SOPHIST
Ongoing Investigation in the Case „System Development“
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1 General Facts on the Craft

2 Informants and Witnesses

3 The Cognitive Process

4 Methods of Investigation

5 Concluding Remarks

Ongoing Investigation in the Case „System Development“

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- The Truth
- The Object of Observation
- Complicated – Complex

General Facts on the Craft

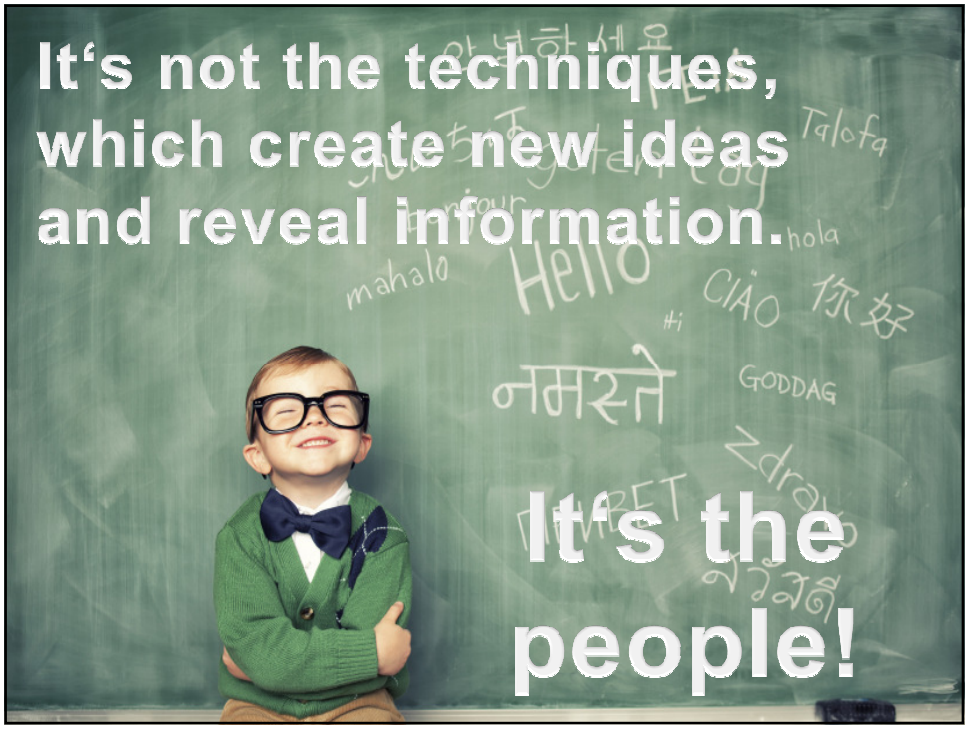
Let me be honest with you…

EXTRA! EXTRA!
READ ALL ABOUT IT!
OMG!!
…It might come as a shock to you…

Elicitation methods…

…are not used effectively.

How does that come!?



General Facts on the Craft

RE-Disciplines

What RE actually is

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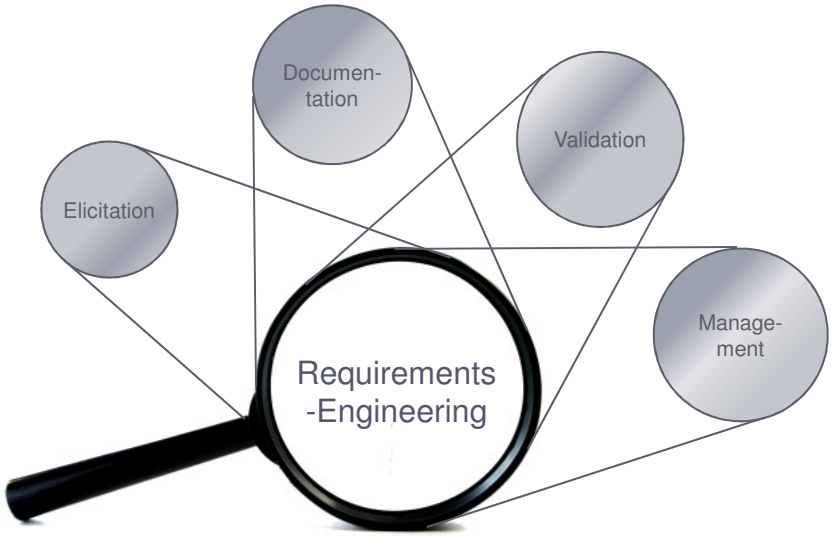

General Facts on the Craft

Hair-splitting

complicated - complex

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Sometimes it pays off to be precise ... and to differentiate

- inanimate
- **complicated (e.g. mathematics, physics - deterministic)**
- data (inanimate structures)
- Control/supervision
- teacher
- knowledge

- animate
- **complex (e.g. people, stay surprising)**
- information (conscious reflection)
- guidance
- master
- ability

By the way: Women are not complicated, but complex!

General Facts on the Craft

Hair-splitting

effective - efficient

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Effectiveness	Efficiency
„Doing the right things.“	„Doing the things right.“

- Effectivity denotes understanding the degree of achieved objectives, which is the aspirated goals in proportion to the achieved results. The underlying effort is of no importance.
- Efficiency is the contributed effort in proportion to completeness and accuracy, which is needed in order to meet a specific objective.

General Facts on the Craft

Effective - Efficient

An example

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http://www.memomag.de/effizienz-effektivitaet/

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- Map of Stakeholders
- Requirements-Engineering
- Usability Engineering

Informants and Witnesses

York der Knöfel: Thoughts (1996) -- Galerie Wohnmaschine -- now installed in Neues Museum Nürnberg

Informatns and Witnesses

Stakeholders

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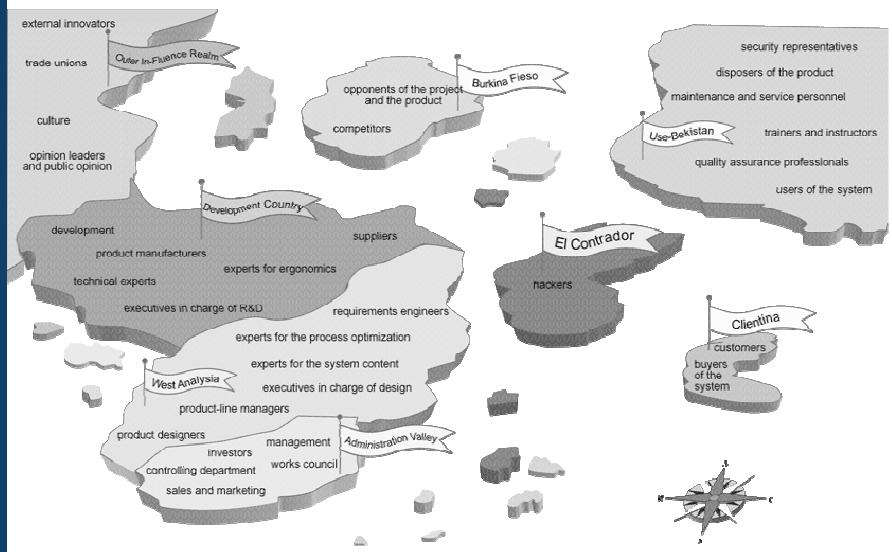
The Map of Stakeholders – Different roles of stakeholders



Function	Name	Contact details	Field of knowledge	Justification
General Manager	Antonio Müller	47mueller@bl.de	Knows all procedures within the restaurant	Decision on realization, financier
Cook	Franco Ferro	ferro@bl.de	Expert on purchasing foodstuff	User of the system, has to order foodstuff
Developer	Franz Huber	huber@4soft.de	Object-oriented programming	Technical implementation of the system
Waiter	Tobias Wegerer	tobi-w@aol.de	Table service and care for guests	The system shall replace the waiter.
Receptionist	Michaela Heilmeier	0171 5628452	Receiving reserverations	User of the system, responsible for reserverations
Bartender	Matthias Hansen	0911 3457890	bar, drinks service and care for guests	User of the system, responsible for drinks
Service engineer	Thorsten Keller	tk22@gmx.de	Maintenance and repair of technical appliances	Maintenance and repair of terminal devices
Customer	Anna Schweiger	0174 8813401	Administrative activities using the computer	User of the terminal device, wants to order

Informatns and Witnesses

Requirements-Engineering

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Arguments for a list of stakeholders

- Completeness of stakeholder classes
- At least one representative of each class
- lucid, easy to expand
- Organisational data available
- Help with legitimation (e.g. management‘s approval of requested resources)
- Solid basis for further planning (when who with which method of elicitation)
- Supports and challenges responsibility
- Leads to consolidation

Cooper, Alan/ Reimann, Robert/ Cronin, David: About Face und Interaction Design mitp, Heidelberg, 2007
Goodwin, Kim: Designing for the Digital Age Wiley Publishing, Inc., Indianapolis, 2009
Schüpferling, Popp: Sind Benutzerbedürfnisse die wahren Anforderungen - Für den Benutzer; Java Magazin, 2013
Chris Rupp, Popp: Wie viel Usability Engineering braucht das RE?, Proceedings der Gesellschaft für Informatik, 2013

Role	Regular customer	
Demographic variables		
Name:	Michael Heider	
Age:	34 years	
Family status:	married, 2 children	
Income:	High earner	
Place of residence:	Major city	
Origin:	German	
Behavioral variables		
Activities:	Making a reservation; A day in advance, the customer calls the receptionist in order to make a reservation for two. He prefers his favourite table by the window.	
	Choosing a dish; The customer chooses a dish from the menu.	
	Stating special requests; The customer does not like mushrooms.	
	Placing an order; The customer places his order with the service staff.	
	Taking care of the bill; The customer takes his partner‘s bill on his own account.	
	Settling the bill; The customer usually pays cashless.	
Attitudes:	Technological Progress; thinks positively about technological progress and is easily enthused.	
Qualification:	Educational level; academic background, is now employed at a big company.	
	Type of learner; is among the balanced learner types, which can equally learn with all senses.	
Goals:	Evaluating the furnishings; appreciates modern furnishings.	
	Entertainment factor; The customer rejoices in live music.	
	Stay in the restaurant; Average waiting time in order to enjoy the time spent together with his wife.	
	Appreciating specialities; sets great value on seasonal and regional products, on a gentle cooking process, on fresh foods and on a resource-saving consumption.	
Skills:	Computer literacy; privately owns a computer and a laptop which he uses for daily administrative activities (E-Mail, Word, Excel, uploading pictures). In addtion, the customer uses social media every now and then.	
	Mobile phone; the customer owns a smartphone and uses it for administrative purposes twice a day.	
Mental Model:	Idea of the system; pictures the system acting like a waiter. He is greeted by name, accompanied to his reserved regular place, having smalltalk,…	
Ambience:	The customer is most of the time in the guest area. Only when entering the restaurant and going to the toilet he temporarily leaves the guest area of the restaurant. Depending on the customers, the background noise is loud to very loud. As there are conversations at every table, there is always a certain sound level.	

Role	Regular Customer
Demographic variables	
Name:	Michael Heider
Age:	34 years
Family status:	Married, 2 children
Income:	High earner
Place of residence:	Major city
Origin:	Germany

Activities:	*Making a reservation;* A day in advance, the customer calls the receptionist in order to make a reservation for two. He prefers his favourite table by the window.
	Choosing a dish; The customer chooses a dish from the menu.
	Stating special requests; The customer does not like mushrooms.
	Placing an order; The customer places his order with the service staff.
	Taking care of the bill; The customer takes his partner‘s bill on his own account.
	Settling the bill; The customer usually pays cashless.
	Tipping; The customer is very pleased with the service of the waiter – that is why he always leaves 20% tip.
	Conversation with the waiter; He highly appreciates smalltalk with the service.

Attitudes:	*Technological Progress;* thinks positively about technological progress and is easily enthused.
Qualifications:	*Educational level;* academic background, is now employed at a big company.
	Type of learner; the regular customer is among the balanced learner types, which can equally learn with all senses.
Goals:	*Evaluating the furnishings;* appreciates modern furnishings.
	Entertainment factor; The customer rejoices in live music.
	Stay in the restaurant; Average waiting time in order to enjoy the time spent together with his wife.
	Appreciating specialities; sets great value on seasonal and regional products, on a gentle cooking process, on fresh foods and on a resource-saving consumption.
	Company; The customer enjoys the mixed company in the restaurant (Italians,

Skills:	*Computer literacy;* privately owns a computer and a laptop which he uses for daily administrative activities (E-Mail, Word, Excel, uploading pictures). In addtion, the customer uses social media every now and then.
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Informatns and Witnesses

Usability Engineering

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Arguments in favor of personas

- No compelled completeness
- Personas are fictive –
  no real stakeholders necessary –
  ressource-efficient
- Every persona is easy to imagine
- As requirements are invented by the team, no explicit elicitation methods have to be applied
- No consolidation between stakeholders necessary

- Parallelization of UE-RE is the best option
- Combination of both perspectives:
  - Provides completeness for further phases of development
  - Secures users‘ acceptance
  - encourages cooperation of the project participants on the long run
  - Broadens the view on the system
- Prioritizing or consolidation – both is possible

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- Lewin‘s Equation
- Levels of Knowledge
- Constructivim
- This is Your Brain (Andy Hunt)
- What do a Cat and a Car have in Common?

The Cognitive Process

The Cognitive Process

The Physical Cognitive Process

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Four stages (Hering)

Inductive Conclusion (n → n + 1)
Generalisation (abstraction)

Laws of physics
System of legitimate coherences
Measurement instructions

Deduction
Logical derivation of concrete behaviour

Experiment
Correlation of physical quantities
Verification

The Cognitive Process

The Physical Cognitive Process

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The Experiment

- Seeking, defining and comparing features of the lifeless environment (= physical quantities)
- Documentation of discovered correlations – usable for other scientific disciplines

Inductive Conclusion

- Mathematical term (Inference from n to n+1) = Generalisation
- Physical implications are repeatedly confirmed by experiments – implication: they are universally valid
- Premise for conclusion and transfer to other scientific disciplines: existence of natural constants

The Cognitive Process

The Physical Cognitive Process

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Laws of Physics

- Mathematically expressed generalisation of an inductive conclusion
- Theory = Multitude of physical laws creates a consistent system of scientific statements on regular coherences in a physical range
- This theory enables predictions by using deduction and it also enables verification

Deduction

- Logical derivation of specific, problem-focused predicates from physical theories or laws
- Benefit: precise and reliable
- Derivation of future behaviour from valid physical laws is of great importance e.g. for the prevention of damage

The Cognitive Process

The Physical Cognitive Process

SOPHIST

Four steps (Hering)

Inductive Conclusion (n → n + 1)
Generalisation (abstraction)

Laws of physics
System of legitimate coherences
Measuring instructions

Deduction
Logical derivation of concrete behaviour

Experiment
Correlation of physical quantities
Verification

The Cognitive Process

Lewin‘s Equation

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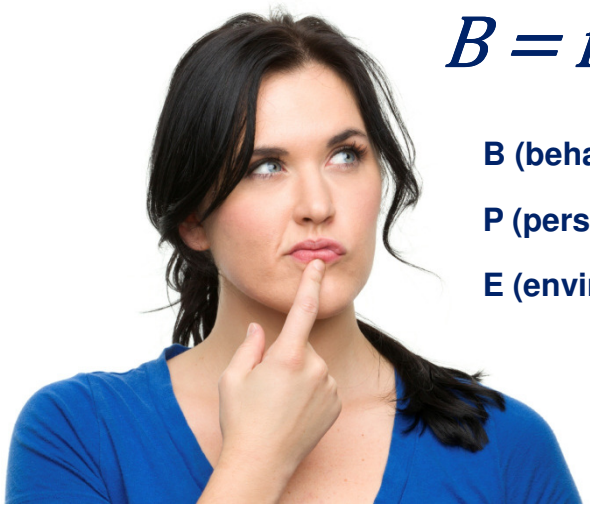
A psychological equation of behavior



$$B = f(P, E)$$

B (behavior)

P (person)

E (environment)

The Cognitive Process

Lewin‘s Equation

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A psychological equation of behavior

P(erson) and E(nvironment) mutually influence each other.

➔ The same person might act differently in diverse situations/environments.

➔ Individual people might act differently in the same situation.

The Cognitive process

Levels of Knowledge

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- Theory – axiom or fact-based
- Experiment – designed and controlled observations
- Observation – many observations
- Anecdotal – one or very few observations
- Hunch – intuition-based

The Cognitive Process

Ernst von Glasersfeld (1917-2010)

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Radical Constructivism

- „Knowledge is not passively absorbed by the thinking ego, but actively established.“
- There is no ontological reality, i.e. there is no underlying reality or idea of things
- Everybody has his or her own reality
- „Knowledge is generally based on one‘s own experience, on one‘s own constructions.“

The Cognitive Process

Paul Watzlawick (1921-2007)

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- First-order reality
  - Everything that can be determined objectively; physical property of things; i.e. repeatable proof, leads to the same result when repeated
- Second-order reality
  - Every person attributes sense, meaning and value to the facts of the first order. Experience and cognitive performance of the person affect the second-order.
  - „The reality of the second-order is exclusively based on the attribution of sense and value to these things, and therefore it is based on communication“ (Watzlawick)

The Cognitive Process

This is Your Brain

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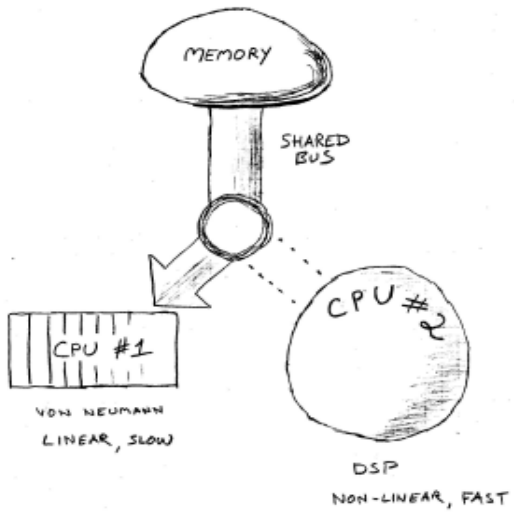

(according to Hunt: Pragmatic Thinking and Learning, p. 58)

The Cognitive Process

An Analogy

Your brain, the computer

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- The L-mode is a verbal, linguistic mode that works its way through all the details and makes them possible. (CPU #1)
- The R-mode is unpredictable – anyone, any place, any time – prepare yourself for having THE idea. (CPU #2)
- Everybody possesses this device and thus, everybody can have great ideas – it's just that not everybody makes the best of it

The Cognitive Process

Hunt's Key to Creativity

What creativity needs

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Look at your problem in different ways!
Avoid formal methods – Intuition and positive emotions could be helpful.
Broaden and guide your thought processes – by identifying unusual and rather absurd connections.

The Cognitive process

What do a Cat and a Car have in Common?

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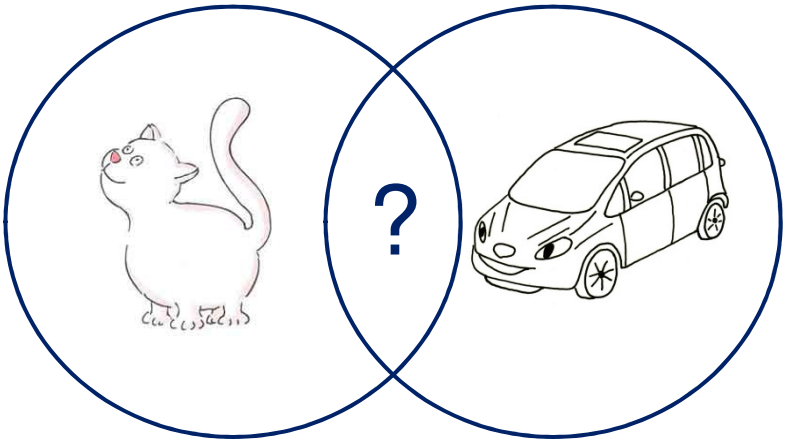

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- Elicitation Techniques
- Elicitation Matrix
- Big Picture

Methods of Investigation

Methods of Investigation

Elicitation Techniques

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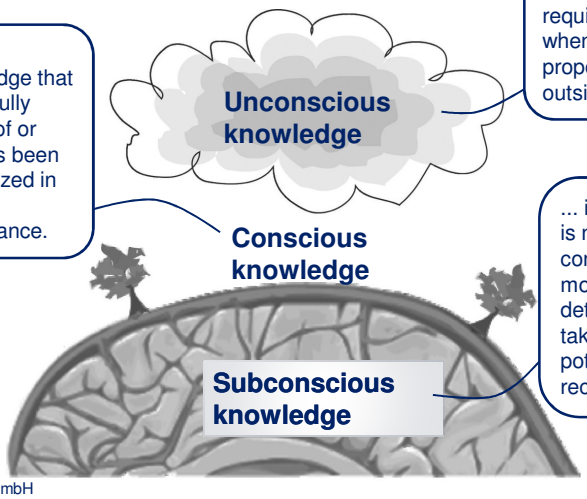
How to unearth the respective kind of knowledge?

... is knowledge that one is fully aware of or that has been recognized in its full significance.



... are unknown wishes that are recognized as requirements only when they are proposed by an outside source

... is knowledge that is not present within consciousness at the moment but determines actions taken and could potentially be recalled.

Methods of Investigation

Elicitation Techniques

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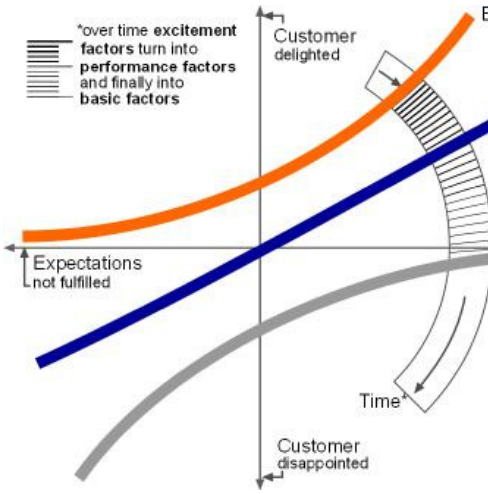
Categorizing requirements according to the Kano-model



Sending a text message was an exotic feature in 1994.

Text messaging became a feature that was often asked for when buying a cell phone.

When buying a cell phone today, the phone's ability to send and receive text messages is implicitly taken for granted.

Methods of Investigation

Elicitation Techniques

Logical Propaedeutics

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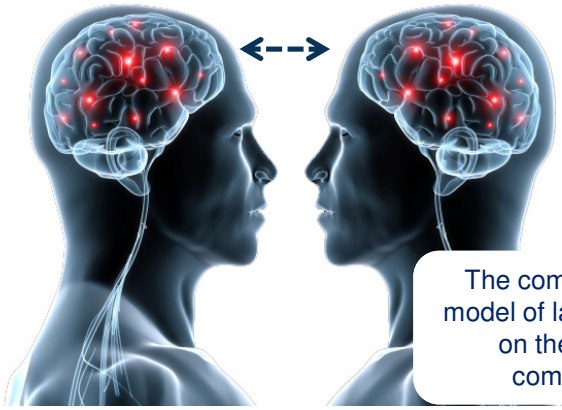
Words alone are meaningless

Telepathy does not work

Perfect communication is impossible



The common reference model of language decides on the success of communication

Kamlah, Lorenz: Logische Propädeutik 1996

Choosing suitable elicitation techniques

Legend:

-	not recommended
0	no influence => may be used
+	recommended
++	highly recommended

	Brainstorming	Brainstorming paradox	Method 6-3-5	Change of Perspectives	Analogy Techniques (bionics/ bisociation)	Osborn's Checklist	Field Observation	Apprenticing	Contextual Inquiry	Questionnaire	Interview	System archaeology	Reuse
Human influences													
Low motivation of the stakeholders (to participate actively)	-	-	-	-	-	-	+	-	0	0	+	++	++
Low communication skills	-	-	-	-	-	-	++	++	0	-	+	++	++
Ability to think in the abstract deficient	-	-	-	-	0	-	++	++	+	0	+	++	++
Many different opinions	+	+	++	+	+	+	++	++	++	+	0	0	0
Imbalance of power between the people involved	-	-	+	-	0	0	0	0	0	0	0	0	0
Problematic group dynamics	-	-	+	+	0	0	0	0	0	0	0	0	0
Organizational influences													
Development for a complex market	++	+	+	+	+	+	-	-	-	++	0	+	0
Fixed, tight project budget	++	++	++	+	-	+	+	-	-	-	+	-	++
Wide distribution of stakeholders	-	-	0	-	-	0	0	0	0	++	0	0	0
Poor availability of the stakeholders	+	+	+	-	-	+	+	-	+	+	++	++	++
High number of stakeholders	+	+	-	+	0	0	0	-	0	++	0	0	0
Technical influences													
High criticality of the business matter	0	0	0	+	0	0	++	-	+	+	+	++	+
System has a large scope	0	0	0	0	-	-	+	-	0	-	+	+	+
No previous experience in the domain	0	0	0	0	0	0	-	+	+	-	-	+	+
Trying to find rough requirements	++	++	++	+	+	++	+	0	0	+	++	-	0
Trying to find detailed requirements	+	+	+	+	0	0	+	++	++	-	+	++	+
Non-functional requirements wanted	0	0	0	0	+	+	0	+	+	-	+	+	+
High complexity of the business matter	0	0	0	0	+	-	-	-	0	-	+	+	+
Part of the syllabi for CPRE Foundation Level (*), Advanced Level Elicitation & Consolidation (**)	*,**	*,**	**	**	*,**	**	*,**	*,**	**	*,**	*,**	*,**	*,**

Methods of Investigation

Elicitation Techniques

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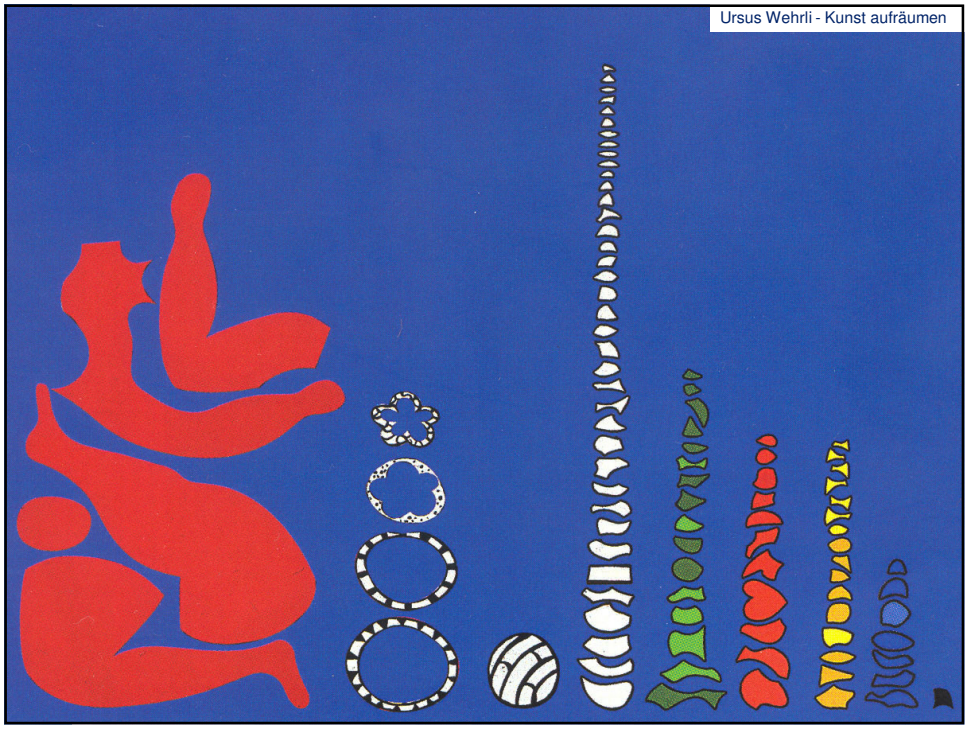
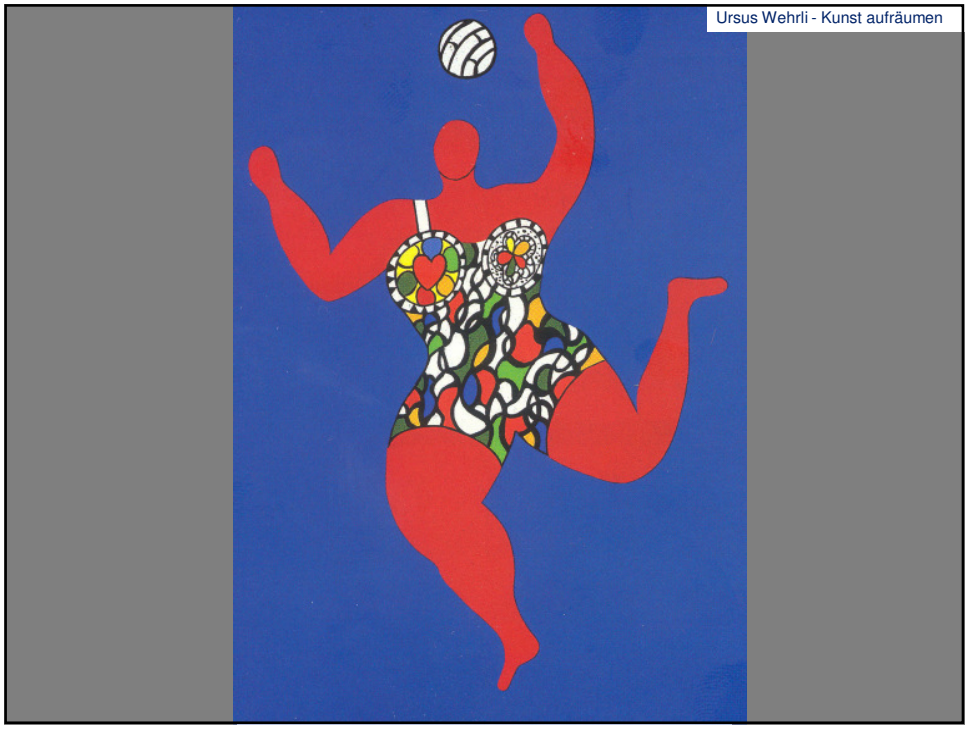
The only thing that we know for sure is…

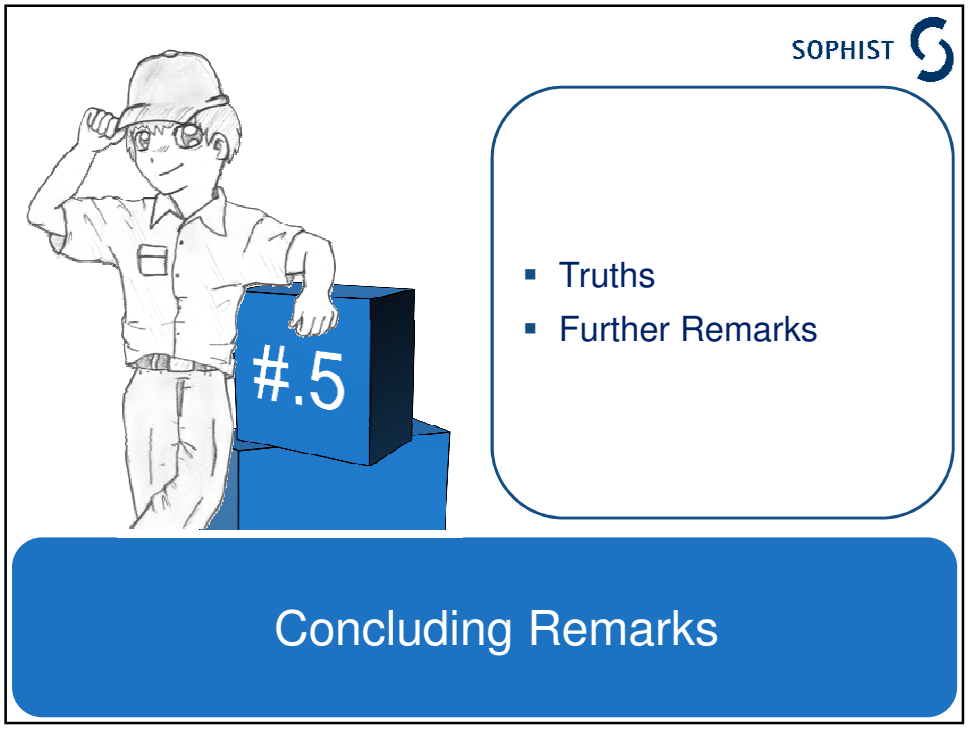
… that stakeholders never serve their requirements on a silver tray...

The transfer of knowledge is a core competence of modern system development!



Ursus Wehrli - Kunst aufräumen


Ursus Wehrli - Kunst aufräumen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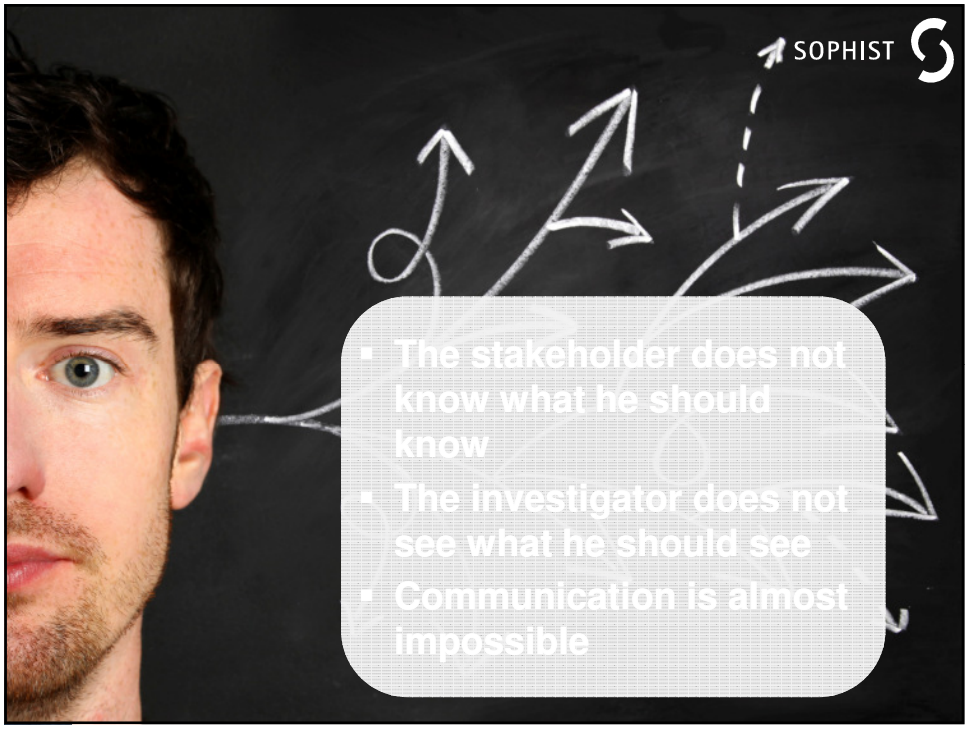
#.5
Truths
Further Remarks
Concluding Remarks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The stakeholder does not know what he should know
The investigator does not see what he should see
Communication is almost impossible

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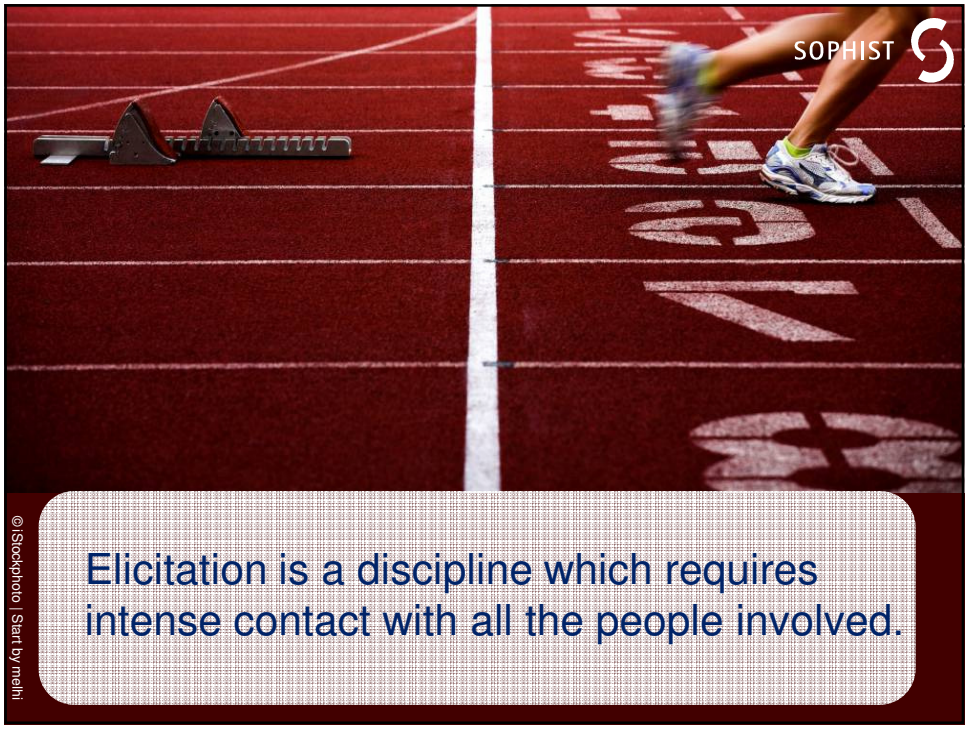
The golden rule:
He who has the gold makes the rules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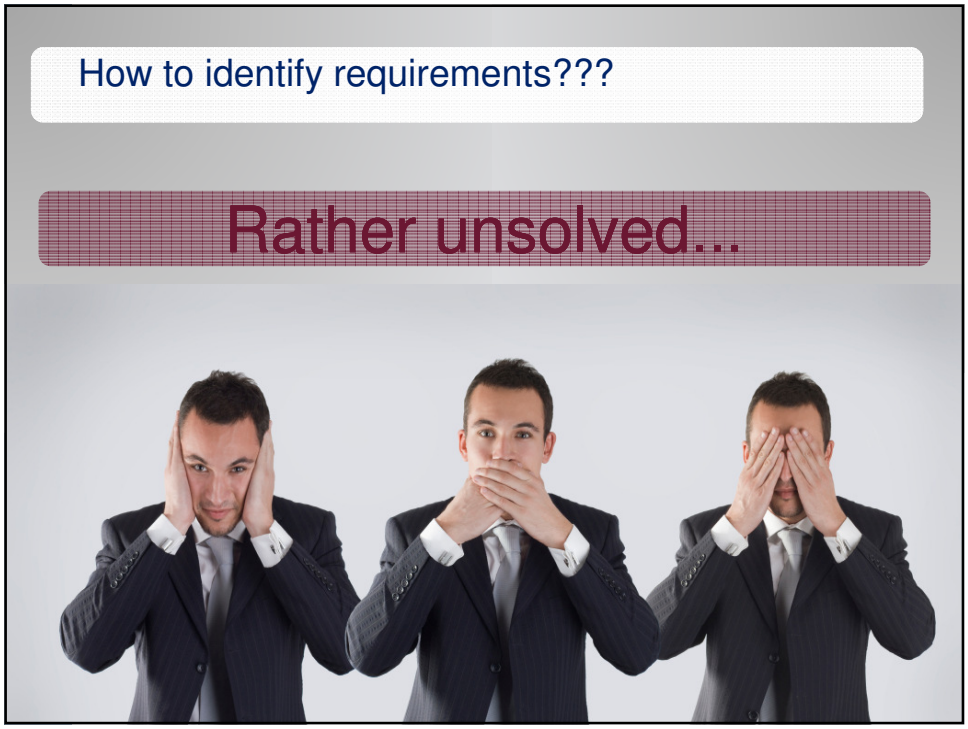
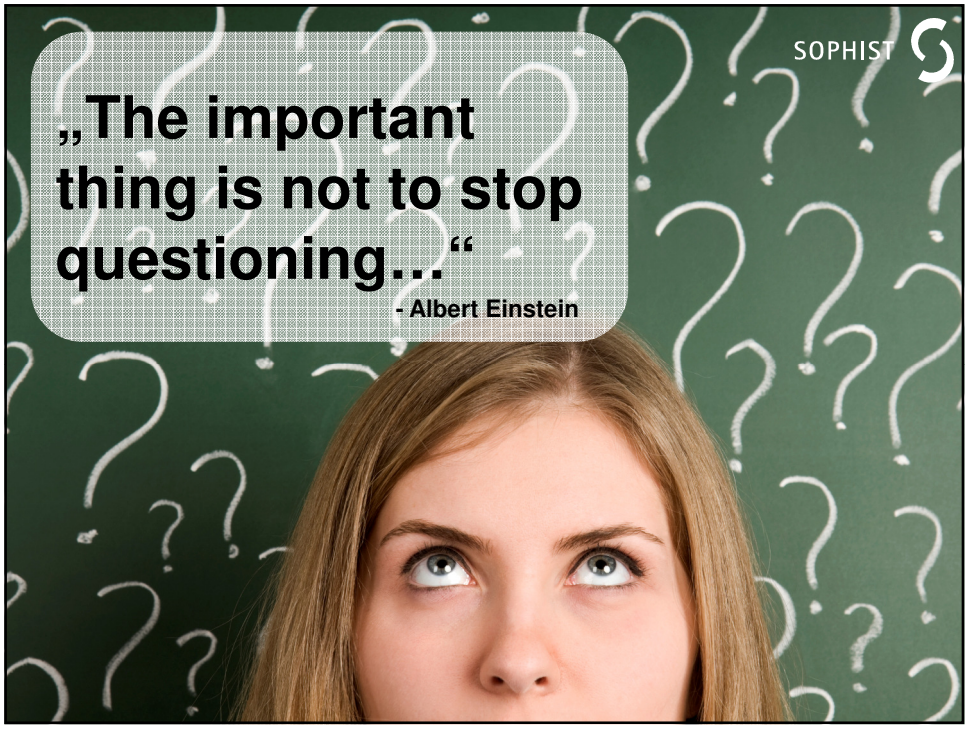
Elicitation is a discipline which requires intense contact with all the people involved.
© iStockphoto | Start by mehi


How to identify requirements???
Rather unsolved...



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Any further questions?

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The Conference on RE in Germany

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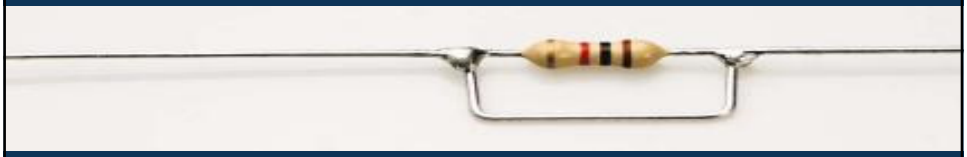
More Information → www.sophistdays.de

Further information from SOPHIST



Resistance is futile!

What we offer:

- Book chapter on the topic
- The presentation as PDF
- Login to our download area
- Newsletter about OO and RE
- Superb events

What you need to do:

Send us an email with your contact details to heureka@sophist.de, and we will send you a link to our download area.
Keyword: DREAM event

Curious? Then you've come to the right place.
Find more information at www.sophist.de/en

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