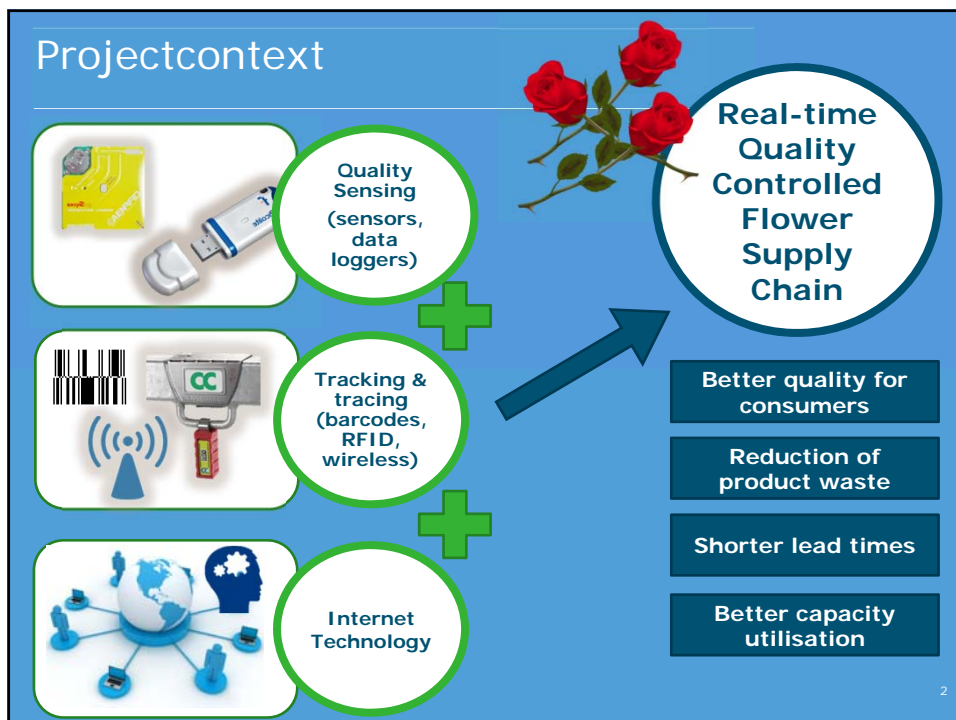
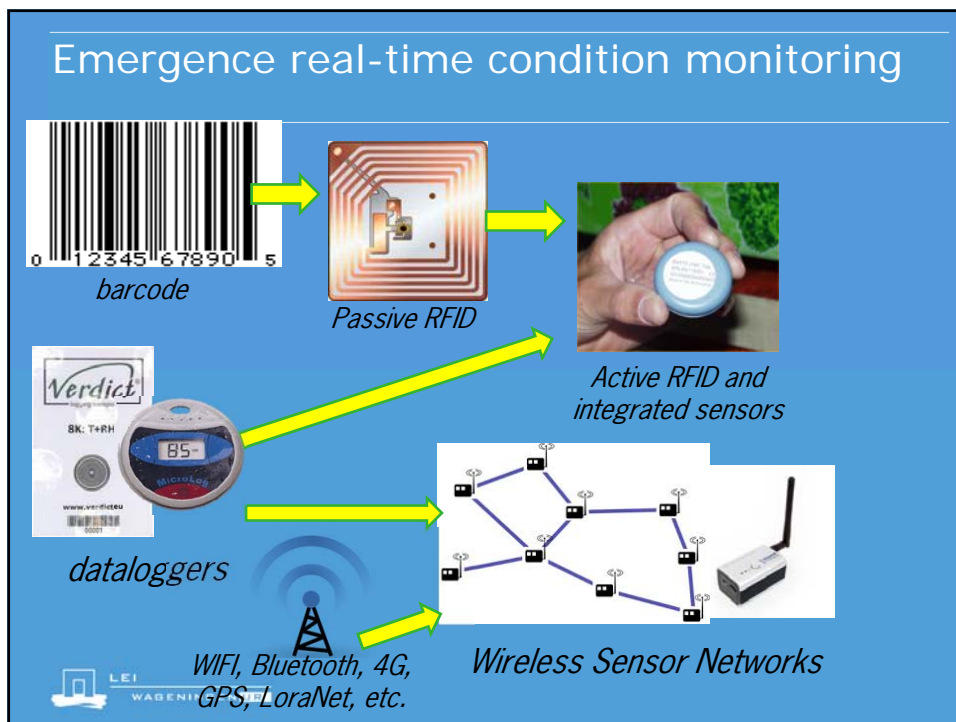
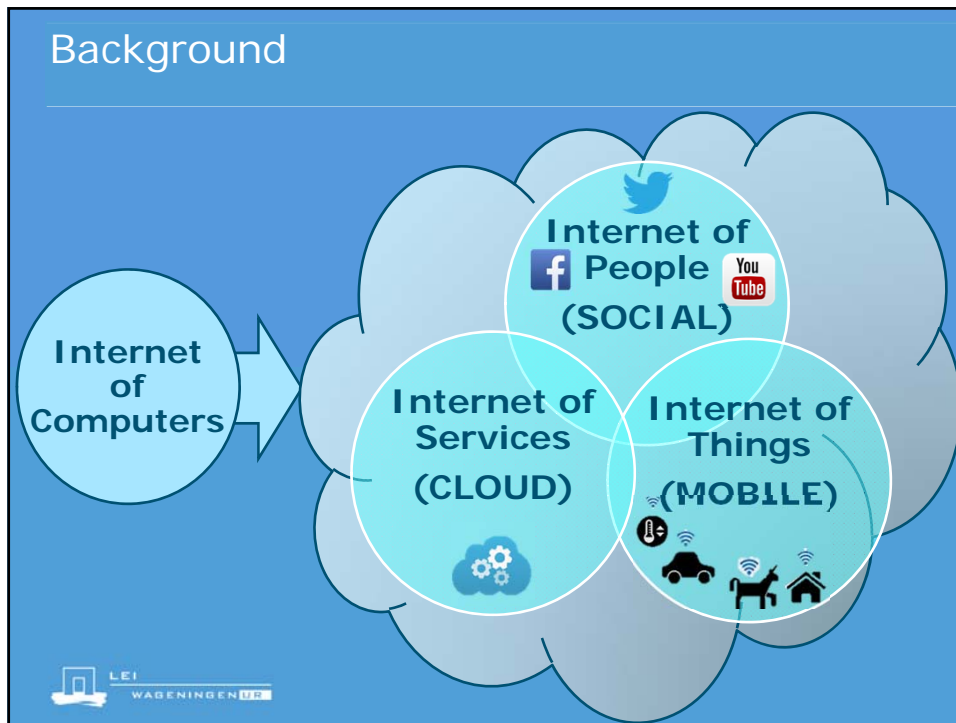
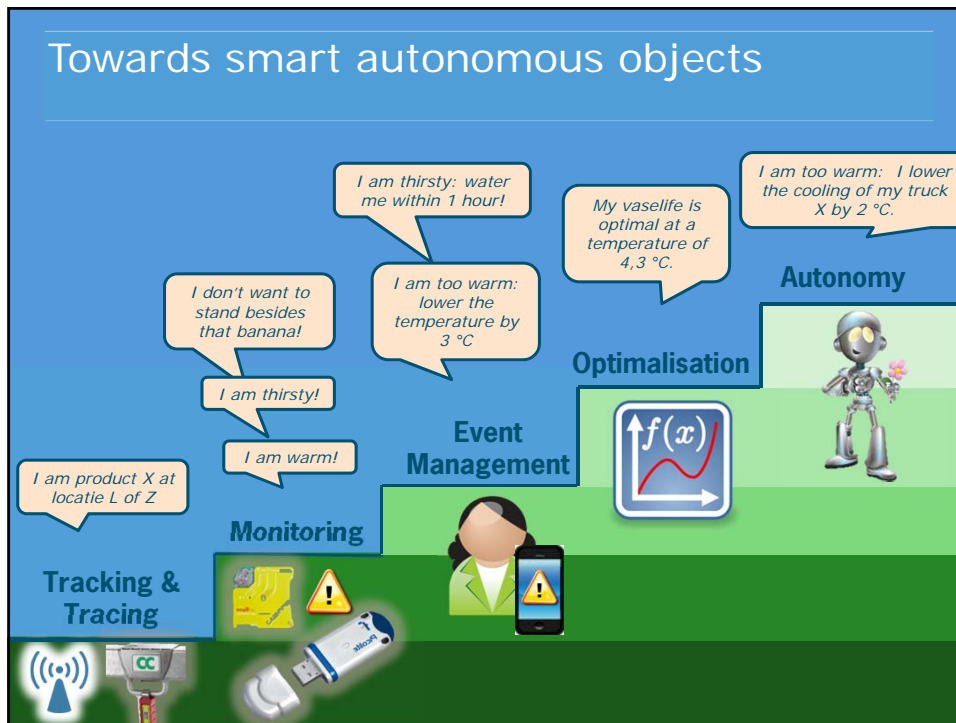


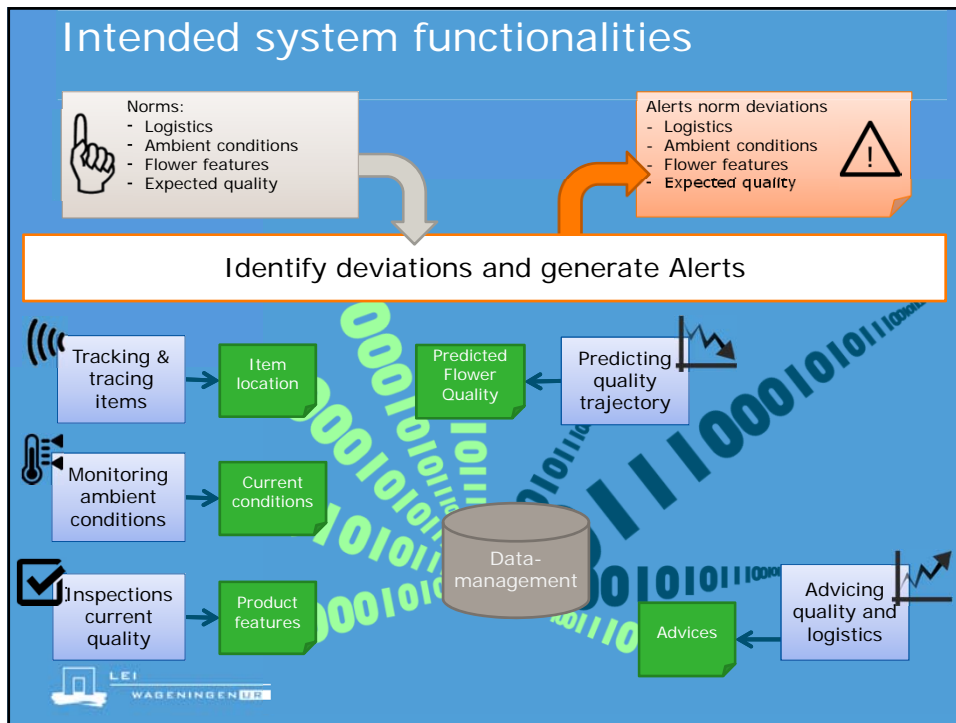
A Sensing and Prediction System for Quality-Controlled Flower Supply Chains

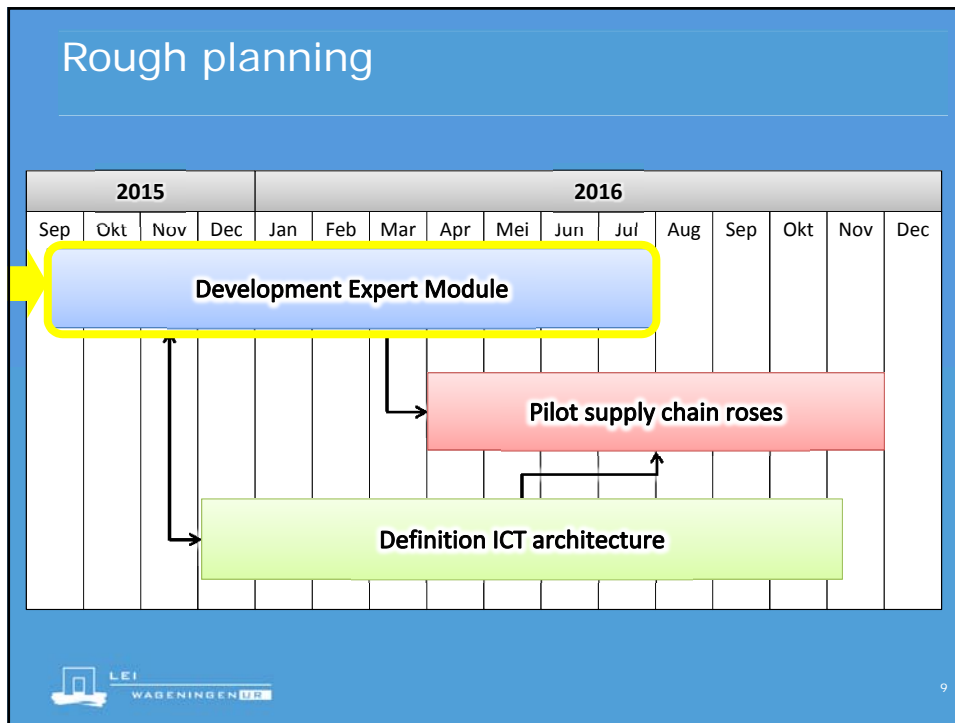
Cor Verdouw, Don Willems, Wageningen UR
Gitta ten Hoop, Royal Flora Holland
Greentech, 16 June 2016, Amsterdam











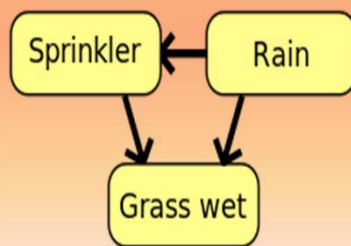
Forecasting flower quality by Bayesian Network

Gitta ten Hoop
Supply Chain consultant Royal FloraHolland

Royal Flora Holland

Principal

- Probabilistic graphical model based on Rev. Thomas Bayes (1702-1761)
 - Sometimes the probability of a hypothesis is given before the event or evidence is observed
 - Showed how to compute the probability of the hypothesis after some observations are made.



1. "Rain" influences "Grass wet"
2. "Sprinkler" is influenced by "
3. In view of the fact that the "grass" is wet how big is the probability that it rains?



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Self- learning and based on expert knowledge

RAIN	SPRINKLER	
	T	F
F	0.4	0.6
T	0.01	0.99


```

    graph TD
      Rain((RAIN)) --> Sprinkler((SPRINKLER))
      Rain((RAIN)) --> GrassWet((GRASS WET))
      Sprinkler((SPRINKLER)) --> GrassWet((GRASS WET))
    
```


		RAIN	
		T	F
0.2		0.2	0.8

		GRASS WET	
SPRINKLER	RAIN	T	F
F	F	0.0	1.0
F	T	0.8	0.2
T	F	0.9	0.1
T	T	0.99	0.01



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Advantages of Bayesian Networks

- Makes expert knowledge explicit and transparent
- Accepts qualitative and quantitative data
- Integration of Empiric models is possible
- Not all data are needed to be available always (Graceful degradation)
- Can be self- learning
- Feed back calculation (what did go wrong?)
- Calculations can be done directly

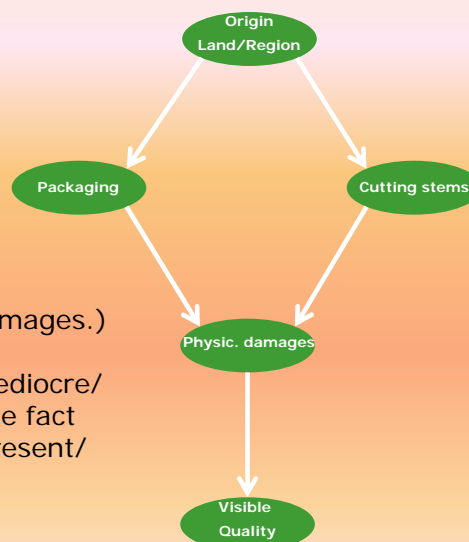


Prediction of flower quality

1. Inventory of all influencers of flower quality
2. Answering the question of "how big is the influence"

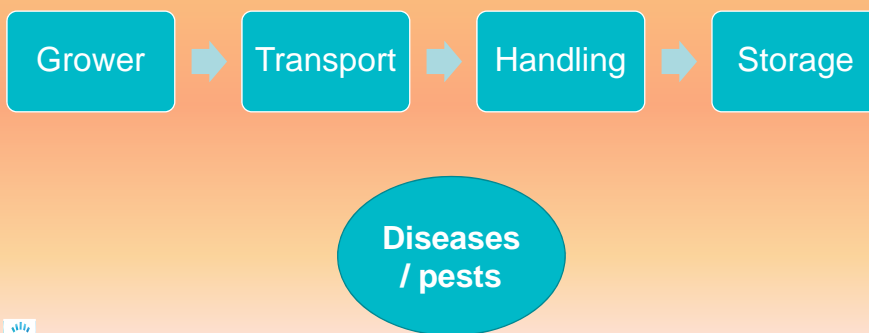
$P(\text{visible quality} | \text{physical damages.})$

The probability of a good/ mediocre/ bad visible quality viewing the fact that physical damages are present/ absent.



Expert module

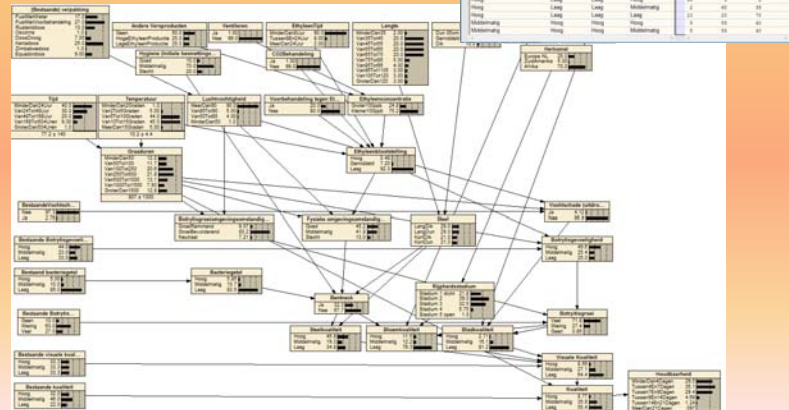
1. Different modules for each chain link
2. Modules can occur several times, depending on the real chain



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How to build a Bayesian net

- Sessions with experts:
 - (Causality)diagram
 - Filling the data tables with expert knowledge



Many thanks for
your attention!

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