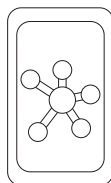
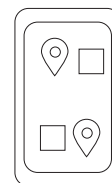
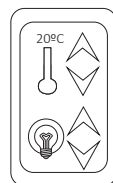
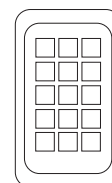
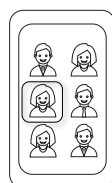
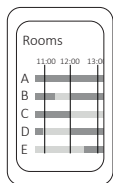
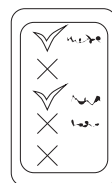


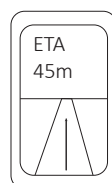
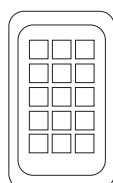
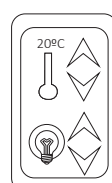
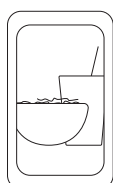
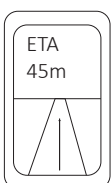
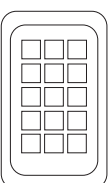
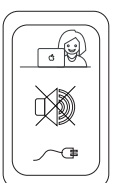
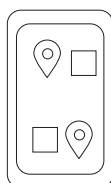
Choosing your place



Making a user journey to illuminate the possibilities of smart tools to support new users of the campus in choosing their workplace



4161858



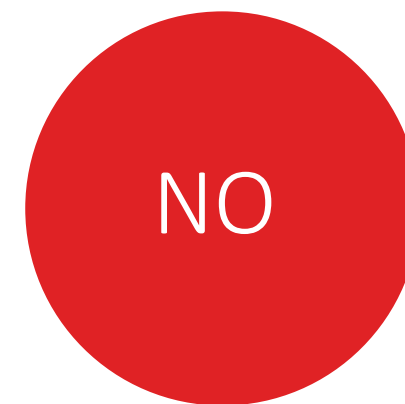
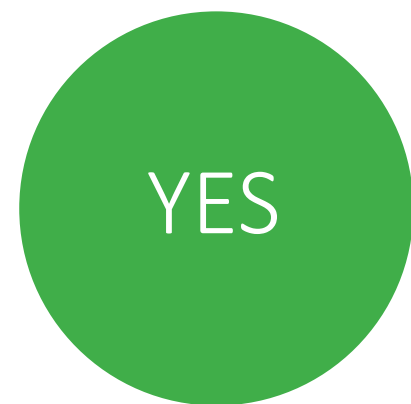
Welcome

Final presentation

First, two short questions for you!

Was it easy to find this room today?

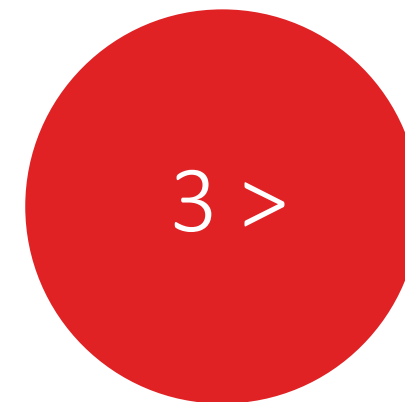
Was het makkelijk om deze ruimte te vinden?

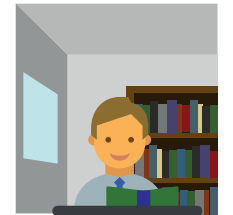


First, two short questions for you!

If you would work a day at this campus, how many types of workplaces and spaces would you like to use?

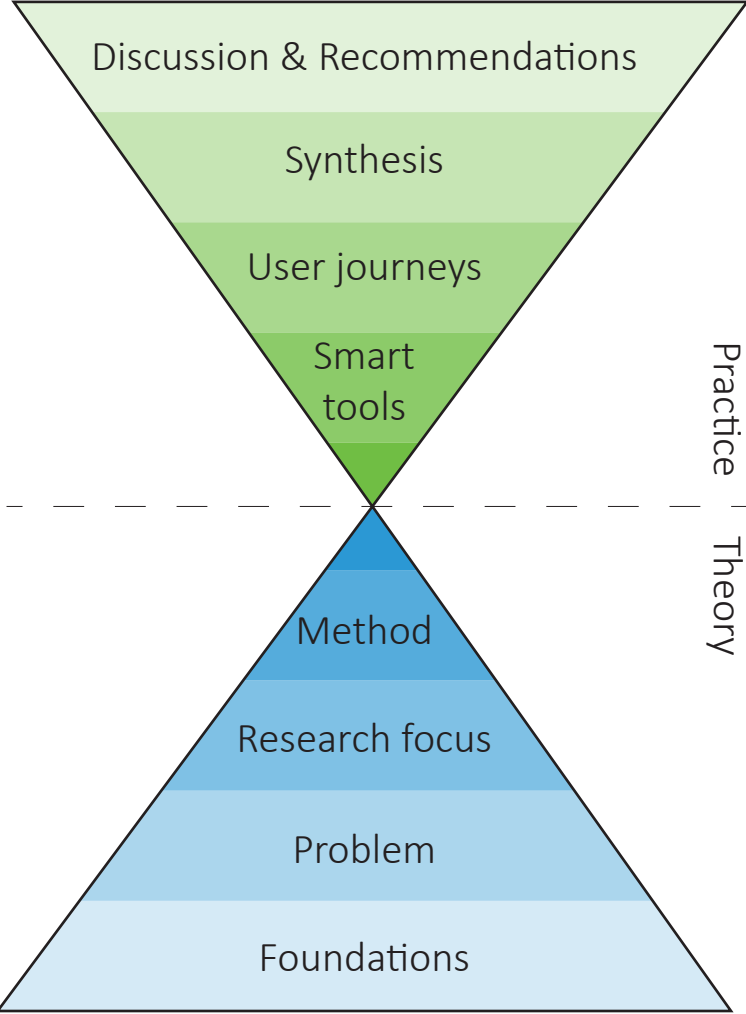
Als je hier een dagje op de campus zou werken, hoeveel verschillende soorten werkplekken zou je dan willen gebruiken?





Foundations of the research

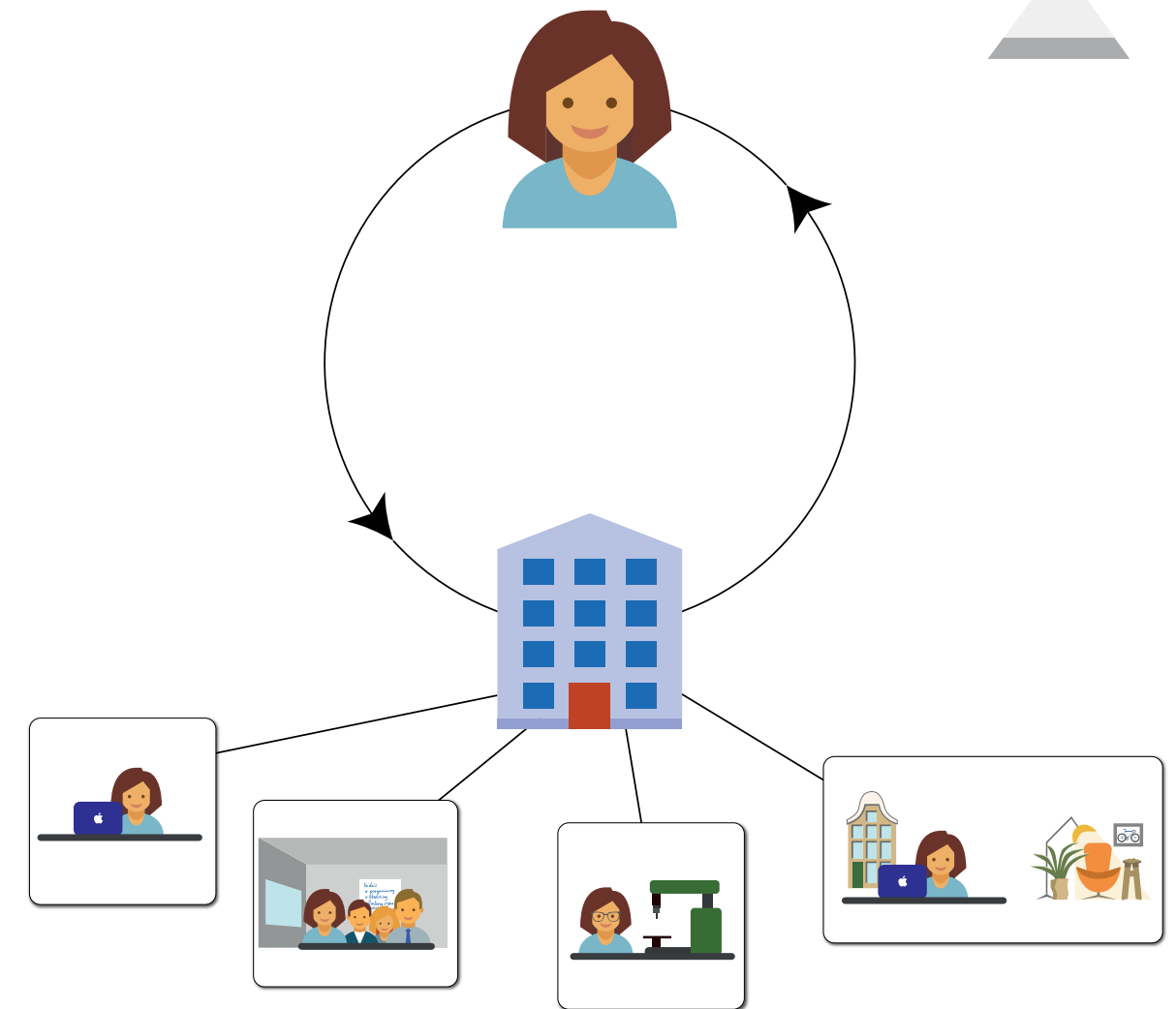
Real estate management
Campus
Campus manager
Smart tool



Real estate management

Connection between building and organization

Can add value to the organisation



The importance of the link between real estate decisions and the organizations' overall objectives

(Nourse & Roulac, 1993)

From operating necessity towards strategic resource

(Haynes et al., 2017)

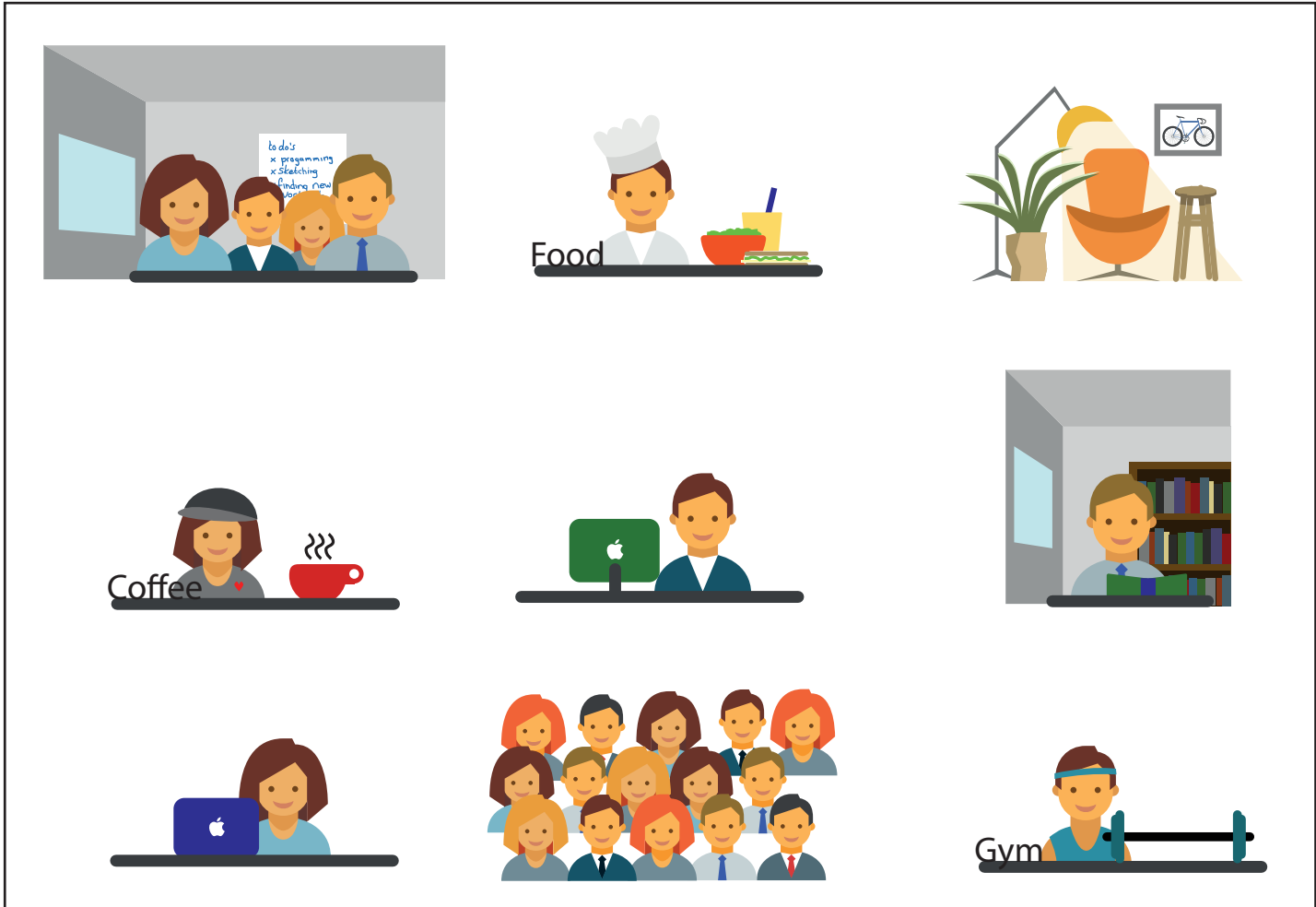
Own illustration



Campus

A physical place which contains several types of spaces which are used in a hybrid and shared way.

Based on the definitions of Jaitli and Hua (2013), Den Heijer (2011), TU Delft (2016)



Own illustration



Campus manager

In the domain of real estate management

Balancing different perspectives to provide a good environment for all players.

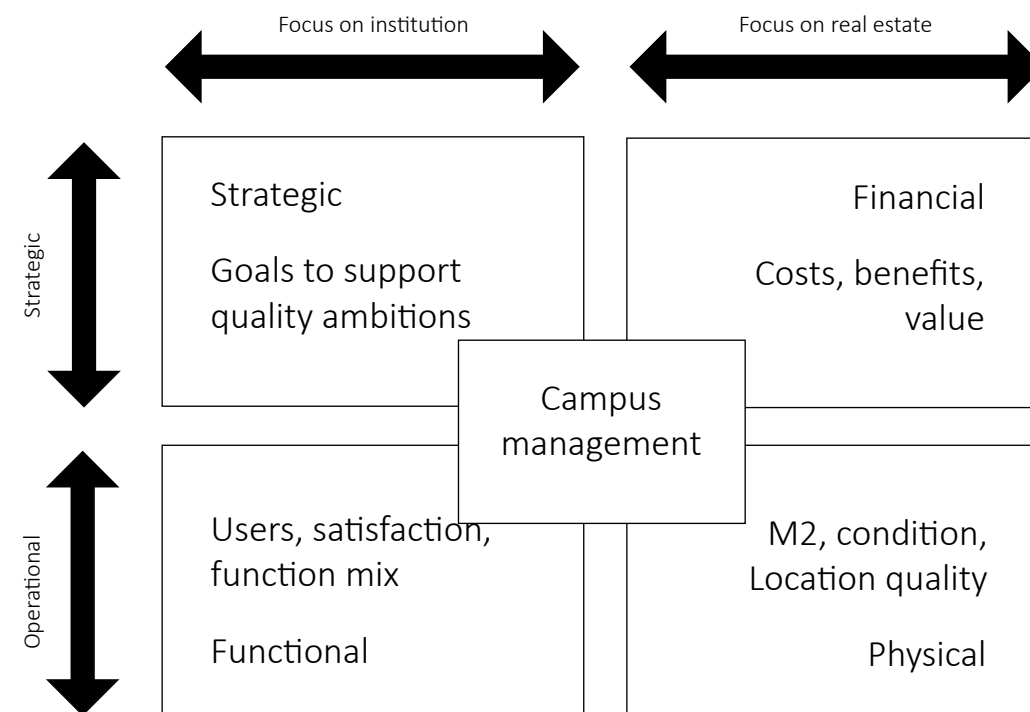


Figure derived from Den Heijer (2011)

Collaboration is needed to provide a 'high performance' workplace

(Harris & Cooke, 2014) (Haymes et al., 2017)

Campus manager

In the domain of real estate management

Balancing different perspectives
to provide a good environment for all players.

Focus on user perspective

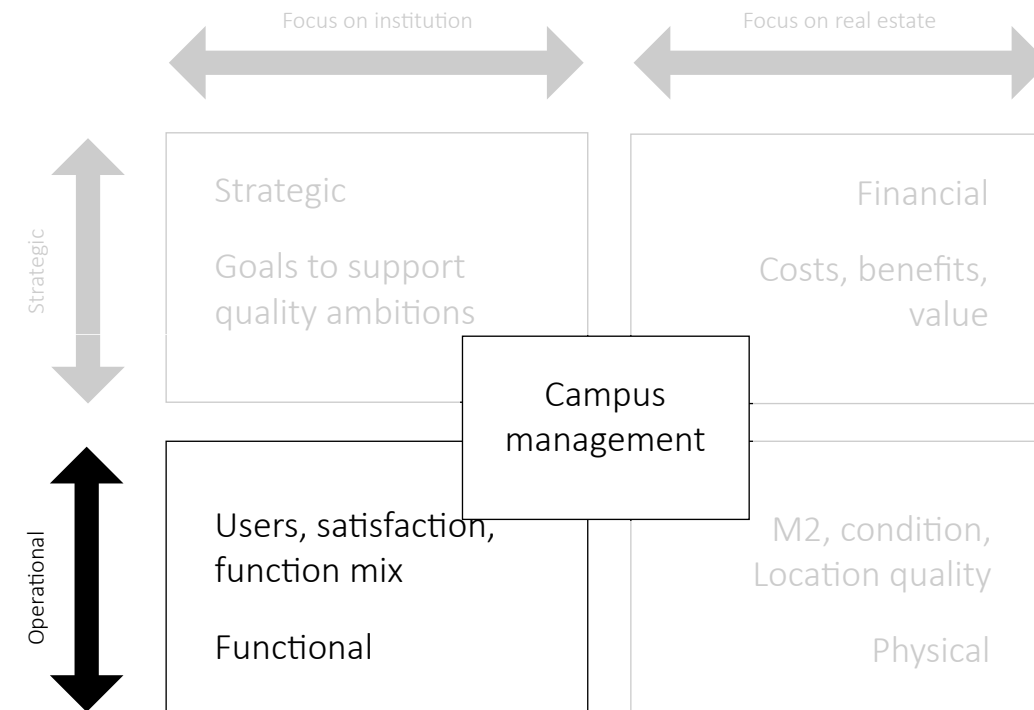


Figure derived from Den Heijer (2011)

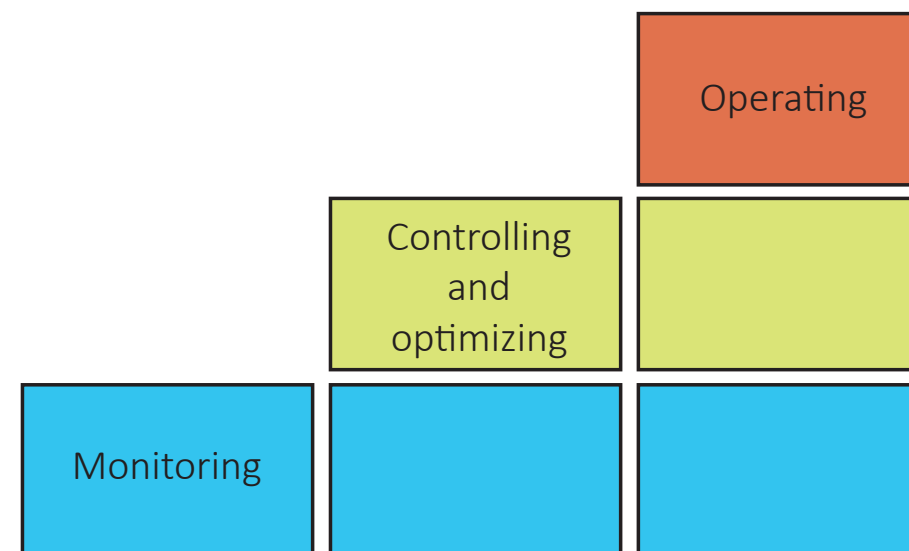


Smart tools

A smart tool is a service or product to provide (real time) information to its users to improve space usage at the campus.

Based on the definition of Valks et al. (2016)

Smart tools have different levels of 'smartness'

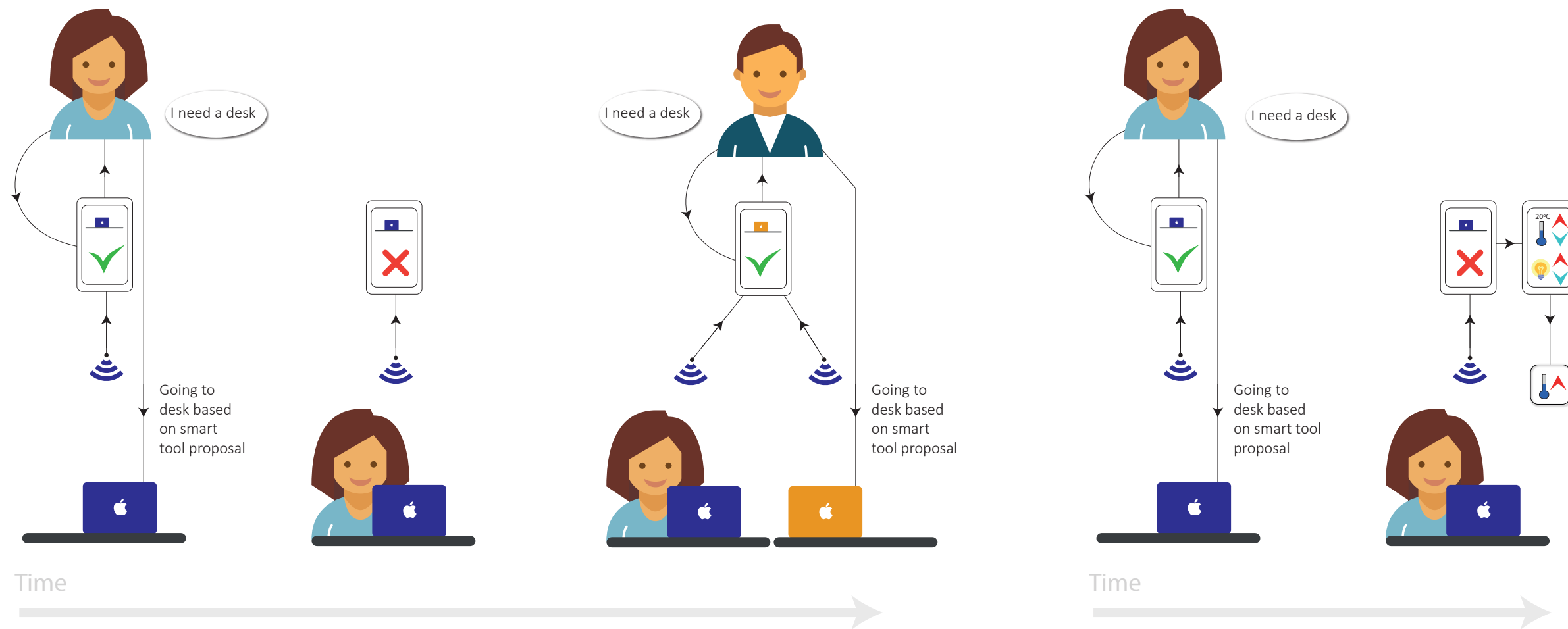


Stages of a smart tool

(Baumer et al., 2017)
Own illustration, based on Baumer



Smart tools in the workplace



First stage: Monitoring

Second stage: Controlling and optimizing

Own illustration



Privacy

Difference in purpose and data type

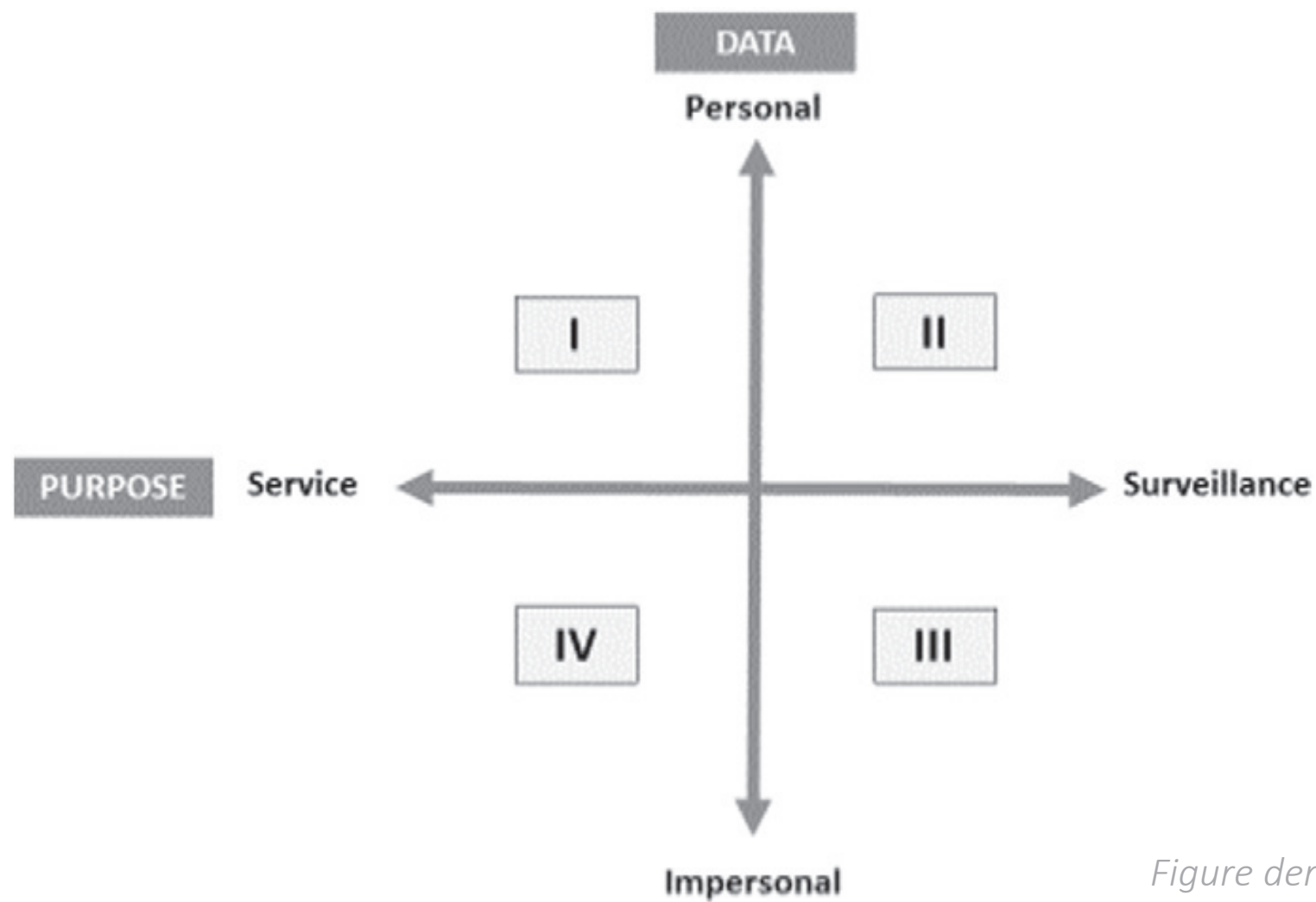
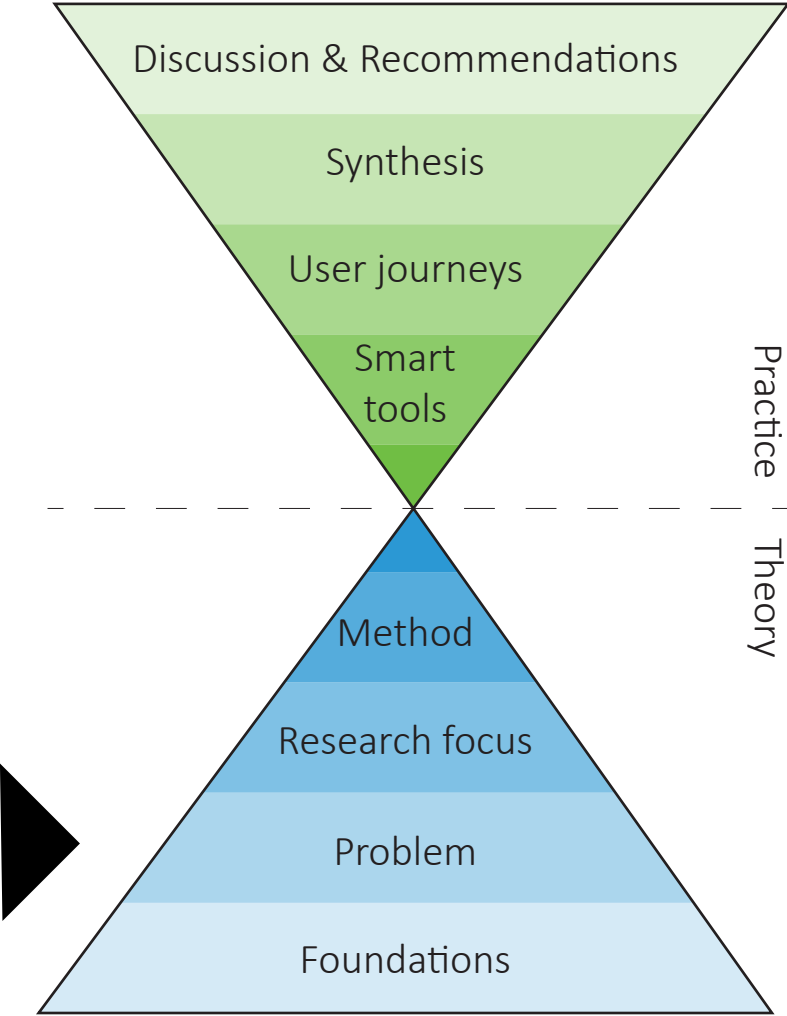


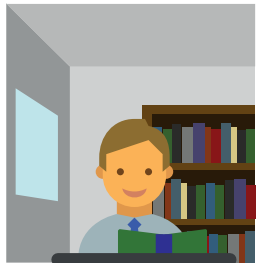
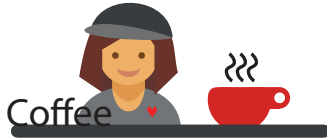
Figure derived from Van Zoonen (2016)

Problem definition

Problem statement
Research focus
Research question



Multiple workplace types



Changing palette of work settings

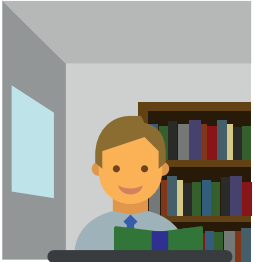
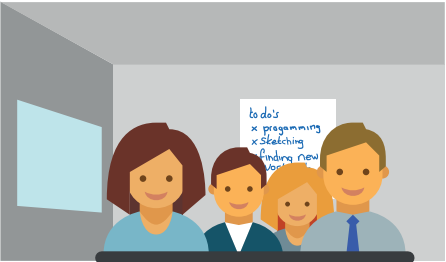
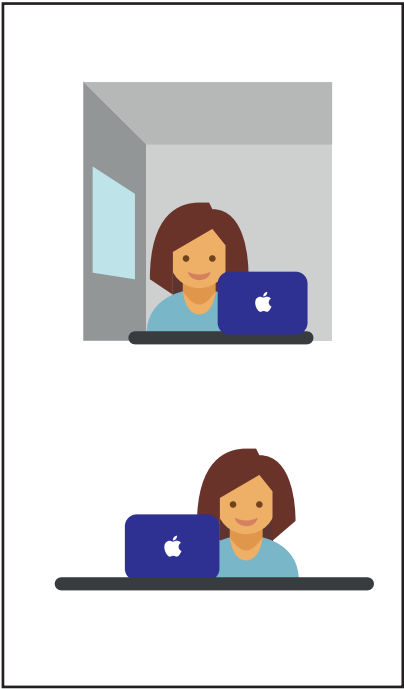
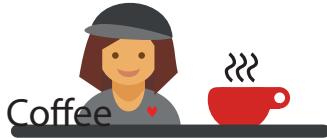
(Harris, 2015)

There is no one-size fits all approach for the workplace fit-out

(Hoendervanger et al., 2016)

Own illustration

Multiple workplace types

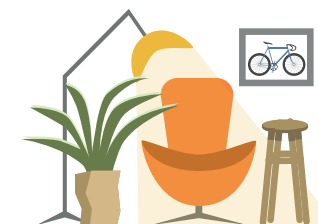
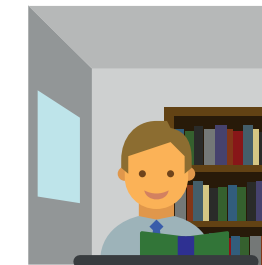
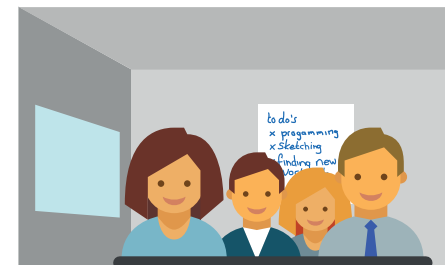


Co-con

Co-Con workplace, developed in the 80's. Stands for communication and concentration workplace

(Kleijn et al., 2012)
Own illustration

Flexible use of workplaces



1 person

Multiple persons

Flexible use driven by low occupancy rates

(Kleijn et al., 2012)

Higher expectations towards the non-territorial workplace

(Kim et al., 2016)

Own illustration



Variation within workplace types



Many variation within a user group

Choosing a workplace can provide personalization

(Van Meel, 2015)

(Kim et al., 2016)

Own illustration

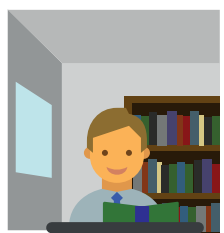
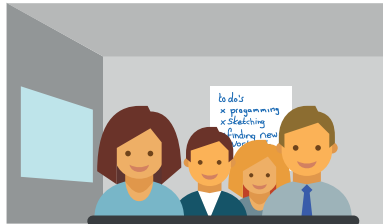
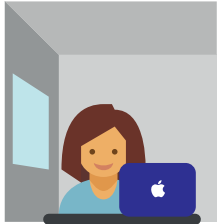


The contemporary workplace is increasingly used in a dynamic way.

People have difficulties finding their colleagues, available workplaces and waste time by setting-up the workplace every time they move.



Campus manager



The above information is found by Kim et al. (2016) during a research about the non-territorial workplace.

Own illustration

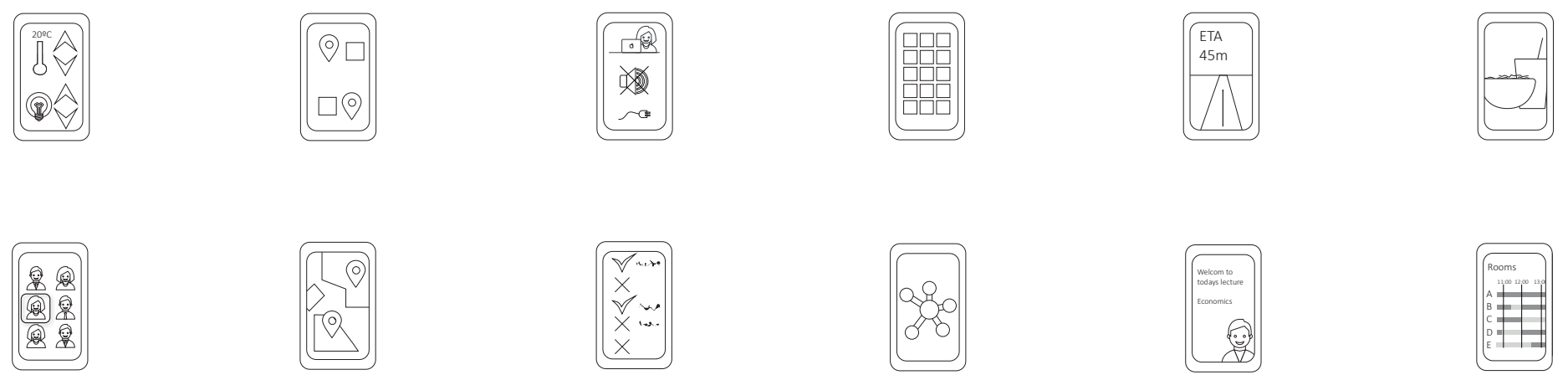


This leads to potential for the implementation of smart tools

“We want something with smart!”



Campus manager



Own illustration

Increase of technology



Technology shifts the way people perform their job

(Holland & Bardoel, 2016)

Possibilities of interconnected tools is barely revealed

(Cisco, 2017)

Smart tools have the potential to make our lives and workplaces easier and more streamlined

(Morgan, 2014)

Own illustration



Smart tools in the workplace are in its early stages



60% of the smart tool projects does not survive the 'proof of concept' phase

(Cisco, 2017)

Learning from failures helps to accelerate other smart tool projects

(Cisco, 2017)

Own illustration



Smart tools have potential, but how do we make them work?



Campus manager

Look at the user

Expectations from users

Matching smart tools with user preferences

Involving the user is essential to make the workplace work

(De Been et al., 2016)

(Brunia et al., 2016)

(De Been et al., 2016)

Own illustration



Research focus

The new knowledge worker of the campus

Knowledge worker

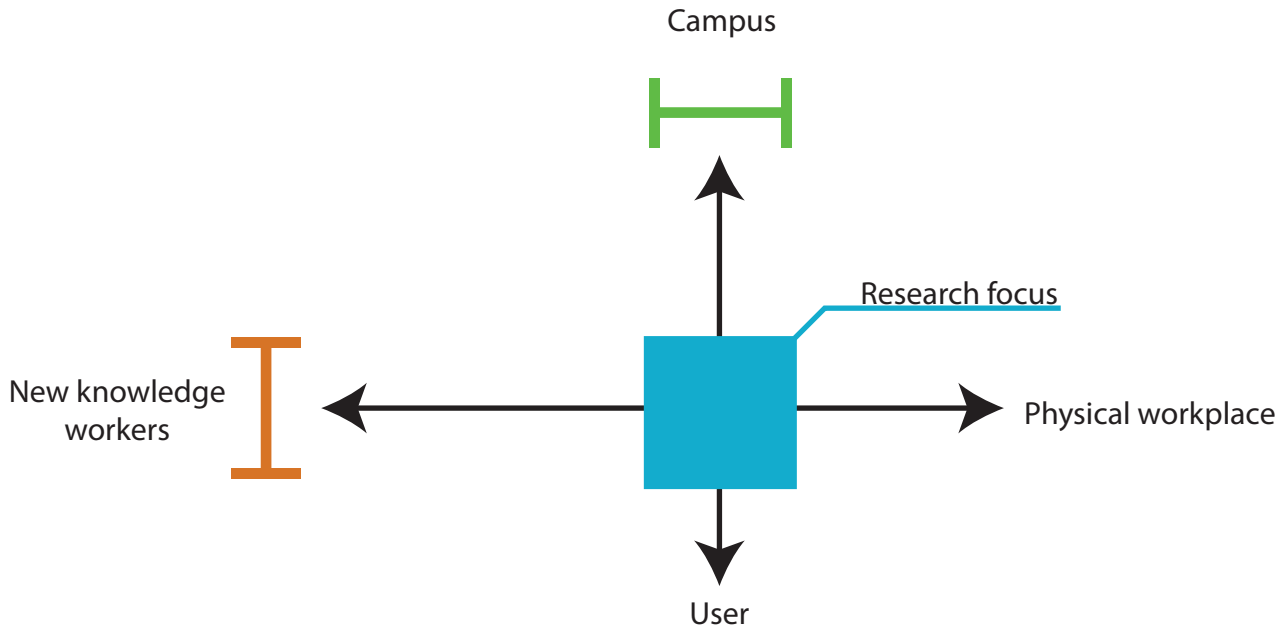
Different workplaces
(Duffy, 2008; Hoendervanger et al., 2016)

Campus

Dynamic use of a large number of workplaces
(TU Delft, 2016)

Unfamiliarity

Looking for information sources
(Tan & Wu, 2016)



Own illustration



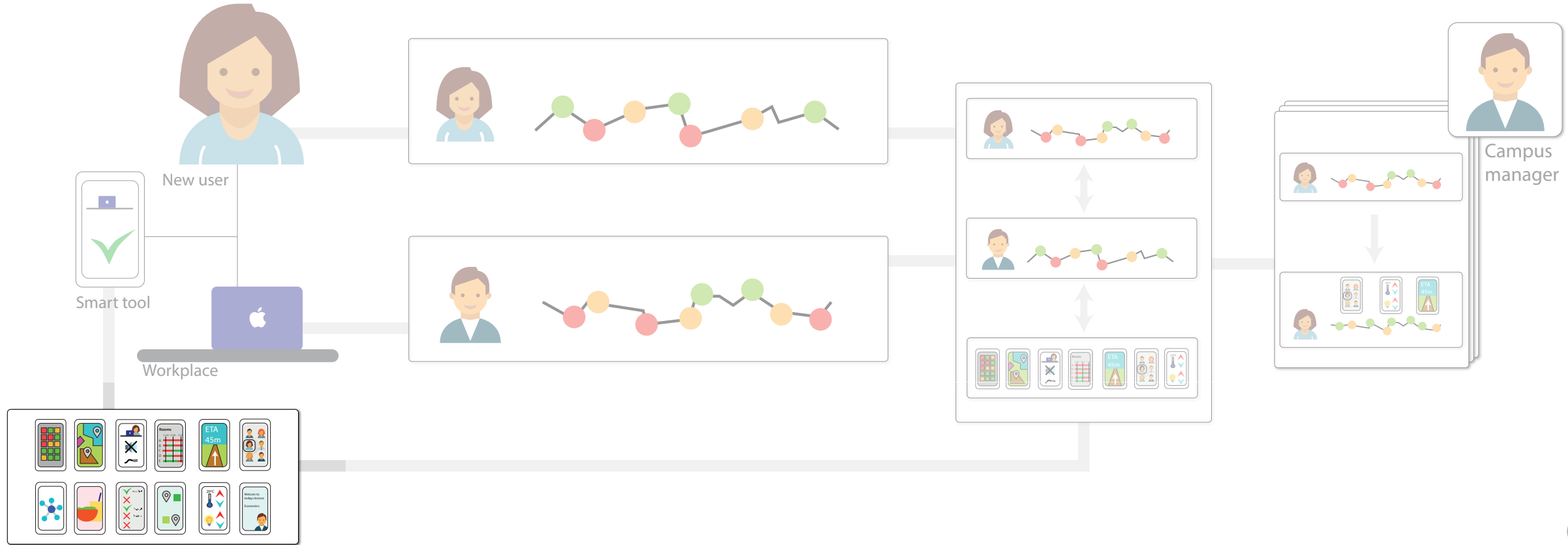
Research question

Which functions of smart tools are needed to assist new campus users in choosing an appropriate work place throughout the day and what are the implications for the campus manager of the lessons learnt from these user insights, when exploring the possibilities of smart tools at the campus?



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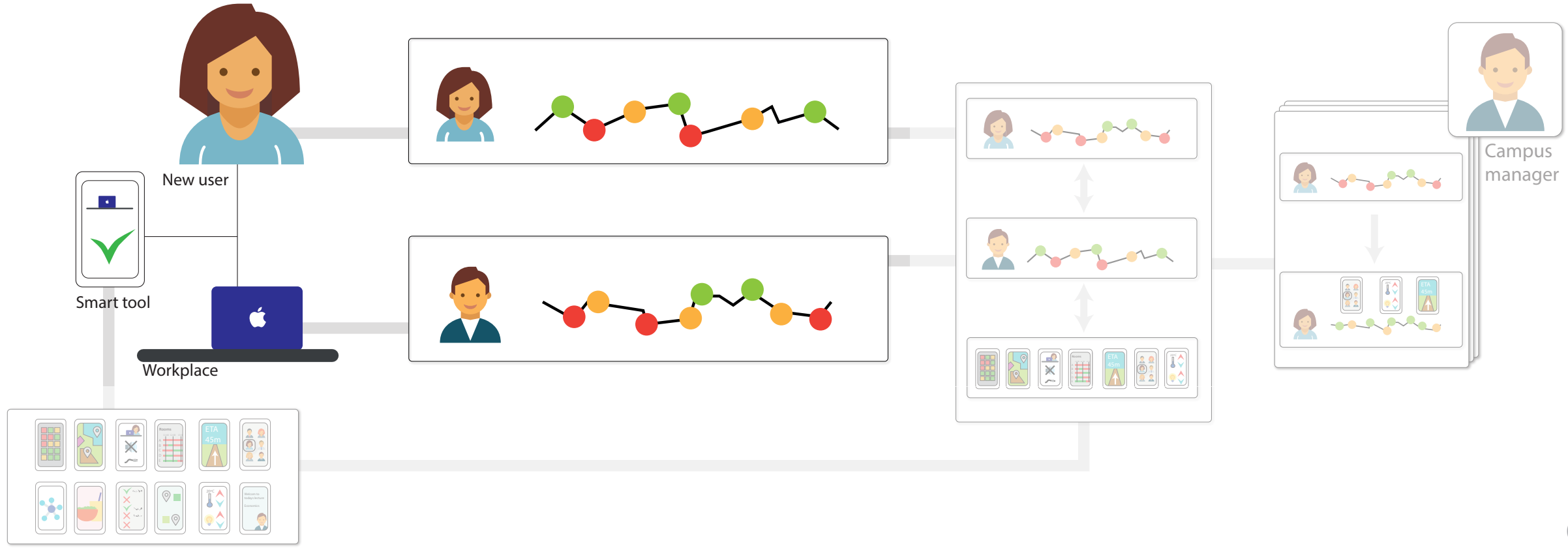


Own illustration



Research question

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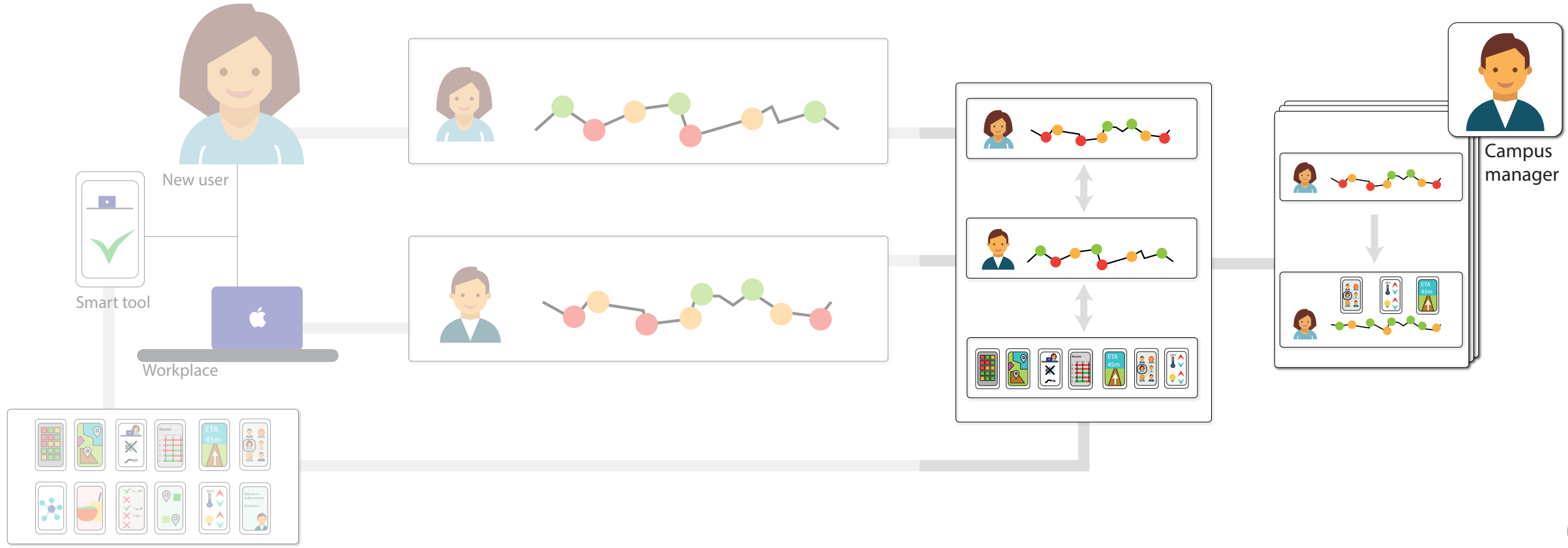


Own illustration



Research question

Which functions of smart tools are needed to assist new campus users in choosing an appropriate work place throughout the day and what are the implications for the campus manager of the lessons learnt from these user insights, when exploring the possibilities of smart tools at the campus?



Own illustration



Research method

Qualitative research

Part I Exploration of smart tools

Based on 25 cases

Part II Making user journeys

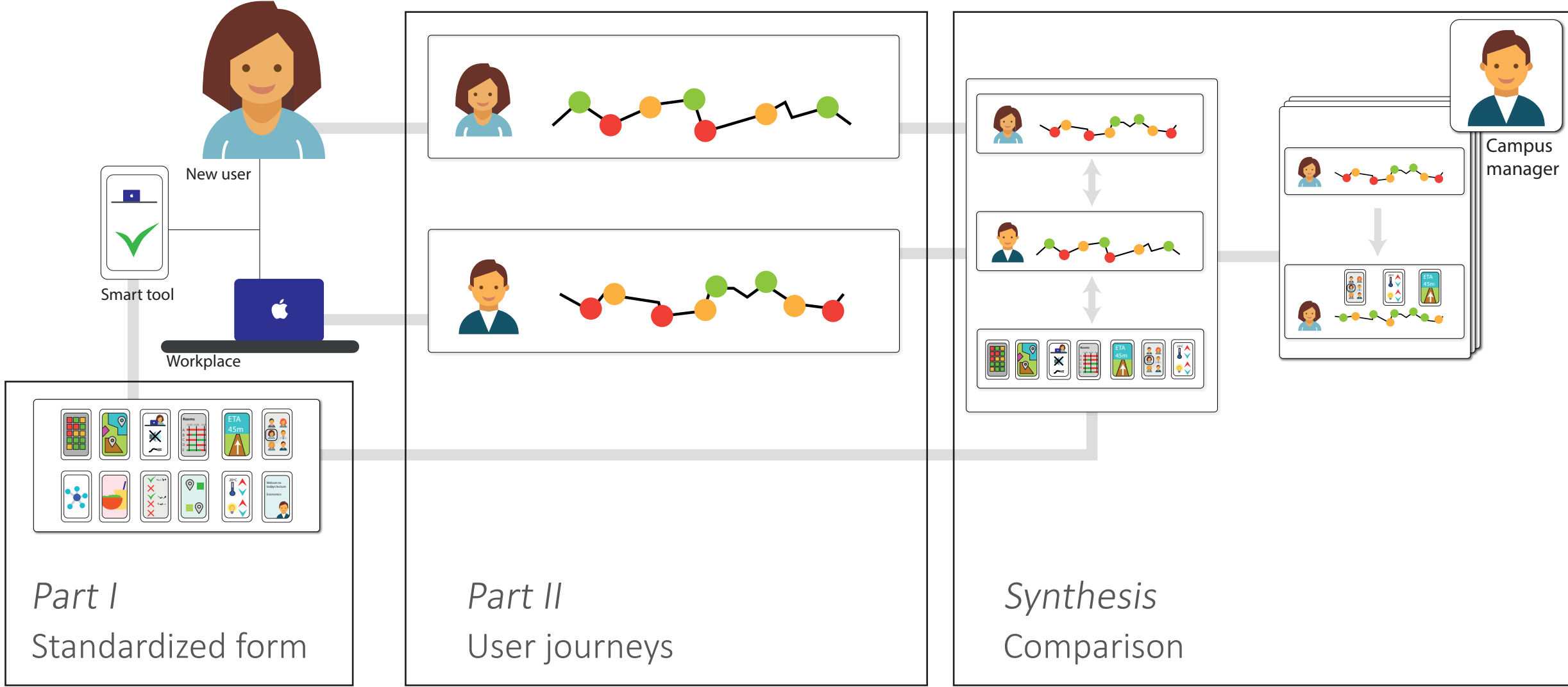
Based on 24 in-depth cases

Synthesis

Combining findings to advise the campus manager

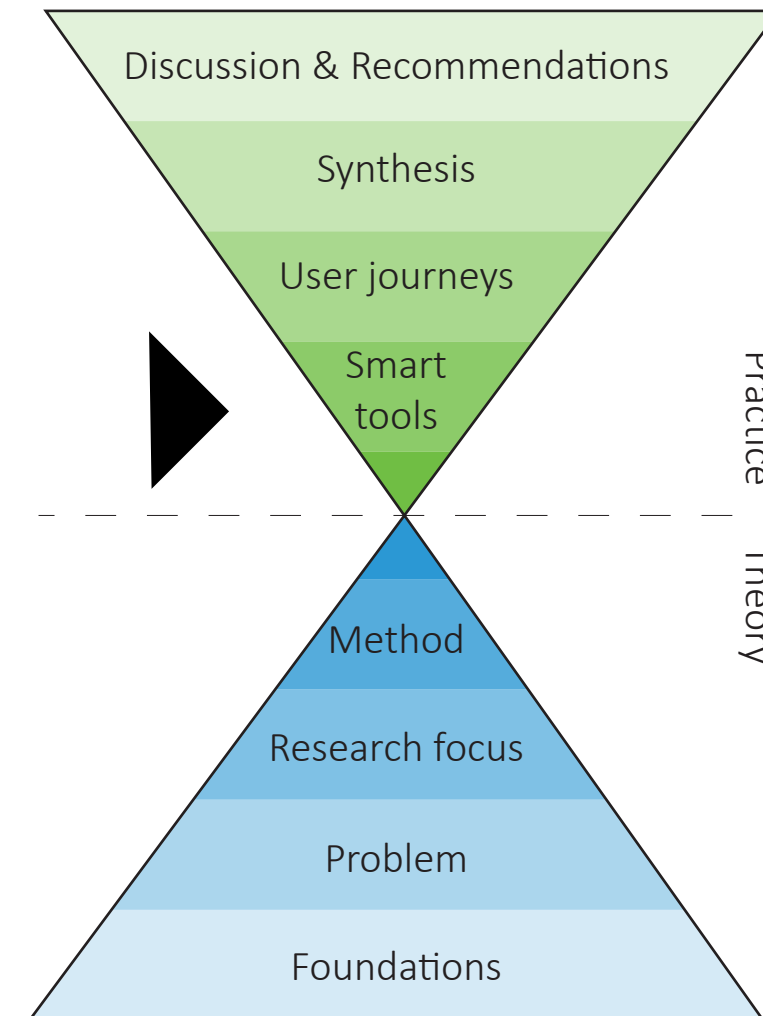


Research process



Findings

Smart tools
25 cases
User journeys
ING



Smart tools

Only smart tools that deliver a function to the user

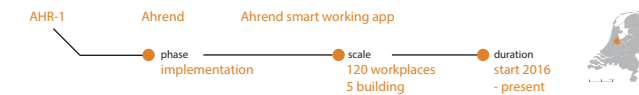
Collaboration with campus research team

25 cases

13 public organisations

12 private organisations

Standardized form to collect data

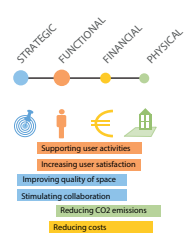


Project description
The development of the tool started from the original business of Ahrend; (office) furniture. Based on providing extra services to the user, the development started. The development is very demand (user) driven. The problem statement is that users have difficulty to find colleagues and suitable workplaces in a large open office. At the same time, users often have empty batteries.

Foreseen developments
The first development is implementing the so called ergonomic passport. This passport is connected to a specific user and remembers the personalized settings for the height of the desk. This will be developed towards the comfort workplace, a decentralised way of heating, cooling and lighting which is integrated in the workplace. The main room temperature will be lowered and the desks will have additional heating and cooling elements integrated. This adapts to the specific user at a specific moment. Besides these new developments, also the existing elements are upgraded.

Profile

Why: Objectives

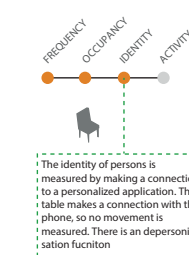


The demand side has priority, so strategic and functional. The supply is a result of the demand oriented approach.



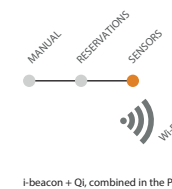
Impression - map to find available spaces

What: Measurement



identity is visible for all application users to find each other in the building. Frequency is used for reporting and occupancy for finding an available space.

How: Measurement method



i-beacon + Qi, combined in the PUK



User information (employees)
Users are able to see who is in the building and which working spaces are still available. This is registered by putting your phone on a certain spot at the desk (called the PUK). If you leave the desk, it will be available after a certain period, based on the wishes of the company. The PUK is measuring activity within a certain distance, upto 1 to 2 meter around the PUK. Only after the phone has been physically on the PUK, the PUK will detect a nearby phone, to prevent the PUK from connecting with every single closely phone. The user can see available workplaces and meeting rooms and find colleagues.



Management information

The manager is able to review occupancy throughout the whole building. This is visible per specific workplace. The information is connected to a specific workplace and not to a person. The specific person, who used a certain spot, is depersonalised by the system. In this way, it is not possible to monitor where a specific person is sitting during a period longer than one day. Every users gets a new code every day in the data base. This makes it impossible to know who is connected to which number, only at the current day.



Actuality of the information



The information displayed in the on screens and in the application in floorplans and reports and is (near) real-time.

The data used in reporting goes from real-time to as far back as possible.

Access levels



Only employees have access to the app. There is a possibility to review the information on a screen so visitors can review the information as well.

Manager can derive report about occupancy. Identity is depersonalized.

Benefits

The main aim of the tools is providing a better service to the user and in the end happy and healthy employees. Other benefits as lower energy costs and more users per square meter are connected to the main aim but are an effect of the tool. These latter benefits are also important for the business case. We are measuring the satisfaction rate of employees via questionnaires and interviews (before a new working concept and after). Occupancy can be monitored via the online dashboard.

Side notes

There is a 'depersonalisation-button' so users can make themselves invisible to find. Only the occupancy will be measured than, but no personal information will be made available to other users.

Ahrend smart working app

Personalizing the desk and finding colleagues and available desks

Combination of functions

Show availability by putting your phone on the desk

'It does not follow you to the toilet'

ING custom made application

Release booked, but non-used rooms to ad hoc users.

1 function

100% accuracy

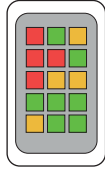
'You don't want to go to a room that is still used by others'



Conclusions

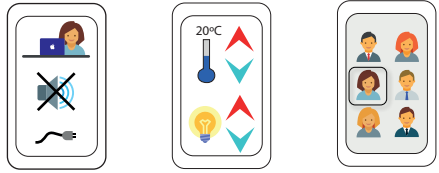
Public

Focus on 1 function
> 50% availability of single workplace



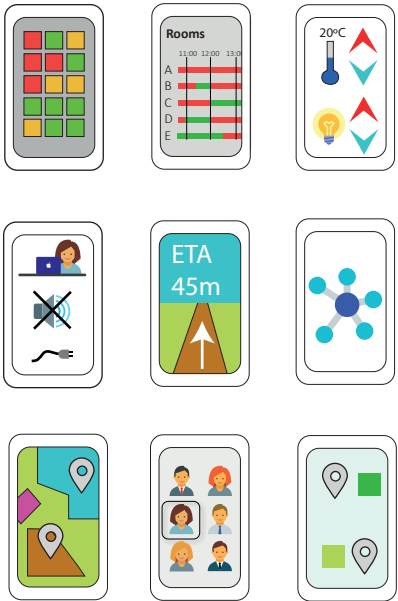
Private

Focus on combination of functions
25% availability of single workplace



Functions for users

9 functions
Differences in accuracy
different combinations of functions in a tool

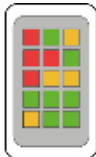






Input for next phase

Classification of smart tools / functions



Classification of smart tool functions

Function	Icon	Level of accuracy	Function specification	Reference cases	Smart tool supplier
1 Show real time workplace availability <i>One workplace type</i>		Group of people	From defined zones of a floor the occupancy is shown.	NLG UU ABN	Plekchecker Lone Rooftop Lone Rooftop
		Individual	On building level Based on specific workplace measurement	KL DTU ING	Blokken in Leuven Smart library (custom)
2 Show real time workplace availability <i>Different workplace types</i>		Group of people	Type of workplaces on a floor level, check-in required for desk by QR code Type of workplaces on a floor level	OVG TUD-1 UvA MIC – 1	MapiqPhilips Mapiq - Blinq systems Mapiq Smart building app
		Individual	Based on the desk the person uses around that moment. Which relates to type of room Based on detecting persons and showing the specific room.	AHR ERI AGF	Smart working app Flowscape Office 3.0
3 Show 'thirds places' in neighbourhood		-	Showing third workplaces which can be filtered by checking personal workplace preferences	CAM	Spacefinder
4 Room booking		-	Booking a workplace or group room, check-in required for desk by QR code Booking a workplace or group room Booking a group room	TUE OVG AGF TUD-1 UvA ERI	Book my space – Planon MapiqPhilips Office 3.0 Mapiq - Blinq systems Mapiq Flowscape
		-	Shortening the process of room booking and accompanied actions Releasing meeting rooms if they are booked but not used	BOOK ING	(custom made) (custom made)
5 Way finder		Indoor	Shows where a room or area is on the map	TUD-1 UvA OVG ERI	Mapiq - Blinq systems Mapiq MapiqPhilips Flowscape

Assist users in choosing an appropriate workplace

Own illustration



User journeys

Århus Universitet, Denmark

Technische Universiteit delft, The Netherlands

ING, Amsterdam, The Netherlands

Tech company, The Netherlands



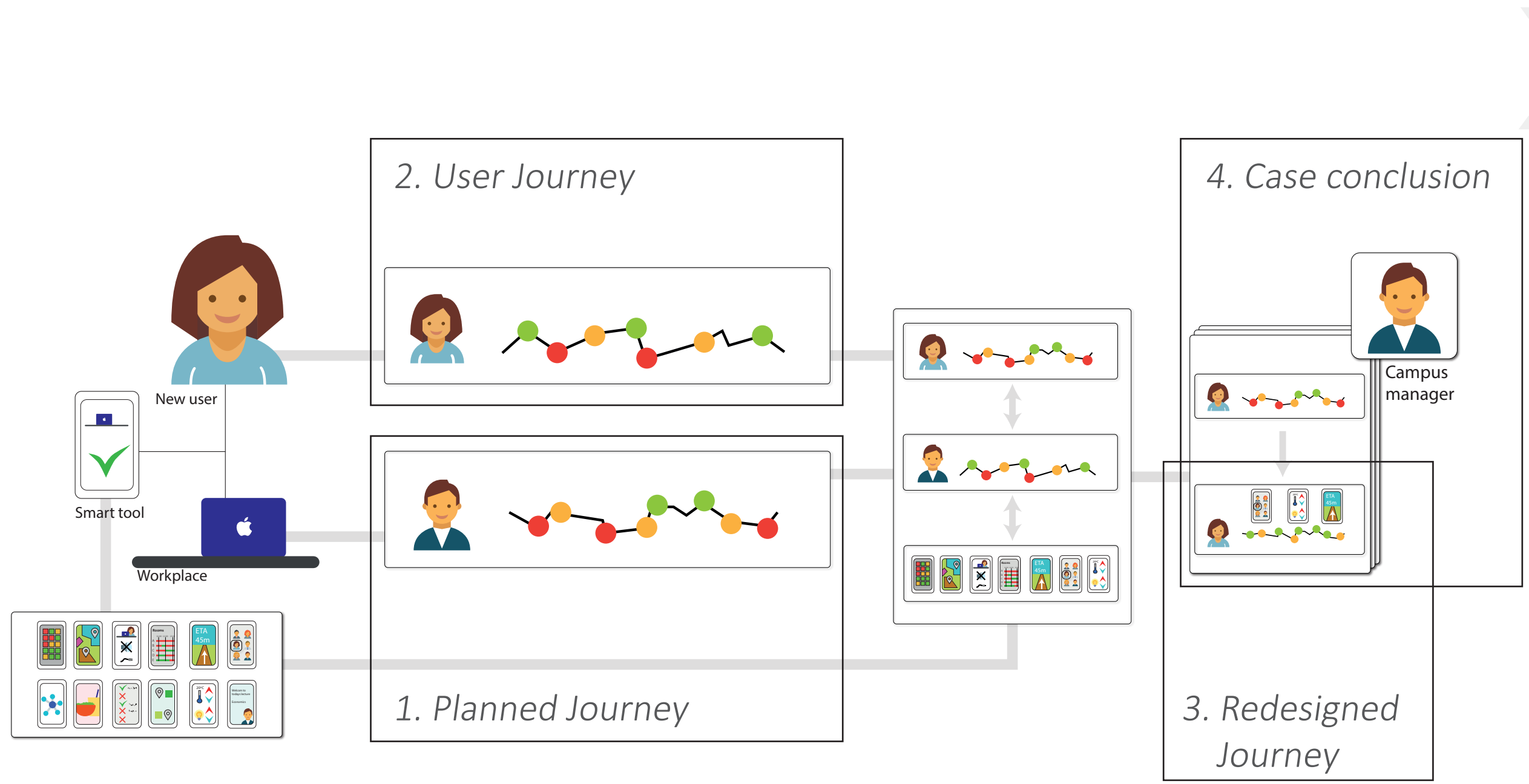
Journey method

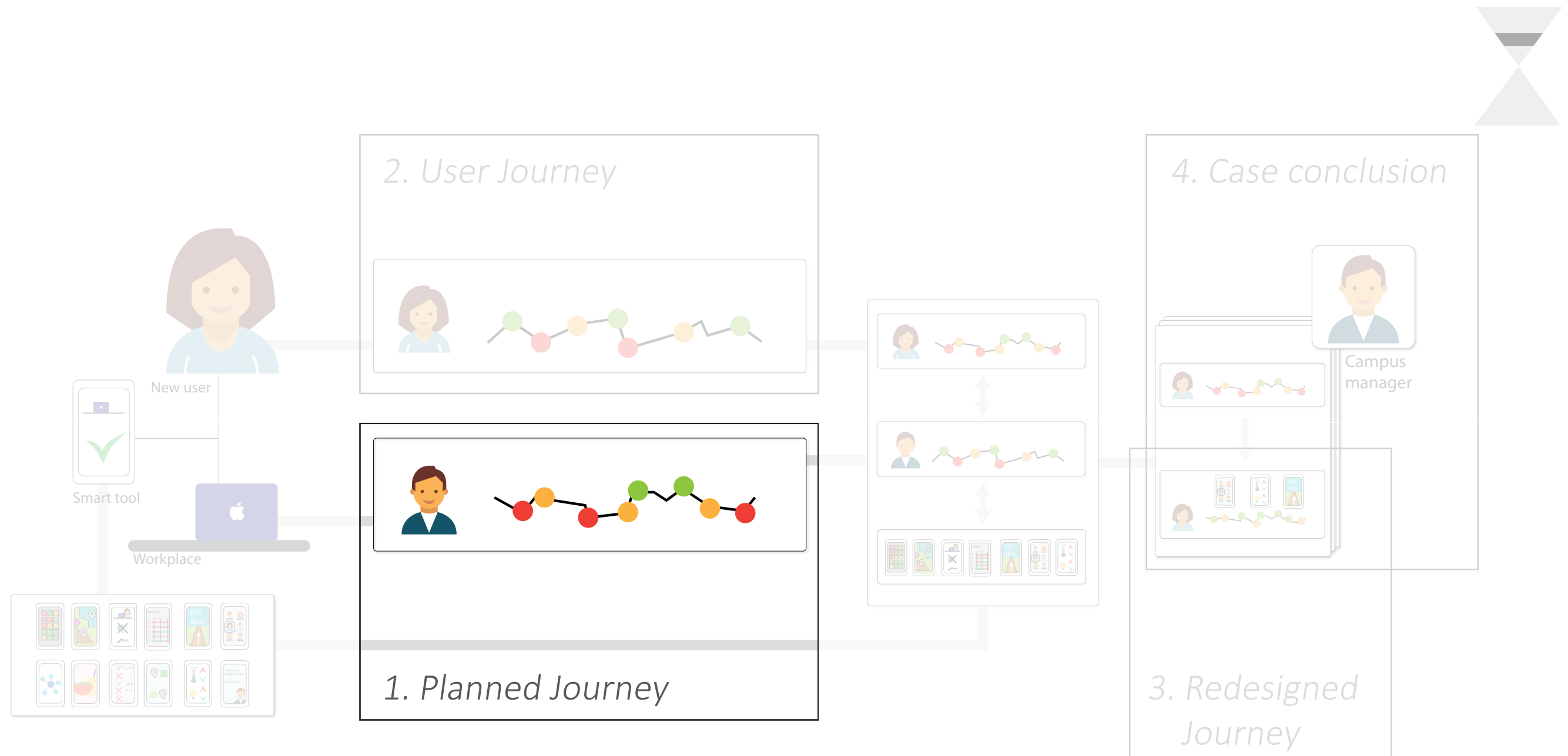
Planned journey

User journey

Redesigned journey

Case conclusion





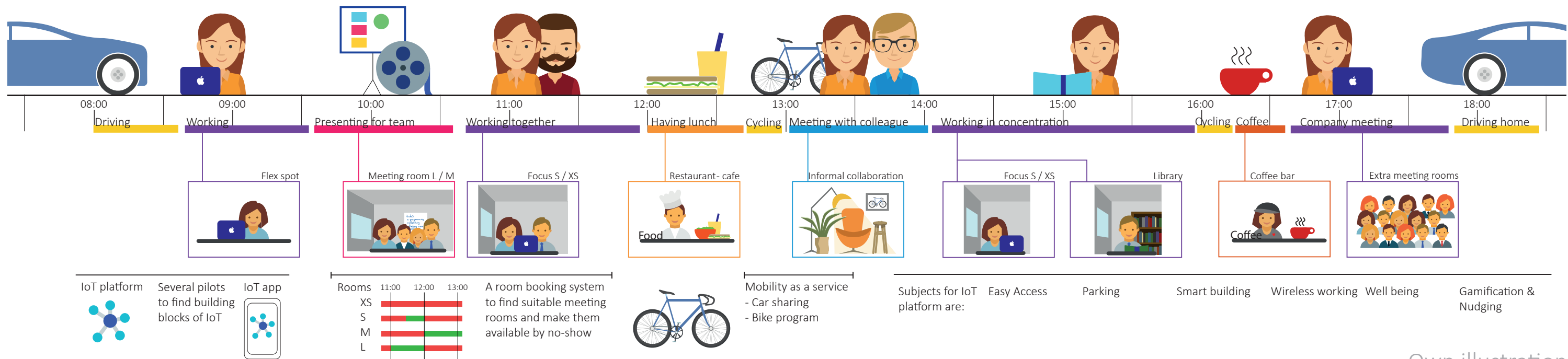
Planned journey



New building (opens in 2019)

Many ideas on smart tools

Pilot projects to test smart tools in the workplace



Own illustration

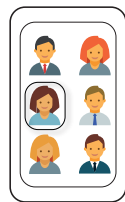
User journey



Satisfied with job



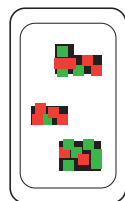
Background noises

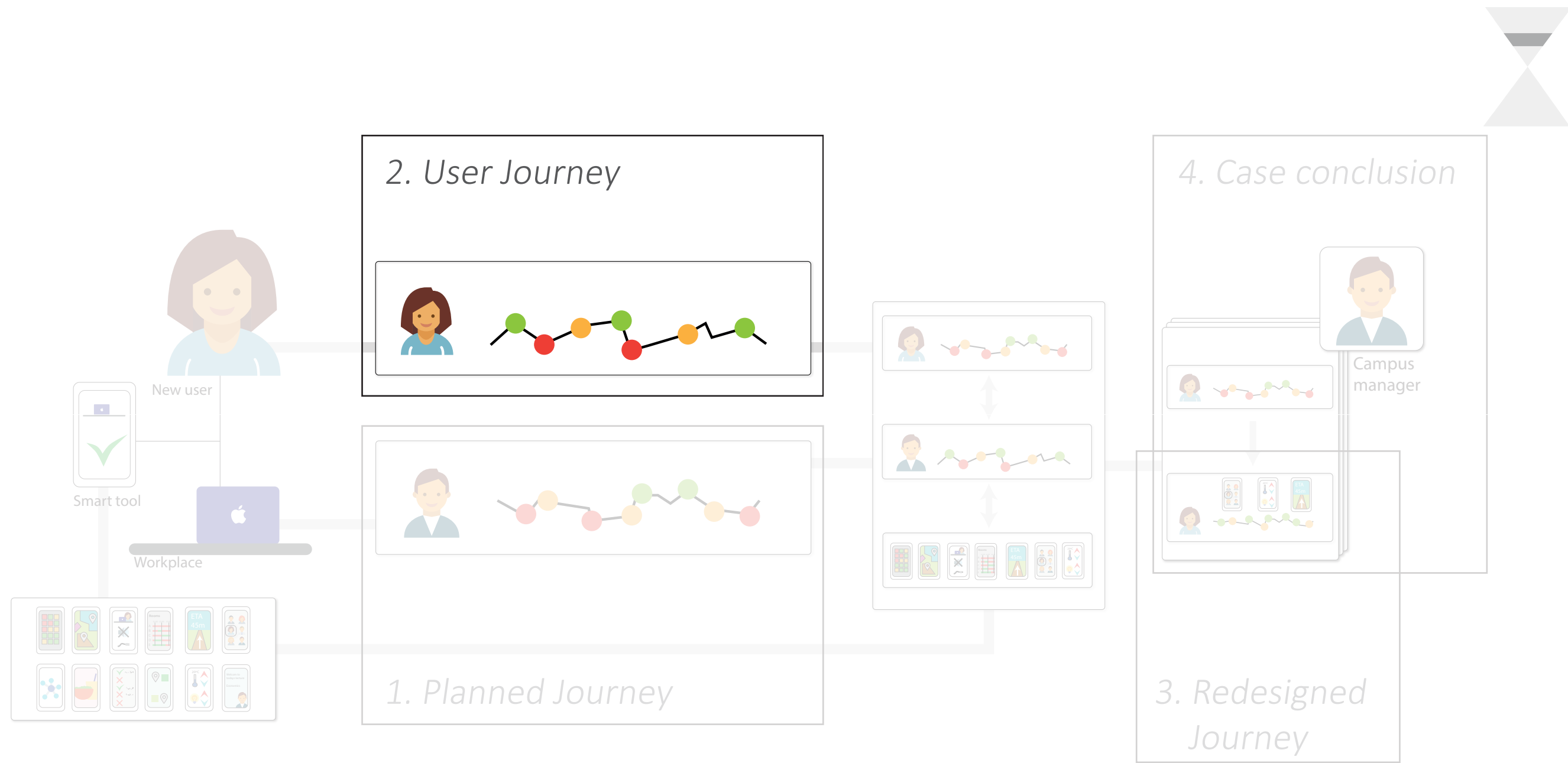


People finding application

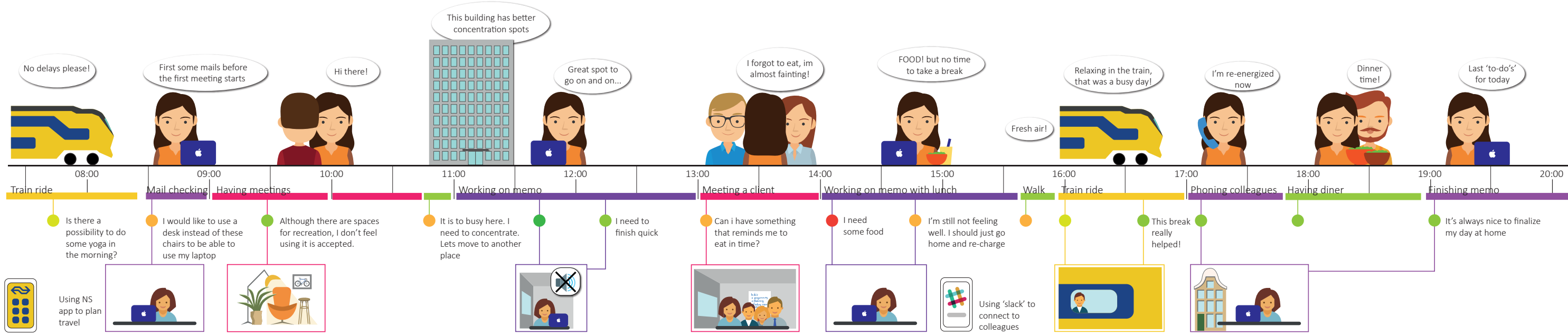


Noise cancelling headphone



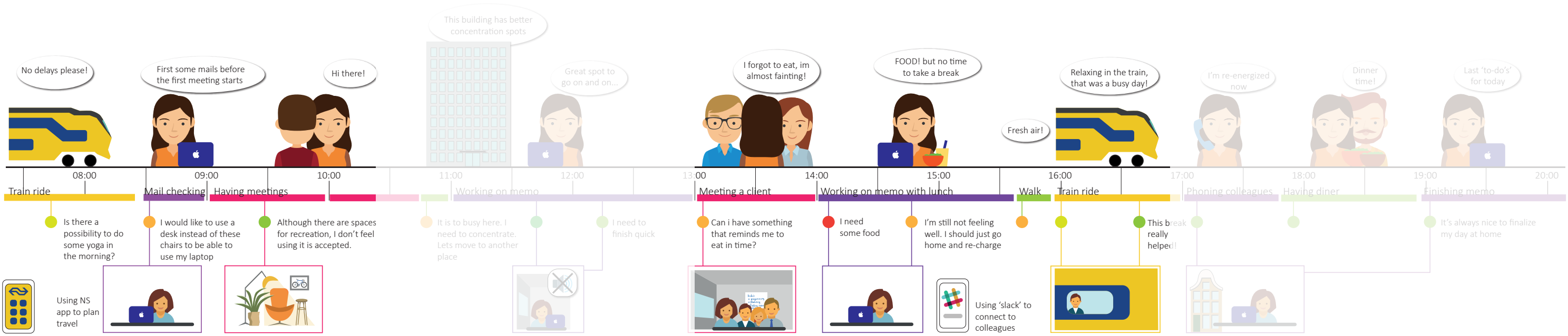


User journey



Own illustration

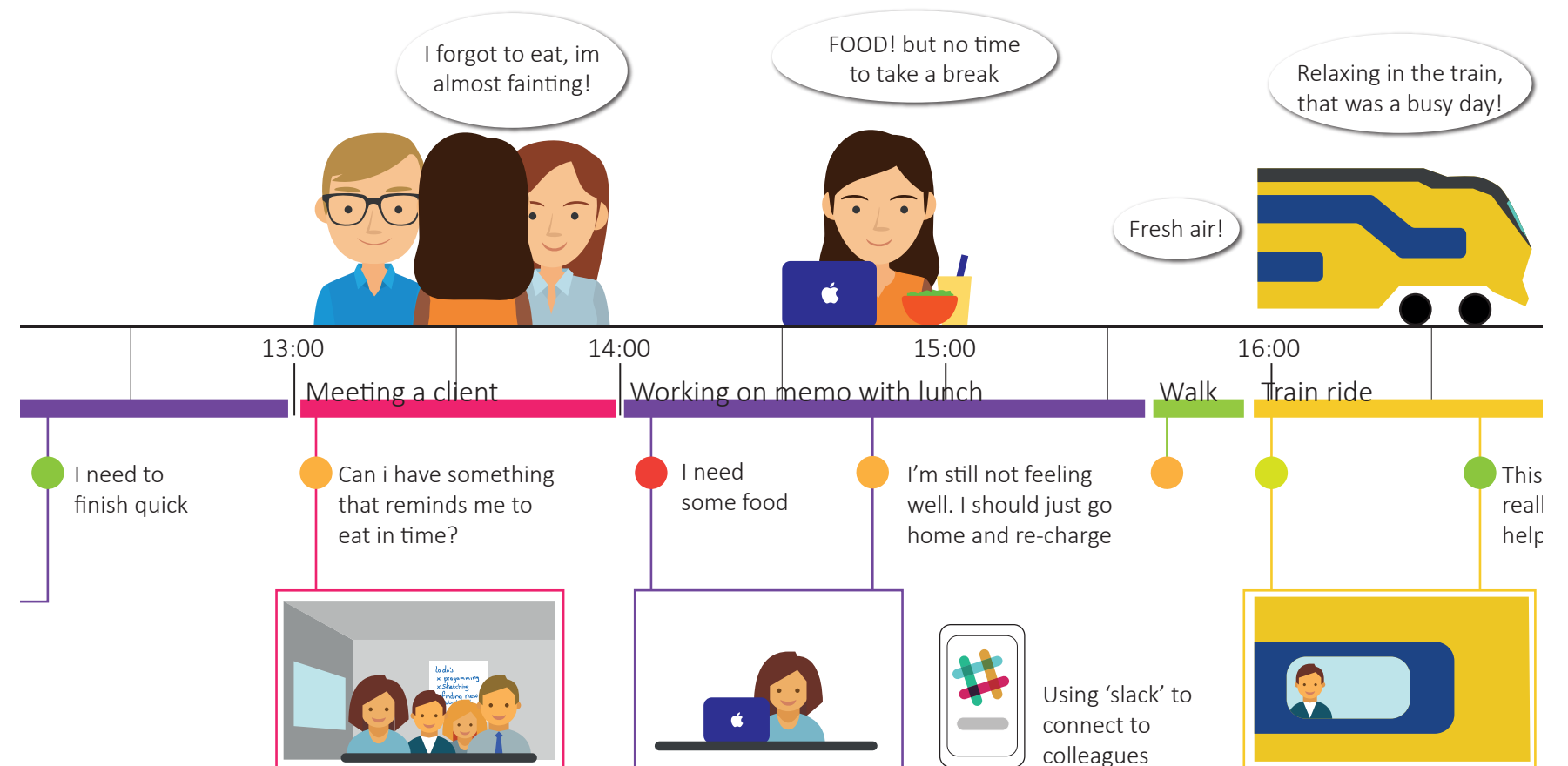
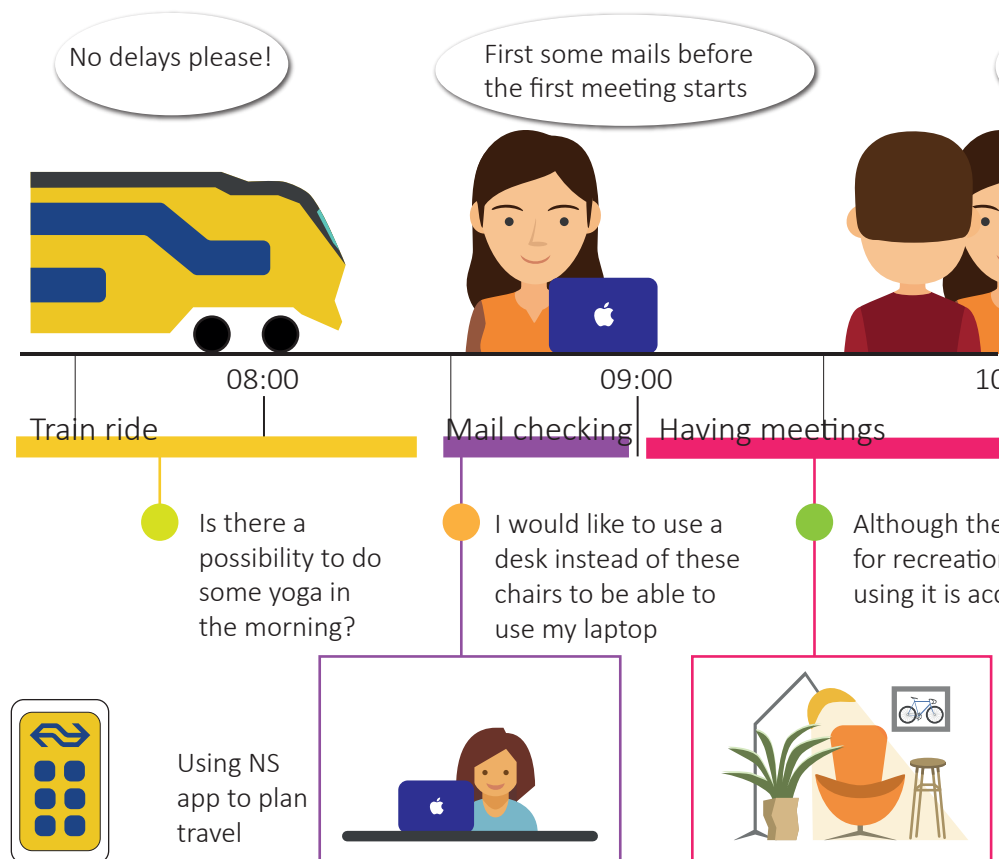
User journey



Own illustration

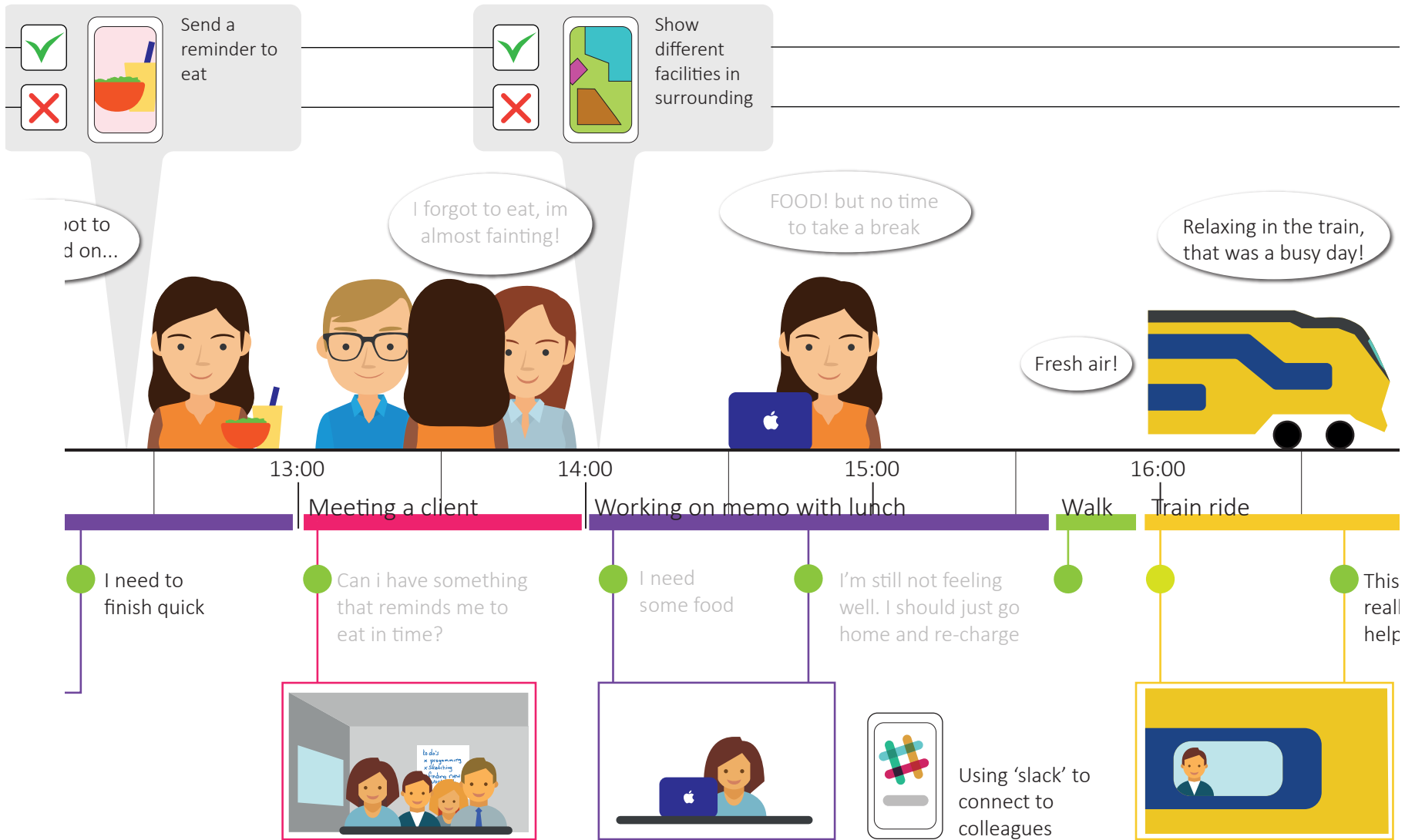
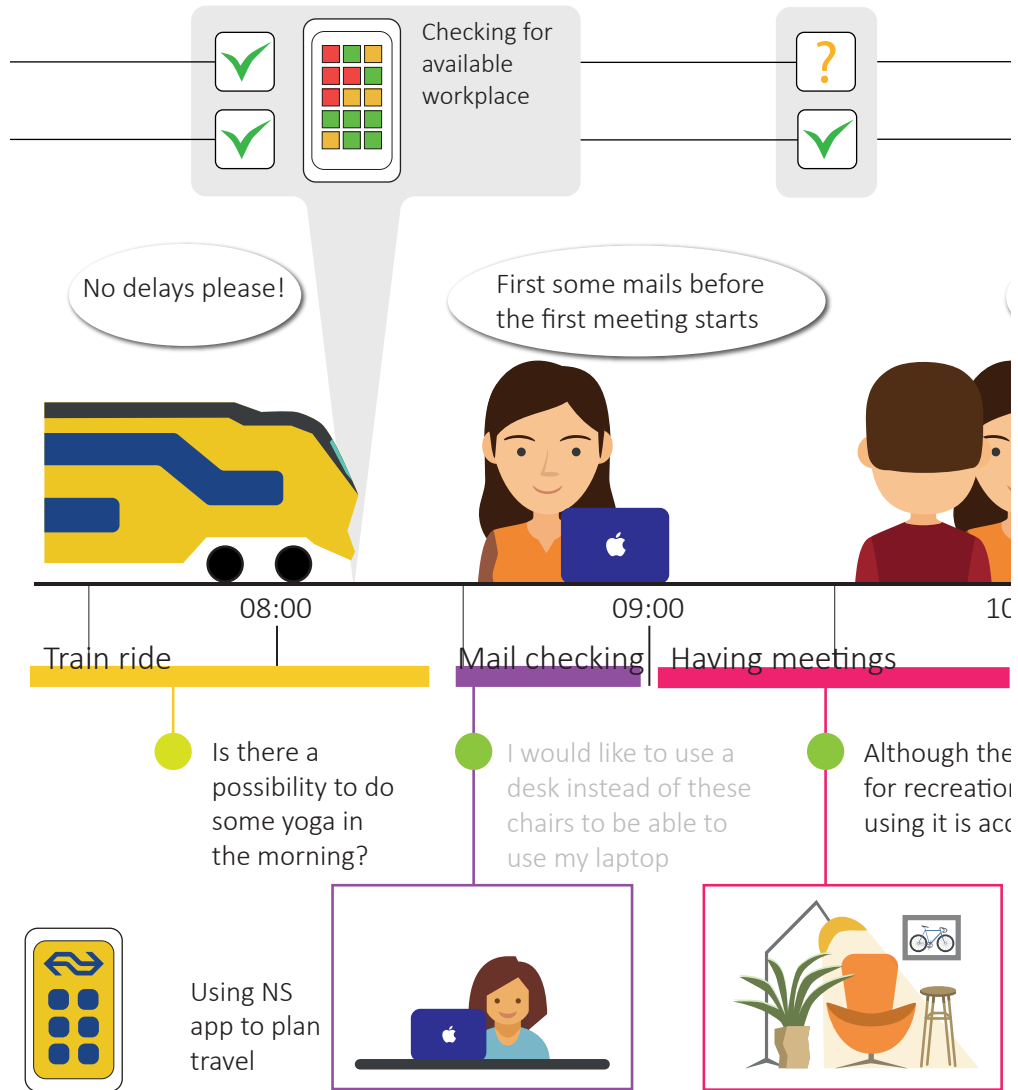
Available workplace

a reminder to eat

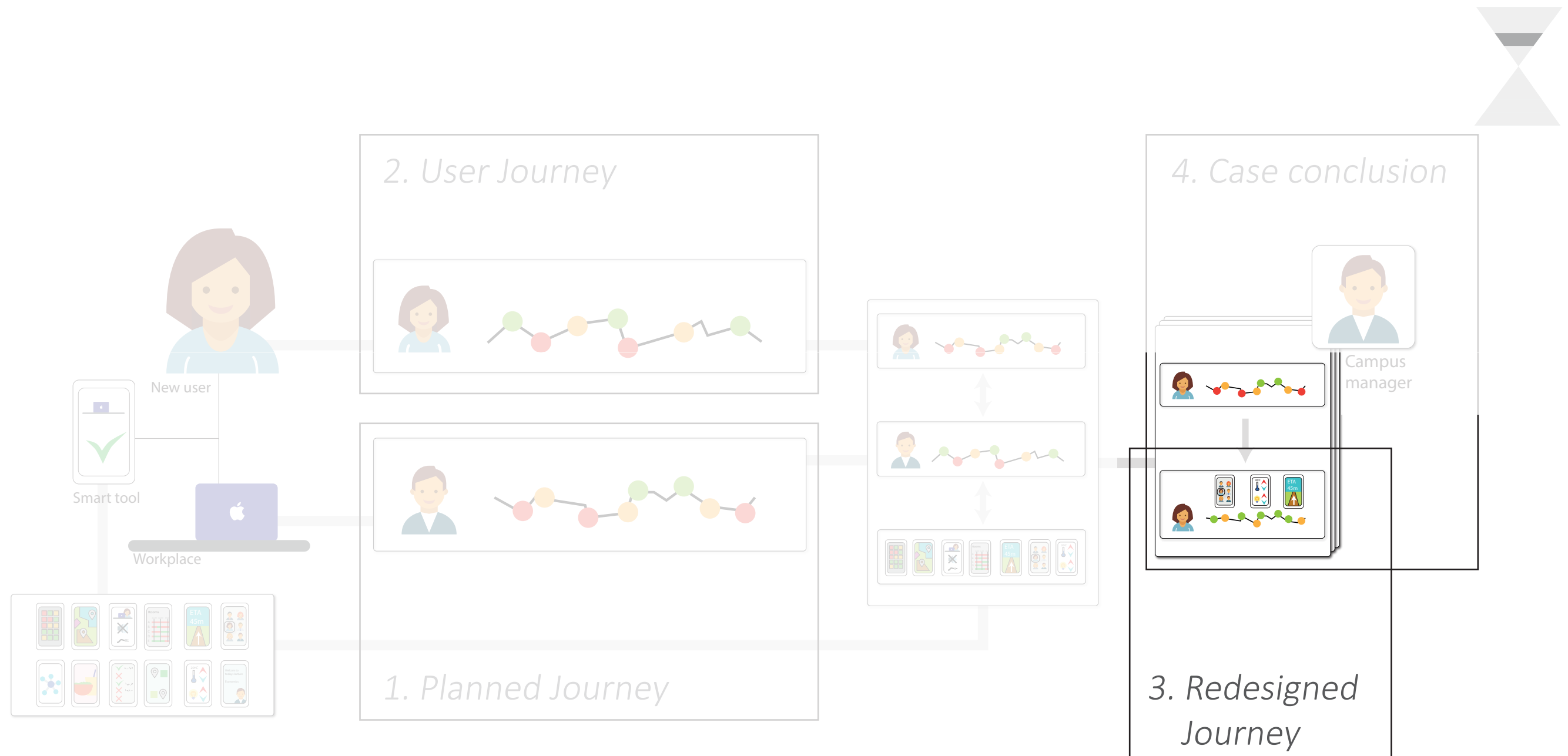


Own illustration

Redesigned journey



Own illustration

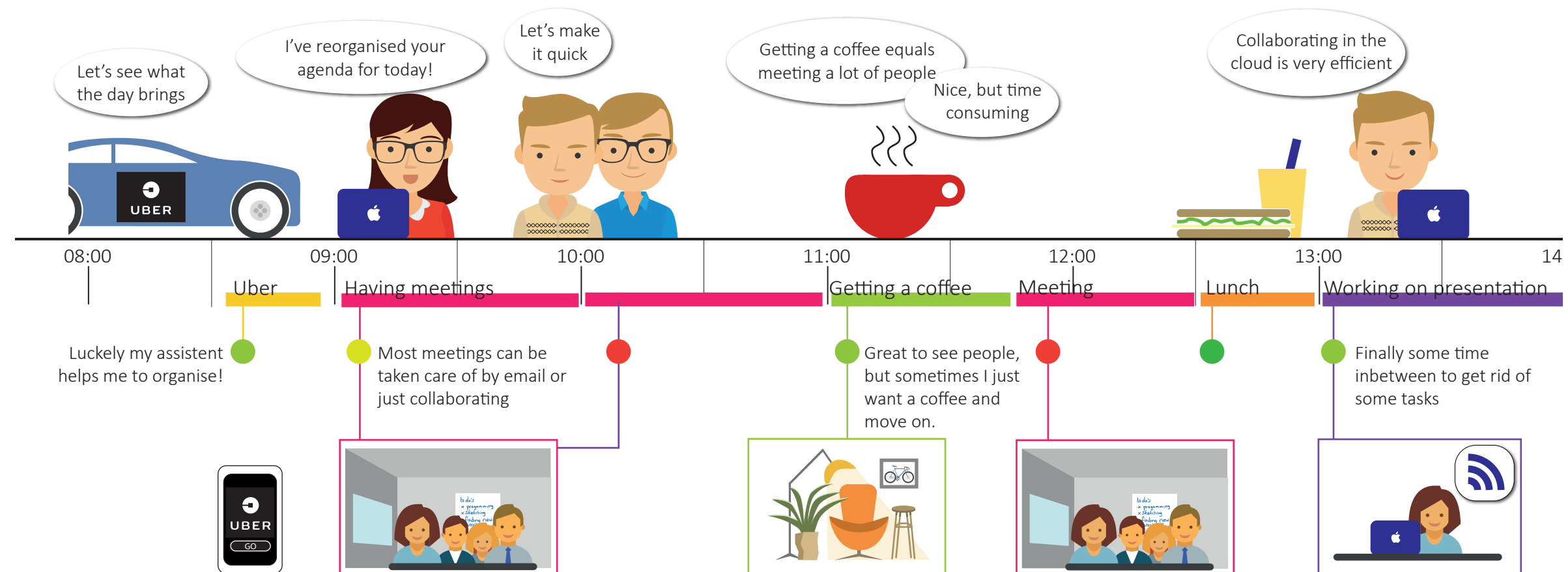


Other ING user

User journey



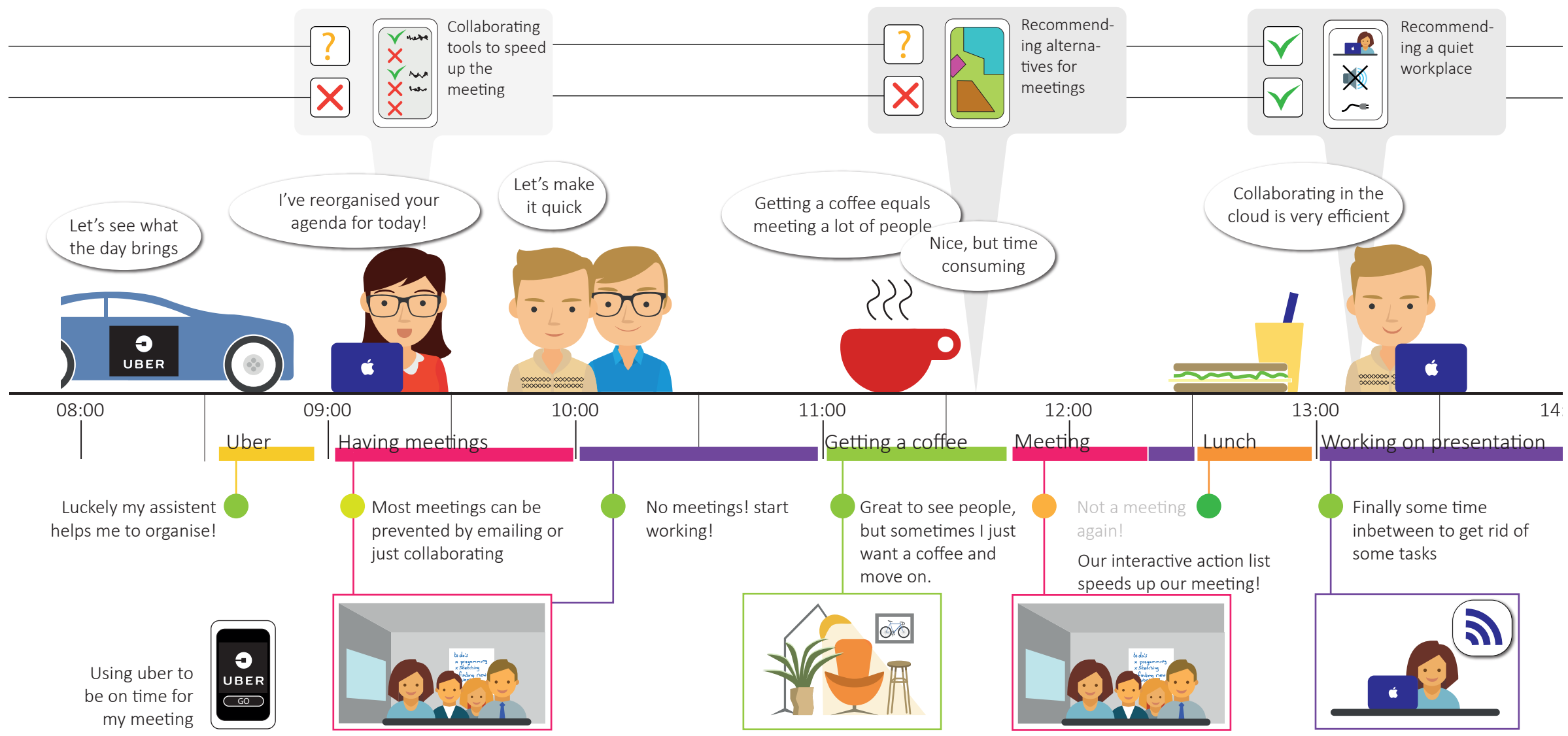
Don't like meetings



Own illustration



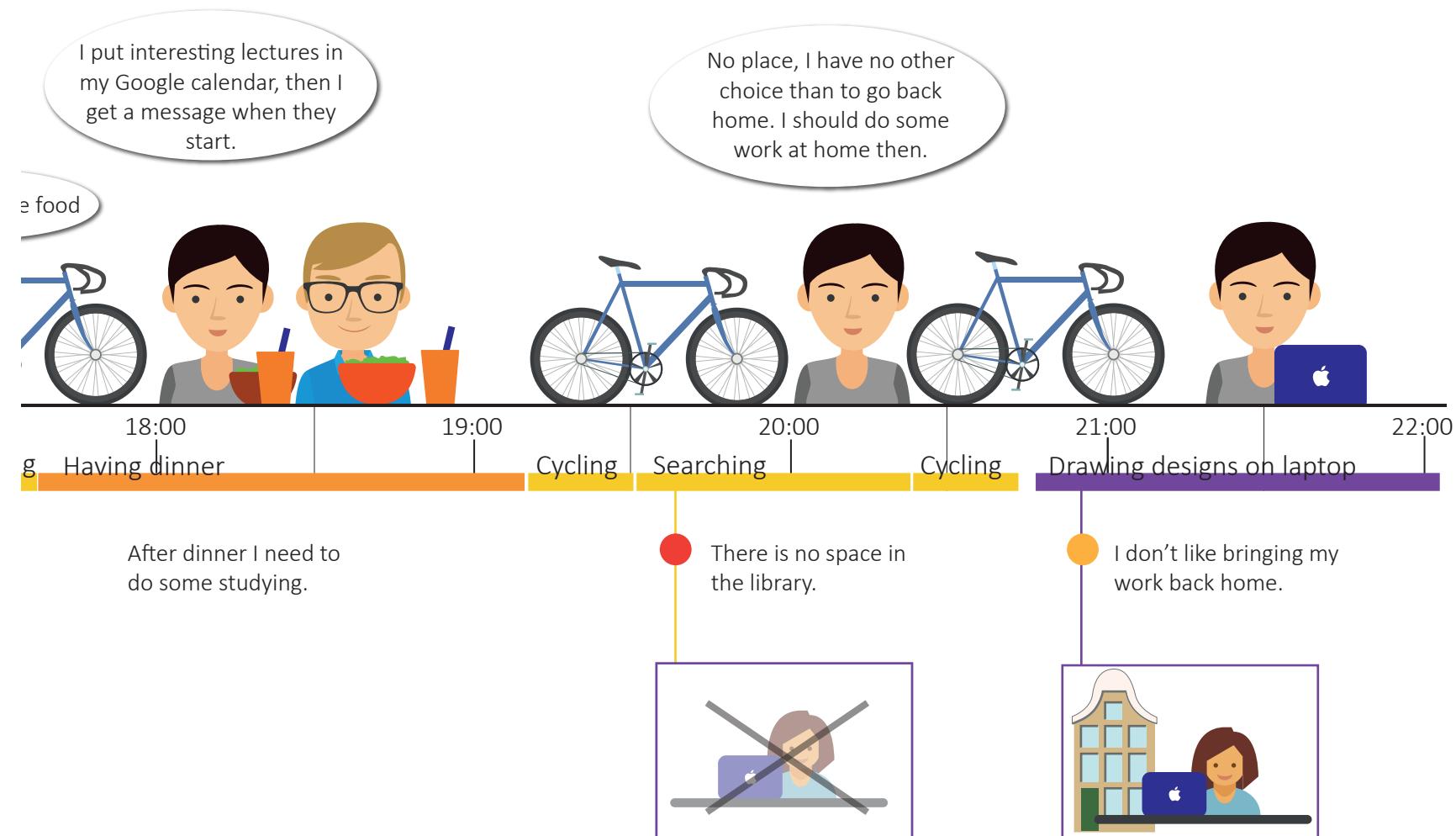
Redesigned journey



Other Case, other user

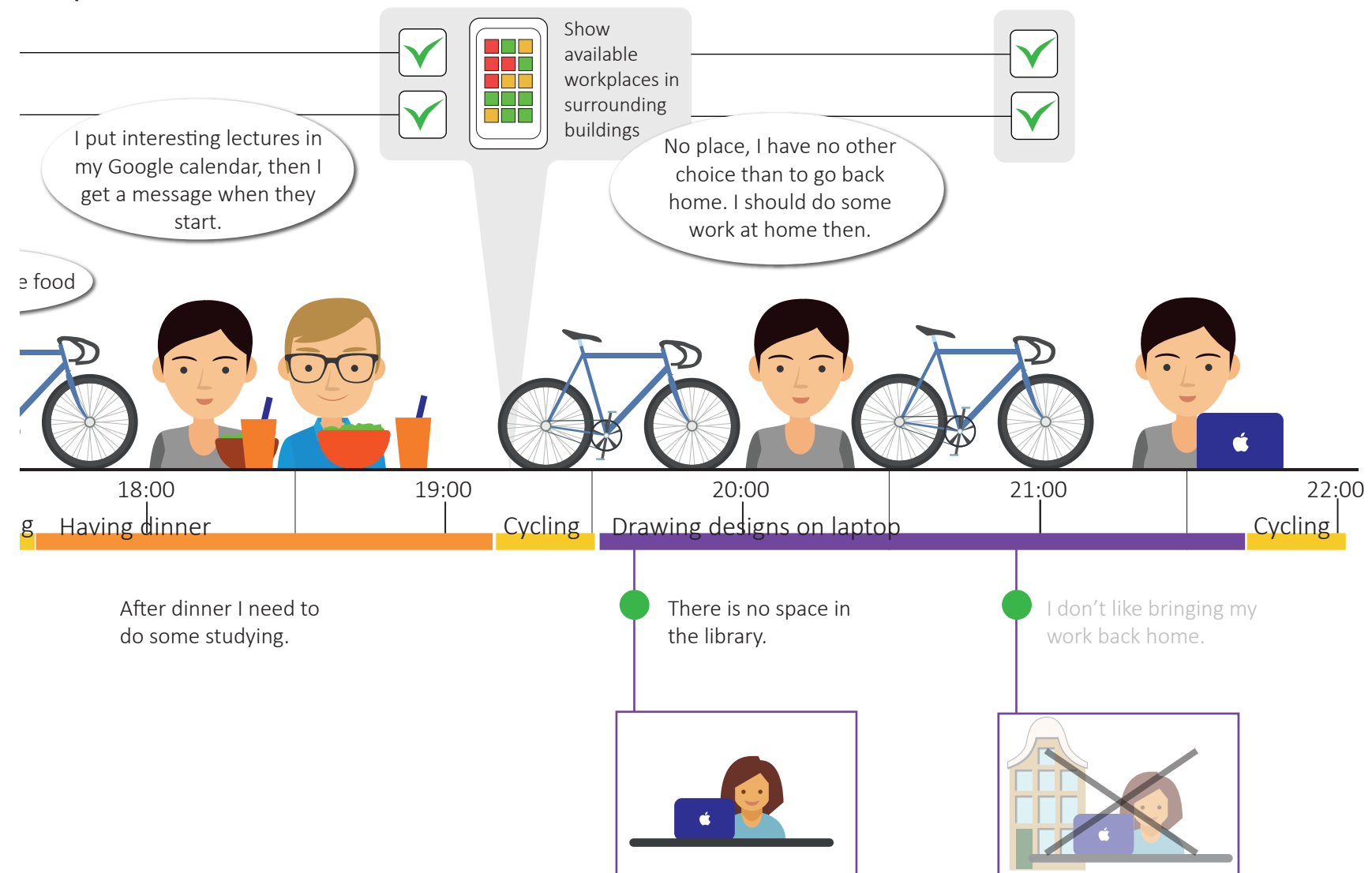
User journey

Available study place





Redesigned journey



Case conclusion

All requested smart tools fit the (broad) planned journey

Request go beyond the workplace itself

Very focussed approach

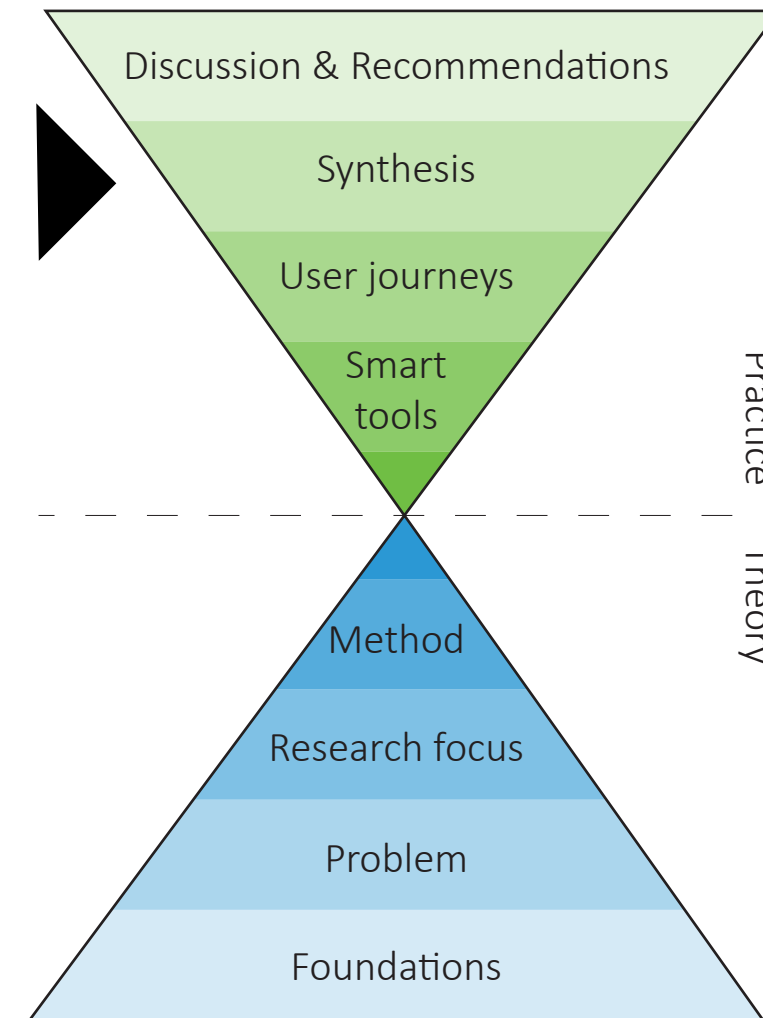
- Tailoring smart tools for one specific function

- Pilot of a smart tool to test it



Synthesis

Lessons learnt
Conclusion
Discussion and recommendations



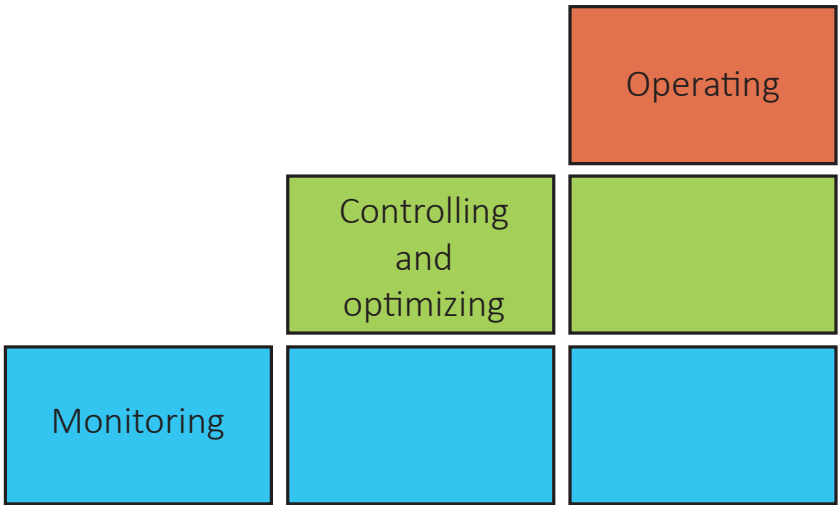


Smart tools

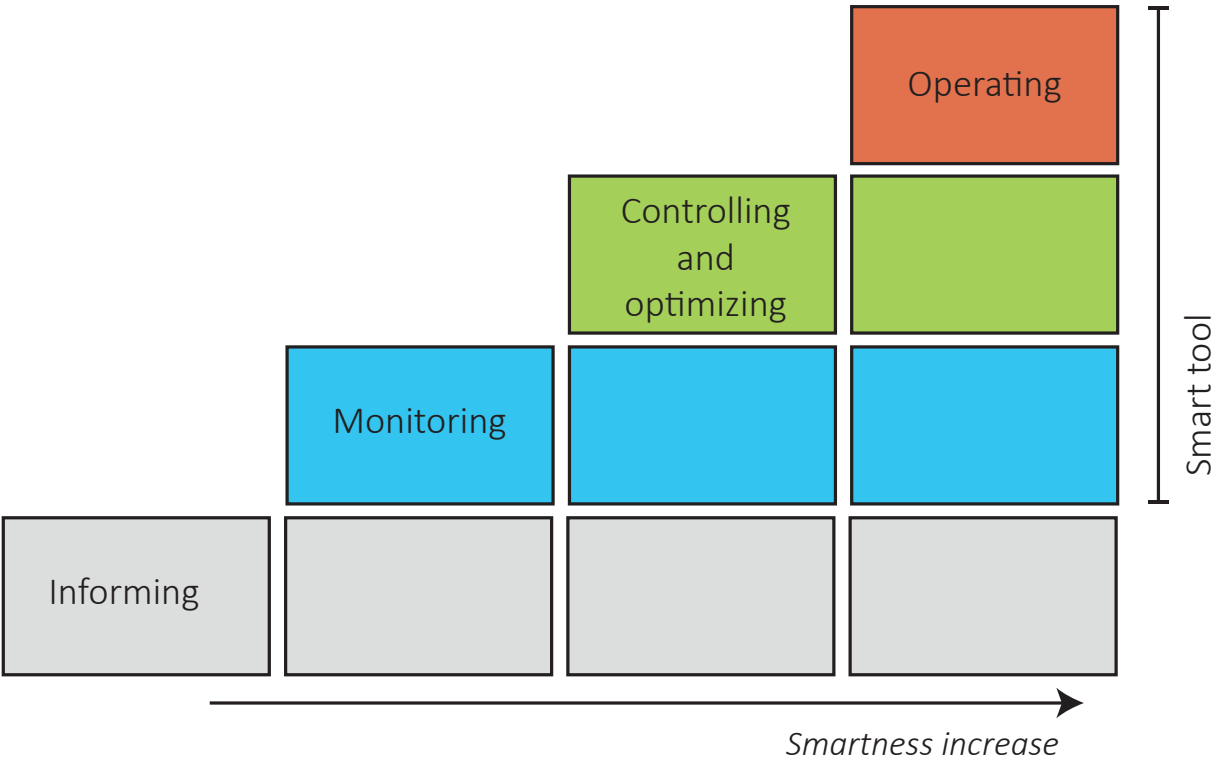
Future smart tool functions

Informing can be providing enough information already

Recommendations, no advertisements



The stages of smartness defined by Baumer et al. (2017)



Extra layer added to the stages defined by Baumer et al. (2017)

Own illustration



Smart tools

Differentiations within one function

Accuracy

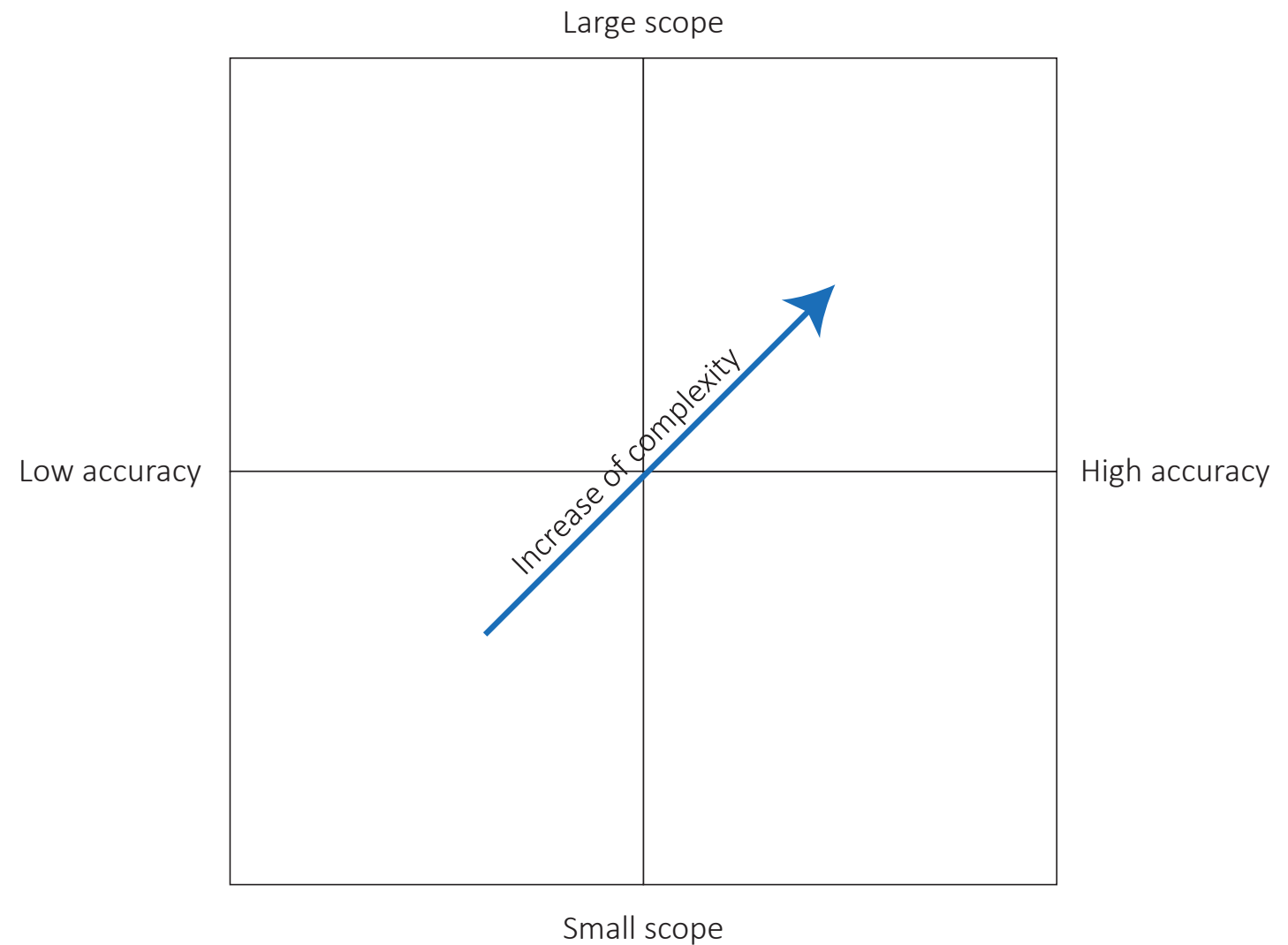
Building level

Desk level

Scope

in the workplace

Beyond the workplace



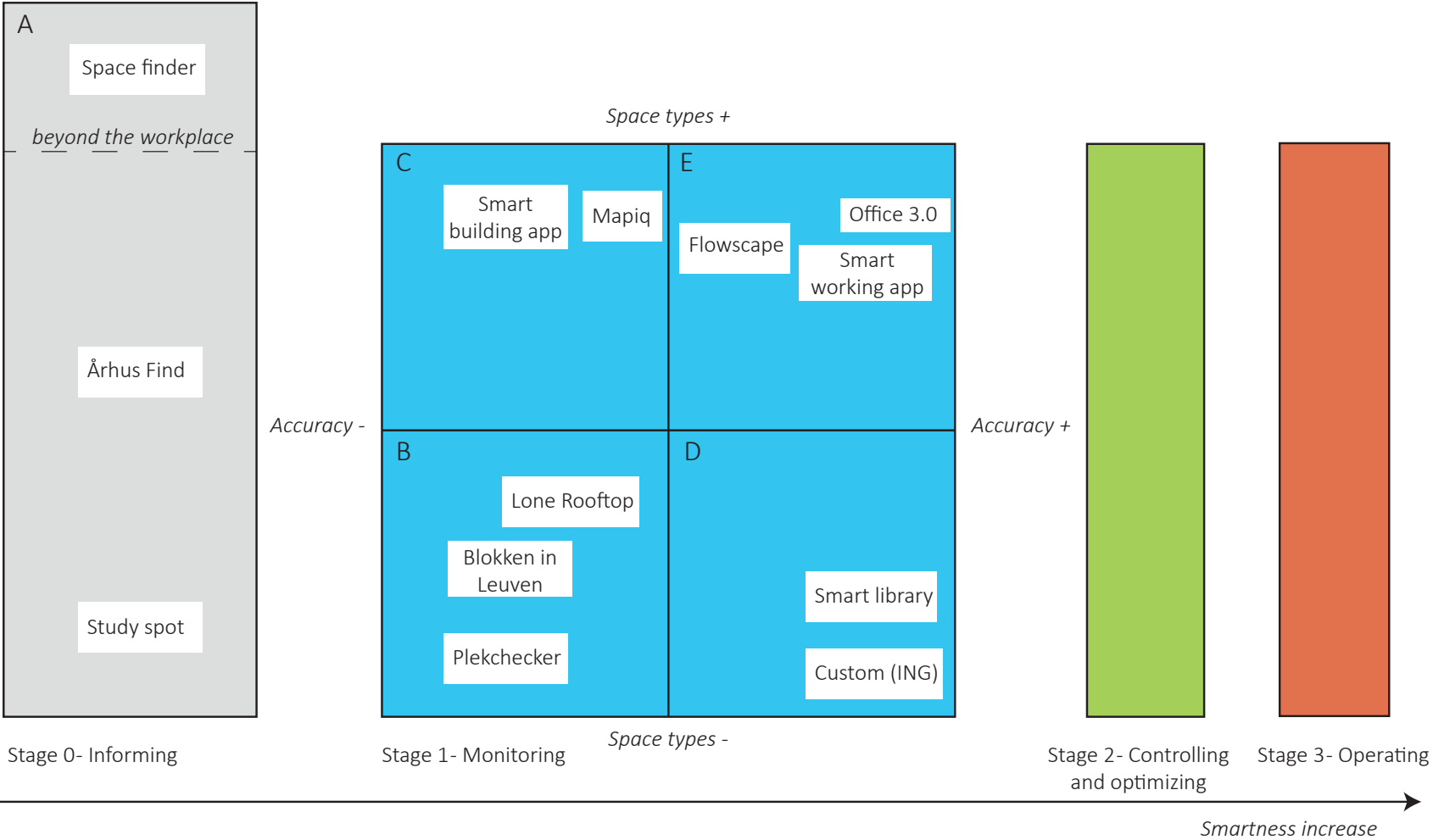
Own illustration

Roadmap (product)

For the campus manager

Overview of possibilities

Mapping differences



Own illustration

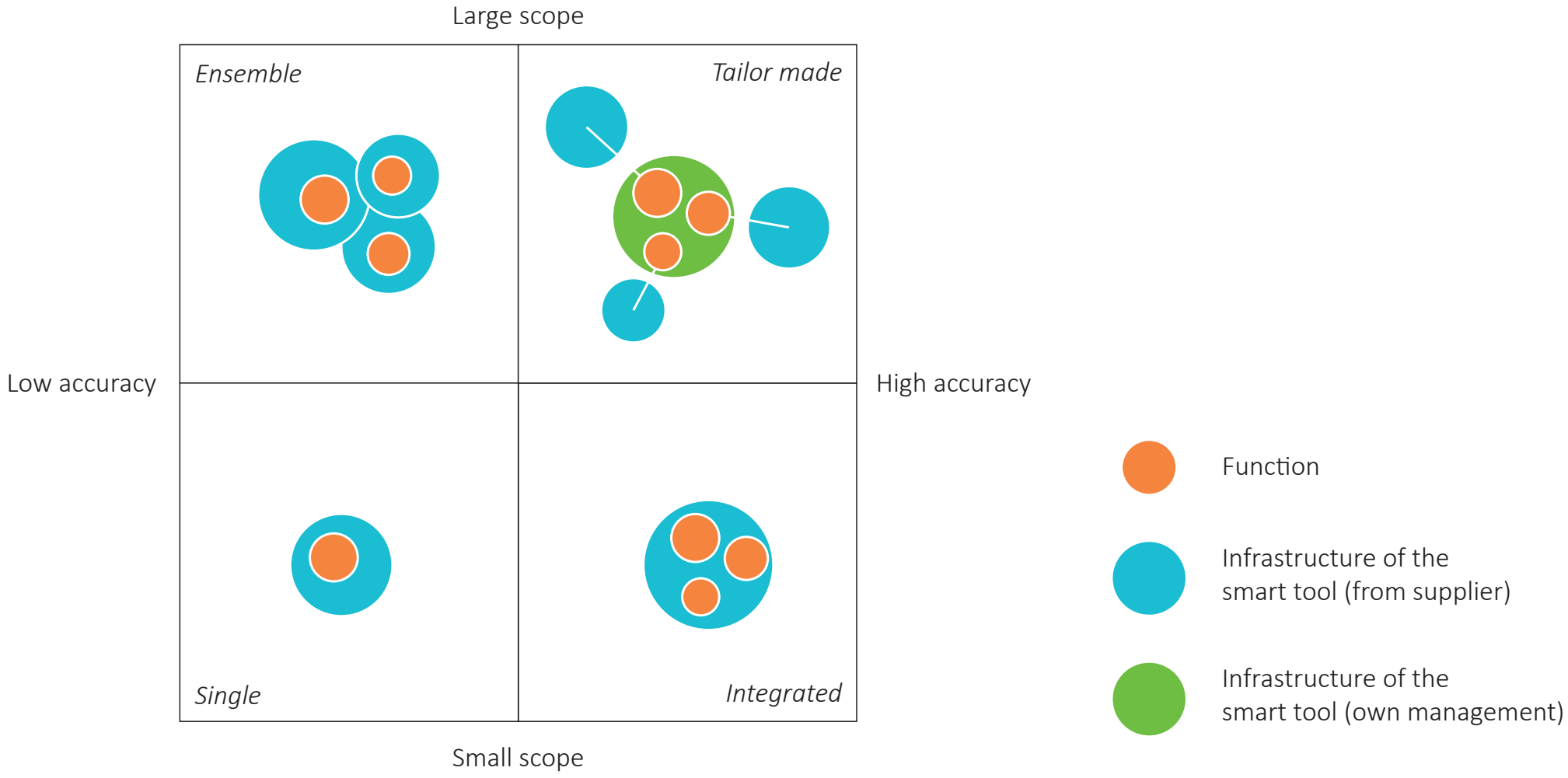


Roadmap (process)

For the campus manager

Ambition framework (user and organisation)

Strategies for smart tool implementation



Own illustration



Roadmap (process)

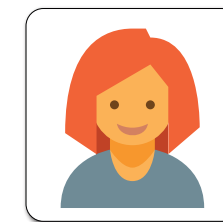
For the campus manager

Steps for implementing a smart tool

1. Research the benefits
2. Explore connections to other domains
3. Test the function in a small project



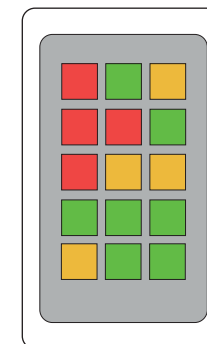
Campus manager



HRM



IT



Pilot group



Conclusion

Which functions of smart tools are needed to assist new campus users in choosing an appropriate work place throughout the day and what are the implications for the campus manager of the lessons learnt from these user insights, when exploring the possibilities of smart tools at the campus?

Smart tools

Smart tool requests from users are very diverse

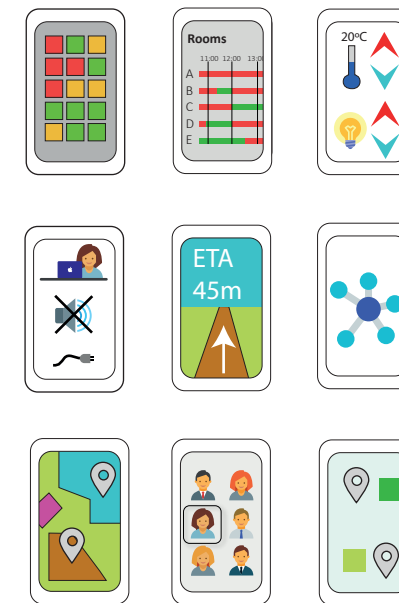
Brand new users request navigation

Smart tools have

- Different levels of accuracy

- Different combinations of functions

Smart tools go beyond the workplace



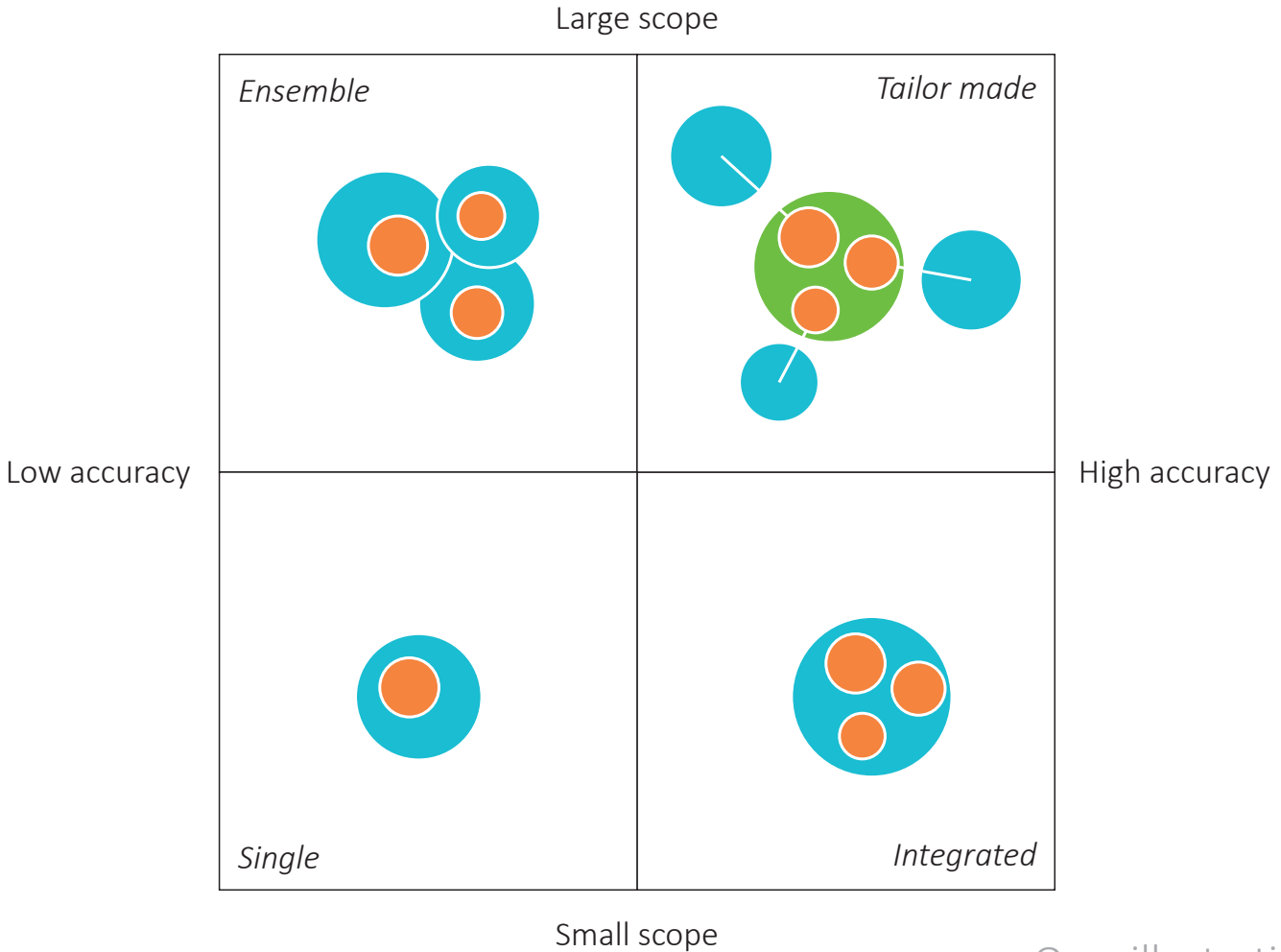
Own illustration



Implications for the campus manager

Ambition framework

- Function
- Infrastructure of the smart tool (from supplier)
- Infrastructure of the smart tool (own management)



Own illustration



Implications for the campus manager

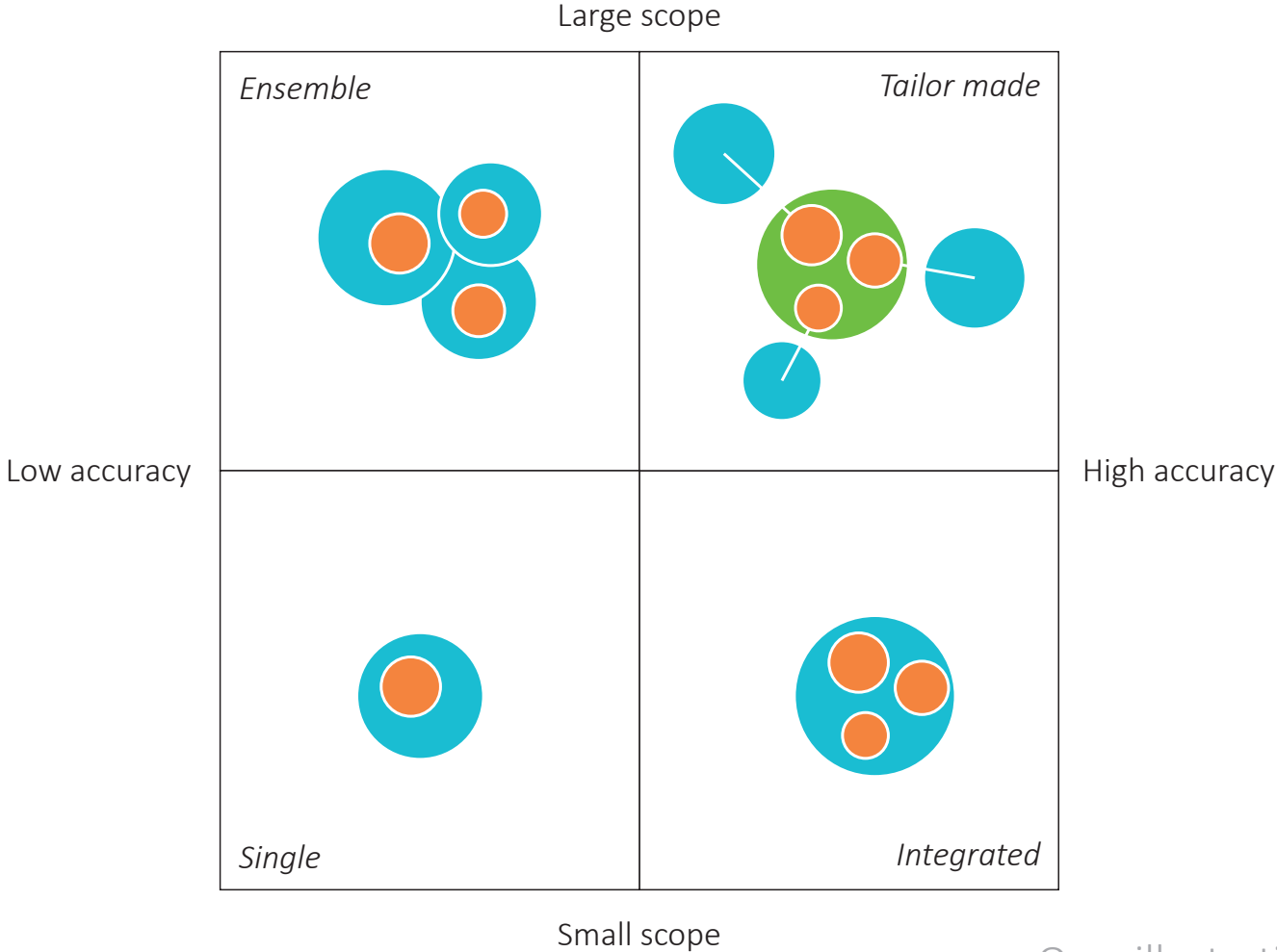
Ambition framework

For user and organization



Campus manager

- Function
- Infrastructure of the smart tool (from supplier)
- Infrastructure of the smart tool (own management)



Own illustration






Implications for the campus manager

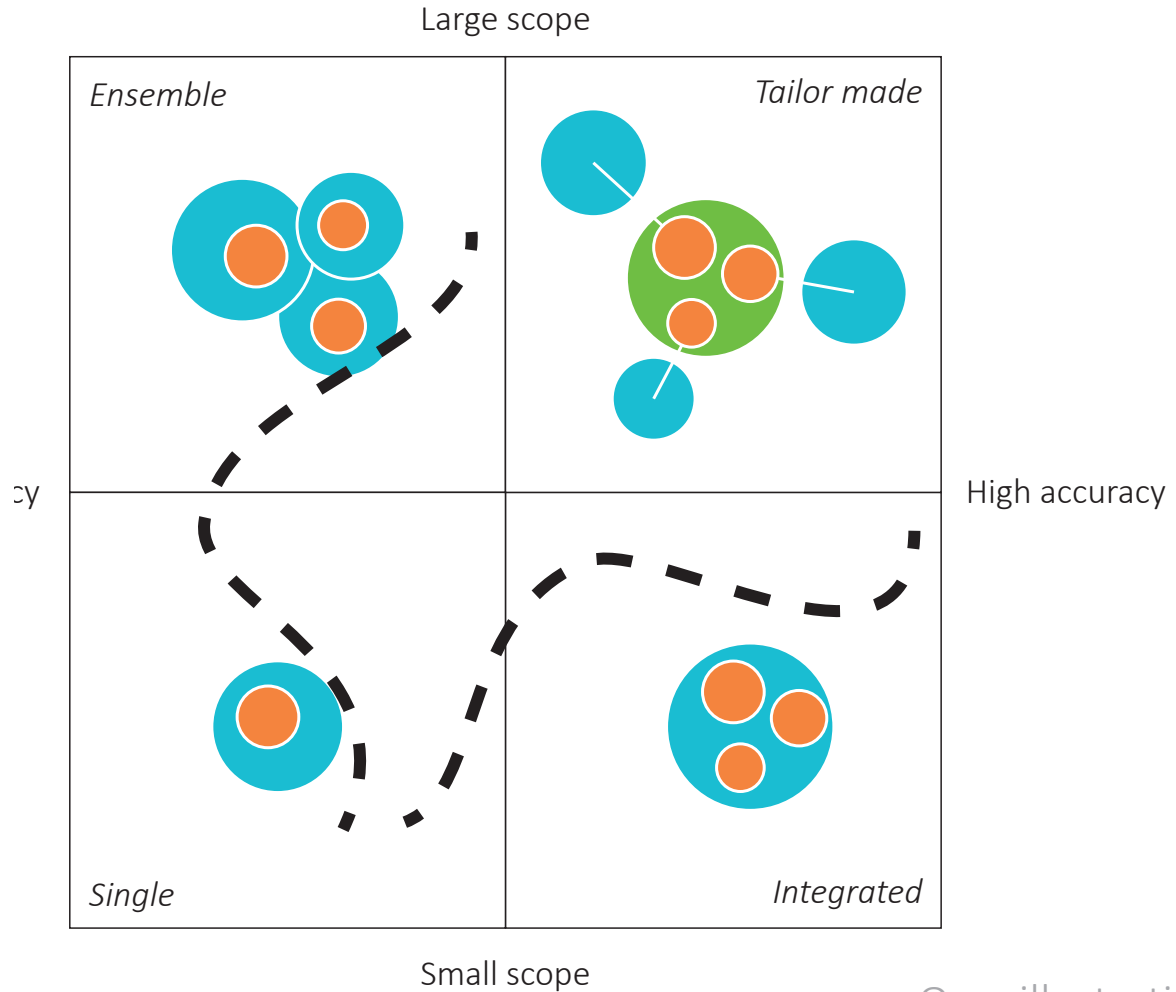
Ambition framework

For user and organization

Routing for the smart tool project

Implementation in steps

-  Function
-  Infrastructure of the smart tool (from supplier)
-  Infrastructure of the smart tool (own management)



Own illustration



Discussion and recommendations

Users and the workplace

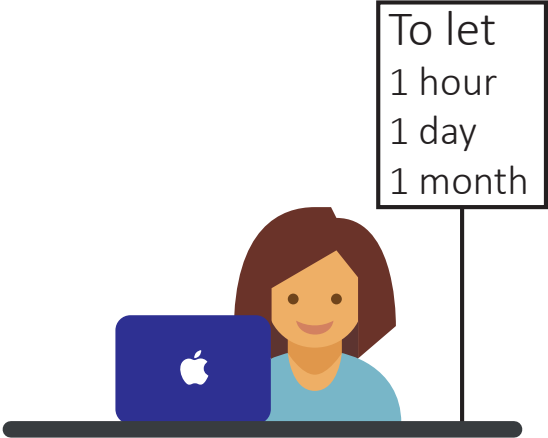
Other group of users

Mobility of users



Other work environments

WeWork / Spaces



Own illustration



Discussion and Recommendations

Incorporate other perspectives

User

Physical

Financial

Strategic

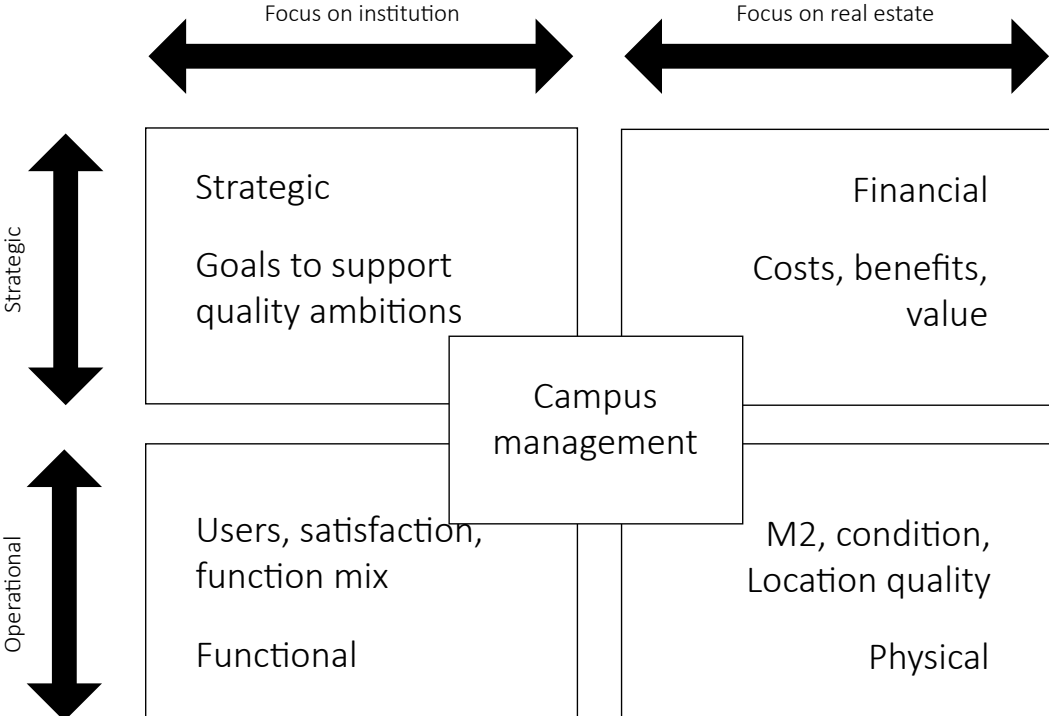


Figure derived from Den Heijer (2011)



Discussion and Recommendations

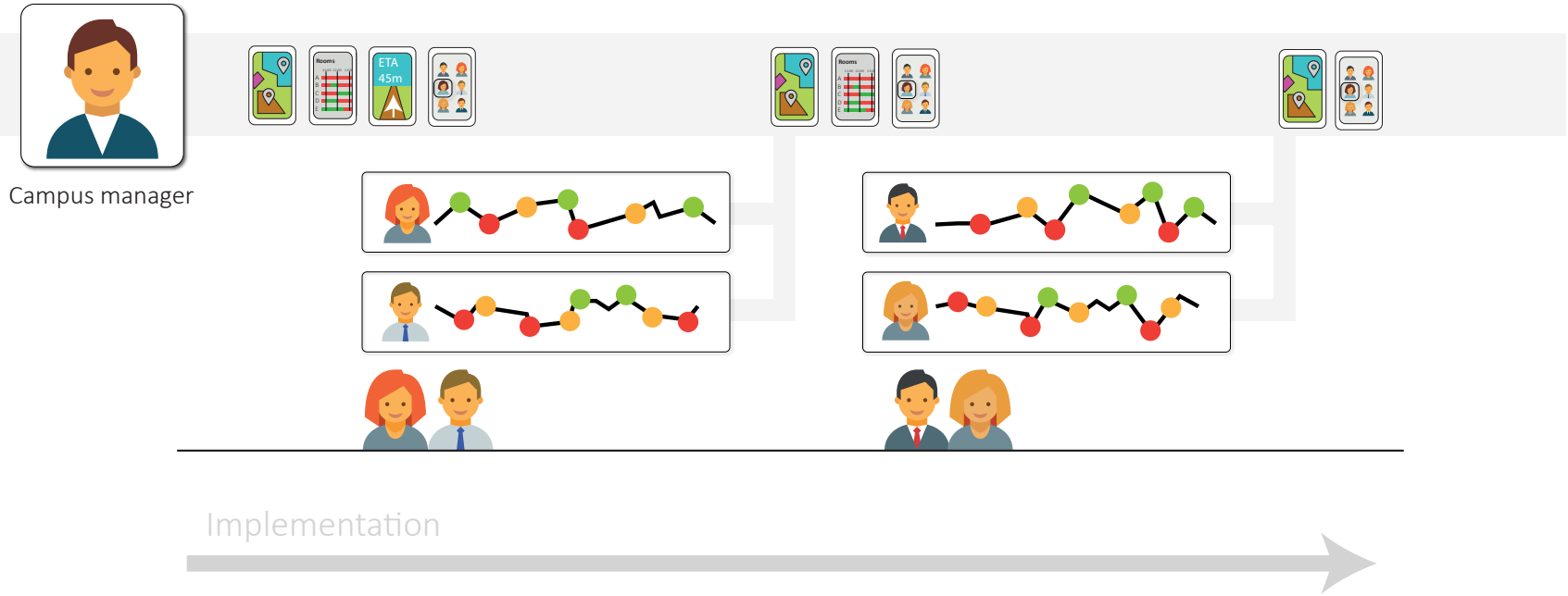
No pick, plug and play
Employee connection and change leadership

(Dery et al., 2017)

User Journey

During all phases of the process

(Boeijen et al., 2014)



Own illustration

How does your future
journey look like?

Thank you!

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Which kind of smart tool function would you like to use?

Which information are you willing to share to get this function?

Problem definition

Problem statement

Dynamic workplace use

People use the workplace in an increasingly dynamic way. Different places are used to perform working activities and the places are shared among a group of users. Varying in workplace type is important to meet the preferences of different users within the organisation.

Difficulties finding a spot

One of the downsides of this activity-based workplace concept is the difficulty to find colleagues and workplaces. The growing technology sector is developing variety of innovations to provide the user with information on the location of available places and colleagues.

Much unknown about the implementation of smart tools

Although the potential of smart tools is seen by the management of organisations, often projects on smart tools are not successfully implemented or even stopped during the pilot phase.

User insights are needed to find the right smart tools for the workplace.

Incorporating the preferences and needs of the users and obtaining knowledge on new innovations are important to give the campus manager the necessary information to make smart tools at the workplace work.

Problem definition

Research aim

Understand workplace problems of users

The aim of this research is to gather a deeper understanding of the problems new users encounter during their day at the workplace and to connect these problems to specific functions of smart tools.

Connect problem to smart tool

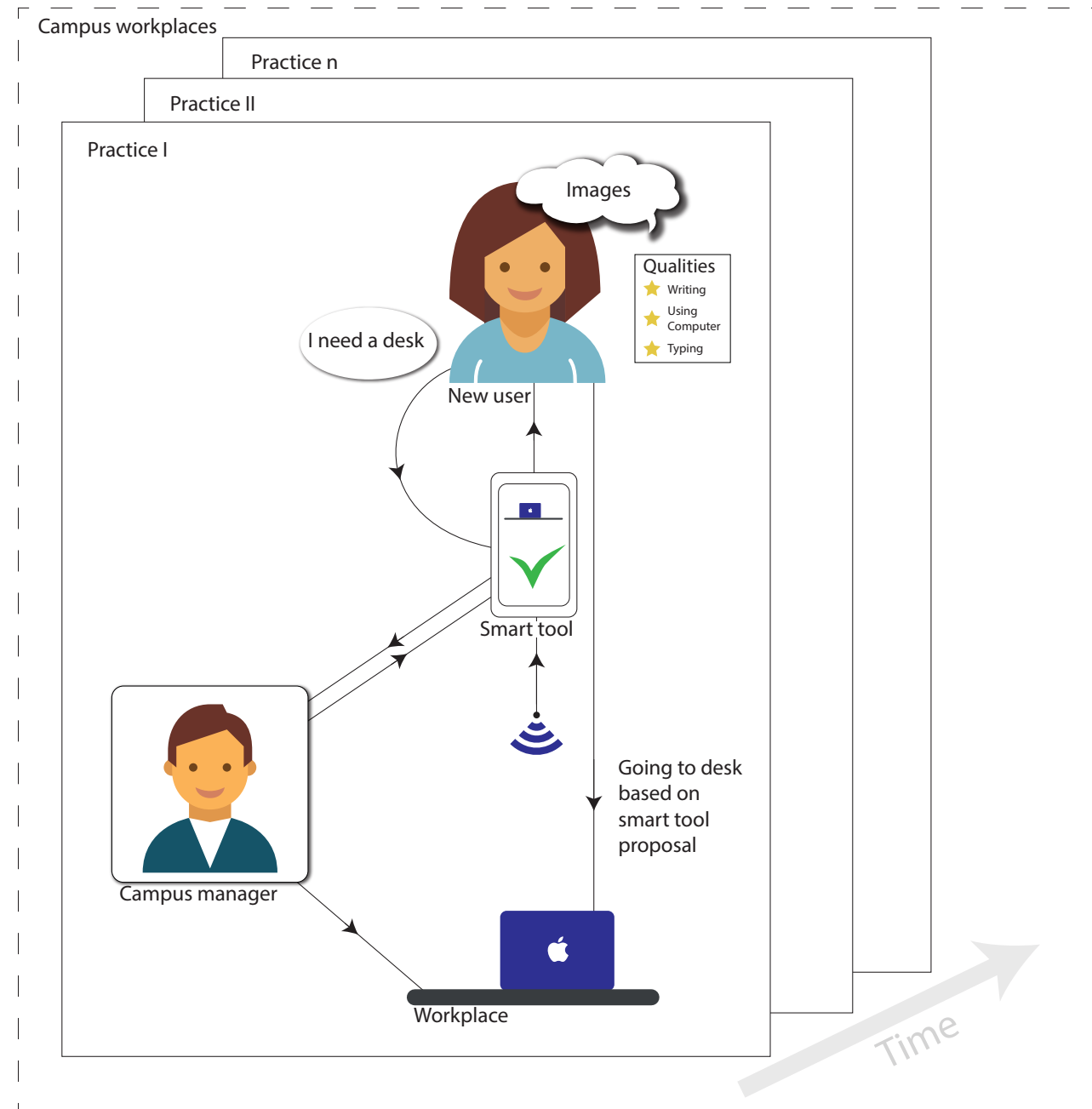
By showing the connection between workplace related problem and smart tool, insight is given on how the work place experience can be optimized during the day on campus and what the role of already available tools in this process can be.

Ideas for the campus manager

These findings can help the campus manager in making plans for the exploration or implementation of smart tools in the workplace.

Theoretical framework

Conceptual model

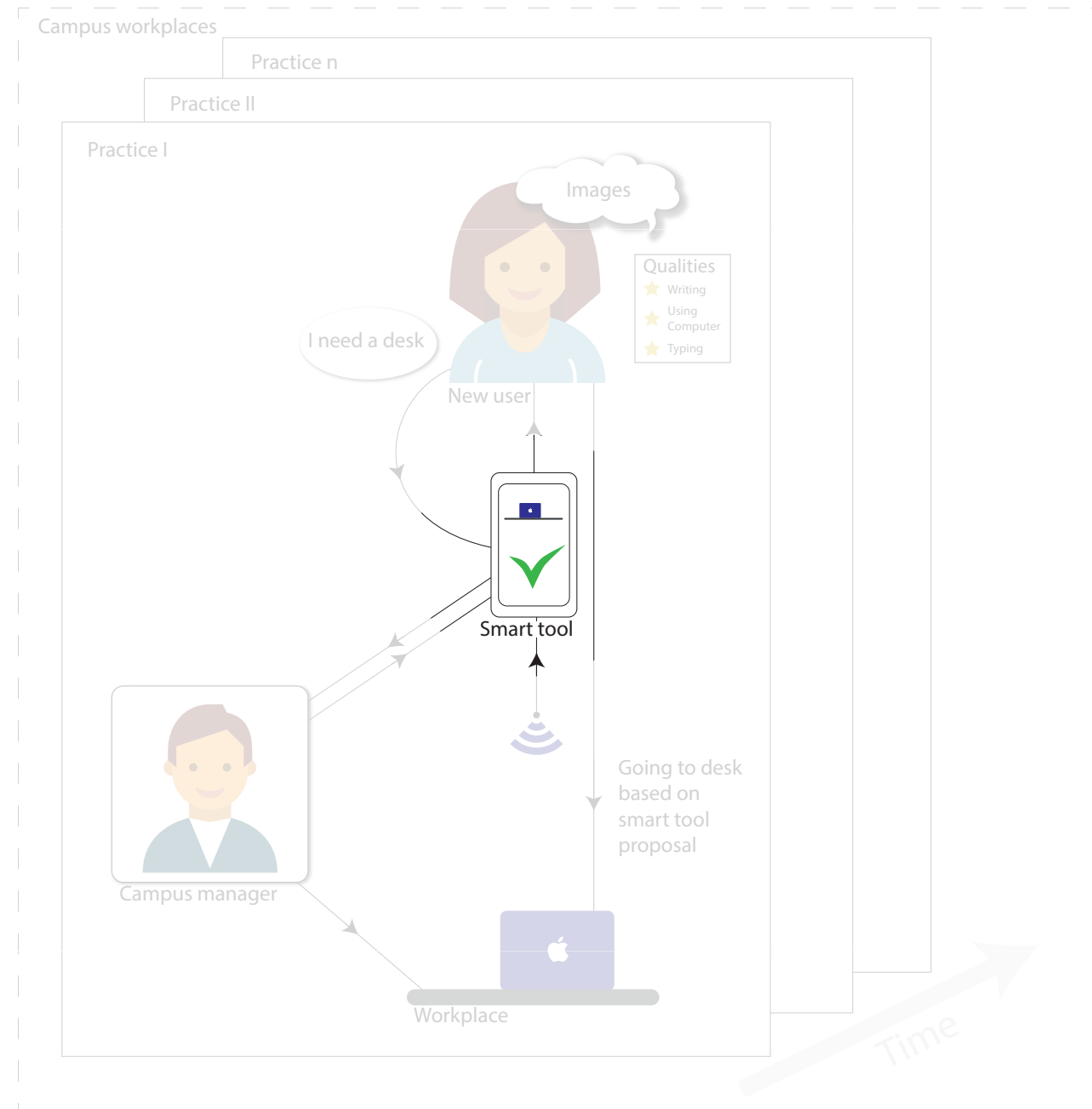


Theoretical framework

Conceptual model

Smart tool

Part I

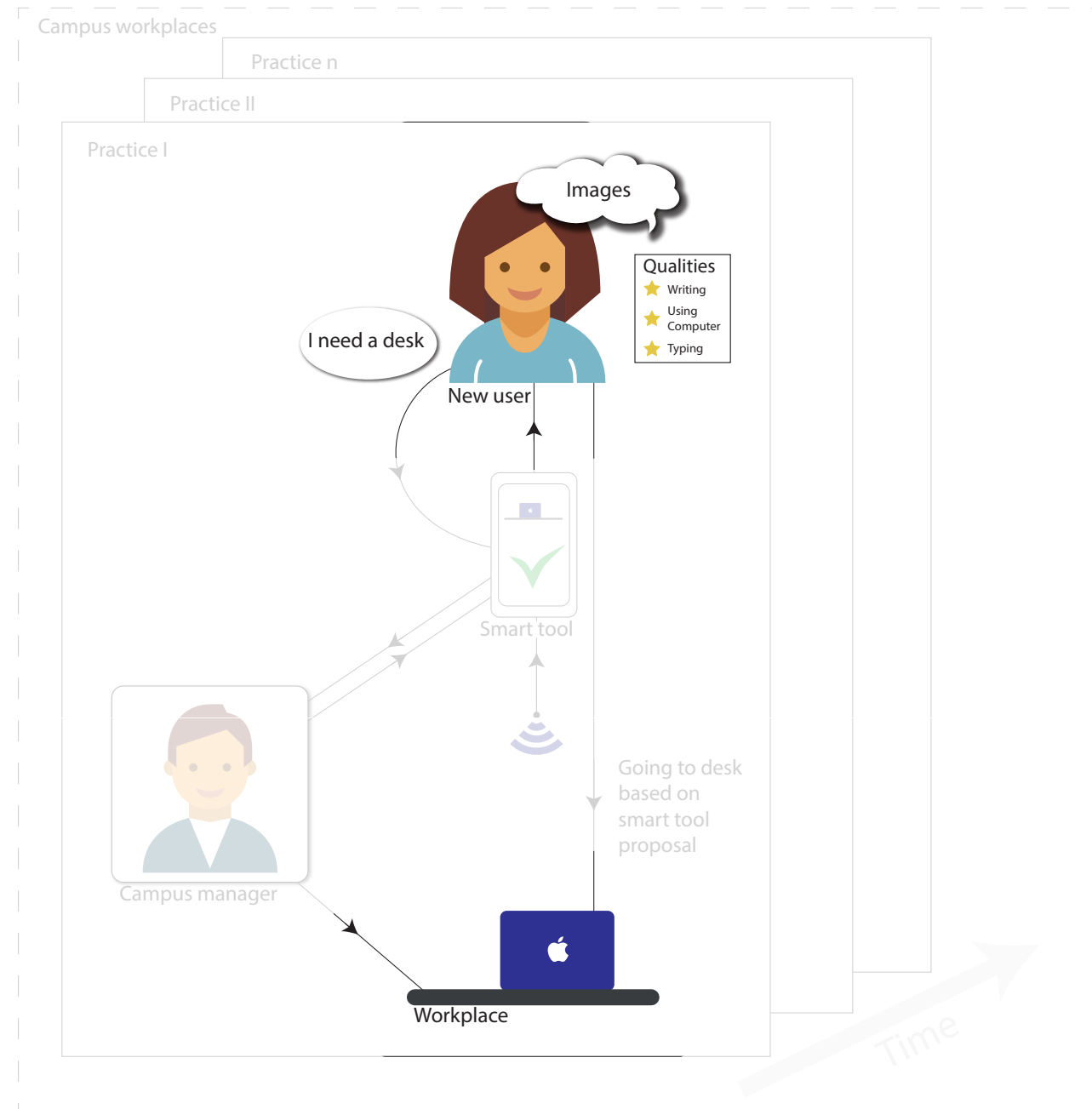


Theoretical framework

Conceptual model

Workplace problems users encounter

Part II

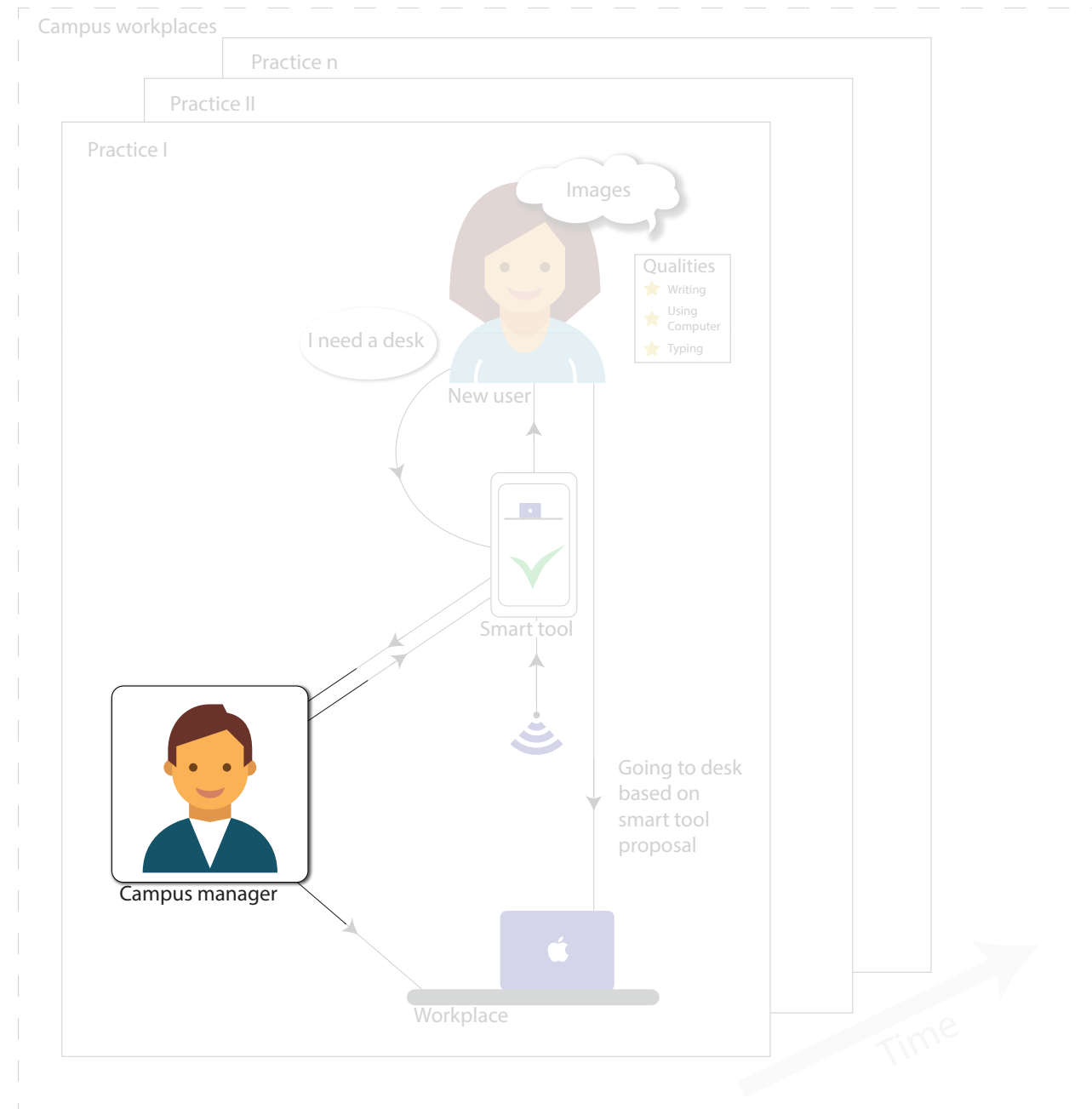


Theoretical framework

Conceptual model

Insights for the campus manager

Synthesis



Differences and similarities

Great variety of requested smart tools

Scope differences between public and private organisations

Smart tools strongly related to workplace concept

Smart tool requests go beyond the workplace

New users

Navigation helpfull for brand new users

Especially when there is no assigned workplace

Navigation, in combination with workplace availability, helps users in discovering new workplaces on campus

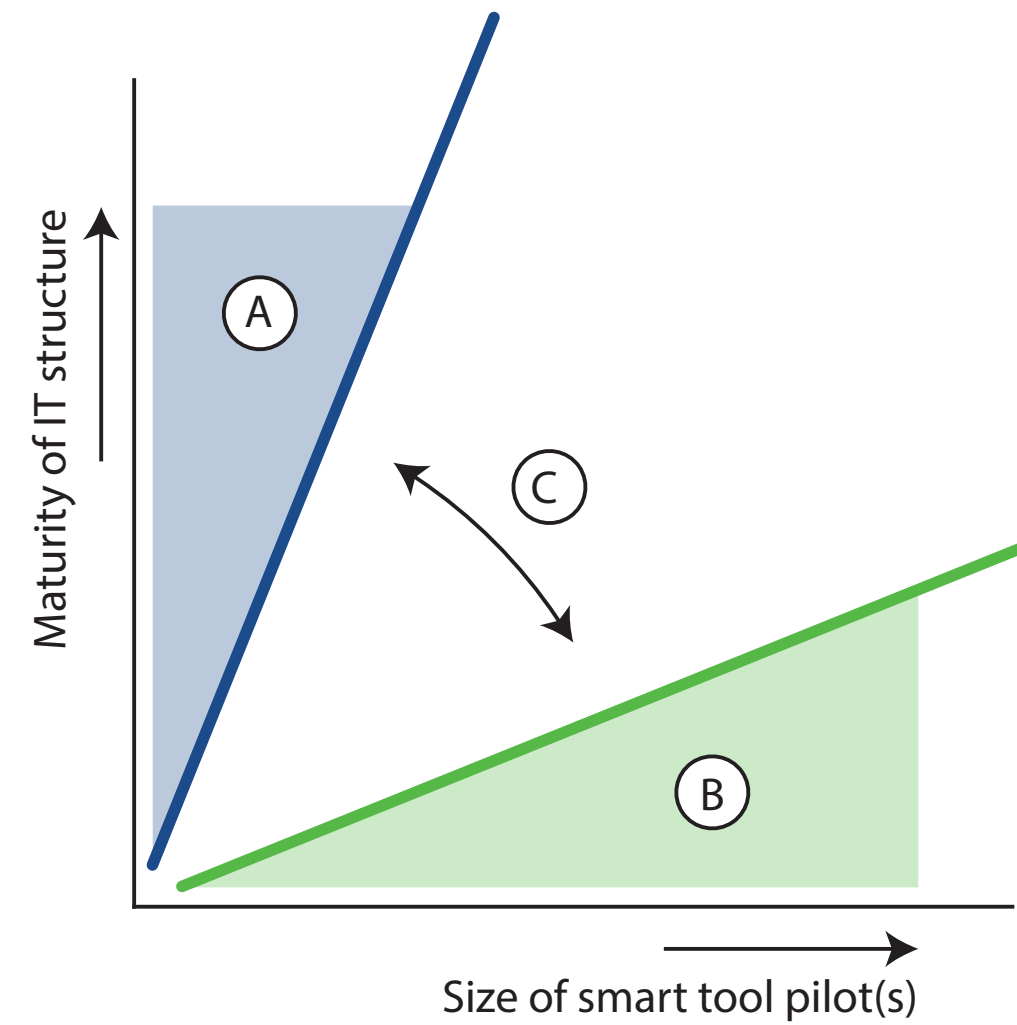
Smart tools

Connection to mature infrastructures

e.g. IT

Experimenting

Scaling

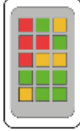










The workplace

Only a part of the campus workplace is used

Large ranges of preferences and activities by users

Classification of functions and differences within functions in relation to an actual smart tools and reference case code

	Function	Icon	Level of accuracy	Function specification	Reference cases	Smart tool supplier
Assist users in choosing an appropriate workplace	1 Show real time workplace availability <i>One workplace type</i>		Group of people	From defined zones of a floor the occupancy is shown.	NLG	Plekchecker
			Individual	On building level Based on specific workplace measurement	UU ABN KL	Lone Rooftop Lone Rooftop Blokken in Leuven
	2 Show real time workplace availability <i>Different workplace types</i>		Group of people	Type of workplaces on a floor level, check-in required for desk by QR code Type of workplaces on a floor level	OVG	MapiqPhilips
			Individual	Based on the desk the person uses around that moment. Which relates to type of room Based on detecting persons and showing the specific room.	TUD-1 UvA MIC – 1	Mapiq - Blinq systems Mapiq Smart building app
					AHR	Smart working app
					ERI AGF	Flowscape Office 3.0
	3 Show 'thirds places' in neighbourhood		-	Showing third workplaces which can me filtered by checking personal workplace preferences	CAM	Spacefinder
	4 Room booking		-	Booking a workplace or group room, check-in required for desk by QR code	TUE	Book my space – Planon
				Booking a workplace or group room	OVG	MapiqPhilips
				Booking a group room	AGF	Office 3.0
				TUD-1	Mapiq - Blinq systems	
				UvA	Mapiq	
				ERI	Flowscape	
5 Way finder		Indoor	Shows where a room or area is on the map	BOOK ING	(custom made) (custom made)	
				TUD-1 UvA OVG ERI	Mapiq - Blinq systems Mapiq MapiqPhilips Flowscape	
Enhance collaboration and wellbeing	6 People finder		Desk	Based on desk login, check-in required for desk by QR code Based on desk login, recognition by application on phone	OVG	Mapiq&Philips
			Person	Based on location of the person	AHR	Smart working app
					AGF	Office 3.0
7 Adjust temperature and lighting		Group of people	Temperature an lighting on a panel level (couple of desks or 1 room)	OVG	Mapiq&Philips	
		Individual	Heating and cooling is provided on the level of an individual person. Follows the person. Adaption on temperature and lighting on a desk level	AGF	Office 3.0,	
				AHR	Smart working app	
Providing information	8 Gives additional information			Showing the impact of meeting room usage to its users	DTU	Smart library
				Provides information on productivity and the projects other colleagues are working on	GGL	Meeting room nanny
				Provides availability information based on room bookings and logged-in PC's	MIC-2	Delve/Workplace Analytics
				Provides information on comfort and noise levels	VU	Study Spot
	9 Gives recommendations			Proposes times and books rooms based on locations and calendars of different people	MIC – 1	Smart building app
			Gives proactive insights to increase productivity	BOOK	(custom made)	
				MIC-2	Delve/Workplace Analytics	

Classification of smart tools related to its different set of functions and the remarks and opportunities of these complete tools.

	Real time availability 1 type	Real time availability - several type	Third places	Room booking	Way finding	People finding	Adjust temperature and lighting	Gives additional information	Gives recommendations	Specific tool function	Remarks and opportunities
1 function (7 tools)											
Lone rooftop	1									Shows availability of workplaces at floor level	Current infrastructure of Wi-Fi in the building determines accuracy of the information. Uses Wi-Fi infrastructure which is already there.
Plekchecker	1									Shows availability of workplaces at building level	It is not know where people are in the building. Uses access control which is already there.
Blokken in Leuven	1									Shows location of third places with filtering option	No real-time availability information. Without sensors, provides new information.
Spacefinder			1							Possibility to book a desk or room	Does not check the presence of people at desks.
Book my space - planon				1						Showing the impact of meeting room usage to its users	Only periodically shared. Gives insight in actual use of meeting rooms to enlighten people
Meeting room nanny								1		Provides availability information based on room bookings and logged-in PC's	Is only partly real time. Uses infrastructure which is already there
Study spot								1			
2 functions (5 tools)											
Custom (ING)	1			1						Releasing meeting rooms if they are booked but not used. Tool gives real time availability of availability or meeting rooms.	Requires high accuracy to prevent mistakes in releasing rooms. Offers people unused spaces
Smart library	1						1			Provides real-time availability on desk level and gives option to adjust temperature and lighting	Each desk needs a sensor. Ability to personalize the workplace and adjusting comfort settings.
Smart building app		1						1		Shows availability on floor level of different workplace types and provides information on comfort and noise levels	Gives additional data to select right place on temperature and noise.
Custom (google integration)				1					1	Shortening the process of room booking by proposes times and books rooms based on locations and calendars of different people	Customised for specific soft and hardware. Smoothens the journey of room booking and meeting organising.
3 functions (4 tools)											
Mapiq		1		1	1					Shows real time availability of different workplace types on a room or area level and provides a room booking option.	Availability is not provided on desk level
Mapiq - Blinq		1		1	1					Shows real time availability of different workplace types on a room or desk level and provides a room booking option.	Indoor positioning is optional. Privacy is guaranteed
Flowscape		1		1	1					Shows real time availability of different workplace types on desk level, provides people finding function and comfort adjustments	People finder function can be turned off to guarantee privacy. The connection between desk and personal information gives another view on privacy.
Smart working app		1				1	1			Provides information on productivity and the projects other colleagues are working on	Is looking into personal information. Privacy can be an issue. Gives advices on improving productivity and insight in colleagues' projects.
Delve / Workplace analytics						1		1	1		
4 functions (1 tool)											
Office 3.0		1		1		1	1			Shows real time availability of different workplace types on desk or room level, provides option to book desks and rooms, provides people finding function and comfort adjustments	Privacy is guaranteed by managing consent by editing the personal profile. The link between comfort preferences to location enables mobility at the office.
5 functions (1 tool)											
Mapiq - Philips		1		1	1	1	1	1		Shows real time availability of different workplace types on a room or area level and provides a room booking option. Comfort can be adjusted and a people finding option is provided.	Availability is not provided on desk level.