

APCOSE 2008 Conference

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Niels Malotaux

**Recognizing and
Understanding
Human Behavior
to Improve
Systems Engineering**

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Niels Malotaux
Recognizing and Understanding Human Behavior
to Improve Systems Engineering

Niels Malotaux

Niels Malotaux is an independent Project Coach specializing in optimizing project performance. He has over 30 years experience in designing electronic hardware and software systems, at Delft University, in the Dutch Army, at Philips Electronics and 20 years leading his own systems design company. Since 1998 he devotes his expertise to helping projects to deliver Quality On Time: delivering what the customer needs, when he needs it, to enable customer success. To this effect, Niels developed an approach for effectively teaching Evolutionary Project Management (Evo) Methods, Requirements Engineering, and Review and Inspection techniques. Since 2001, he taught and coached some 100 projects in 25+ organizations in the Netherlands, Belgium, Germany, Ireland, India, Japan, Romania, South Africa and the US, which led to a wealth of experience in which approaches work better and which work less in practice.

Niels puts development teams on the Quality On Time track and coaches them to stay there and deliver their quality software or systems on time, without overtime, without the need for excuses. Practical methods are developed, used, taught and continually optimized for:

- Evolutionary Project Management (Evo)
- Requirements Engineering and Management
- Reviews and Inspections.

Within a few weeks of turning a development project into an Evo project, the team has control and can tell the customer when the required features will all be done, or which features will be done at a certain date. Niels enjoys greatly the moments of enlightenment experienced by his clients when they find out that they can do it, that they are really in control, for the first time in their lives.

This presentation is based on the paper "Recognizing and Understanding Human Behavior to Improve Systems Engineering": www.malotaux.nl/nrm/pdf/HumanBehavior.pdf

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<i>Result Management</i>	

Recognizing and Understanding Human Behavior to Improve Systems Engineering Results

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Niels Malotaux

Project Coach

- Evolutionary Project Management (Evo)
- Requirements Engineering
- Reviews and Inspections

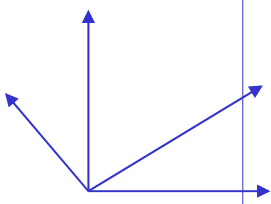
- Researching problems in projects
- Finding ways to fundamentally overcoming these problems
- Ploughing back into projects
- Tuning of the results (because theory isn't practice)

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Humans are part of any system

- **Engineering**
 - Risk of sub-optimizing within limited field of expertise
 - **Systems Engineering**

Optimizing over all necessary dimensions:

 - Whole System
 - Total lifecycle (Cradle to Cradle)
 - All disciplines involved
 - Making sure the whole system performs properly
 - **Including the humans involved**
 - **Humans are part of any system**
- 

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People responsible for success

- **During the project**
 - Can still influence the performance of the project
 - First responsibility of the Project Manager
 - Actually responsibility of the whole development organization
- **Once the system is out there**
 - No influence on the performance of the system any more
 - System must perform autonomously
 - So the performance must be there *by design*
 - Including appropriate interface with humans
 - Responsibility and required skill of Systems Engineering

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Not all systems are perfect

Systems Engineering apparently still is doing something wrong

Otherwise systems would be perfect

Example: Heathrow Terminal 5: "Huge Success"

- Humans are not interested in the technical details of the terminal
- They just want their luggage back as quickly as possible *at the destination airport*, and they didn't

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Murphy's Law

Whatever can go wrong, will go wrong

Accepting fate ... ??

Murphy's Law for Engineers:

Whatever can go wrong, will go wrong ...

Therefore:

We should actively check all possibilities that can go wrong and make sure that they *cannot happen*

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Human Behavior

- Systems are conceived, designed, implemented, maintained, used, and tolerated (or not) by people
- Most project process approaches (as well as engineers) ignore human behavior, incorrectly assume behavior, or decide how people should behave (ha ha)
- To succeed in projects, we must study and adapt to real behavior rather than assumed behavior
- Even if we disapprove of that behavior
- We cannot fight the genes

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Is Human Behavior a risk?

- Human behavior is a risk for the success of the system
 - When human behavior is incorrectly modeled in the system
 - Not because human users are wrong
- Things that can go wrong
 - Customers not knowing well to describe what they really need
 - Users not understanding how to use or operate the system
 - Users using the system in unexpected ways
 - Incorrect modeling of human transfer functions within the system: ignorance of designers of systems engineers
- Actually, the humans aren't acting unpredictably
 - Because it happens again and again

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Discipline

- **Control of wrong inclinations**
 - **Even if we *know* how it *should* be done ...**
(if nobody is watching ...)
 - **Discipline is very difficult**
 - **Romans 7:19**
 - The good that I want to do, I do not ...
- **Helping each other** (watching over the shoulder)
→ **Rapid success**
→ **Making mistakes**

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Intuition

- **Makes us react on every situation**
- **Intuition is fed by experience**
- **It is free, we always carry it with us**
- **We cannot even switch it off**
- **Sometimes intuition is simply wrong**
- **In many cases the head knows, the heart not**
- **Coaching is about redirecting intuition**

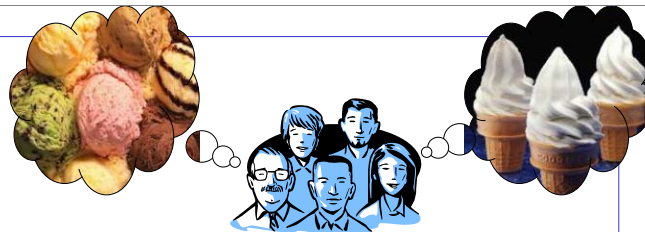
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Communication

- Information exchanged between systems
- Traffic accident: witnesses tell *their* truth
- Same words, different *concepts*
- Human brains contain rather fuzzy concepts
- Try to explain to a colleague
- Writing it down is explaining it to paper
- If it's written it can be discussed and changed
- Vocal communication evaporates immediately

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Perception



- What we intuitively, sub-consciously observe and notice
- What people say and what they do is not always equal
- The head knows, but the heart decides
- Hidden emotions are often the drivers of behavior
- Customers who said they wanted lots of different ice cream flavors from which to choose, still tended to buy those that were fundamentally vanilla
- So, trying to find out what the real value to the customer is, can show many paradoxes
- Better not simply believe what they say: *check!*

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5 times "Why?"

- **Freud and Jung:**
 - Problems are in our sub-consciousness
 - Solutions pop up
- **What's your problem ?**
 - If there's no problem, we don't have to do something
- **Within 5 times "Why?" we usually come down to the real problem to solve**
 - Otherwise we will be perfectly solving the wrong problem

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Excuses, excuses, excuses ...

- **We have been thoroughly trained to make excuses**
- **We always downplay our failures**
- **At the Fatal Day, any excuse is in vain: we failed**
- **Even if we "couldn't do anything about it"**
- **No pain, no gain**

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Preflection, foresight, prevention

**Insanity is doing the same things over and over again
and hoping the outcome to be different** (*let alone better*)

Albert Einstein 1879-1955, Benjamin Franklin 1706-1790, it seems Franklin was first

- Only if we change our way of working,
the result may be different
 - Hindsight is easy, but *reactive*
 - Foresight is less easy, but *proactive*
 - Reflection is for hindsight and learning
 - Preflection is for foresight and prevention
- Only with prevention we can save precious time
- This is used in the Deming/Plan-Do-Check-Act cycle

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The essential ingredient: the PDCA cycle

(Deming cycle)

Act

- What are we going to do differently?
- We are going to do it differently!

Plan

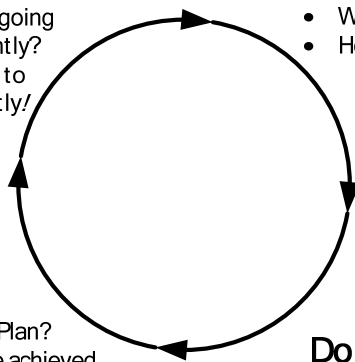
- What to achieve
- How to achieve it

Check

- Is the Result according to Plan?
- Is the way we achieved the Result according to Plan?

Do

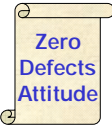
Carry out the Plan



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Recognizing and Understanding Human Behavior to Improve Systems Engineering

- ### Evo elements



 - **Plan-Do-Check-Act**
 - The powerful ingredient for success
 - **Business Case**
 - *Why* we are going to improve *what*
 - **Requirements Engineering**
 - *What* we are going to improve *and what not*
 - *How much* we will improve: quantification
 - **Architecture and Design**
 - Selecting the optimum compromise for the conflicting requirements
 - **Early Review & Inspection**
 - Measuring the quality while we are doing, to prevent doing the wrong things

Evo planning

 - **Weekly TaskCycle**
 - Short term planning
 - Optimizing estimation
 - Promising what you can achieve
 - Living up to your promises
 - **Bi-weekly DeliveryCycle**
 - Optimizing the requirements and checking the assumptions
 - Soliciting feedback by delivering Real Results to appropriate and *eagerly waiting* Stakeholders
 - **TimeLine**
 - Getting and keeping control of Time

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Conclusion

- Discussed several elements of human behavior, affecting the success of our Projects
- The Evo approach actively integrates human behavior
- Constantly improving the way we run projects and design systems (using Plan-Do-Check-Act)
- Taking into account the behavior of *all* people involved
 - All relevant stakeholders of our system
 - Also *our own* behavior while we are engineering the system
 - Creating success faster and more predictably

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