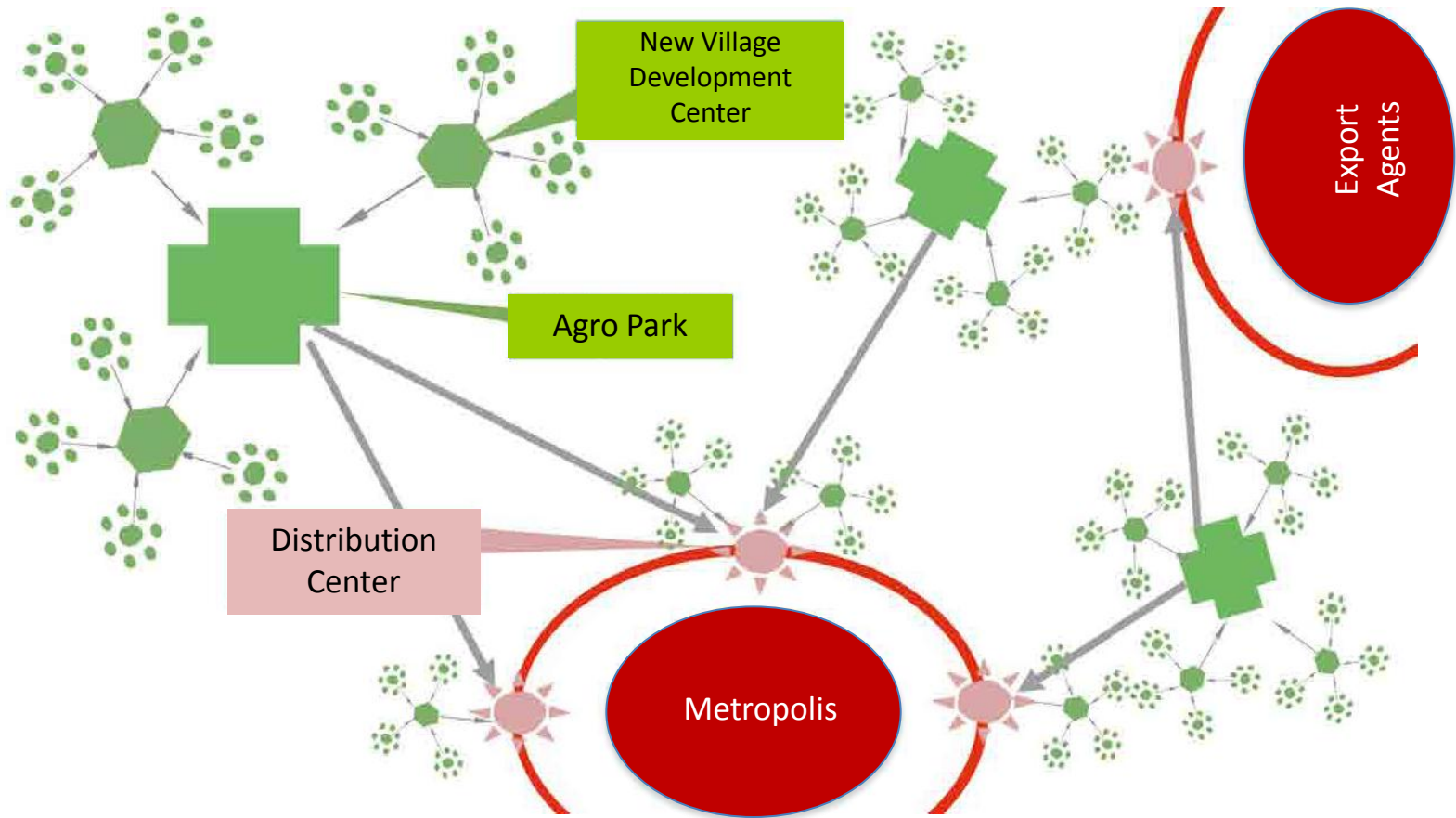
Closest to the consumer, Multi-channel strategy, Vital marketing information, 70 - 80% Buying decisions at P.O.P., Co-marketing



# Intelligent Agro Logistic Networks



QuaTerNes

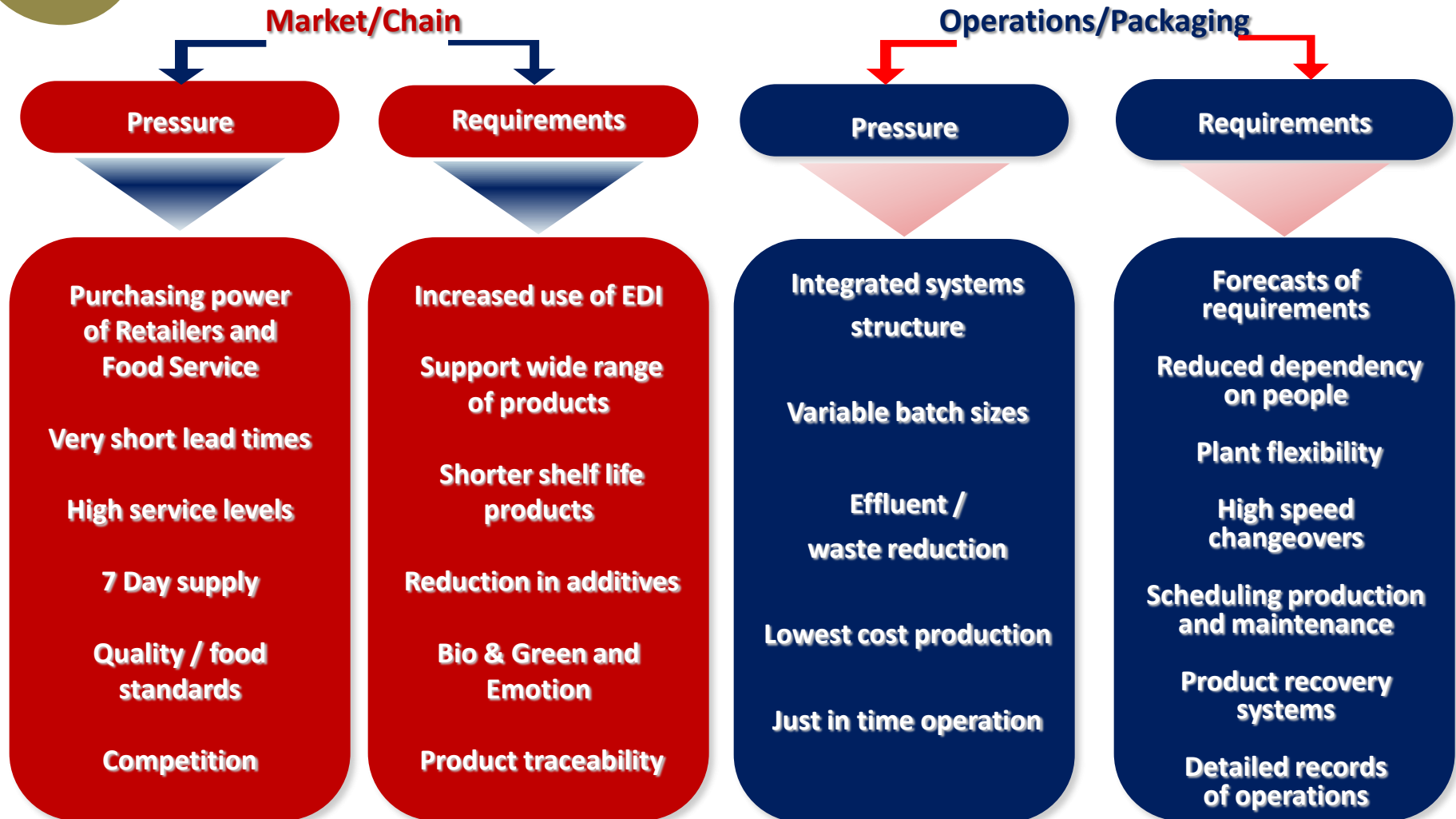


Source: 'Agricultural Eco-Valley, Beijing China, Conceptual Master Plan, DHV – GMV – WUR (2011)



QuaTerNes

# Market Pressure ↔ Requirements







QuaTerNes

# Focus in the Food Value Chain

## Create more added value

- **Healthier, convenience**

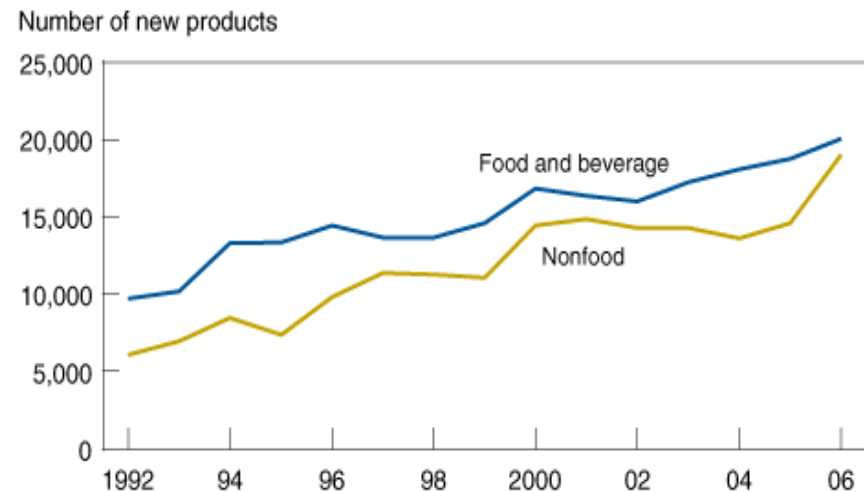
## Distinguish yourself

- **More variations**  
*(functional, organic, exceptional)*
- **Competition**  
*(new packaging ideas, developments on shop floor)*

## Reach new customers

- **Consumer groups**

Food and beverage introductions up 106 percent in 1992-2006



Note: Nonfood items include health and beauty aids, household products, pet products, and miscellaneous items (e.g., tobacco, car care, lighters).

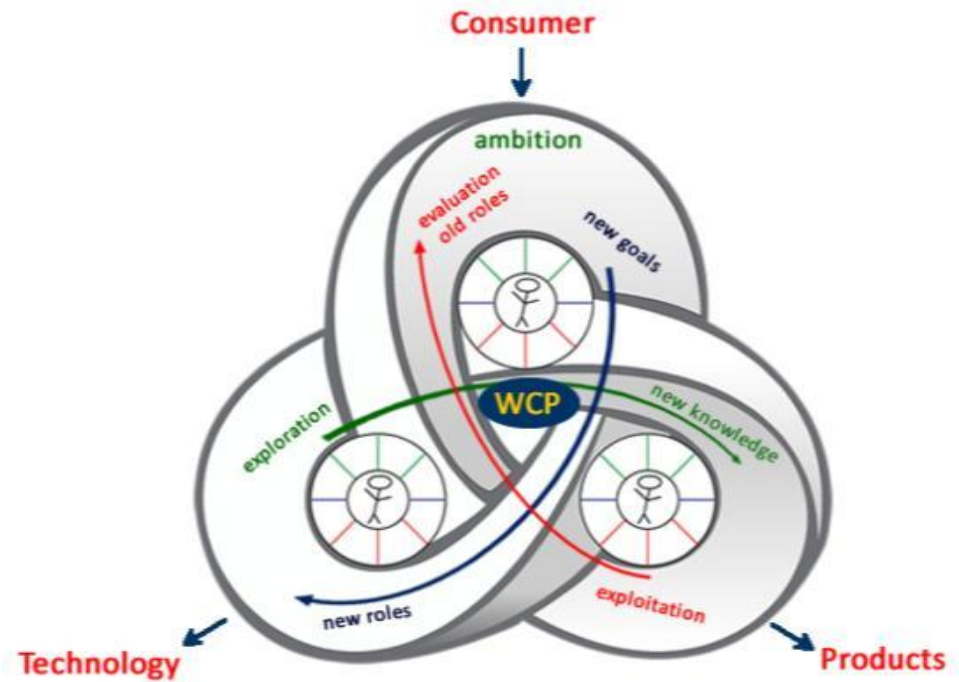
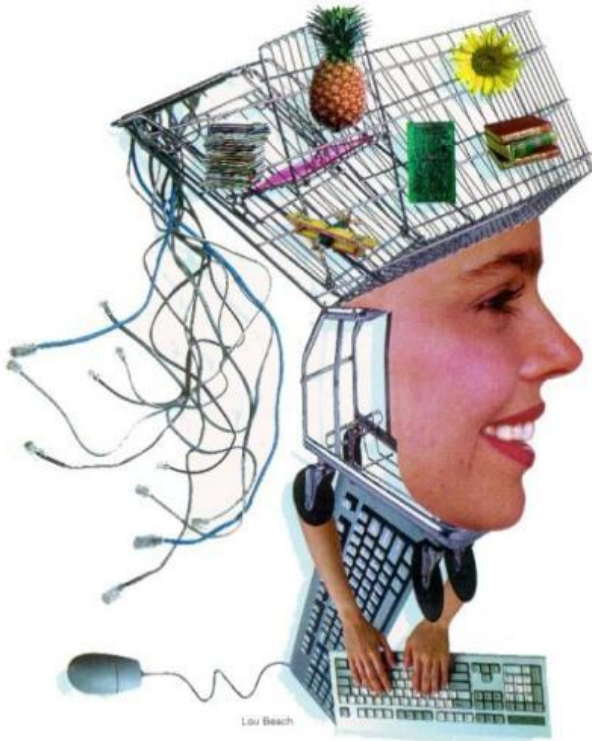
Source: Datamonitor, Productscan Online.

# Challenges for MFS

## Market-led Approach



QuaTerNes



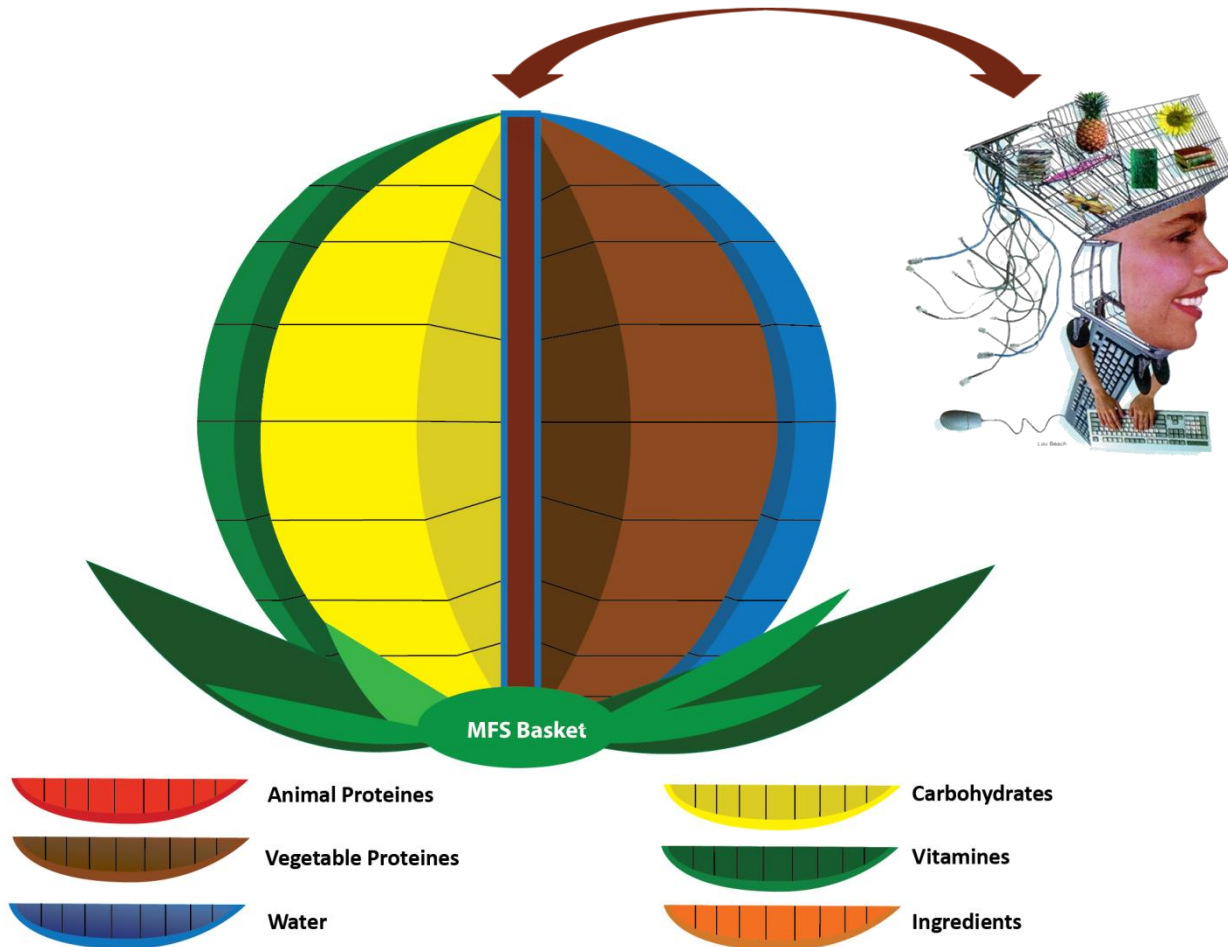


# Challenges for MFS

## MFS Basket



QuaTerNes

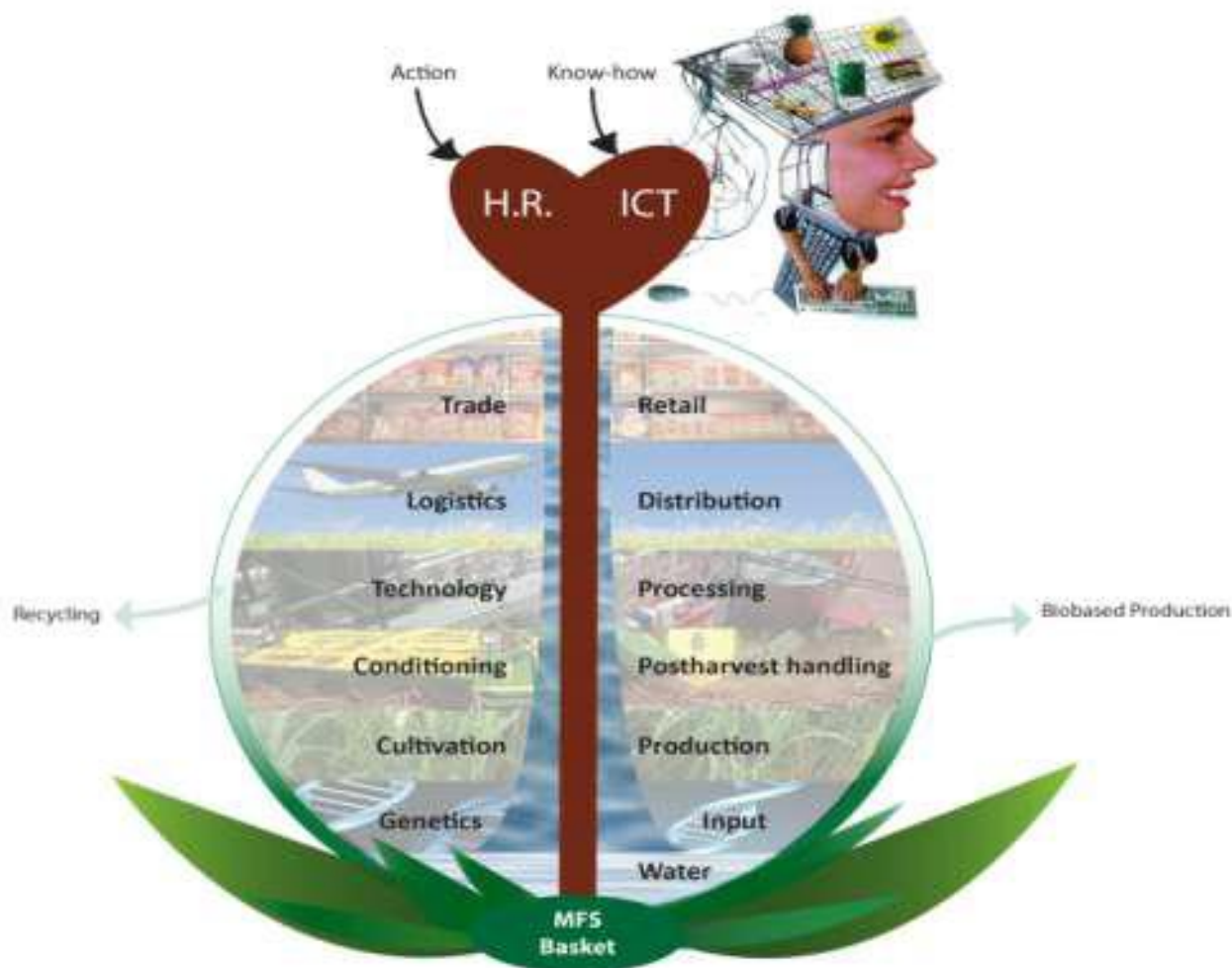


# Challenges for MFS

## Technology Approach



QuaTerNes





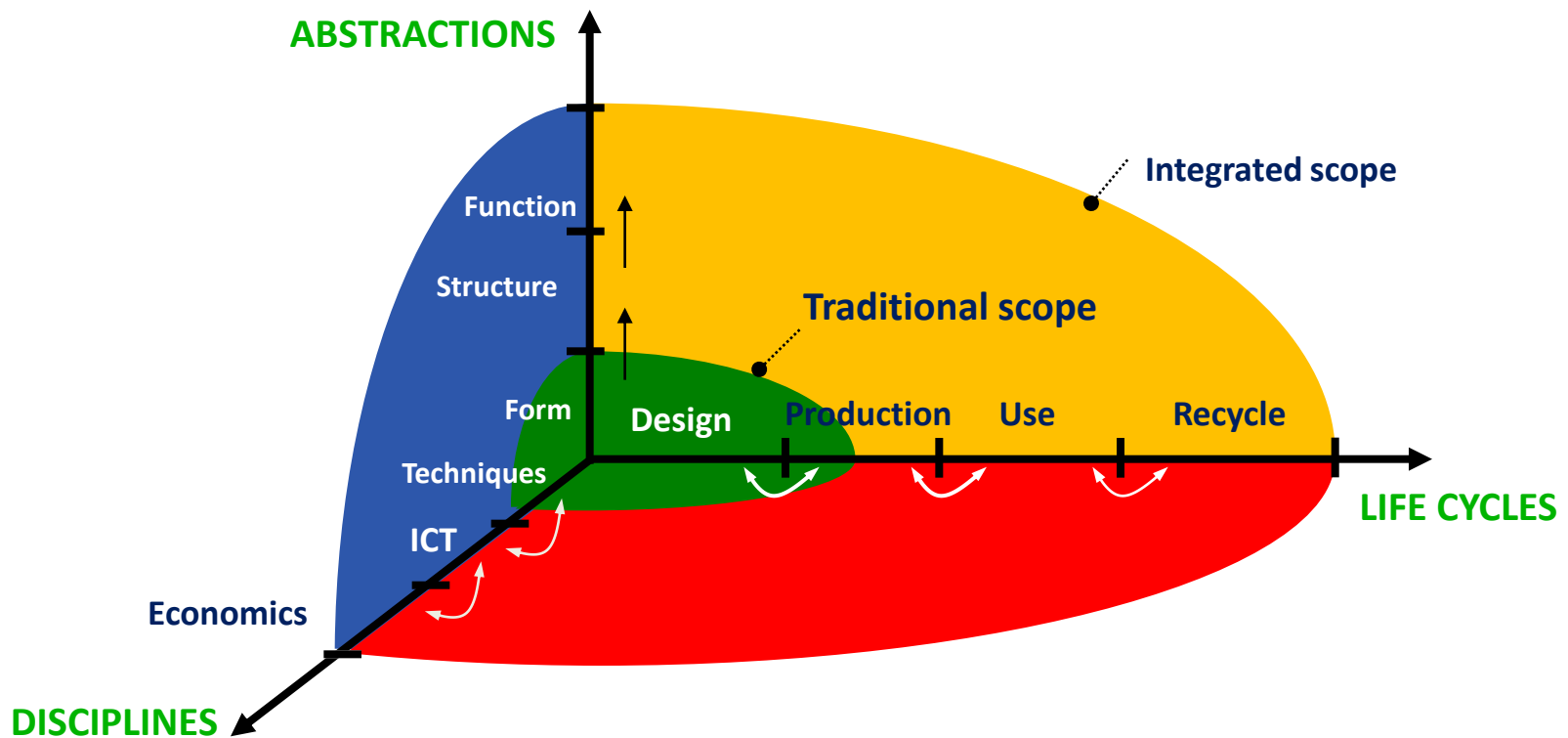
# Challenges for MFS

## Holistic Approach



QuaTerNes

### Integrated product and process development





# Challenges for MFS

## Hardware, Orgware and Software



QuaTerNes

| Hardware?                     | Orgware?                      | Software?                            |
|-------------------------------|-------------------------------|--------------------------------------|
| Contextual relationships?     | Implementation and operation? | Knowledge management?                |
| Infrastructure?               | Business planning?            | R&D?                                 |
| <b>Centers of Excellence?</b> | Investment in infrastructure? | Team development?                    |
| Trade facilities?             | Types of consortia?           | Management of emotions?              |
| Production facilities?        | <b>Stakeholders network?</b>  | Communication?                       |
| Processing facilities?        | External relations?           | Marketing?                           |
| Industrial ecology?           | Policy and politics?          | Branding?                            |
| Energy management?            | Procedures and protocols?     | Quality management?                  |
| Landscape and nature?         | Licences and approval?        | HRM?                                 |
| Routing?                      | Supply chain management?      | Education?                           |
| Design?                       | Project management?           | <b>Capacity building?</b>            |
| ?                             | ?                             | ?                                    |
| ?                             | ?                             | ?                                    |
| <b>What can be held?</b>      | <b>What can be organised?</b> | <b>What can be thought and felt?</b> |





# Challenges for MFS

## Strength – Weakness Matrix



QuaTerNes

| <div>Flow</div> <div>Know-how</div> | Input | Production | Processing | Logistics | Trade | Consumer |
|-------------------------------------|-------|------------|------------|-----------|-------|----------|
| Hardware                            |       |            |            |           |       |          |
| Software                            |       |            |            |           |       |          |
| Org. ware                           |       |            |            |           |       |          |

X = Partner Country / Area



# Challenges for MFS

## Incubators, Demos and Training



QuaTerNes

### EMPOWERING THE NATION THROUGH DISCOVERY AND INNOVATION

NSF STRATEGIC PLAN FOR FISCAL YEARS (FY) 2011-2016

| Transform the Frontiers |  |
|-------------------------|--|
| T1<br>✓                 | Transformative Research Methods<br>Brainlike             |
| T2<br>✓                 | STEM workforce Motivation<br>Intrinsic Motivation        |
| T3<br>✓                 | International Partnership<br>China                       |
| T4<br>✓                 | Research infra to support capabilities<br>Talents Growth |

| Innovate for Society |   |
|----------------------|---|
| I1<br>✓              | Usefull to Society<br>Export growth             |
| I2<br>✓              | Adressing Societal Challenges<br>FoodSecurity   |
| I3<br>✓              | Innovative Learning System<br>Learn to innovate |

| Perform as a Model Organisation |   |
|---------------------------------|---|
| M1<br>✓                         | Excellence through Leadership<br>Self Organisation            |
| M2<br>✓                         | Infuse learning on Professional Level<br>Intrinsic Motivation |
| M3<br>✓                         | Culture of Creativity and Innovation<br>Team-learning         |
| M4<br>✓                         | High level of Customer Satisfaction<br>Co-Innovation          |

✓ High Ranking Sino-Dutch Pilot  
on NSF scale.

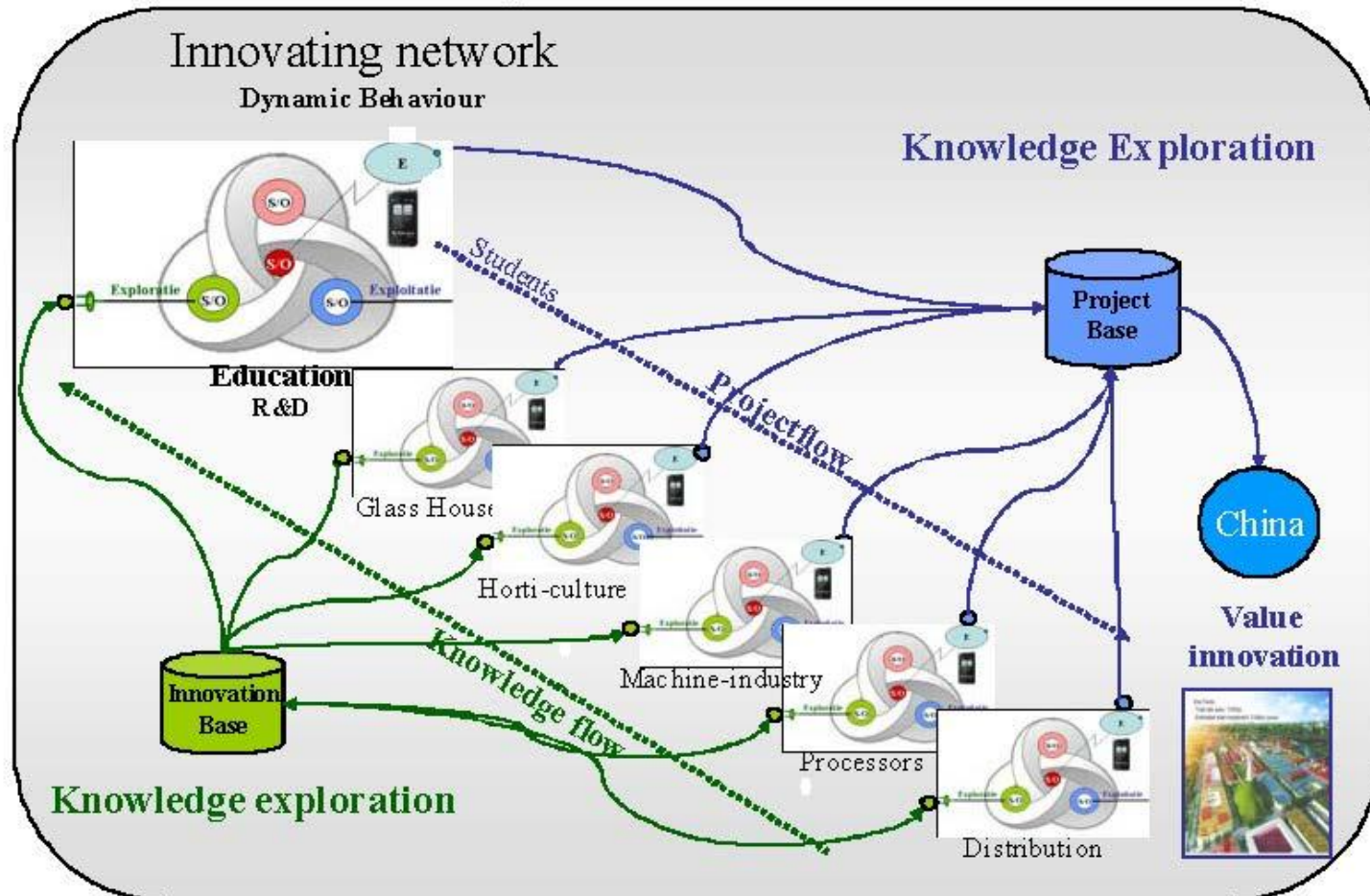


# Challenges for MFS

## Export Total Solutions



QuaTerNes





## Challenges for MFS

- (Integrated) urban demand approach
- Improve market value chain
- Water, genetics and primary sector development
- Use technology (adapt mechanization for women and elderly)
- Private sector leading > farmers, food chain
- Create Brainports / Innovation Centers



**CENTERS OF EXCELLENCE !**



## Centers of Excellence

- **Entrepreneurship:** Key to development and food security
- **Own experience:** Learning, building a sustainable knowledge base
- **Lead:** Private sector
- **Trust:** Power of Entrepreneurs
- **Concern:** Impact on small holders

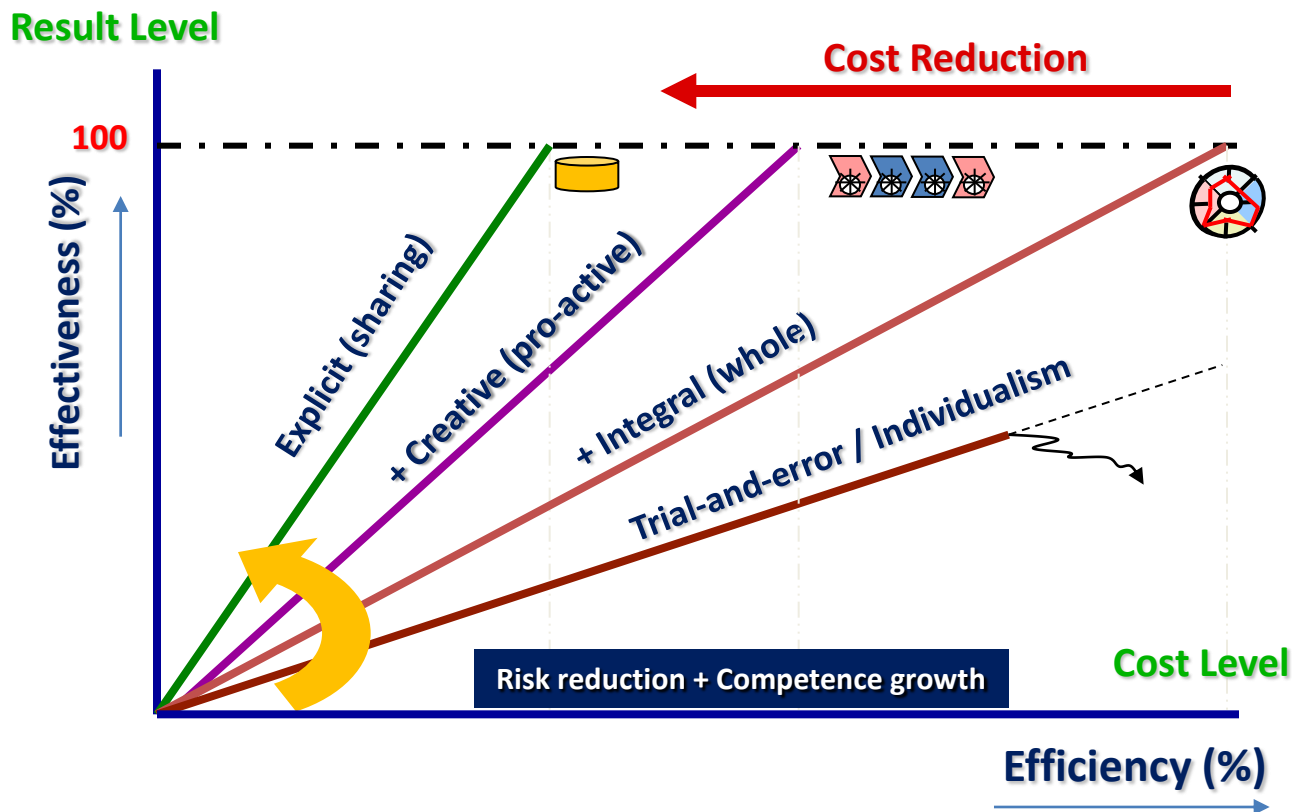






QuaTerNes

## Conclusion: Result Orientation





## Conclusion: Success



## 7 P's

1. **People**
2. **Professionals**
3. **Plan**
4. **Pro-active**
5. **Performance**
6. **Planet**
7. **Prosperity**



Thank you!



QuaTerNes



Powered by

**DUTCH  
TECHNOLOGY**

More information:

[www.quaternes.nl](http://www.quaternes.nl) | [www.naftc.nl](http://www.naftc.nl)  
[www.metropolitanfoodsecurity.nl](http://www.metropolitanfoodsecurity.nl) | [www.gmv-fme.nl](http://www.gmv-fme.nl)

