

# STRESS IN THE WORK ENVIRONMENT

IMPROVING EMPLOYEE HEALTH AND PERFORMANCE BY MEASURING STRESS  
IN THE WORK ENVIRONMENT

Ruben den Uyl  
4218574

FIRST MENTOR  
Ir. M.H. (Monique) Arkesteijn  
Management in the Built Environment  
Real Estate Management  
Delft University of Technology

SECOND MENTOR  
R.P. (Rein) de Graaf  
Management in the Built Environment  
Real Estate Management  
Delft University of Technology

DELEGATE OF THE BOARD OF EXAMINERS  
Dr. A. (Arie) Romein  
OTB Research in the Built Environment  
Delft University of Technology

INTERNSHIP COMPANY MENTOR  
Ir. M.J. (Marjon) van Bree  
Director Corporate Real Estate Solutions  
Colliers International Occupiers Services

# CONTENT

## ○ INTRO

- Why: Workplace & Health
- How: The Real Estate Manager
- What: Research Questions & Design

## ○ RESEARCH

- Relations
- Measure
- Quantify
- Decision-making
- Use

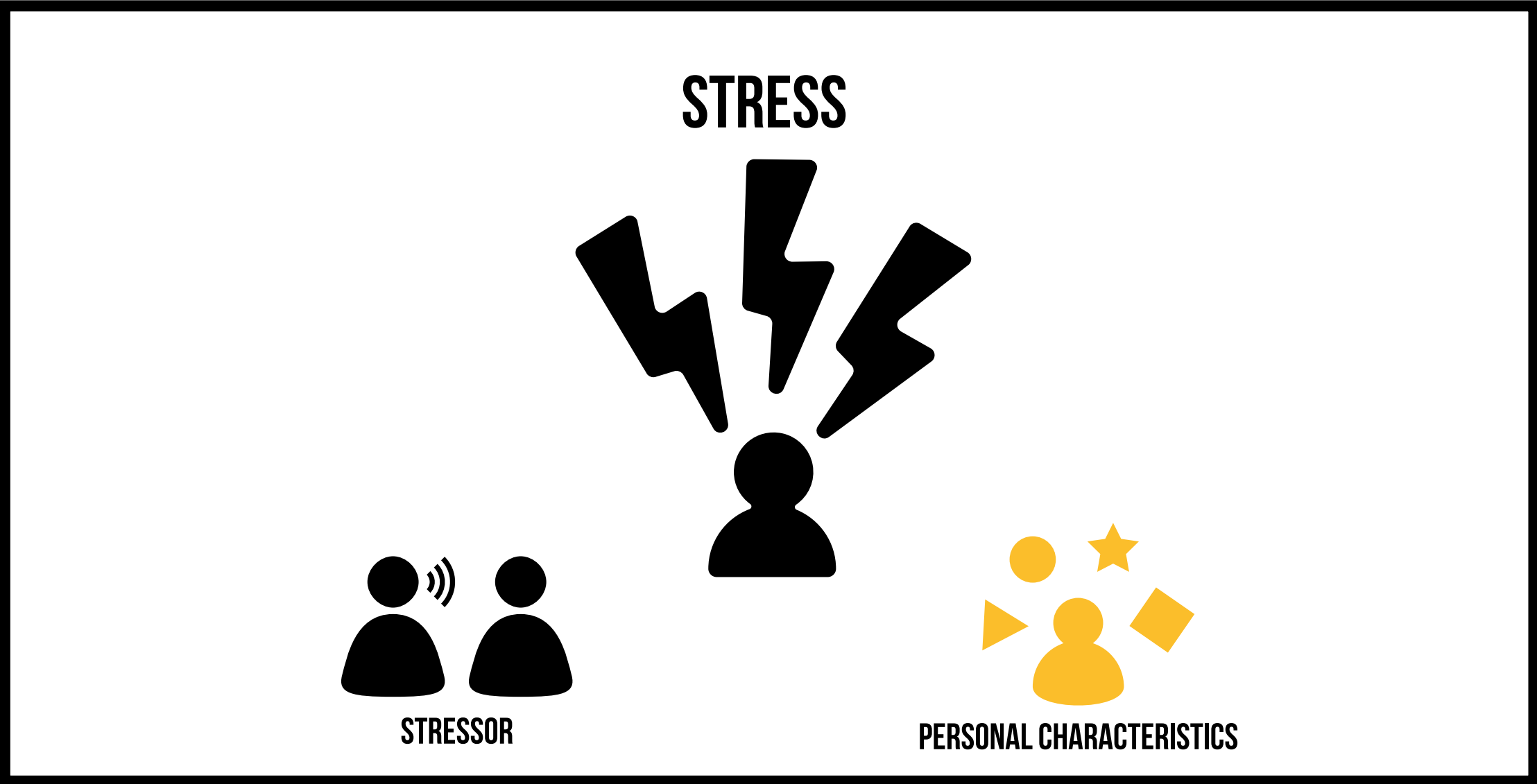
## ○ CONCLUSION

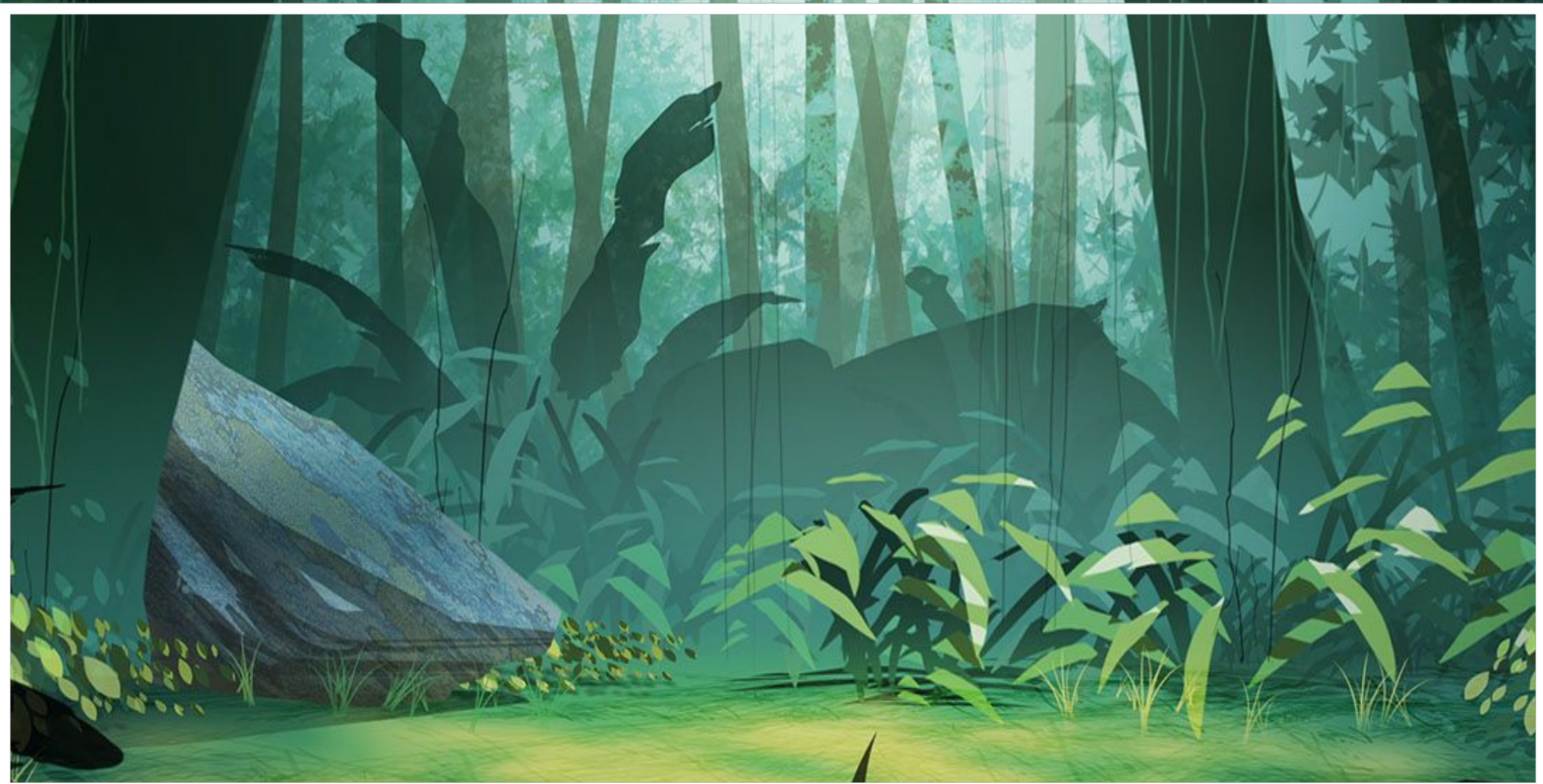
- Conclusion
- Recommendations

# STRESS









Source: <https://pl.pinterest.com/pin/411305378446189705/?lp=true>

INTRO

RELATION

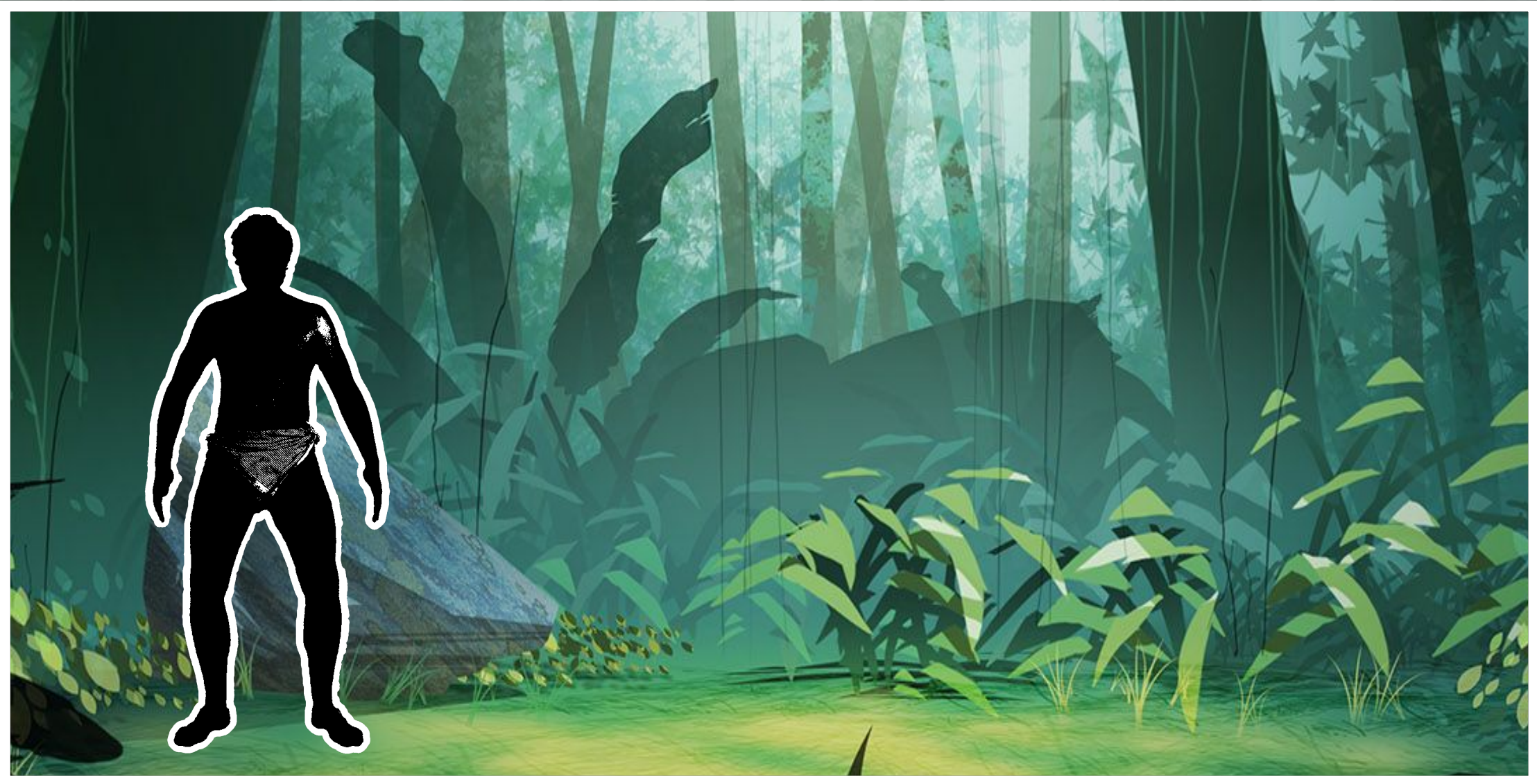
MEASURE

QUANTIFY

MODEL

USE

CONCLUSION



Source: <https://nl.pinterest.com/pin/411305378446189705/?lp=true>

INTRO

RELATION

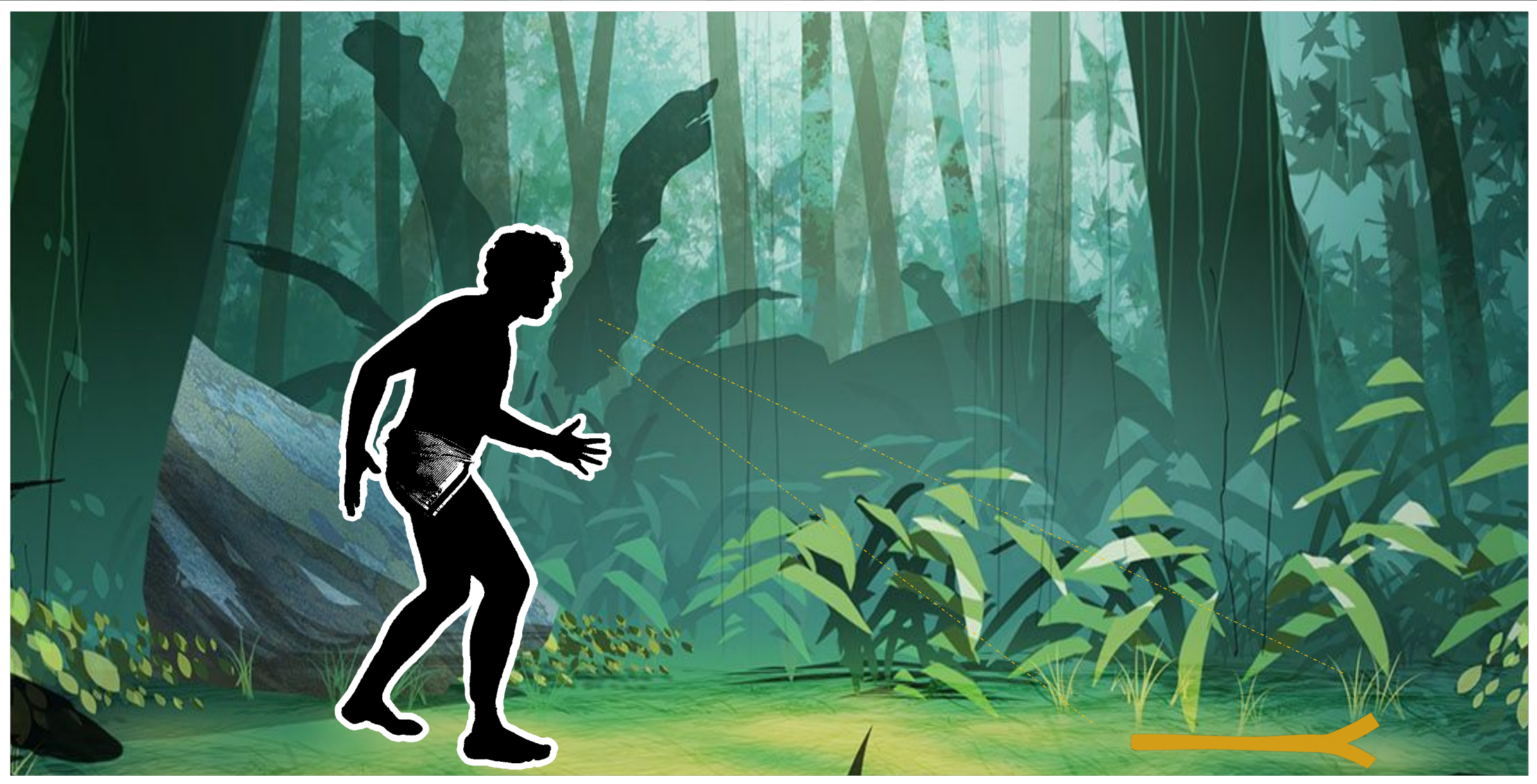
MEASURE

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INTRO

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INTRO

RELATION

MEASURE

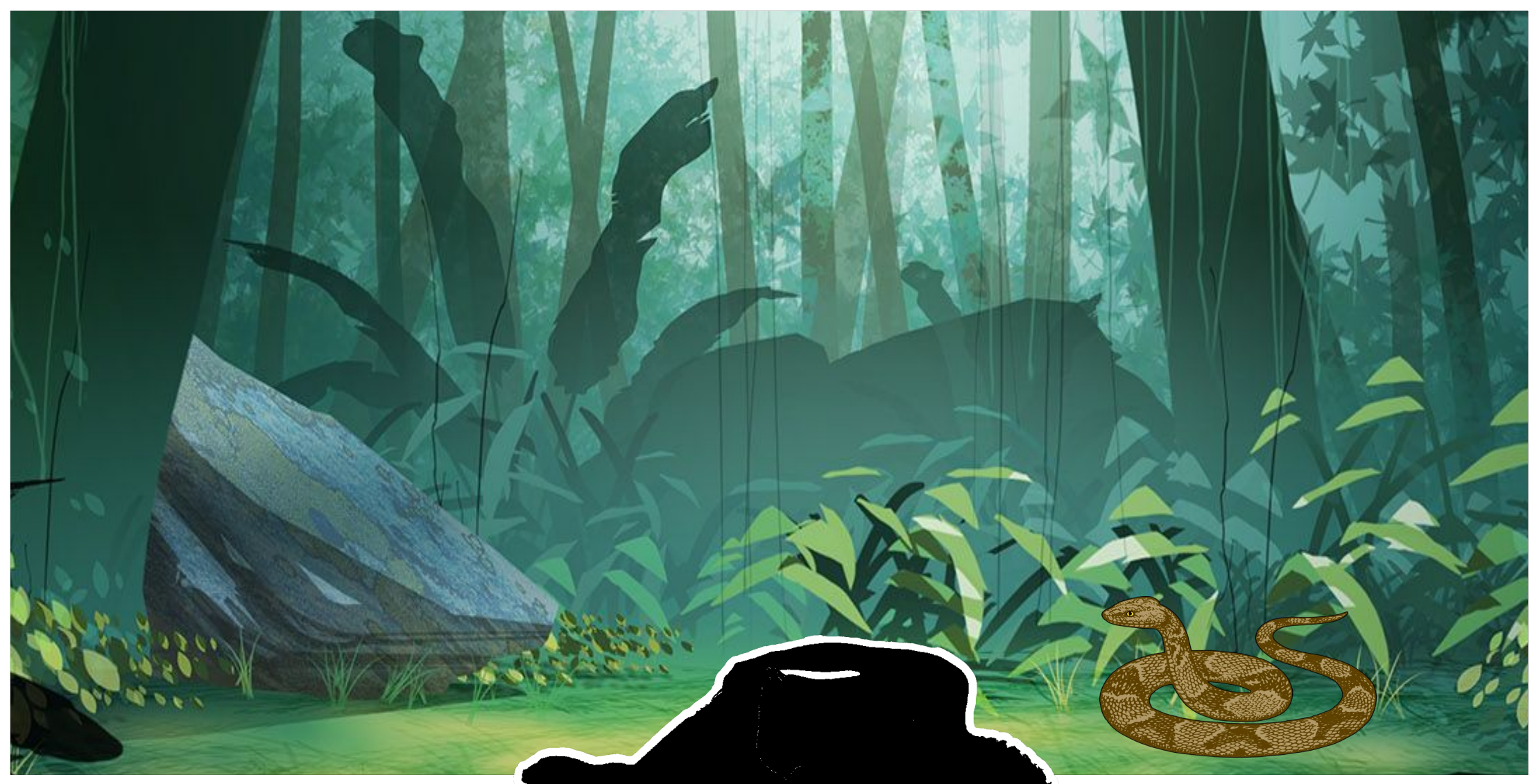
QUANTIFY

MODEL

USE

CONCLUSION

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INTRO

RELATION

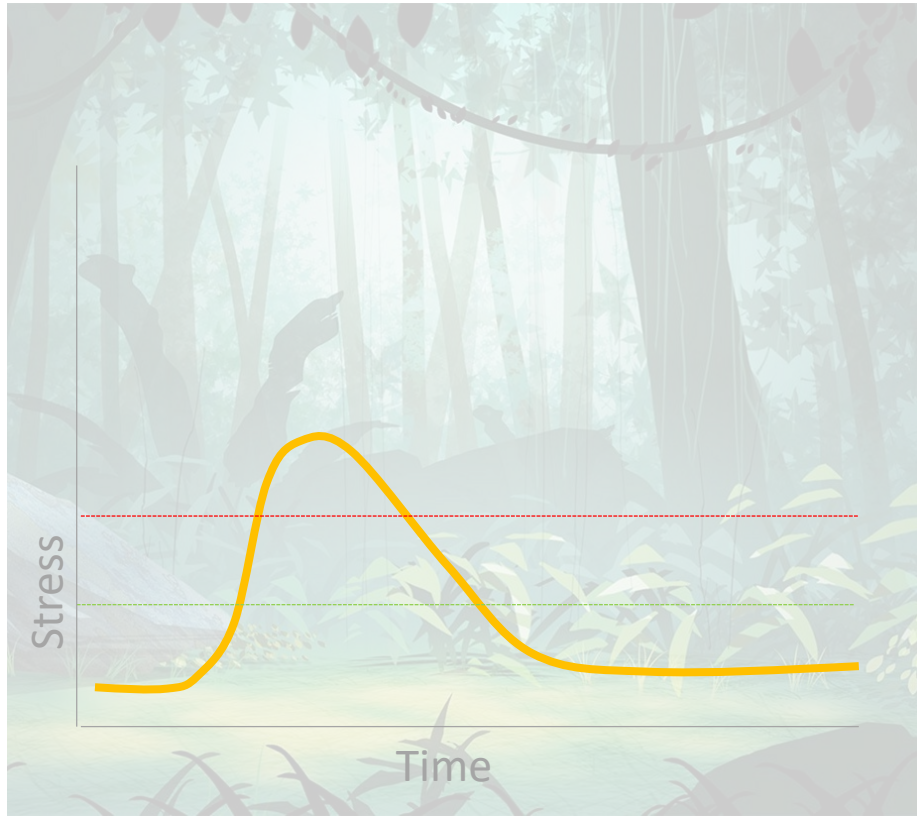
MEASURE

QUANTIFY

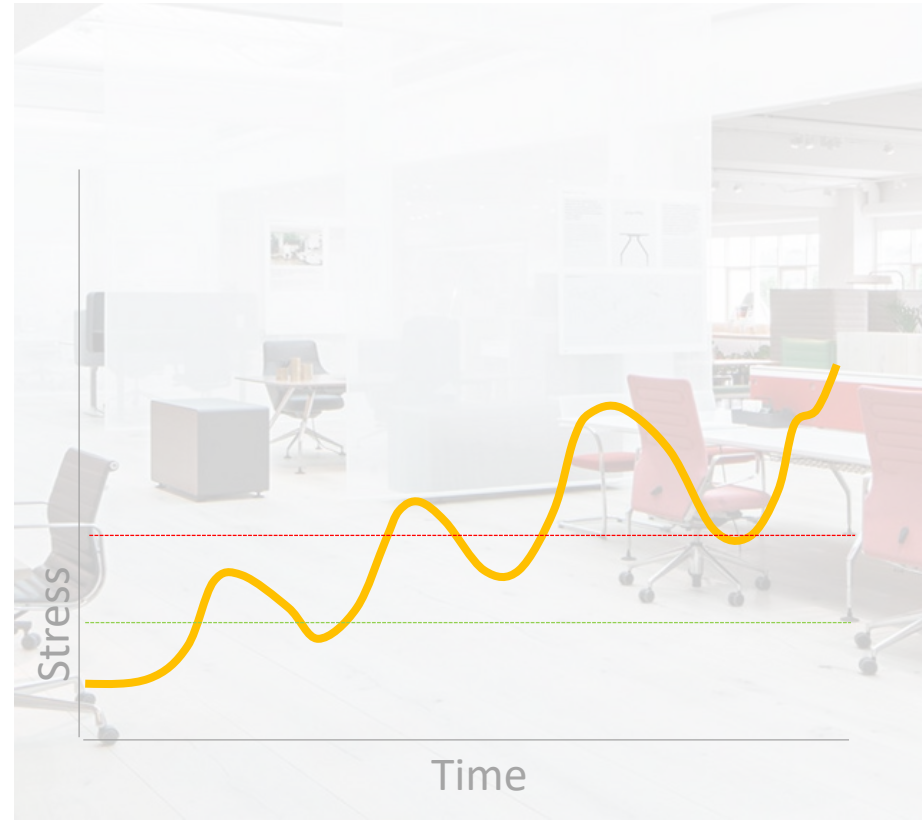
MODEL

USE

CONCLUSION



**STRESS REACTION**

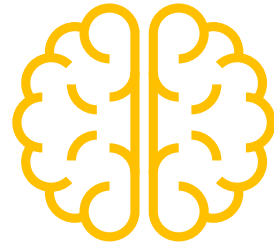


**COMPOUNDED STRESS REACTION**

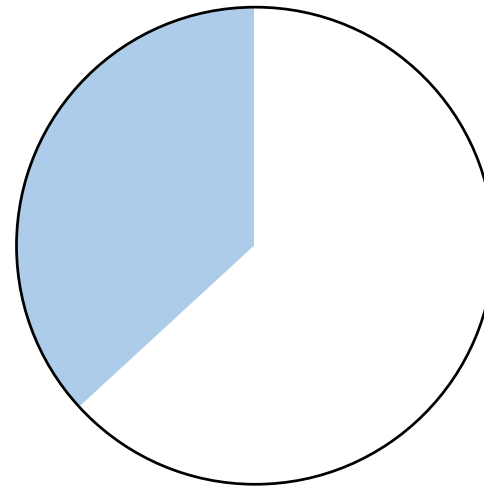
# WHY

*Reducing stress of employees in the work environment  
to improve their health & performance*

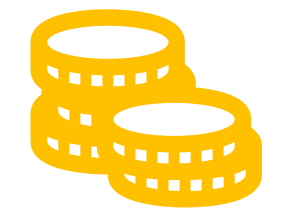
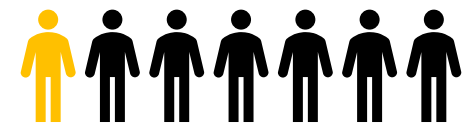
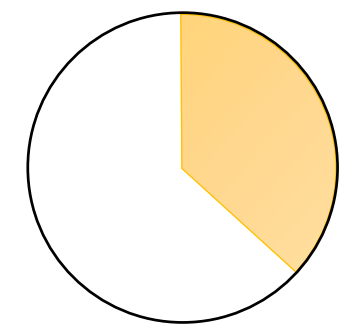
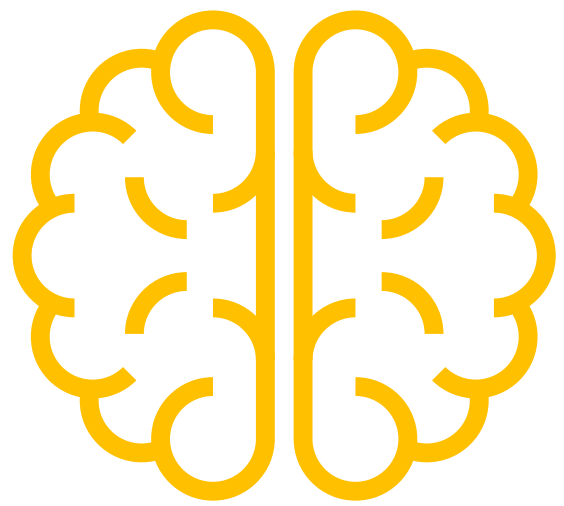
# HEALTH



# WORKPLACE & HEALTH



# WORKPLACE & HEALTH



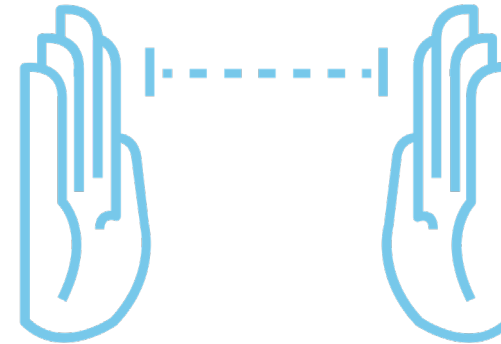


# WHY IS THERE NO SOLUTION YET

## SELF-RATED STRESS VARIABLE



**SURVEY BASED**



**UNCOMPARABLE**

# LACK OF CHANGING CONTEXT OF ACTIVITY & WORKPLACE



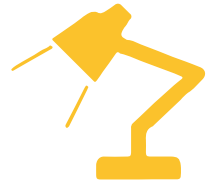
**LEARN**



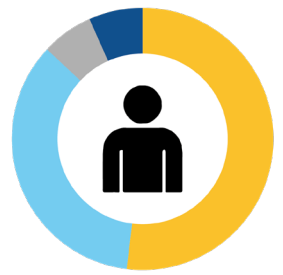
**SOCIALIZE**



**COLLABORATE**



**FOCUS**



# LACK OF CHANGING CONTEXT OF ACTIVITY & WORKPLACE



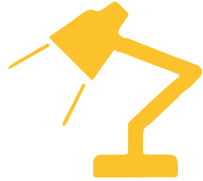
**LEARN**



**SOCIALIZE**



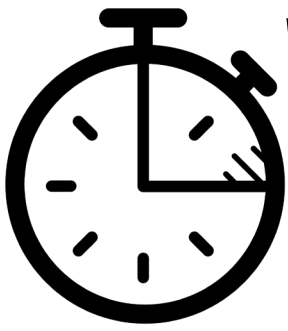
**COLLABORATE**



**FOCUS**

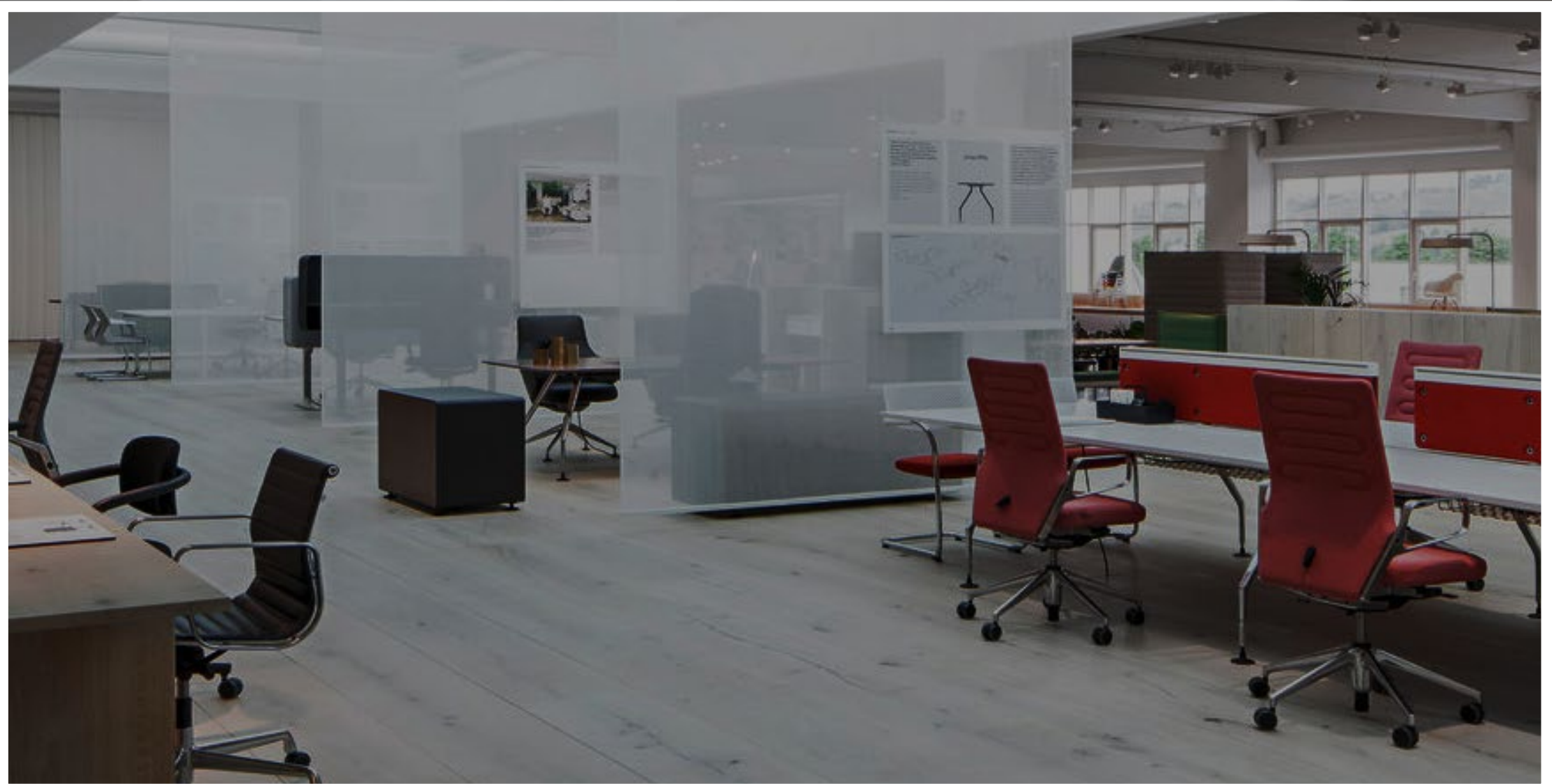


## LACK OF REAL-TIME MEASUREMENTS

**NO****W**

# HOW

*By supporting the real estate manager  
to improve the work environment for the employees*













**MEASURABLE  
COMPARABLE  
OPERATIONAL**



# WHAT

*To generate quantified insights on stress in the work environment  
and using them to develop a decision-making model  
for the real estate manager*

## RESEARCH QUESTION

*How can insights in the relationship between workplace and activity on employee stress be used to develop a real estate decision-making model?*

# RESEARCH QUESTION

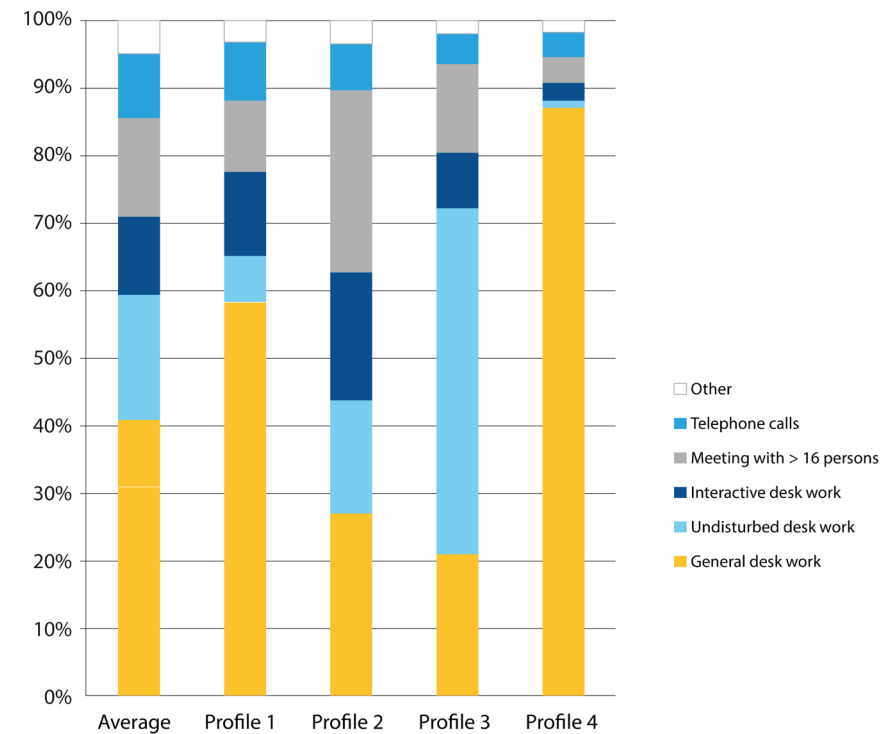
How can insights in the relationship between workplace and activity on employee stress be used to develop a real estate decision-making model?

- 1 RELATION workplace types, activities
- 2 MEASURE stress
- 3 QUANTIFY influence workplace characteristics
- 4 MODEL development
- 5 USE of decision-making model



# ACTIVITIES

1. Undisturbed Desk Work
2. General Desk Work
3. Interactive Desk Work
4. Planned Meeting
5. Unplanned Meeting
6. Calling
7. Socialize
8. Other



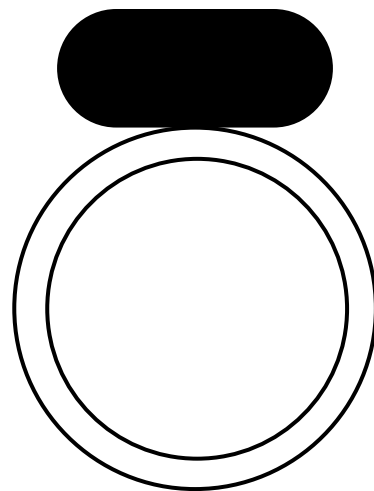
# WORKPLACE CHARACTERISTICS



# RELATION

- Workplaces are supportive to the performance of activities
- Mismatch results in stress

# STRESS MEASUREMENTS





**INTAKE SURVEY**

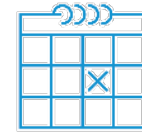
PERIOD:  
**5 (WORK)DAYS**



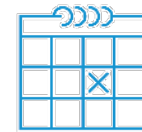
**15 MIN**  
INTERVAL



**CODE**



**1 OF 8**



**1-10**



**0-100**





INTRO

RELATION

MEASURE

QUANTIFY

MODEL

USE

CONCLUSION



INTRO

RELATION

MEASURE

QUANTIFY

MODEL

USE

CONCLUSION











Your 50 is not  
my 50





(SS)

STRESS SCORE

average (mean)

(SSMM)

STRESS SCORE MINUS MEAN

mean = 0

# QUANTITATIVE FINDINGS



## RESULTS FOR WORKPLACE CHARACTERISTIC SIZE OF ROOM (V1)

Workplace characteristics	Value	Average	Average	Average	Average	Average	
<b>Privacy:</b>							
		Average	AP1	AP2	AP3	AP4	
V1	Size of room	cellular 1 person	-5,96	0,00	-6,55	0,00	0,00
V1		celluar 2-4 person	0,00	0,00	0,00	0,00	0,00
V1		celluar 5-10	-4,05	0,00	-5,75	0,00	0,00
V1		open 2-4 person	0,00	0,00	0,00	0,00	0,00
V1		open 5-10	0,00	-5,74	2,10	0,00	0,00
V1		open 10+	0,78	0,00	1,59	0,00	0,00
				-5,96	-5,74	-6,55	0,00



## FINDINGS



**ACTIVITY**



**WORKPLACE CHARACTERISTICS**



**STRESS**

## FINDINGS



**ACTIVITY**



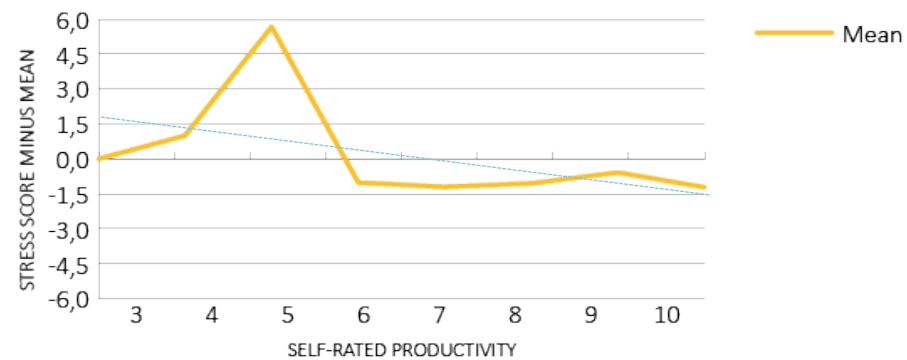
**WORKPLACE CHARACTERISTICS**



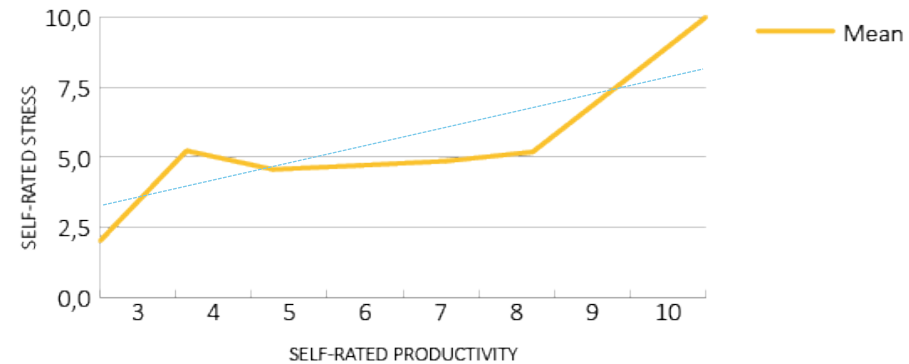
**STRESS**

## FINDINGS

Measured stress versus perceived productivity



Perceived stress versus perceived productivity

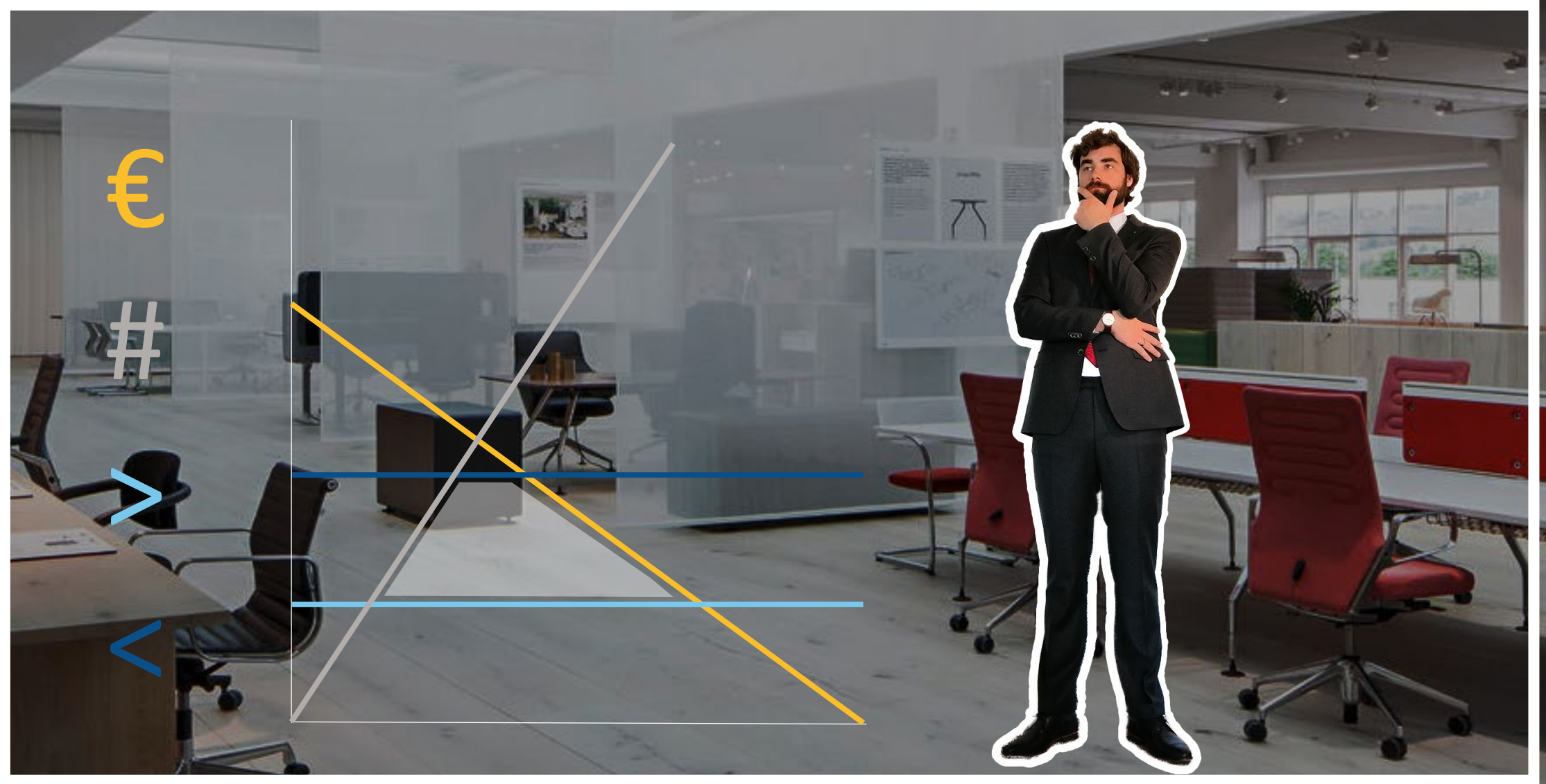


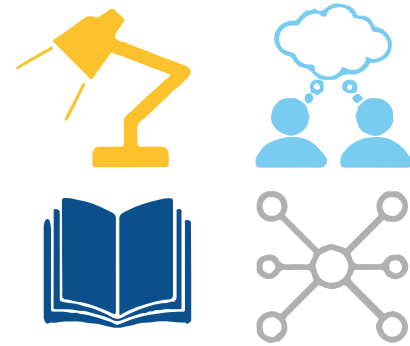
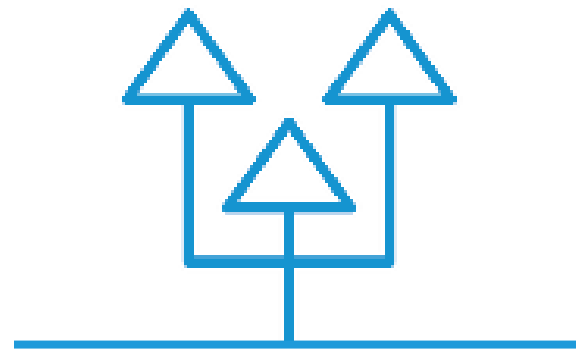
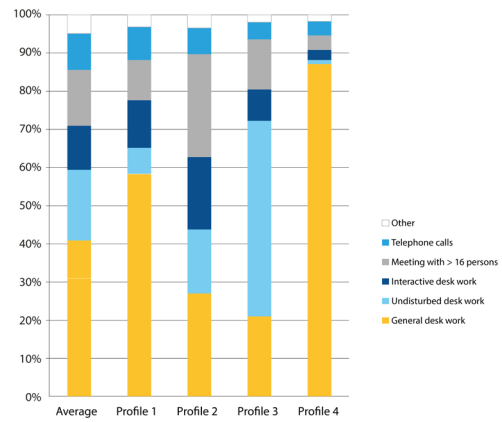
# OPERATIONAL RESEARCH

OPERATIONAL MODEL DESIGN

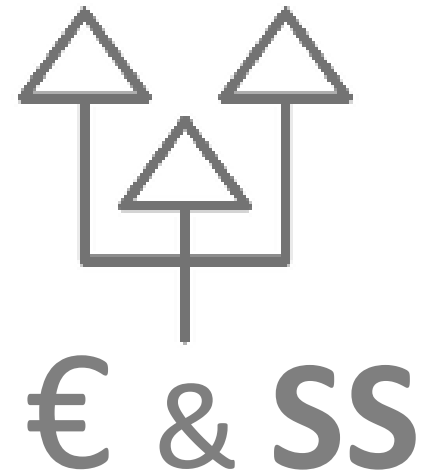
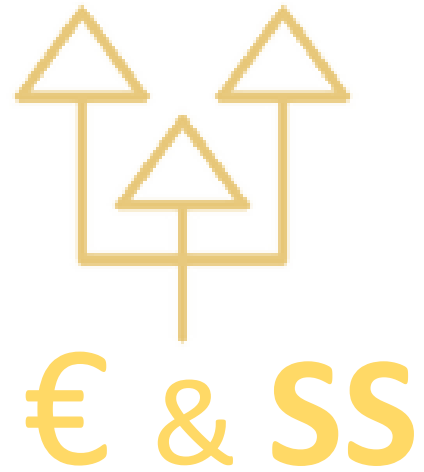
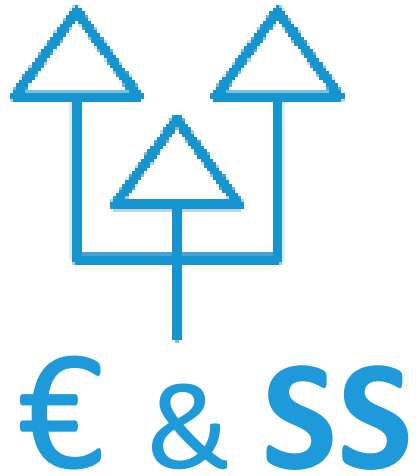












Endogenous Variables	Focus				Collaboration								Meet								Socialize				Total	4									
	F1	F2	F3	F4	B.F1	B.F2	B.F3	B.F4	C1	C2	C3	C4	B.C1	B.C2	B.C3	B.C4	M1	M2	M3	M4	B.M1	B.M2	B.M3	B.M4			S1	S2	S3	S4	B.S1	B.S2	B.S3	B.S4	
Outcome	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0			
Stress	-46,0	-51,0	-62,0	-56,0					-50,0	-55,0	-60,0	-70,0					-30,0	-32,0	-36,0	-37,0									-5,0	-20,0	-25,0	-27,0			
Objective function Stress	-46,0	-51,0	-62,0	-56,0					-50,0	-55,0	-60,0	-70,0					-30,0	-32,0	-36,0	-37,0									-5,0	-20,0	-25,0	-27,0			
Costs per m2	300,0	300,0	300,0	300,0					200,0	200,0	200,0	200,0					400,0	400,0	400,0	400,0									150,0	150,0	150,0	150,0			
M2 per workplace	8,0	9,0	10,0	11,0					8,0	9,0	10,0	11,0					8,0	9,0	10,0	11,0									8,0	9,0	10,0	11,0			
Objective function Costs	2400	2700	3000	3300					1600	1800	2000	2200					3200	3600	4000	4400									1200	1350	1500	1650			
Max. workplaces																																		1	
Min. workplaces																																			1
Max. Focus	1	1	1	1																															
Min. Focus	1	1	1	1																															
Select F1-4								1	1	1	1																								
Select F1	1							-10000																											
Select F2		1							-10000																										
Select F3			1							-10000																									
Select F4				1							-10000																								
Max. Collaboration									1	1	1	1																							
Min. Collaboration									1	1	1	1																							
Select C1-4														1	1	1	1																		
Select C1															1																				
Select C2																1																			
Select C3																	1																		
Select C4																		1																	
Max. Meeting																		1	1	1	1														
Min. Meeting																		1	1	1	1														
Select M1-4																										1	1	1	1						
Select M1																																			
Select M2																																			
Select M3																																			
Select M4																																			
Max. Social																																			
Min. Social																																			
Select S1-4																																			
Select S1																																			
Select S2																																			
Select S3																																			
Select S4																																			
Budget	1	1	1	1					1	1	1	1					1	1	1	1															

Required	Available
4 <=	1000
4 Not >=	950
0 <=	526
0 Not >=	368
1 =	1
0 <=	0
0 <=	0
-10000 <=	0
0 <=	0
0 <=	0
0 <=	197
0 Not >=	138
1 =	1
0 <=	0
-10000 <=	0
0 <=	0
0 <=	0
0 <=	196
0 Not >=	137
1 =	1
-10000 <=	0
0 <=	0
0 <=	0
0 <=	0
0 <=	93
0 Not >=	65
1 =	1
0 <=	0
0 <=	0
-10000 <=	0
0 <=	0
0 <=	2500000

# DISCUSSION OPERATIONAL MODEL

- Garbage In – Garbage Out
- Model reality vs. Actual reality
- Supportive instrument, not a prescript

# CONCLUSIONS

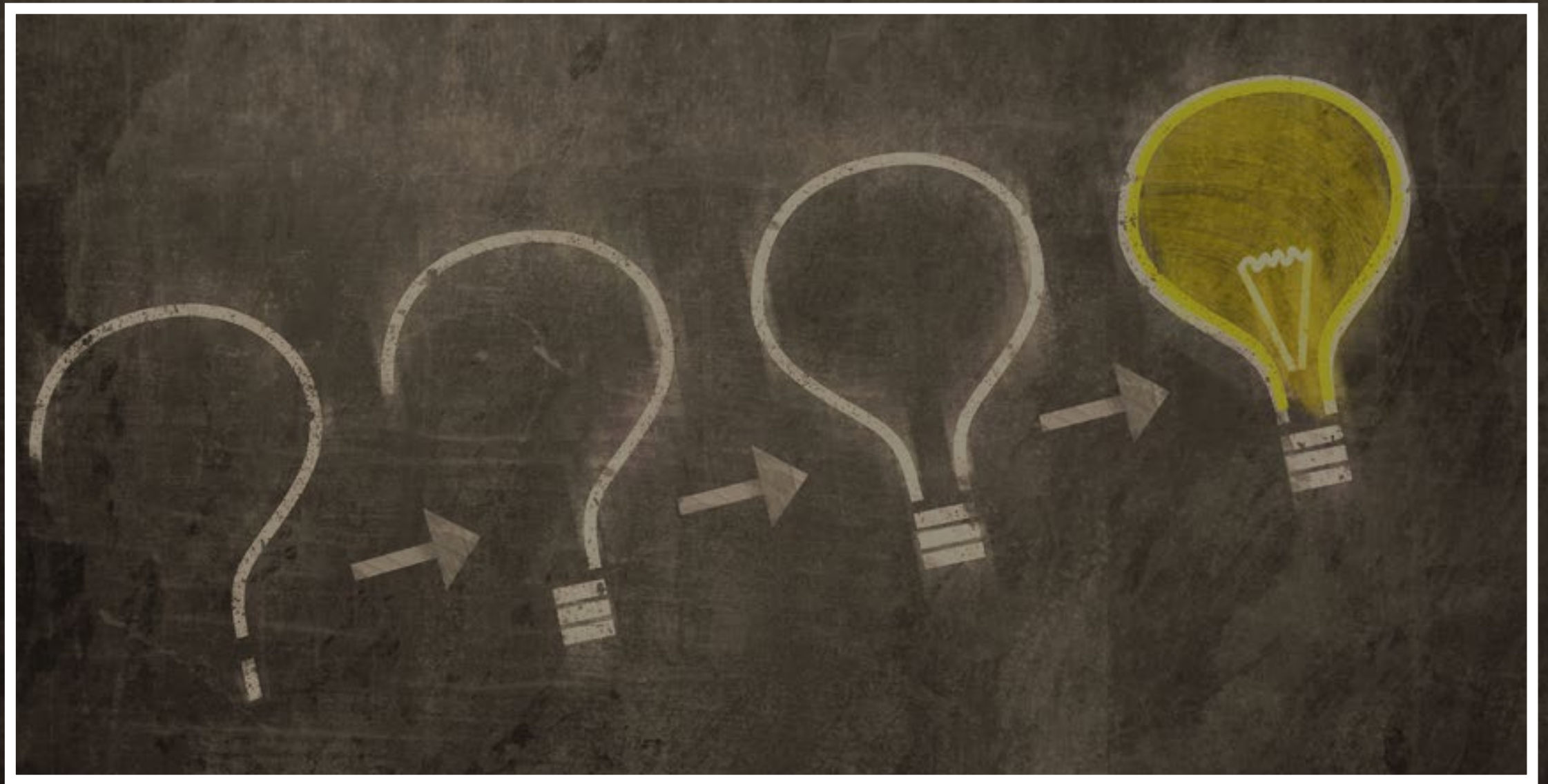
- 1 What is the relation between workplace types and activities on employee stress?
- 2 How can employee stress be measured?
- 3 What workplace characteristics are of influence on employee stress?
- 4 What are input and output variables for a decision-making model that can reduce employee stress
- 5 How can real estate managers use the decision-making model?

“

*How can insights in the relationship between workplace and activity on employee stress be used to develop a real estate decision-making model?*

# RECOMMENDATIONS

- Workplace design
- Model validation by intervention testing
- Smart tool development to improve real-time current situation





**STUDENT**

R.G. (Ruben) den Uyl  
4218574

**INSTITUTIONS**

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**DELEGATE OF THE BOARD OF EXAMINERS**

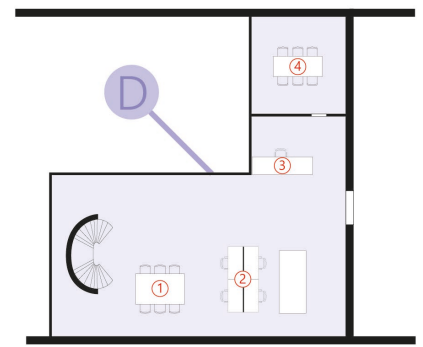
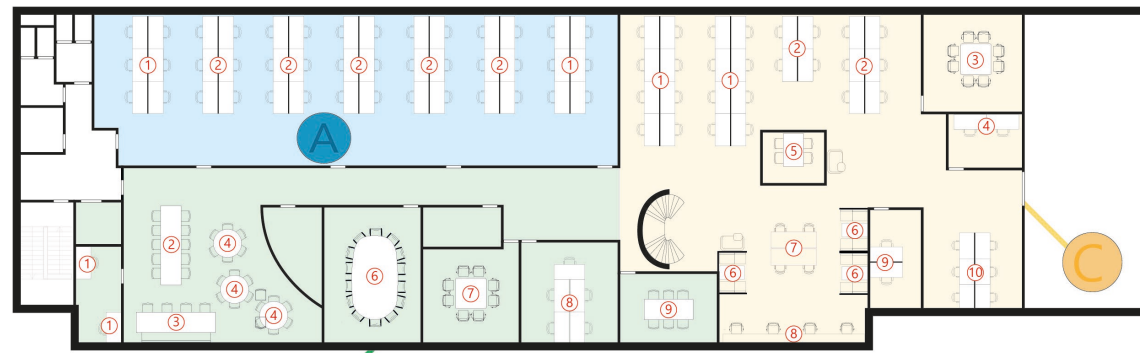
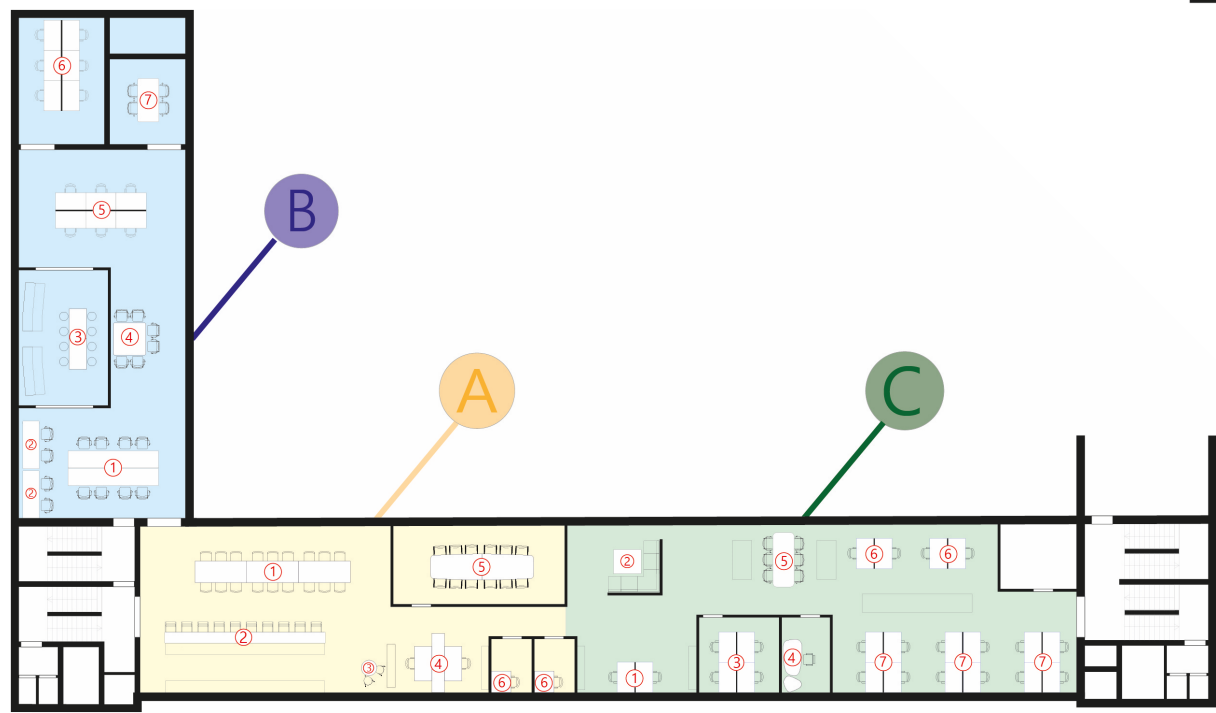
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# WORKPLACES

		Rotterdam																	Amsterdam																												
		B1	B2	B2.1	B4	B3	B5	B7	B6	A1	A2	A3	A4	A5	A6	C1	C2	C3	C4	C5	C6	C7	A1	A2	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	D1	D2	D3	D4
Place	Attribute	Workplace																																													
	Distance to:																																														
	<ul style="list-style-type: none"><li>Entrance/exit</li><li>Parly/kitchen</li><li>Toilet</li><li>Office supply</li><li>Printer</li><li>Nearest door</li><li>Nearest person</li></ul>																																														
Space	Privacy:																																														
	Size of room																																														
	Openness of room	walls & no windows																																													
		walls & windows																																													
		walls & open																																													
		glass walls with curtains																																													
		glass walls																																													
		curtains																																													
	Audio privacy (how many people can hear you)	open with 1 wall																																													
		open																																													
		0																																													
	Visual division (office partitions, facing a wall)	1 or 2																																													
		2+																																													
		wall																																													
		window																																													
		office partition																																													
	Use	Facilities:																																													
			Power socket																																												
			Extra monitor																																												
		Type of chair	No chair/standing																																												
			Desk chair																																												
			Bar stool																																												
		Type of desk (sitting, standing, walking etc)	Regular chair																																												
			No desk																																												
			Shared table																																												
			Individual desk																																												
		Presentation hardware (screen & sound)	Individual desk, adjustable																																												
Special desk																																															
0 = no 1 = yes																																															
Desk space (able to use papers conveniently)		no desk																																													
		small																																													
		regular																																													
Storage		spacious																																													
		0 = no 1 = yes																																													
		0 = no 1 = yes																																													
Access:		Department based or free use																																													
		Flex use or assigned desk																																													
Use agreements:		0 = free use 1 = department A 2 = flex use 3 = assigned																																													
		Out loud speaking or silence																																													
		Calling																																													
		Multiple person meeting																																													
		Bookable - temporarily use																																													
		Purpose (focus, collaborate, social, learn)	focus																																												
	collaborate																																														
social																																															
learn																																															



RELATION

## RE Decision-making model

