Improve
QUALITY SERVICES

# Product Ecology for the Elicitation of Requirements


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Een heldere kijk op requirements

# About me

What, a tester?

Testing is an empirical, technical investigation conducted to provide stakeholders with information about the quality of the product under test.
- Cem Kaner

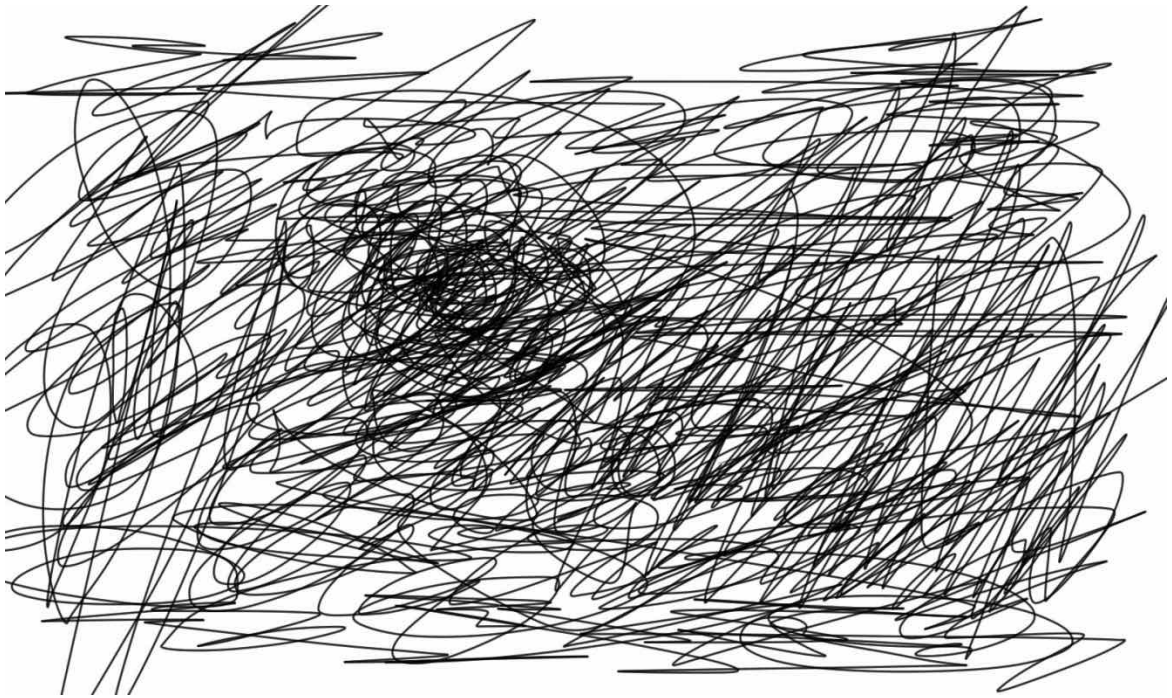
# Myth

Testing depends on documented requirements.

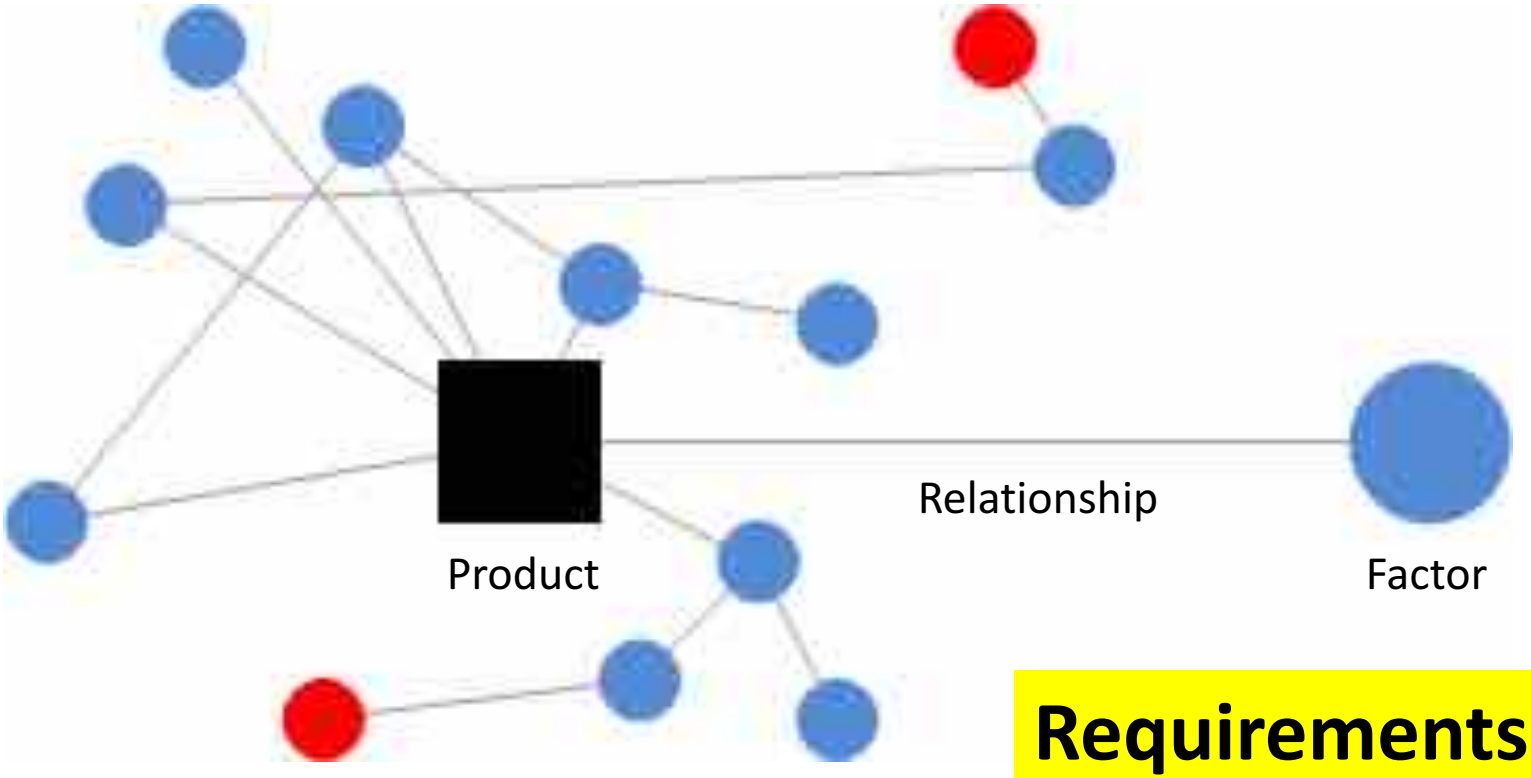
There is value in a high quality requirements document but it is often not available or maintained.

# Problem

The context of the product is unclear.



# A complex system




**Requirements**

What factors influence the product and how?
What factors are influenced by the product and how?
Understanding one side of the interaction tells you little about the quality of the interaction.

# Product Ecology method

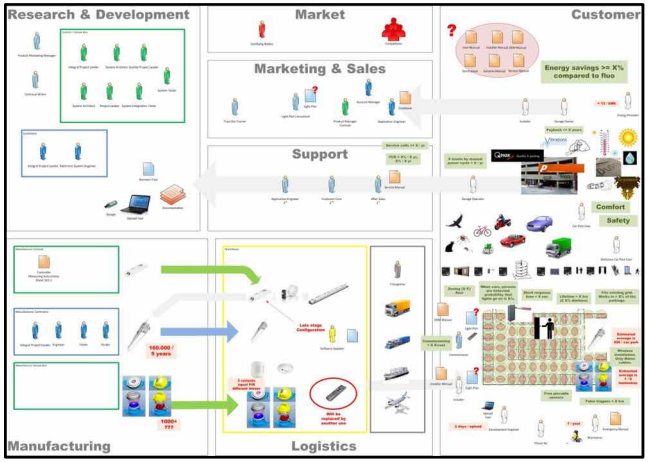
Making the complex clear by

1. making the invisible visible

creating a diagram

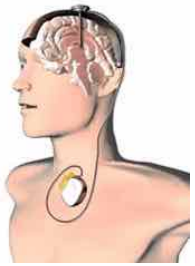
2. applying heuristics

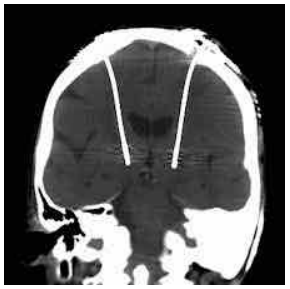
to discover structures

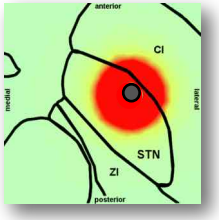


# A pacemaker for the brain

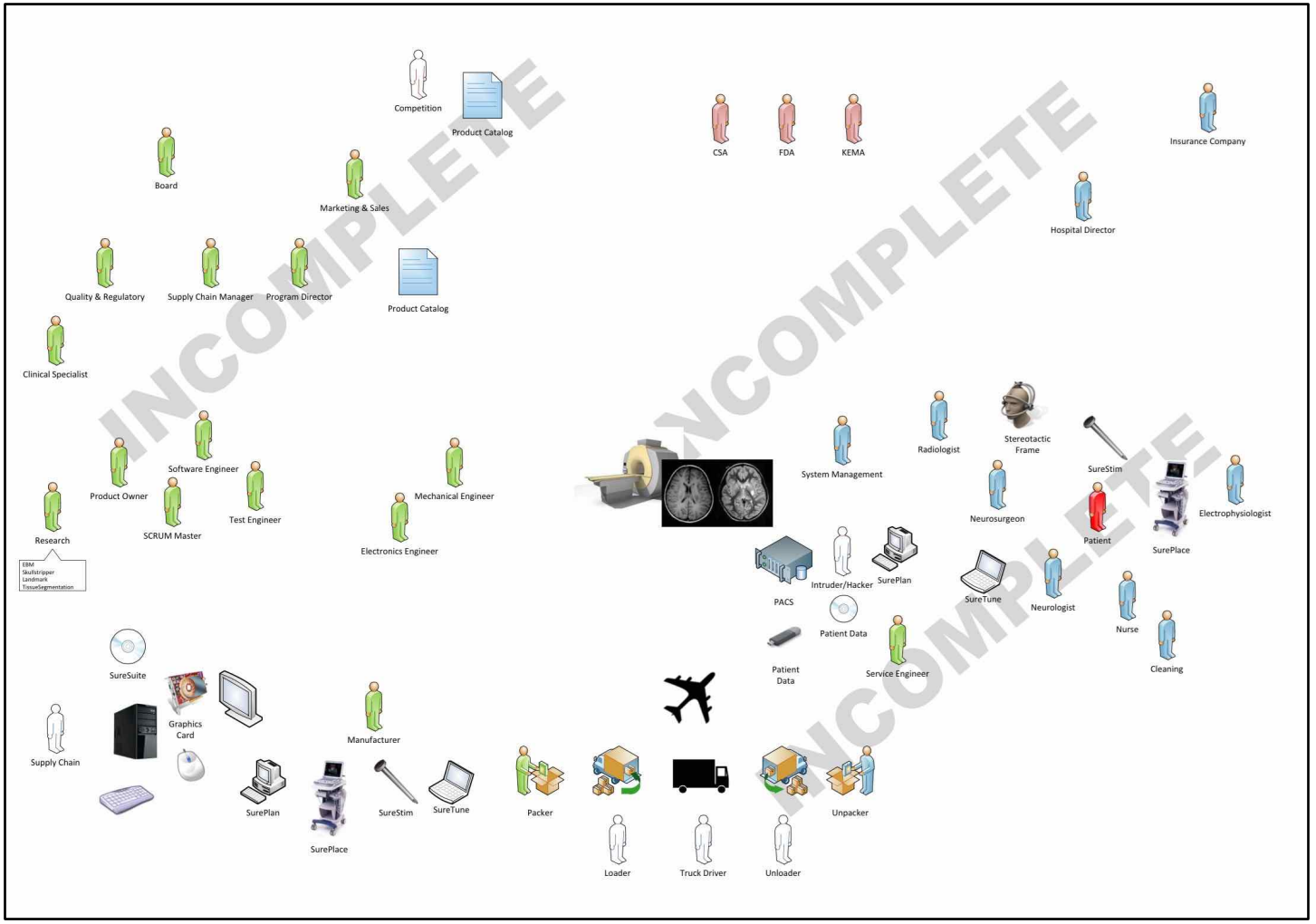
- A Deep Brain Stimulation system that features an advanced DBS lead with 40 individual stimulation points
- This advanced system is designed to allow more precise stimulation of the intended target in the brain and may potentially result in reduced procedure time and fewer stimulation-induced side effects



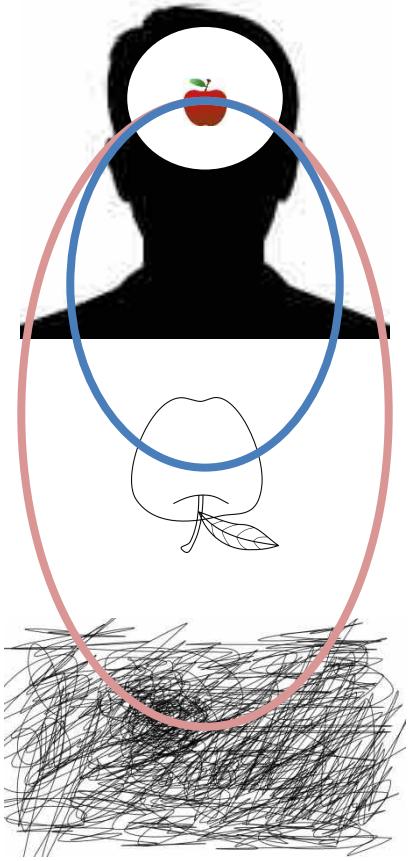




# Who are the stakeholders?



# Making the invisible visible

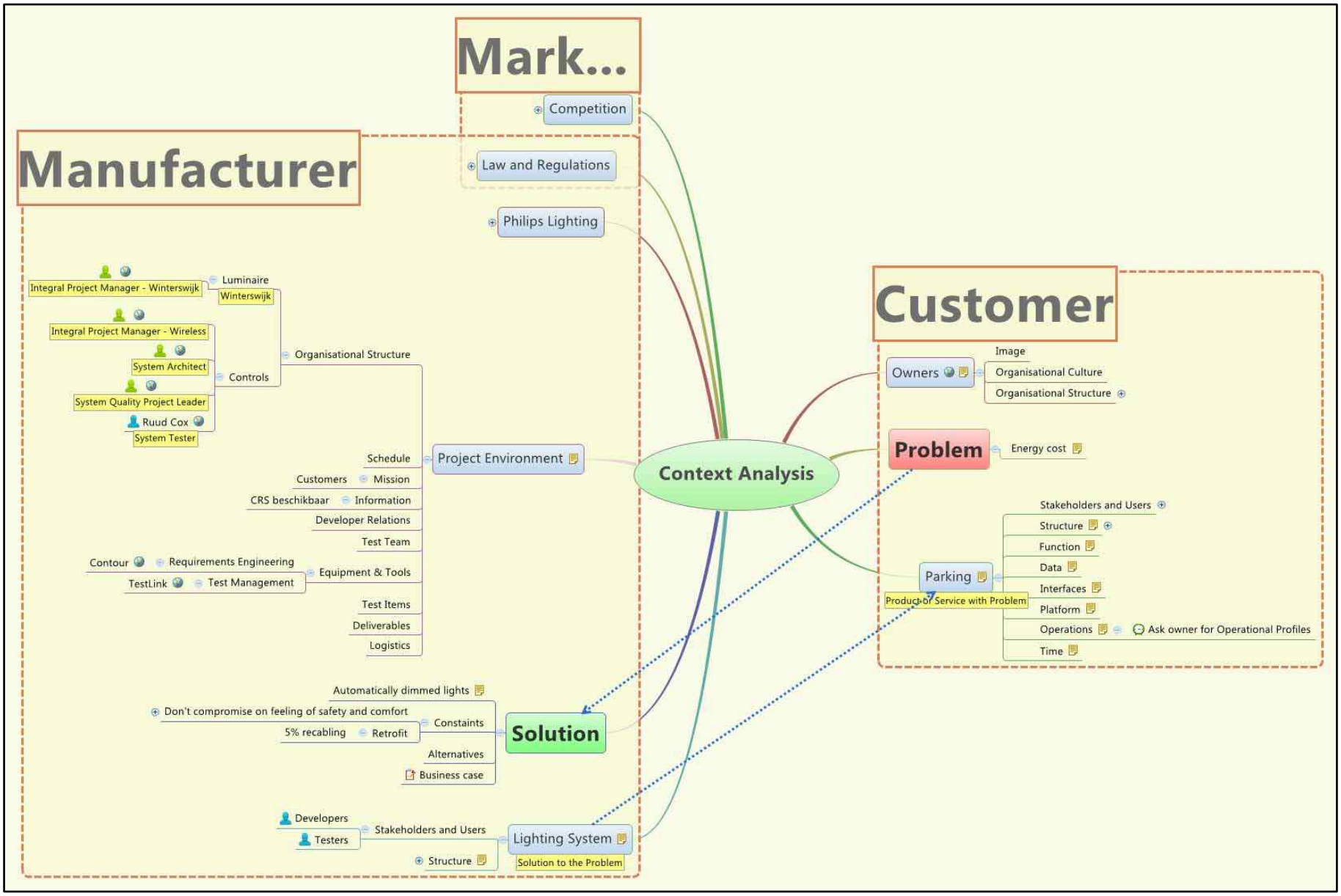


Clarifies the relationships existing between the parts of the whole.

INCOMPLETE
INCOMPLETE
INCOMPLETE
Competition
Product Catalog
CSA
FDA
KEMA
Insurance Company
Board
Marketing & Sales
Hospital Director
Quality & Regulatory
Supply Chain Manager
Program Director
Product Catalog
Clinical Specialist
Software Engineer
Product Owner
Test Engineer
SCRUM Master
Research
EBM
Skullstripper
Landmark
TissueSegmentation
Mechanical Engineer
Electronics Engineer
System Management
Radiologist
Stereotactic Frame
SureStim
Neurosurgeon
Patient
SurePlace
Electrophysiologist
PACS
Intruder/Hacker
SurePlan
SureTune
Neurologist
Nurse
Cleaning
Patient Data
Patient Data
Service Engineer
SureSuite
Graphics Card
Supply Chain
Manufacturer
SurePlan
SurePlace
SureStim
SureTune
Packer
Loader
Truck Driver
Unloader
Unpacker

# A lighting system for car parks

- Design a lighting system for car parks that consumes less energy than current systems
- Don't compromise on comfort feelings and safety
- ROI <= 2 years


Mark...
Competition
Law and Regulations
Philips Lighting
Manufacturer
Integral Project Manager - Winterswijk
Luminaire
Winterswijk
Integral Project Manager - Wireless
System Architect
System Quality Project Leader
Ruud Cox
System Tester
Controls
Organisational Structure
Schedule
Customers
Mission
CRS beschikbaar
Information
Developer Relations
Test Team
Contour
Requirements Engineering
TestLink
Test Management
Equipment & Tools
Test Items
Deliverables
Logistics
Project Environment
Automatically dimmed lights
Don't compromise on feeling of safety and comfort
5% recabling
Retrofit
Constaints
Alternatives
Business case
Solution
Developers
Testers
Stakeholders and Users
Structure
Lighting System
Solution to the Problem
Context Analysis
Customer
Image
Owners
Organisational Culture
Organisational Structure
Problem
Energy cost
Stakeholders and Users
Structure
Function
Data
Interfaces
Platform
Operations
Ask owner for Operational Profiles
Time
Parking
Product or Service with Problem

# What is a heuristic?

A fallible method of solving a problem.

Simple rules and shortcuts, comprehensive procedures, or even sophisticated software tools.

Fallibility implies that wisdom and responsibility are critical.

From Reinventing Testers by James and Jon Bach

# Heuristics

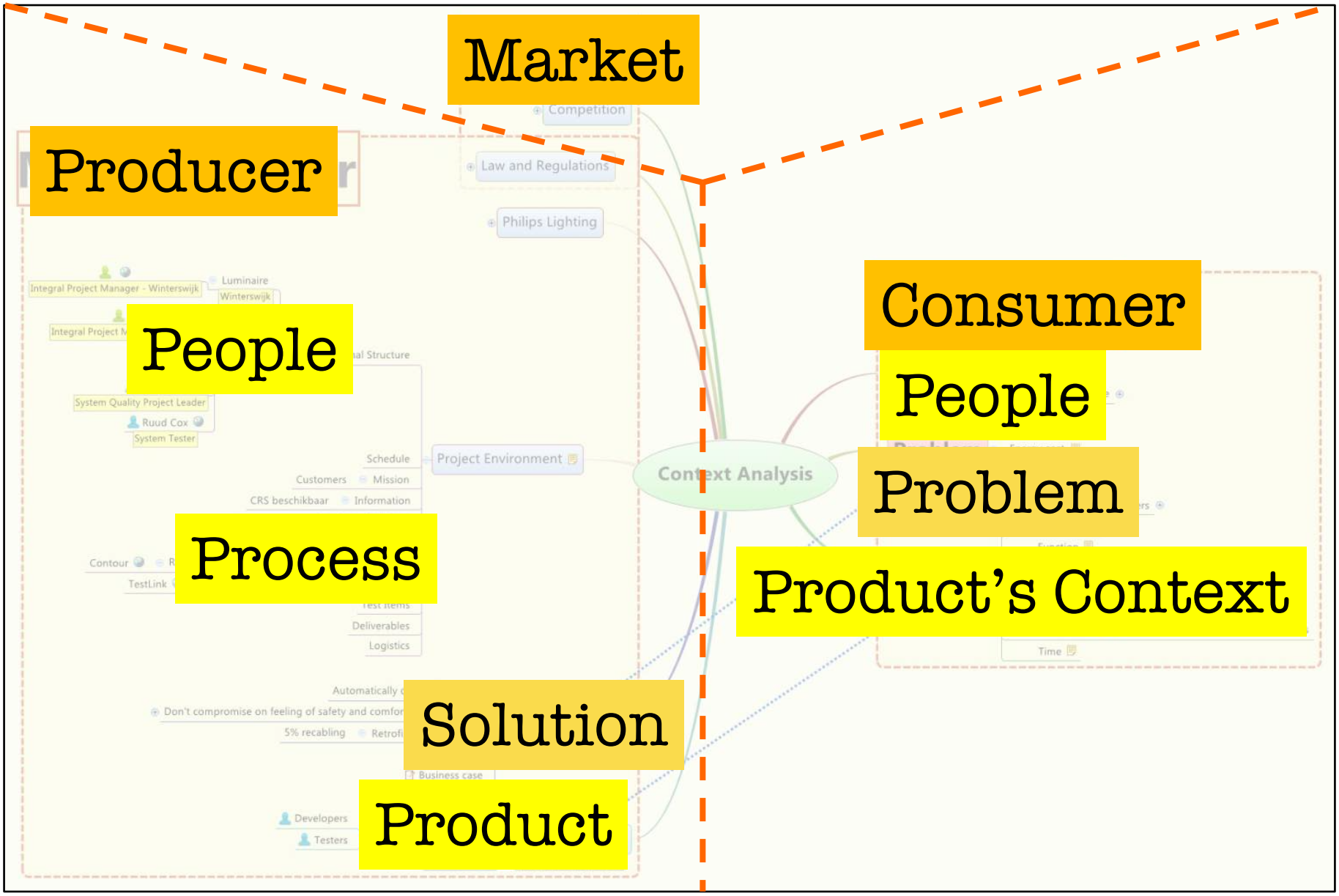
## Producer, Market, Consumer

## Problem, Solution

What is the problem that we are trying to solve?
What is our solution to the problem?
What other solutions were proposed or evaluated?

## Product, People, Process

What are the elements of the product?
How are the people organized? Project? Departments?
What does the product development process look like?


Market
Producer
People
Process
Solution
Product
Consumer
People
Problem
Product's Context
Context Analysis
Competition
Law and Regulations
Philips Lighting
Luminaire
Winterswijk
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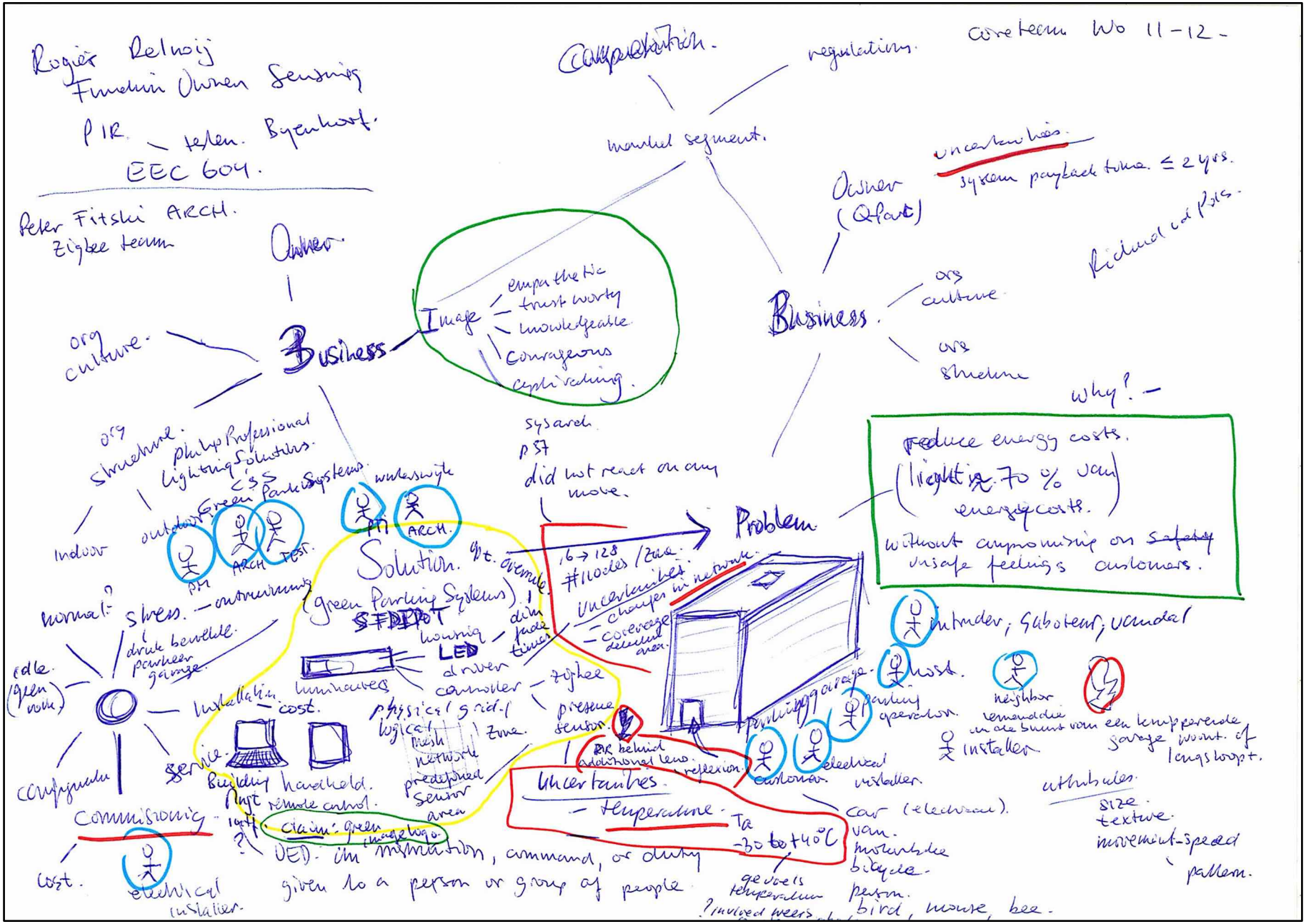
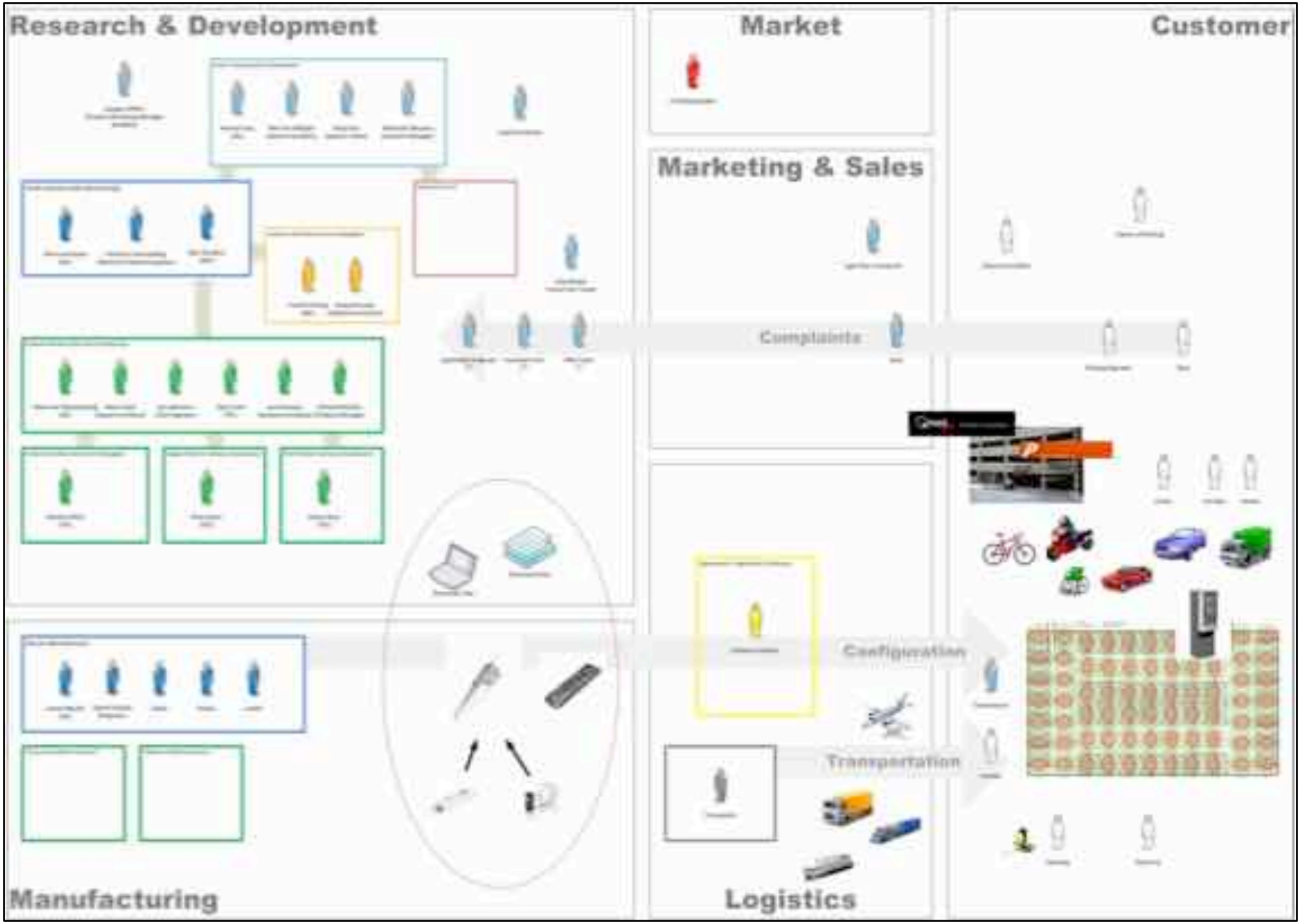
Logistics
Business case
Developers
Testers
Time


Rogier Relnoij
Fundin Owner Sensing
PIR — telen. Byenhoef.
EEC 604.
Peter Fitski ARCH.
Zigbee team
core team Wo 11-12.
Competition.
regulations.
market segment.
Owner
Business
Image
empathetic
trust worty
knowledgeable
courageous
captivating.
Owner (Q-Part)
uncertainties.
system payback time. ≤ 2 yrs.
Richard ed Pols.
Business.
org culture.
org structure.
org culture.
Business
why? —
reduce energy costs.
(light ≈ 70 % van energy costs.)
without compromising on safety
unsafe feelings customers.
sys arch.
p 57
did not react on any move.
Problem
16 → 128
#nodes / zone.
uncertainties.
— changes in network.
— coverage
detected area.
Solution.
(green Parking Systems)
SFDIPOT
housing
LED
driver
controller
zigbee
presence sensor.
luminaires
physical grid.
logical
mesh network
predefined sensor area
zone.
PIR behind additional lens.
reflexion.
Uncertainties.
— temperature.
Ta
-30 to +40°C
gevoels temperature
? invloed weers
Ontwerp
Philips Professional Lighting Solutions.
C&S
Green Park Systems.
outdoor
indoor
PM
ARCH
TEST.
PM
ARCH.
normal?
stress. — outrunning
druk bewerkte parkeer garage.
idle. (green work)
installation
cost.
service.
Building
handheld.
remote control.
Commisioning.
cost.
electrical installer.
claim: green
image logo.
UED. an instruction, command, or duty given to a person or group of people
intruder, saboteur, vandal
host.
parking garage.
parking operator.
neighbor
installer.
customer.
electrical installer.
car (electrical).
van.
motorbike
bicycle.
person.
bird, mouse, bee.
attributes.
size.
texture.
movement-speed
pattern.

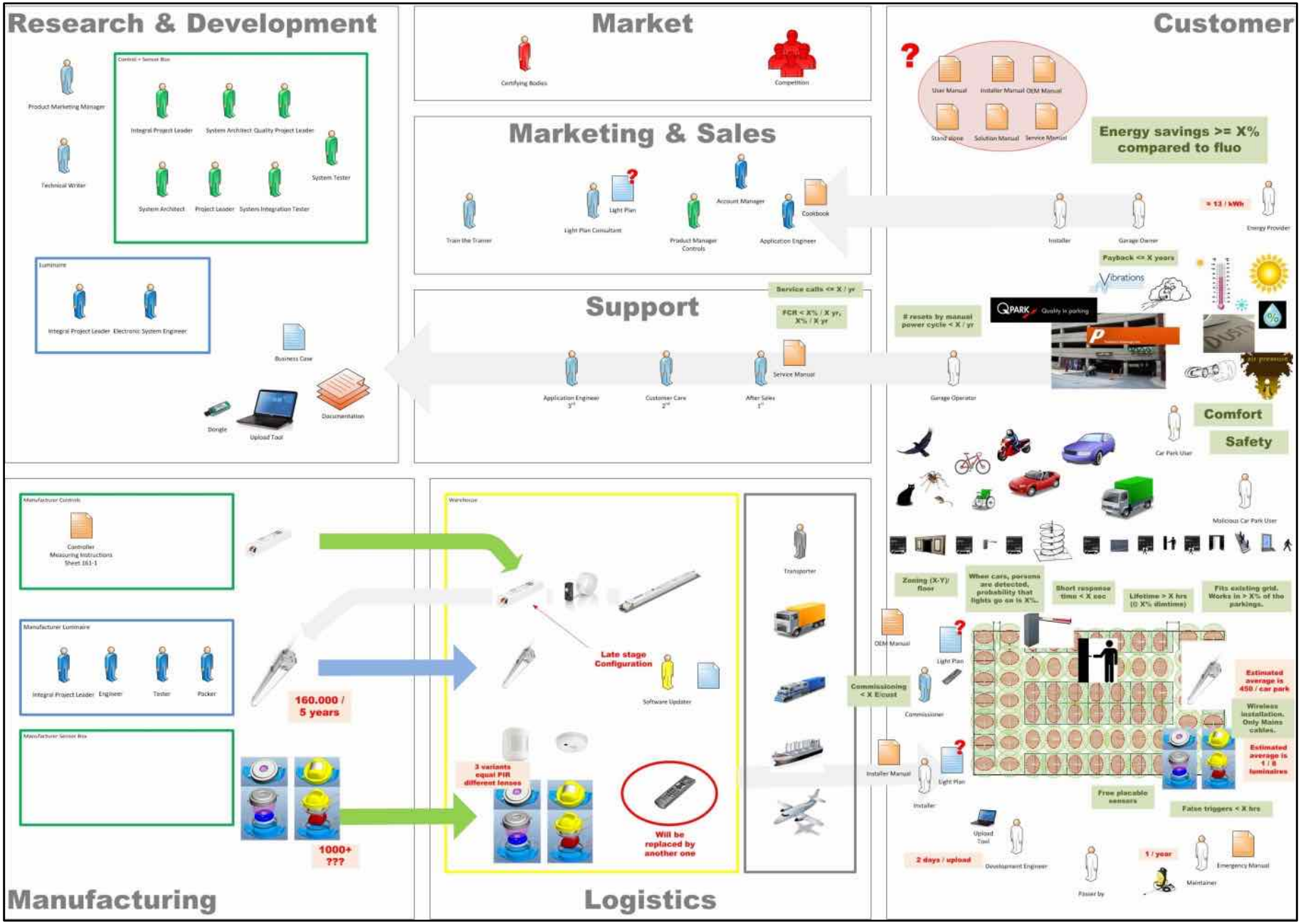

Research & Development
Market
Customer
Marketing & Sales
Complaints
Configuration
Transportation
Manufacturing
Logistics

# **Heuristics**

Supply/Value Chain

Product Life-cycle

User Scenarios


Research & Development
Product Marketing Manager
Technical Writer
Control + Sensor Box
Integral Project Leader
System Architect
Quality Project Leader
System Tester
System Architect
Project Leader
Systems Integration Tester
Luminaire
Integral Project Leader
Electronic System Engineer
Business Case
Dongle
Upload Tool
Documentation
Market
Certifying Bodies
Competition
Marketing & Sales
Train the Trainer
Light Plan Consultant
Light Plan
Product Manager Controls
Account Manager
Application Engineer
Cookbook
Support
Service calls <= X / yr
FCR < X% / X yr, X% / X yr
Application Engineer 3rd
Customer Care 2nd
After Sales 1st
Service Manual
Customer
User Manual
Installer Manual
OEM Manual
Stand alone
Solution Manual
Service Manual
Energy savings >= X% compared to fluo
Installer
Garage Owner
= 13 / kWh
Energy Provider
Payback <= X years
Vibrations
QPARK Quality in parking
# resets by manual power cycle < X / yr
Garage Operator
Comfort
Safety
Car Park User
Malicious Car Park User
Zoning (X-Y) / floor
When cars, persons are detected, probability that lights go on is X%.
Short response time < X sec
Lifetime > X hrs (@ X% dimtime)
Fits existing grid. Works in > X% of the parkings.
OEM Manual
Light Plan
Commissioning < X €/cust
Commissioner
Estimated average is 450 / car park
Wireless installation. Only Mains cables.
Estimated average is 1 / 8 luminaires
Installer Manual
Light Plan
Installer
Free placable sensors
False triggers < X hrs
Upload Tool
Development Engineer
2 days / upload
1 / year
Emergency Manual
Maintainer
Passer by
Manufacturing
Manufacturer Controls
Controller
Measuring Instructions
Sheet 161-1
Manufacturer Luminaire
Integral Project Leader
Engineer
Tester
Packer
Manufacturer Sensor Box
160.000 / 5 years
1000+ ???
Logistics
Warehouse
Late stage Configuration
Software Updater
3 variants equal PIR different lenses
Will be replaced by another one
Transporter

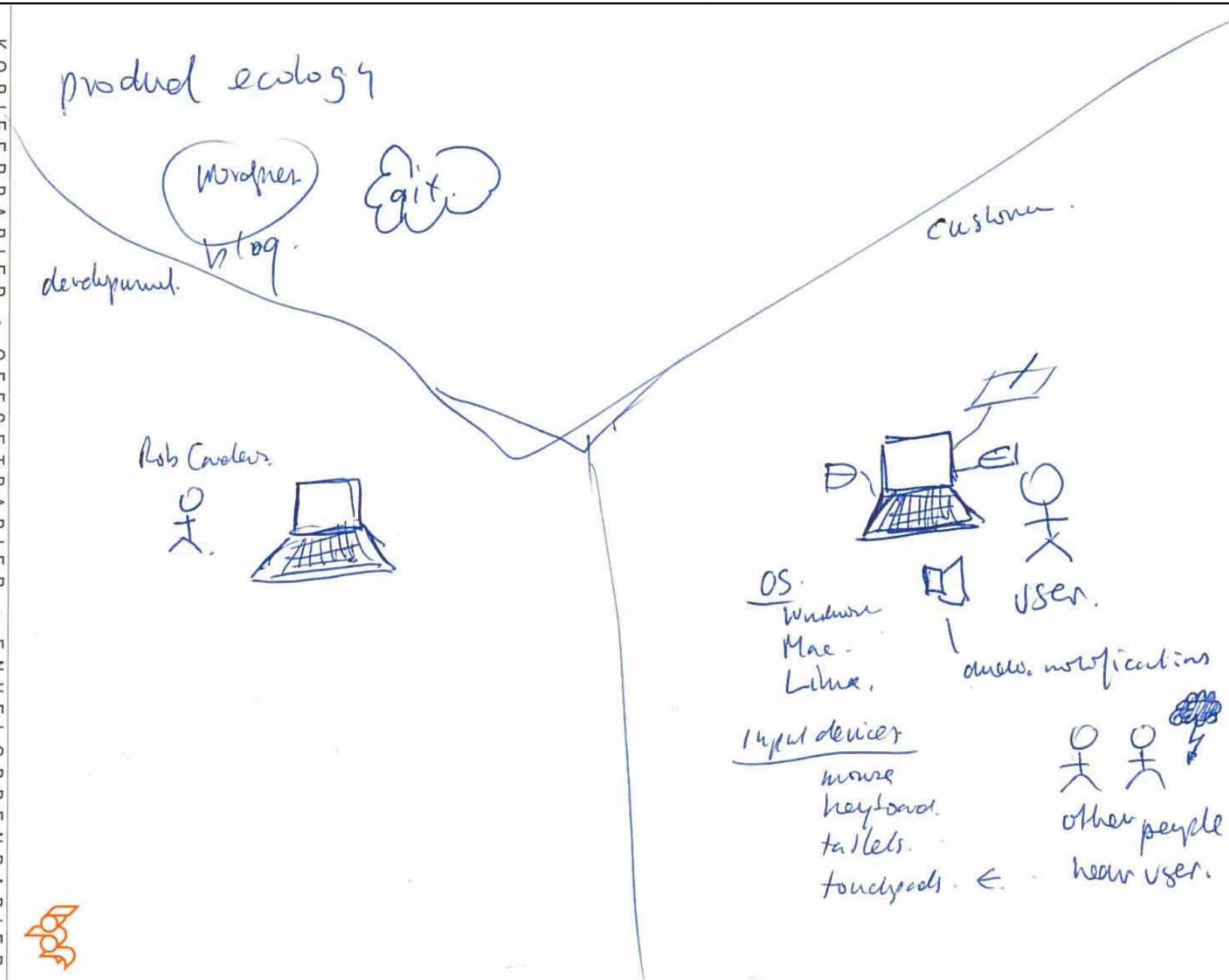
# Prevention and recovery of RSI

- Workrave is a program that assists in the recovery and prevention of Repetitive Strain Injury (RSI)
- The program frequently alerts you to take micro-pauses, rest breaks and restricts you to your daily limit

The break prelude window, bugging you to take a micro-pause:

If you give in to the annoying prelude window, this is your rewar

KOPIEERPAPIER • OFFSETPAPIER • ENVELOPPENPAPIER




BERGHUIZER PAPIERFABRIEK • WAPENVELD • HOLLAND

## Supply Chain

GNOME

GitHub

## Market/Competition

Open Source -
How to model other devs?

research.
validity of
breaks. +
break duration.

## Law & regulations

DE
ARBO
WET

## Research & Development

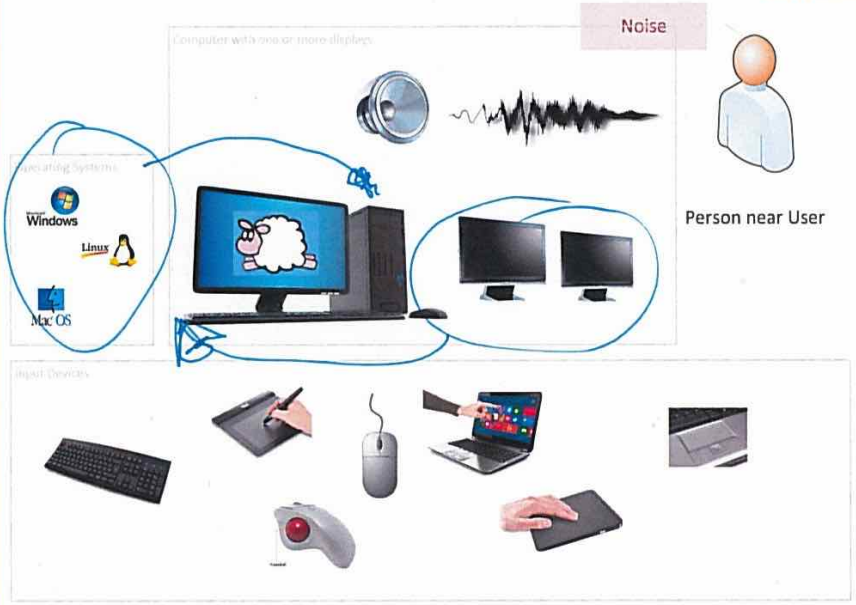
Developer, Tester

Developer, Tester

Testability

Portability

## Customer




Person near User

Reliability

Localization

Installability

User

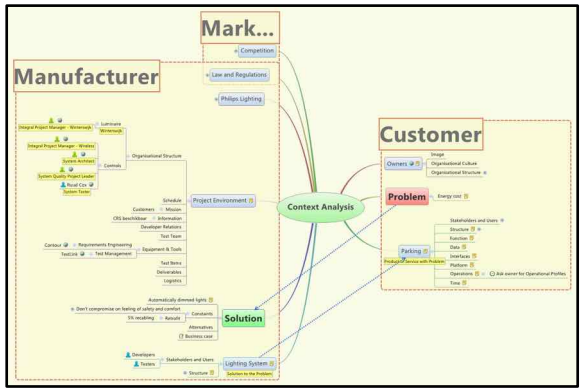
# Product Ecology method

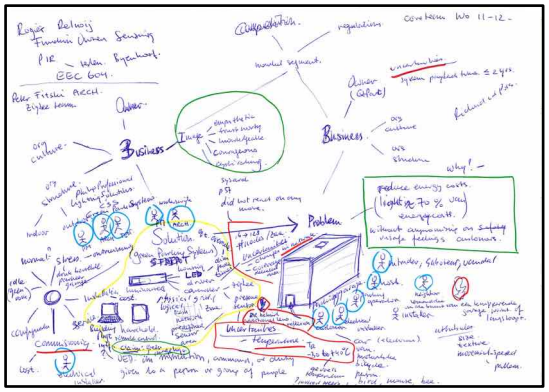
Making the complex clear by

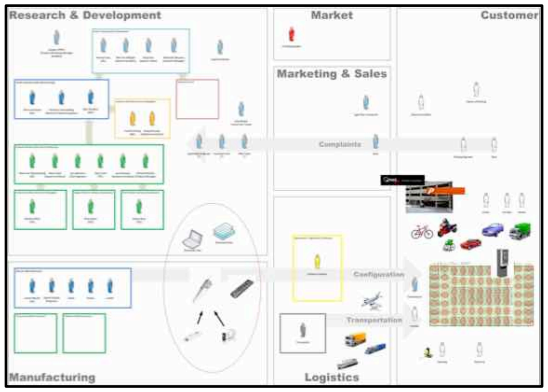
1. making the invisible visible
creating a diagram

2. applying heuristics
to discover structures

# Representations






A new situation might require a change of representation.
(Re)structure, dual-task effect.

# Heuristics

Problem, Solution
Producer, Market, Consumer
Product, People, Process

Supply/Value Chain
Product Life-cycle
User Scenarios

# Requirements identification

Quality is in the relationships between the product and its environment

Holistic; more than operational context

Social impact; more than technological impact

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