

# Lessons Learned in the Introduction of TRIZ at Siemens Automation and Drives

Siemens A&D

Initial Situation

Introduction of TRIZ

Successes of TRIZ

Innovation Tool Academy

**TRIZ-Conference 2007**  
**Frankfurt, 06.11.2007**

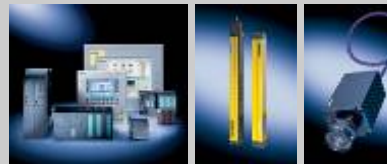
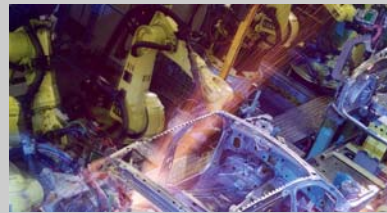
**Dr.-Ing. Robert Adunka**  
**Automation and Drives ST2**

# Mission

## A&D Business Fields

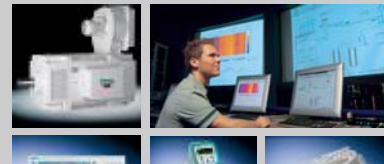
### Manufacturing Automation

Market volume: 49 bill. EUR  
Sales growth: 9%



### Process Automation

Market volume: 40 bill. EUR  
Sales growth: 14%



### Electrical Installation for Buildings

Market volume: 22 bill. EUR  
Sales growth: 5%



**A&D is a world leader in all fields of automation and drives for applications in industry and infrastructure**

Invention on Demand

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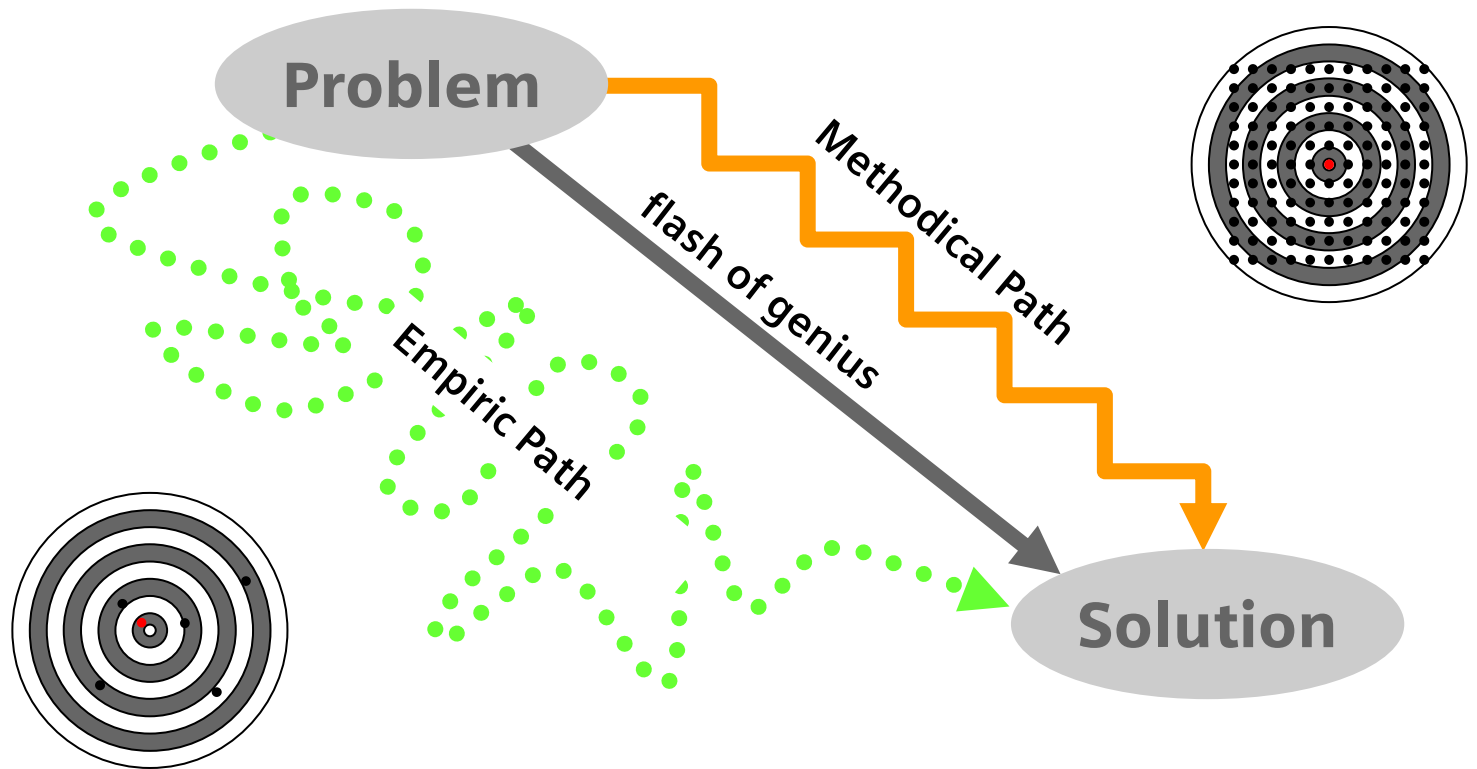
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# Systematically from Problem to Solution



The methodical path moves step by step to the solution and covers thereby the whole solution space

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# Invention on Demand

## Three workshop concepts

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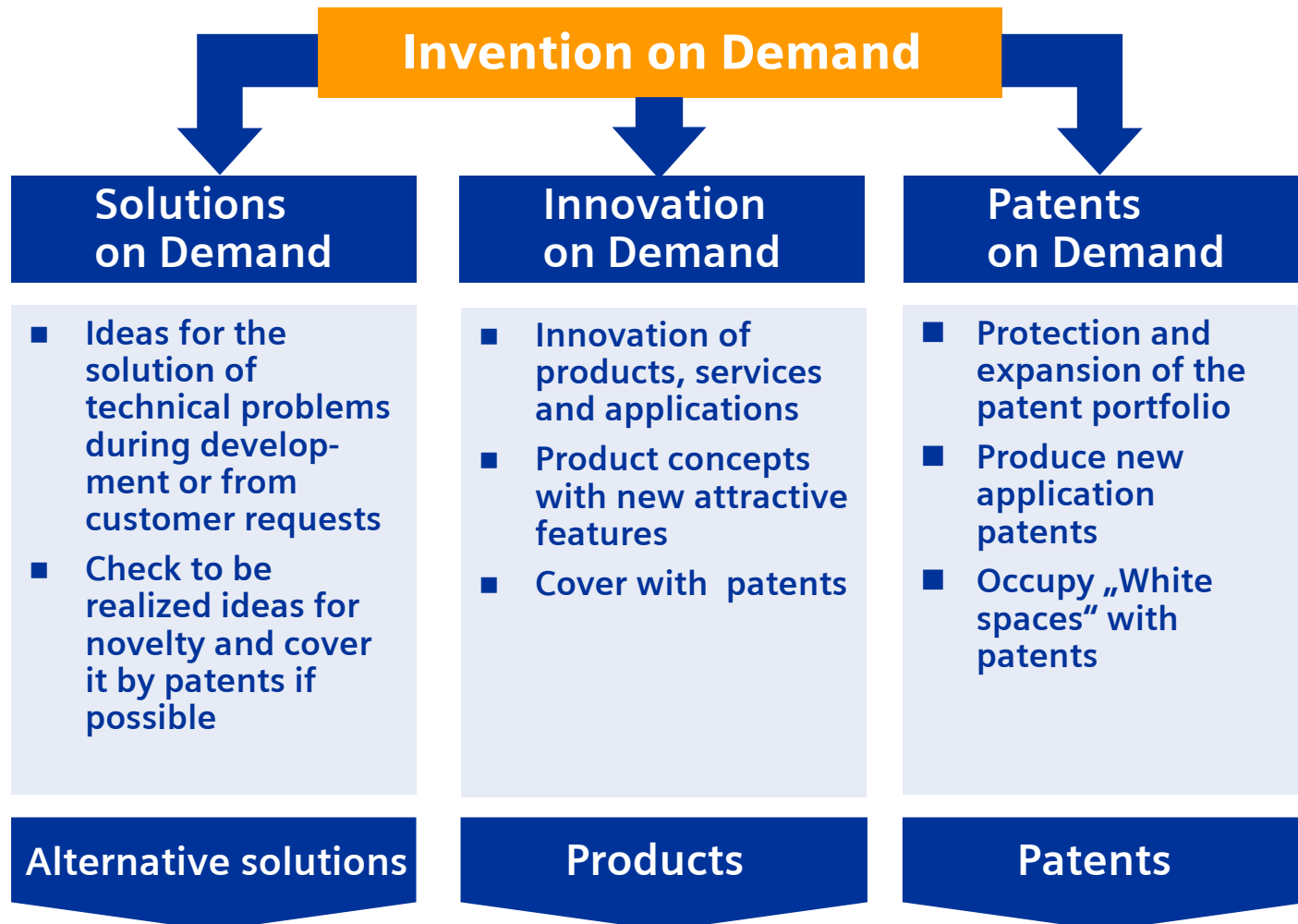
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# Solutions on Demand

## Invention on Demand

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## Input



- technical problem
- History of trials for solutions
- Solutions by competitor

## Workshop



Brainstorming



Morphologic Box



TO Product analysis



TO Process analysis



TO Feature transfer



TO Effects



TO Principles



TO Prediction



Analogies

## Output

- List or spreadsheet with the evaluated or weighted alternatives
- List with possible invention disclosures



# To find a concept – with and without methodical approach

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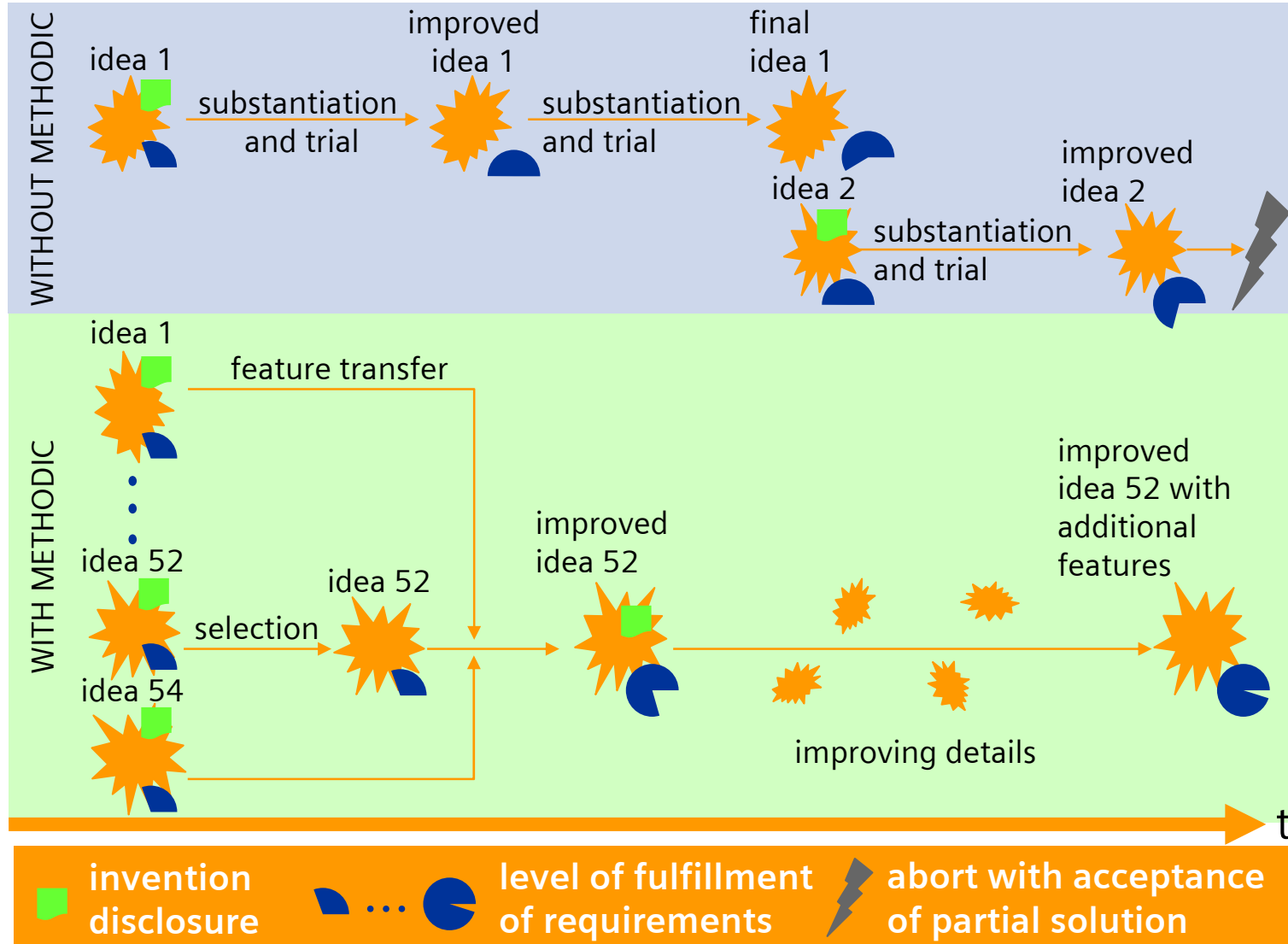
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# Documented ideas, invention disclosures

## Invention on Demand

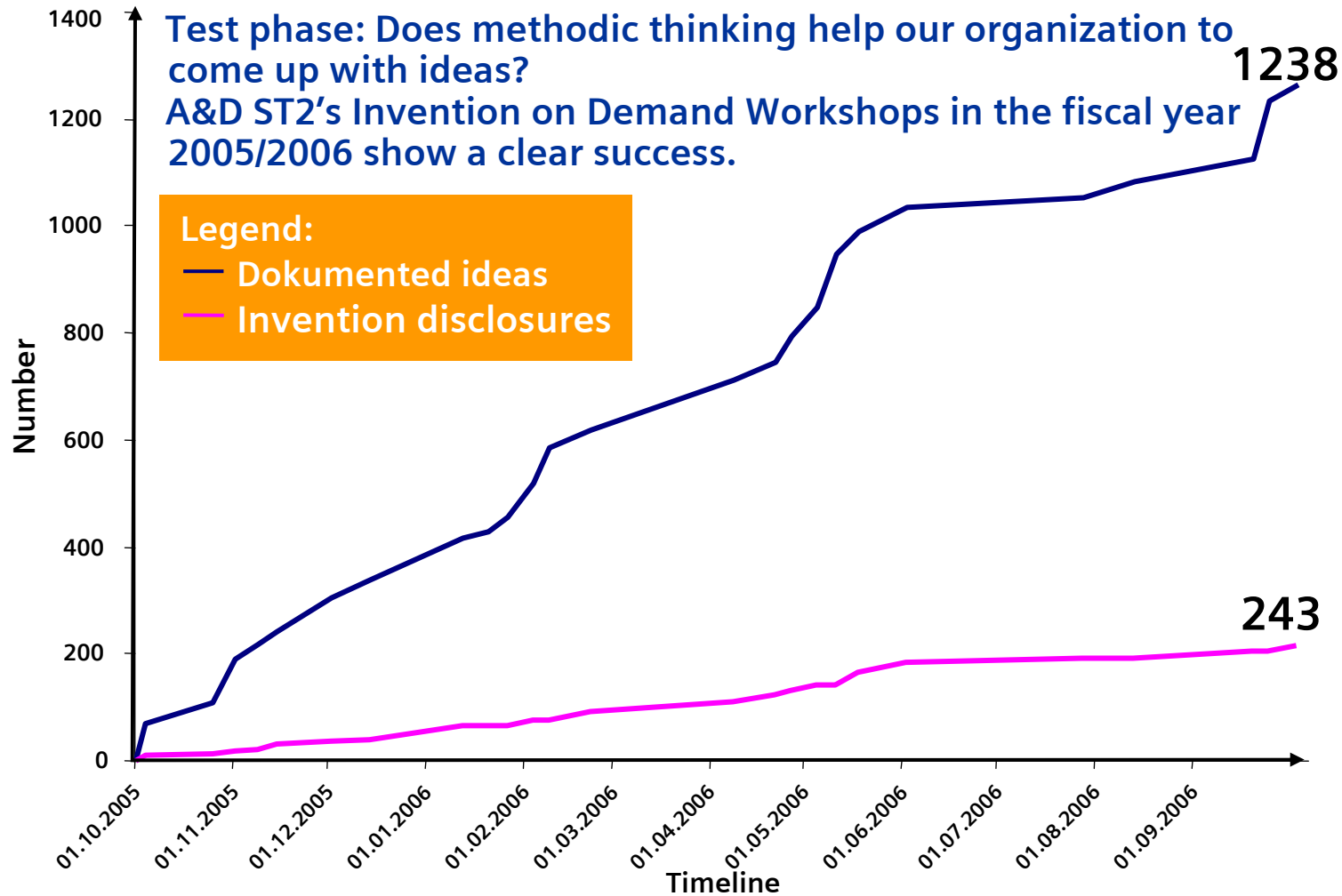
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# Invention disclosures of the last years

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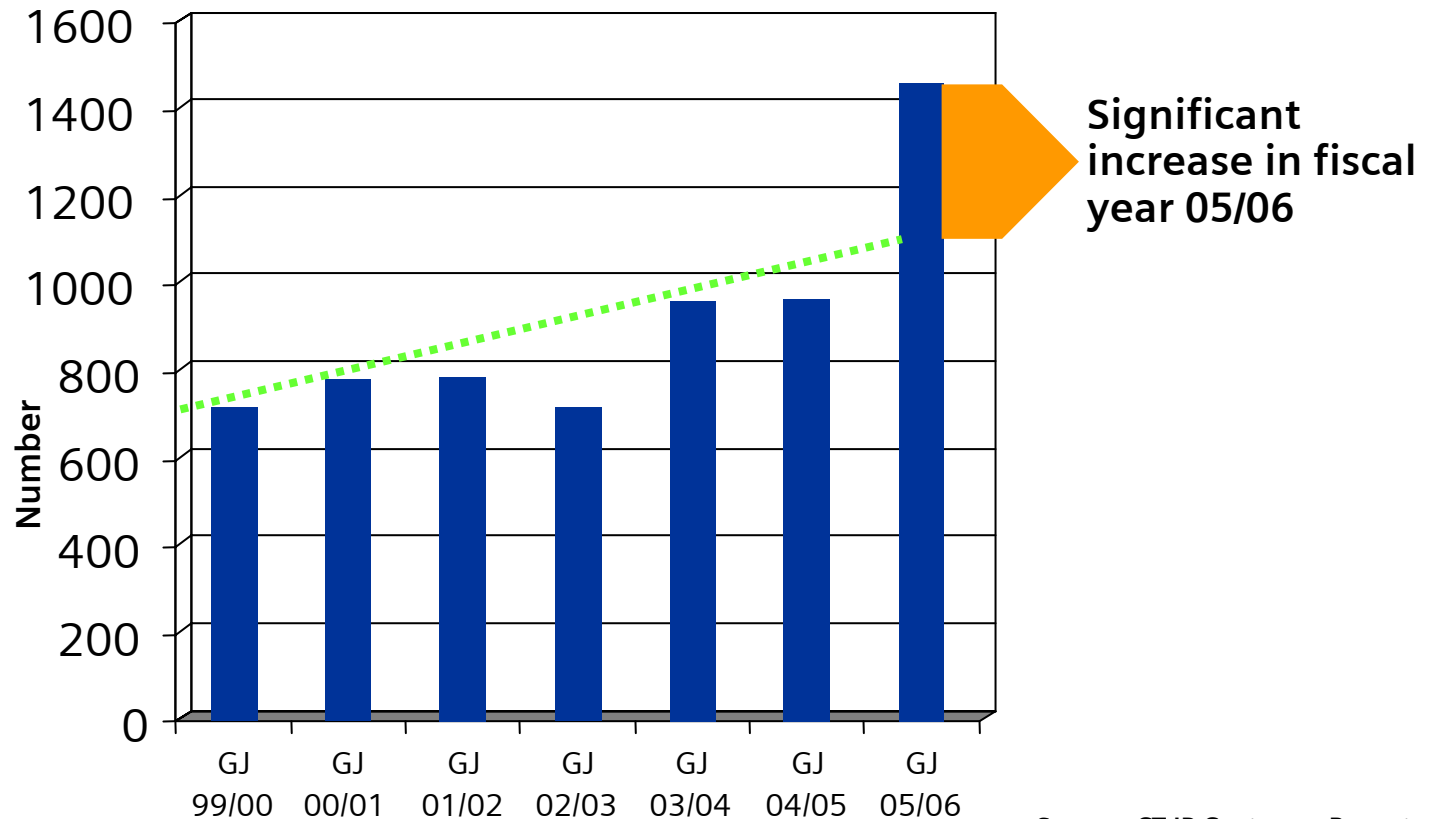
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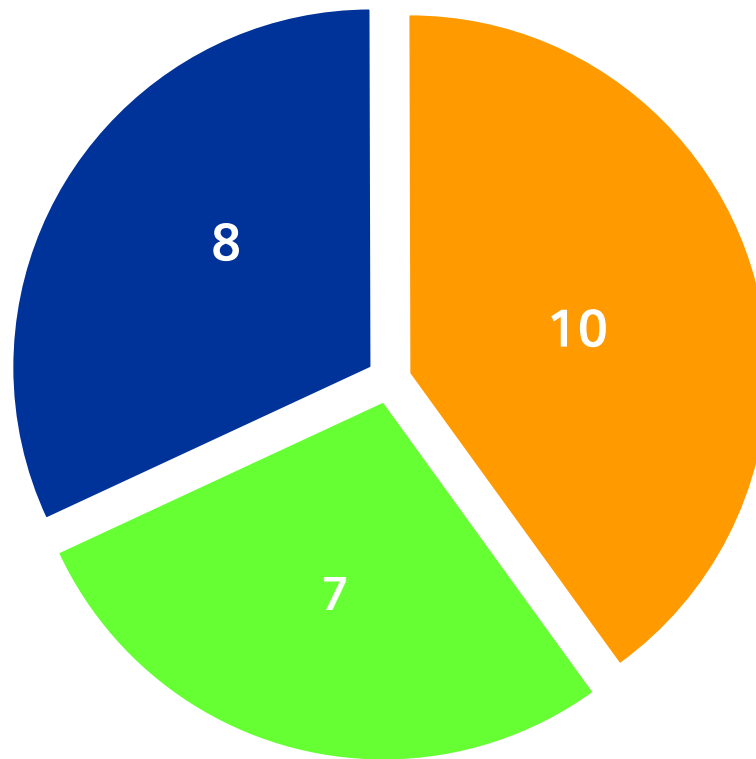


Source: CT IP Customer Report  
A&D GG world-wide  
Report Date: GJ 99/00 – 05/06



# Number of workshops by type

A total number of 25 workshops where conducted.  
In these 244 employees attended.



Type:

- Solutions on Demand
- Innovation on Demand
- Patents on Demand

# Used methods – kind

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Level of Methods	Methods	Appl.	SoD	IoD	PoD
<b>Basic, easy-to-use every-day methods</b>	Brainstorming	25	10	7	8
	Morphologicax Box	25	10	7	8
	Gallery-method	24	10	6	8
	Mindmapping	23	10	6	7
<b>Basic, easy-to-learn methods</b>	DeBono: Random Entry	9	3	2	4
	TRIZ Contraction / 40 iP	7	5	2	
	TOPE Feature Transfer	4	4		
	TRIZ System Operator	3		2	1
	Metaplan-Technique	3	1	2	
<b>Advanced methods</b>	TOPE Effects	3	2	1	
	TRIZ TESE	2		1	1
	Coffeehouse	2		2	
	WOIS Megatrends	2		2	
	TOPE Function Analysis	2	1	1	
	TRIZ MKZ-Operator	2	1	1	
	DeBono: Fokus	2	1	1	
	TOPE Process Analysis	2	2		
	TOPE Prediction	2	2		
	WOIS GALFMORBUS	2	2		
<b>Professional methods</b>	Point evaluation	2	2		
	WWCD	1		1	
	DeBono: Provocation	1		1	
	TOPE Principles	1	1		
	TRIZ ARIZ-85B	1	1		
	TRIZ Innoy. Sit. Quest.	1	1		
	Catalogue of effects	1	1		
	DeBono: Six thinking hats	1	1		
Weigthted point evaluation	1	1			

Number of methods increases

# Used methods – kind

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Methods	Appl.	SoD	IoD	PoD
Brainstorming	25	10	7	8
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TOPE Feature Transfer	4	4		
TRIZ System Operator	3		2	1
Metaplan-Technique	3	1	2	
TOPE Effects	3	2	1	
TRIZ TESE	2		1	1
Coffeehouse	2		2	
WOIS Megatrends	2		2	
TOPE Function Analysis	2	1	1	
TRIZ SCT-Operator	2	1	1	
DeBono: Focus	2	1	1	
TOPE Process Analysis	2	2		
TOPE Prediction	2	2		
WOIS GALFMORBUS	2	2		
Point evaluation	2	2		
WWCD	1		1	
DeBono: Provocation	1		1	
TOPE Principles	1	1		
TRIZ ARIZ-85B	1	1		
TRIZ Innov. Sit. Quest.	1	1		
Catalogue of effects	1	1		
DeBono: Six thinking hats	1	1		
Weighted point evaluation	1	1		

### Kind of Methods:

- Edward de Bono
- Classical TRIZ
- Modern TRIZ
- Based on TRIZ

# Improve existing

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## Task: Improvement of cable fastening



### Problem description:

There are a number of different cable fastening devices used in power converters to satisfy the needs of different mounting surfaces. Each has a different assembling strategy.

**Improve the situation!**

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# Solution to the problem

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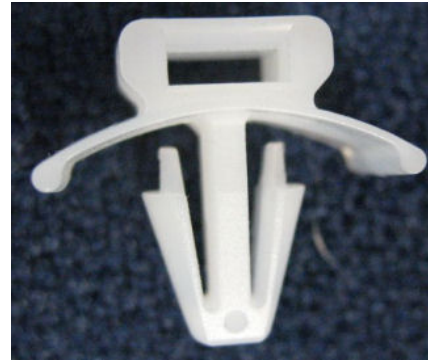
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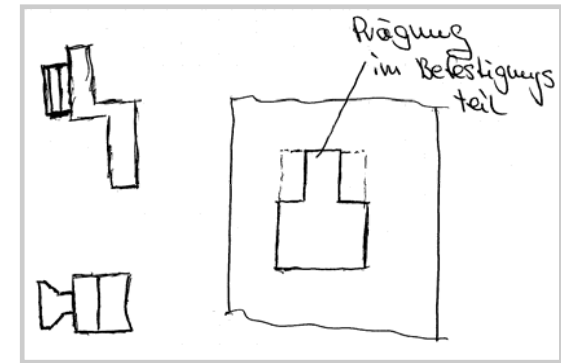
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Easy cable assembly

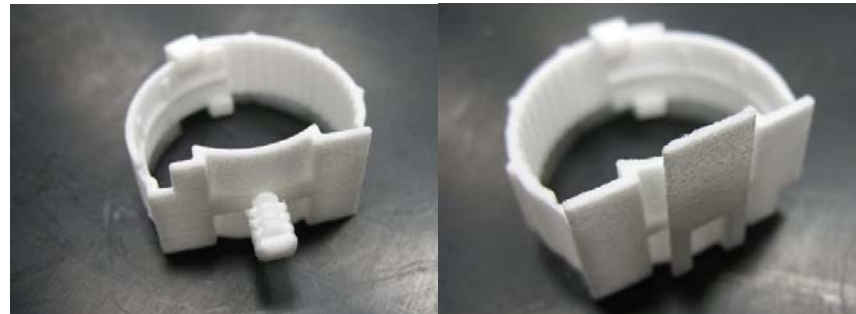


Good design for holes



Good design for sheet metal

## Use of the method "Feature transfer"



Assembly improved

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# Reduce costs

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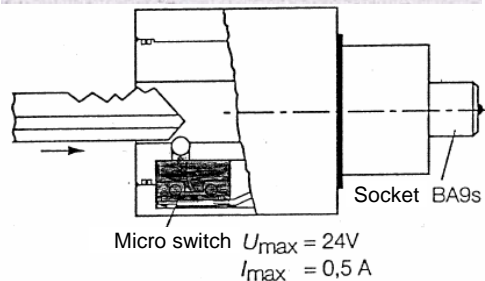
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## Task: Reduce costs of 3SB1 lock



### Problem description:

The 3SB1 lock uses a micro switch for the key detection and a unique assembly for the connection to the wires.

**Reduce the costs and make design smaller for new 3SB3 lock!**

# Initial design Siemens / CES and new design

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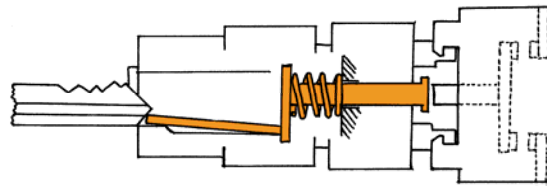
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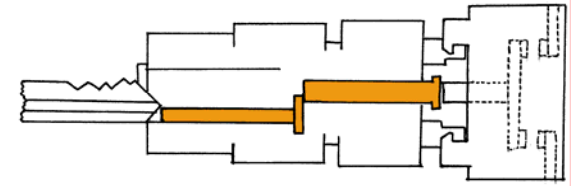
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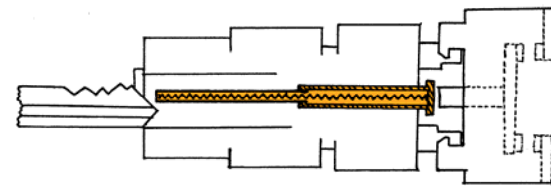


Functionality: +  
Manufacturing: -



Functionality: -  
Manufacturing: +

## Use of innovative principle 7: „Matrjoschka“



Functionality: +  
Manufacturing: +

# Solution to the problem

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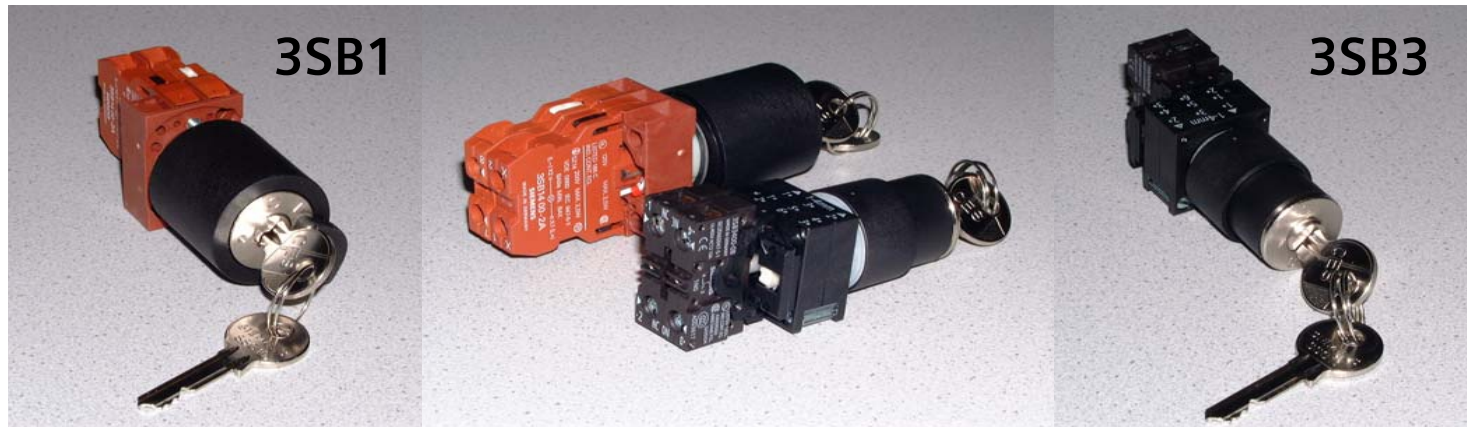
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Former design	Parameter	New design
30 V / 0,5 A	Switch. capacity	400 V / 10 A
<ul style="list-style-type: none"> <li>NC special switching element</li> <li>Vulnerable to dirt</li> </ul>	Tapping	<ul style="list-style-type: none"> <li>NC/NO standard switching element</li> <li>Protected in switch cabinet</li> </ul>
<ul style="list-style-type: none"> <li>Extra size</li> <li>No accessory useable</li> </ul>	Form and size	<ul style="list-style-type: none"> <li>Standard size</li> <li>Standard accessory usable</li> </ul>
Key is in lock when at 0 position	Key ejection	Key is ejected in 0 position

**Manufacturing costs reduced**

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# Knowledge levels of methods

**Level 3:**  
Use of professional  
methods

**Level 2:**  
Use of  
advanced  
methods

**Level 1:**  
Use of  
basic methods

**Level 0:**  
Awareness  
of methods

Expertise

Need for support

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# The Innovation Tool Academy – The Creative Analyst profession

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Courses

Professional course (15 days)



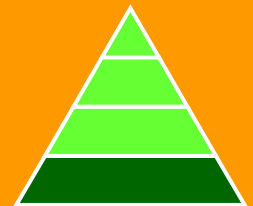
Advanced course (5 days)



Basic course (5 days)



Introduction course  
(0.5/1.5 days)



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# Innovation Tool Academy – tests and certificates

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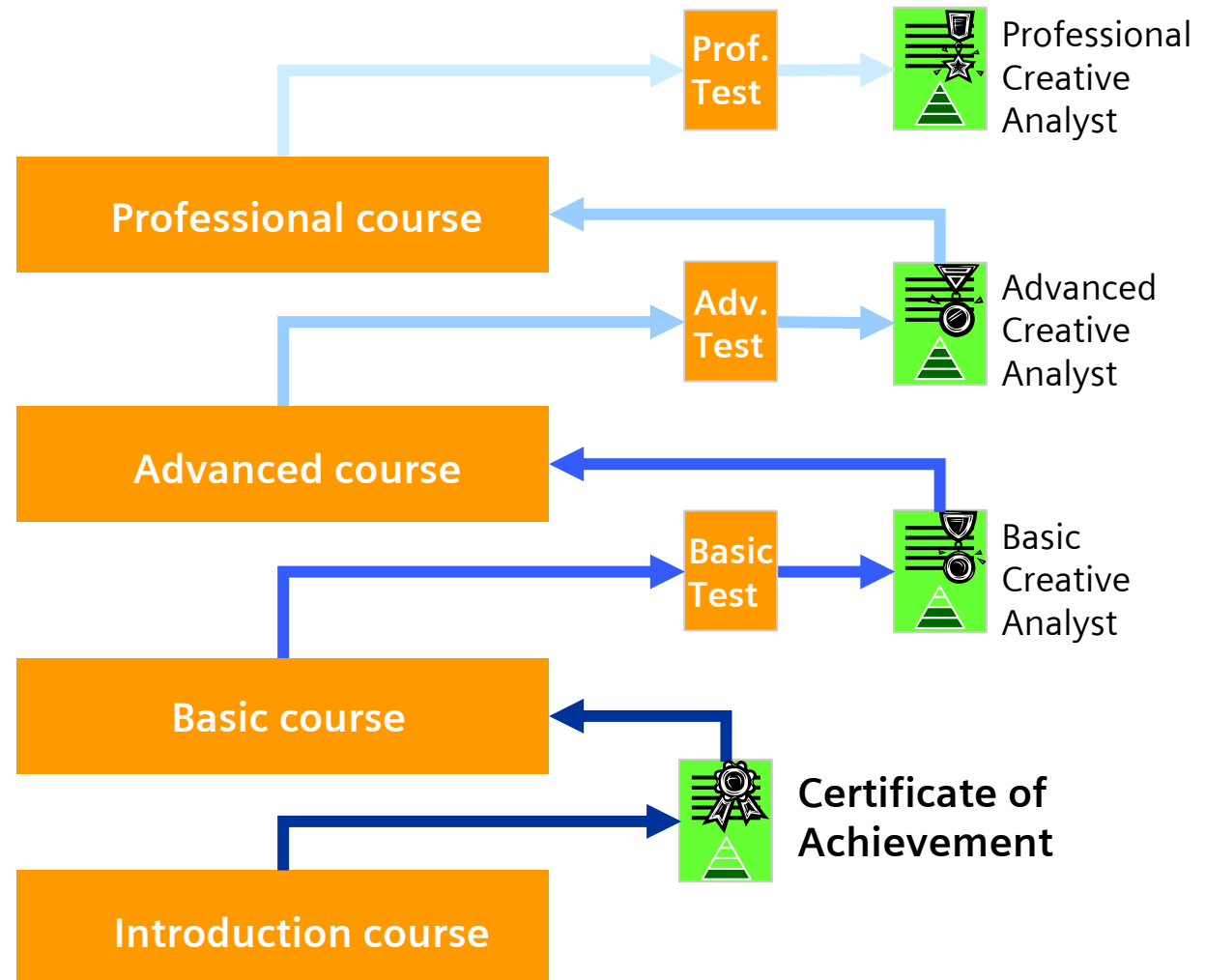
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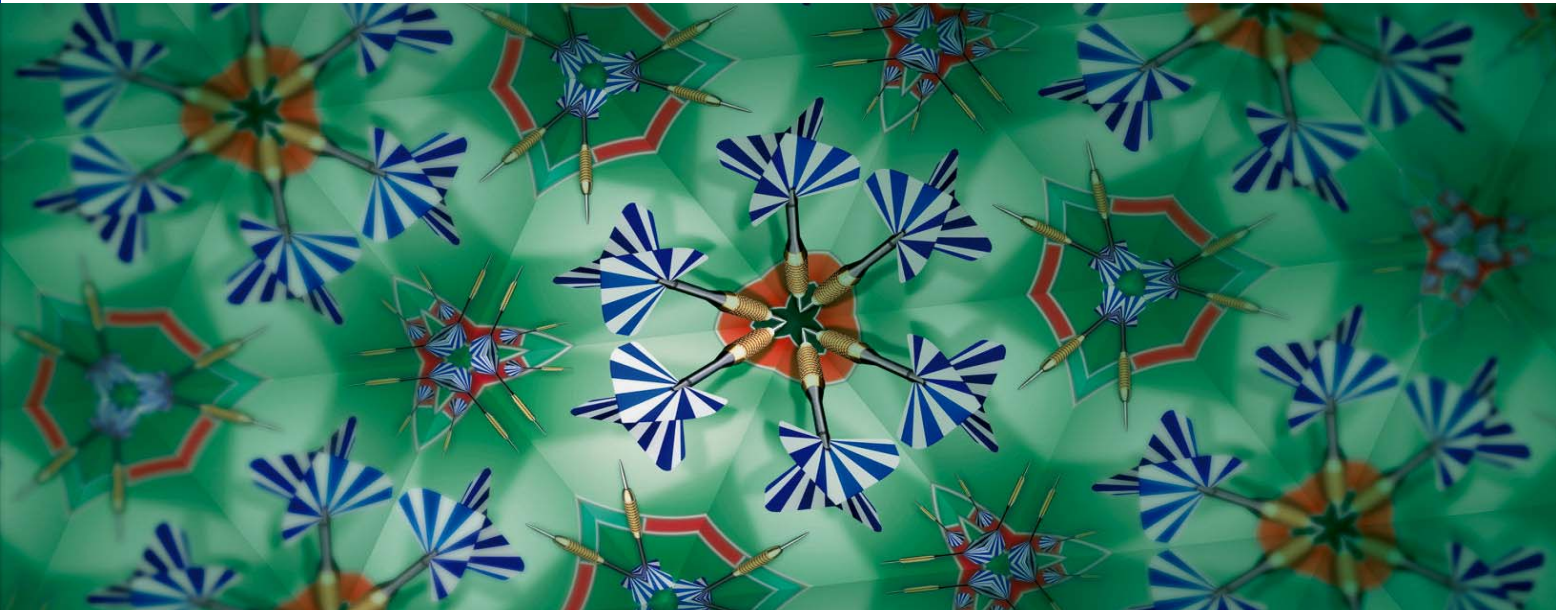
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robert.adunka@siemens.com**



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# Thank you for your attention



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