

# 'Smart' Outpatient Department

Exploring which potential optimisations of the outpatient department could improve patient experience, medical specialist's workflow and utilisation of space

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# Transition from inpatient to outpatient care



Before the early 2000's the level of activity of a hospital was dominated by the provision of inpatient care, this level of activity is now shifting increasingly to outpatient care (College bouw ziekenhuisvoorzieningen, 2004).

# Changing demographics



More people generally get older and stay healthier for longer. However, when people fall ill, they get multiple and more complicated diseases (RIVM, 2018).

# Growing shortage of medical staff



Working population compared to the elderly population is shrinking, which impacts the rising shortage of medical staff in the Dutch healthcare sector (Ministerie van VWS, 2018).

# Patients have 'active' choice



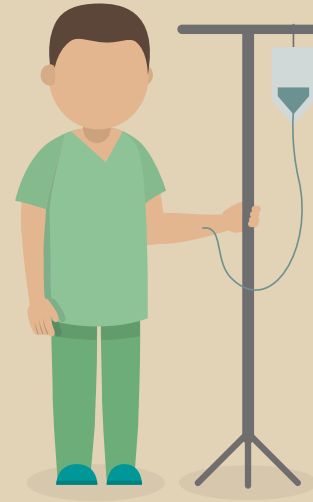
Since the reformation of the Dutch healthcare system in 2006, patients have an 'active choice' in healthcare provider (Victoor & Rademakers, 2015).

# Completely responsible for own real estate



Since 2015 hospitals have become completely responsible for their own real estate, due to the reformation of the Dutch healthcare system (van der Voordt, 2016; van der Zwart, 2014).

Patient experience



Medical specialist's workflow



Utilisation of space



# Smart building



Smart Buildings integrate and account for intelligence, enterprise, control, and materials and construction as an entire building system, with adaptability, not reactivity, at its core, in order to meet the drivers for building progression: energy and efficiency, longevity, and comfort and satisfaction (Buckman et al., 2014).



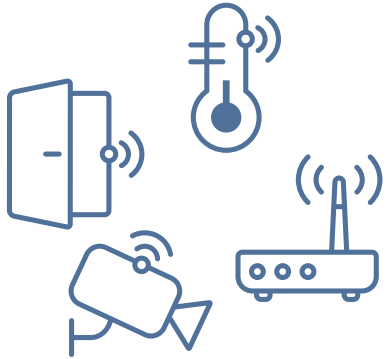
# Smart tool

“A smart tool is a service or product which collects (real-time) information on space use to improve the space use on the current campus on the one hand, whilst supporting decision making on the future space use on the other hand.”

(Valks *et al.*, 2018, p. 8)



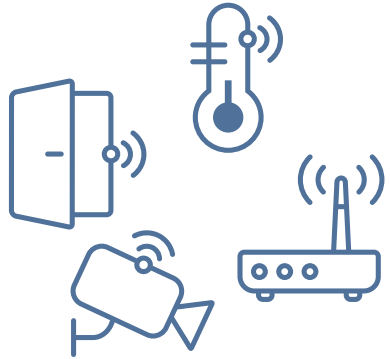
# Smart tool



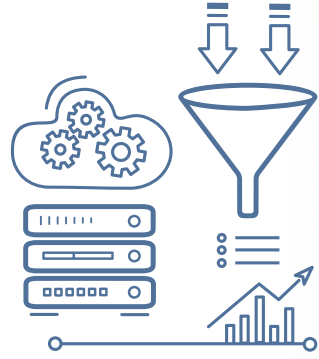
1. Collection of data



# Smart tool



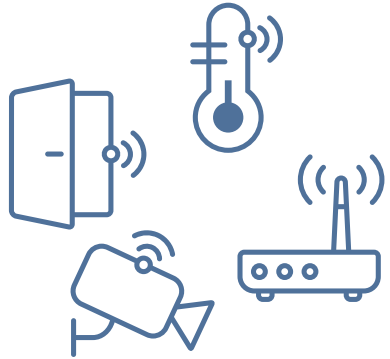
1. Collection of data



2. Processing of data



# Smart tool



1. Collection of data



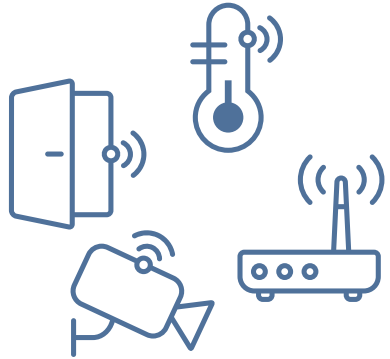
2. Processing of data



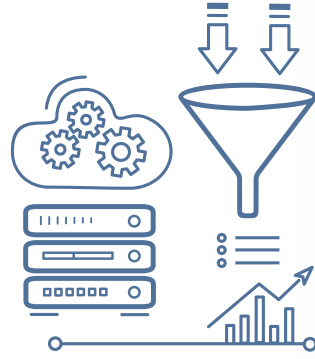
3. Provision of information



# Smart tool



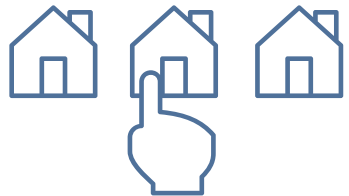
1. Collection of data



2. Processing of data



3. Provision of information



4. Future decision making

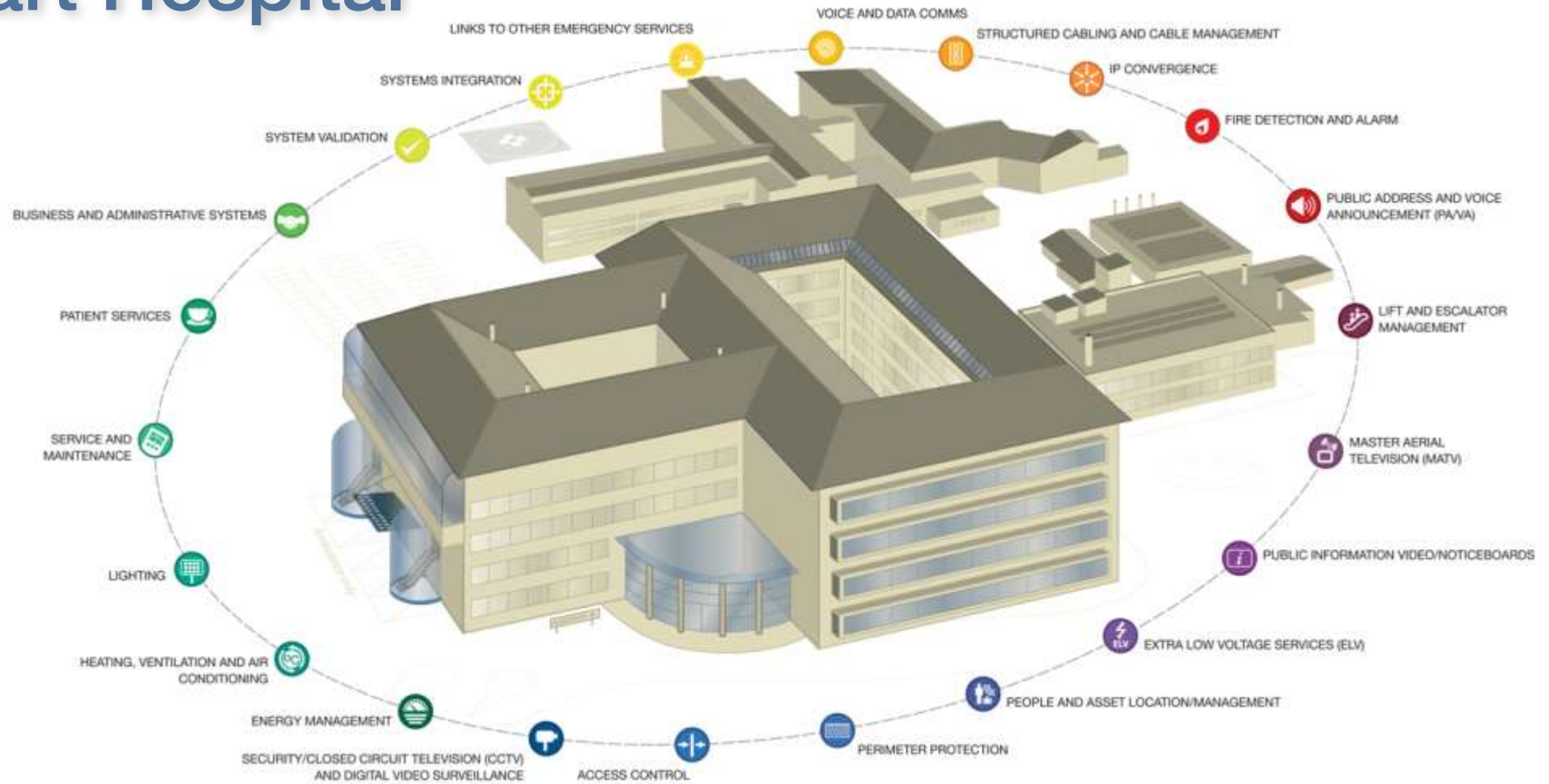


# Big potential for smart technologies in hospitals



Big expectations for the potential of smart 'health' technologies in hospitals. However, this type of technology is still in its infancy and further research and development is needed (Patient@Home, 2018).

# Smart Hospital



# Lack of knowledge on implementation



Less than half of the smart technology projects makes it further than the 'proof of concept' phase, demonstrating the difficulties that companies experience during the implementation of these new technologies (Cisco, 2017).



A blue-tinted photograph of a hospital hallway. In the foreground on the left, an IV drip is hanging from a metal stand. The hallway extends into the distance with several people walking. The ceiling has a grid pattern and a fire exit sign. The overall atmosphere is clinical and professional.

# Concepts

Research questions & Methodology

Which 'smart' optimisations of the outpatient department could improve patient experience, medical specialist's workflow and utilisation of space?

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1

Outpatient department

2

Smart tools

3

Optimised outpatient department

# Sub-questions

## 1

### Outpatient department

- What are the characteristics of the outpatient department of the 21st century?
- Which activities take place at the outpatient department of the 21st century?
- How does real estate add value to the user and organisation?

## 2

### Smart tools

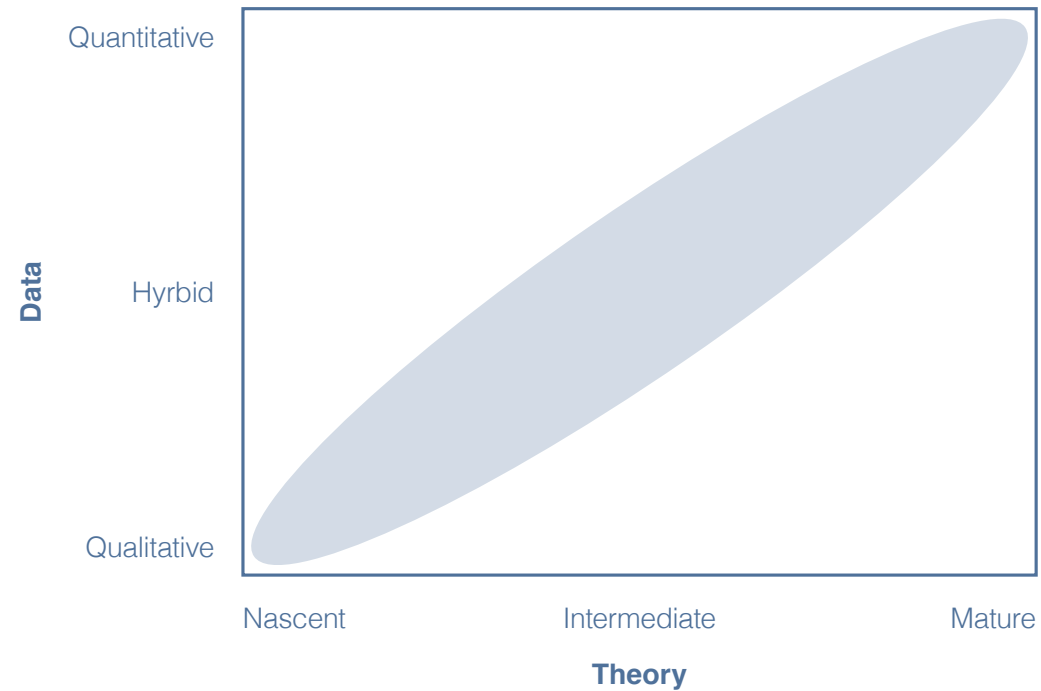
- What are smart tools?
- How are smart tools related to real estate management?

## 3

### Optimised outpatient department

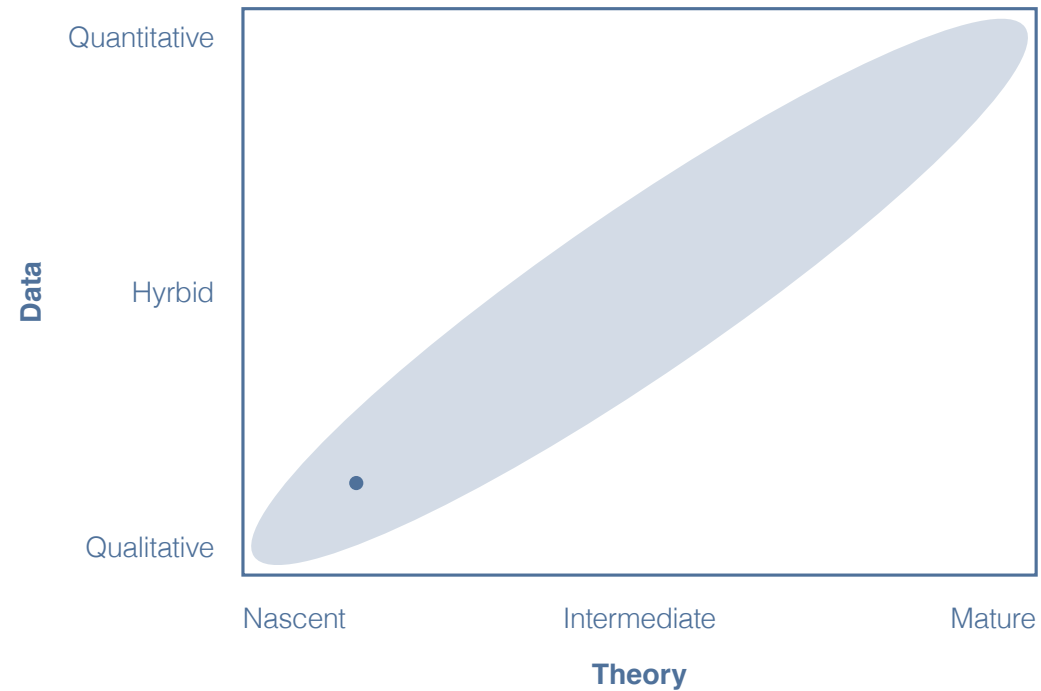
- Which potential optimisations can be defined to improve the patient experience, medical specialist's workflow and utilisation of space?
- Which solution can be recommended to optimise the outpatient department?

# Methodological fit



(Edmondson & McManus, 2007)

# Methodological fit



(Edmondson & McManus, 2007)

# Methodology

## Qualitative research method:

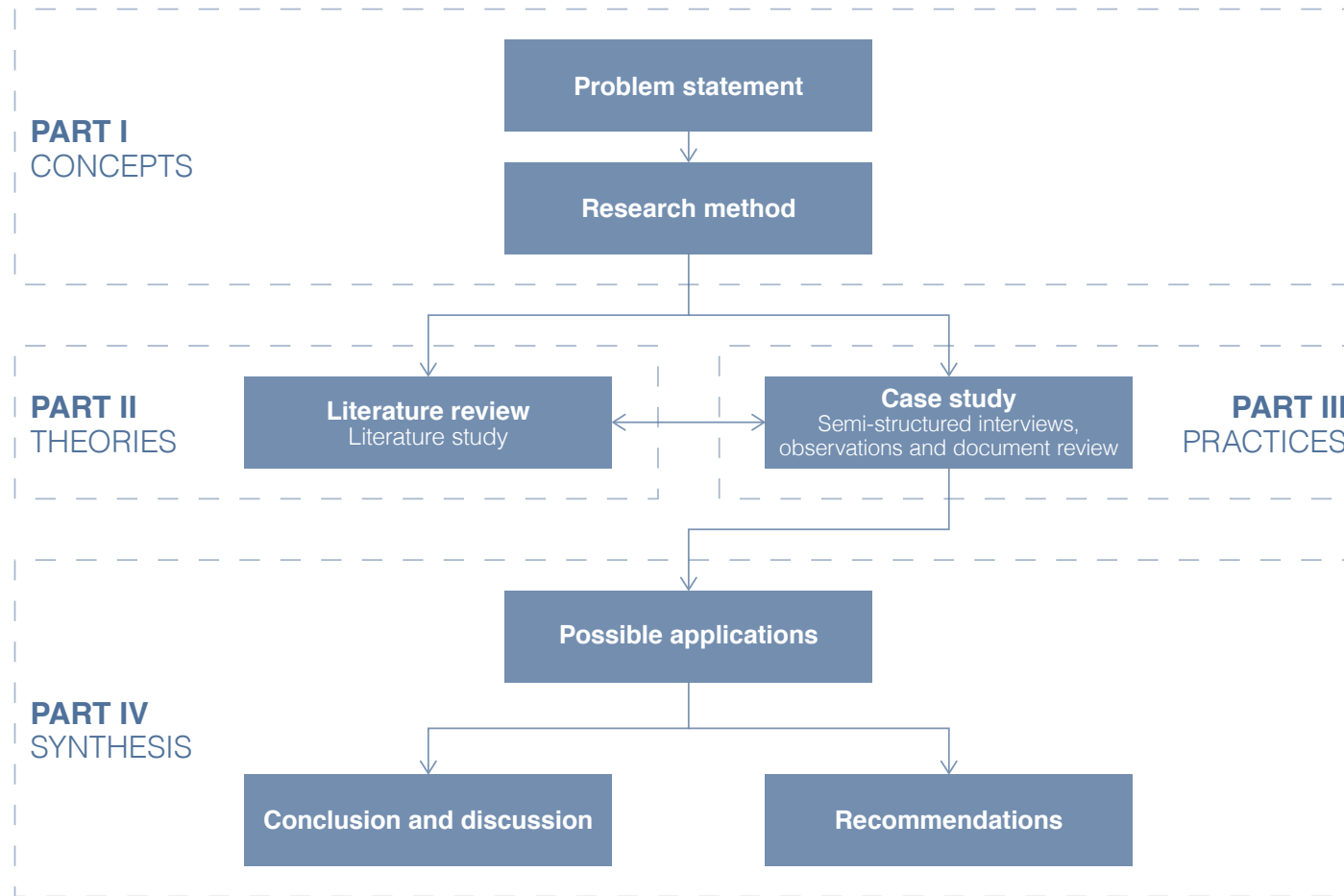
- Useful for theory building instead of theory testing (Bryman, 2015)

## Comparative case study:

- Researches a current and relevant phenomenon within its real-world context (Yin, 2014)
- Suitable method because there is not just one type of hospital and thus not one set of required functions of smart tools



# Methodology



A blurred, blue-tinted photograph of a modern hospital hallway. The hallway is long and brightly lit, with a polished floor that reflects the overhead lights. On the right side, there are medical carts and equipment. The overall atmosphere is clean and professional. A semi-transparent white horizontal band is overlaid across the center of the image, containing the text.

# Theories

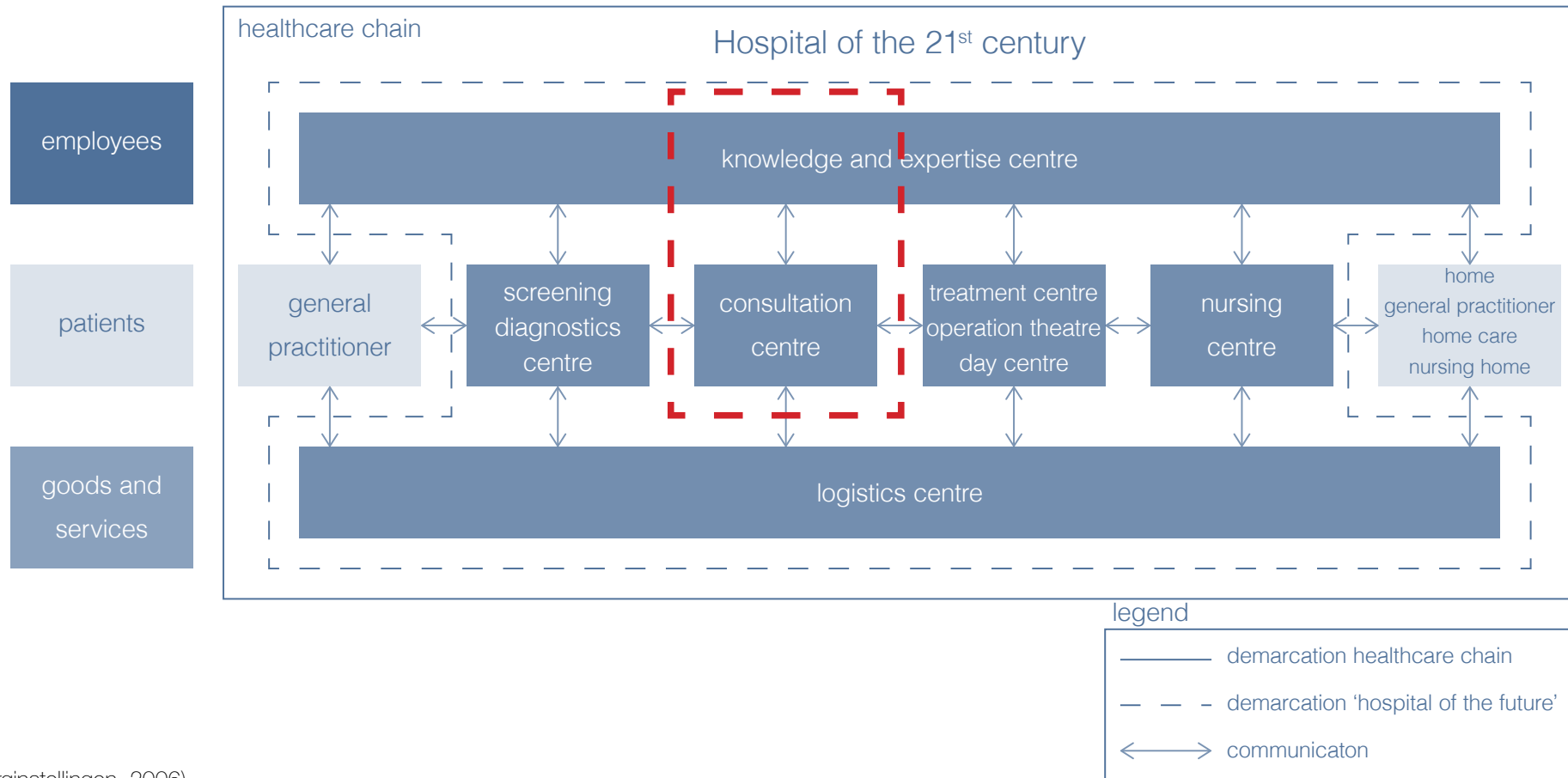
21<sup>st</sup> century hospital concept

# Four principles

- 1 Design the care process from three perspectives: **patients, employees** and **goods and services**.
- 2 Reduce all processes to simple activities. Facilitate and support the **activities** as **efficient** and **patient-friendly** as possible.
- 3 Make **information available independently of time and place**.
- 4 Ensure that the environment matches the circumstances.

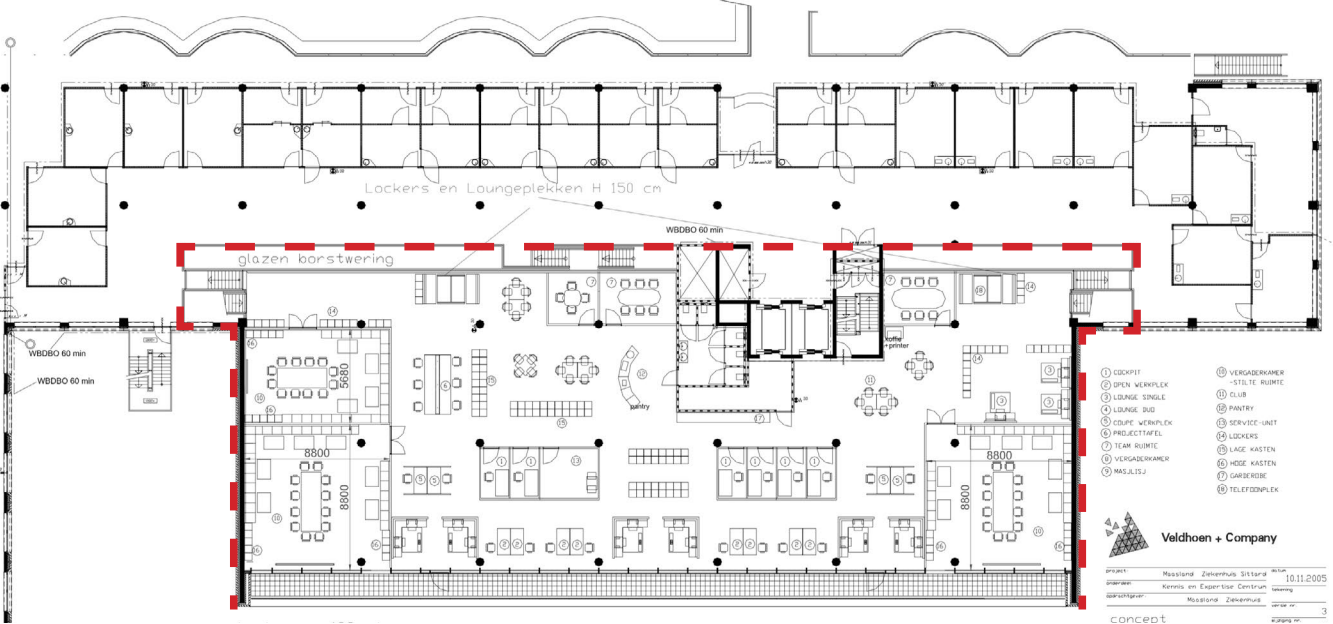
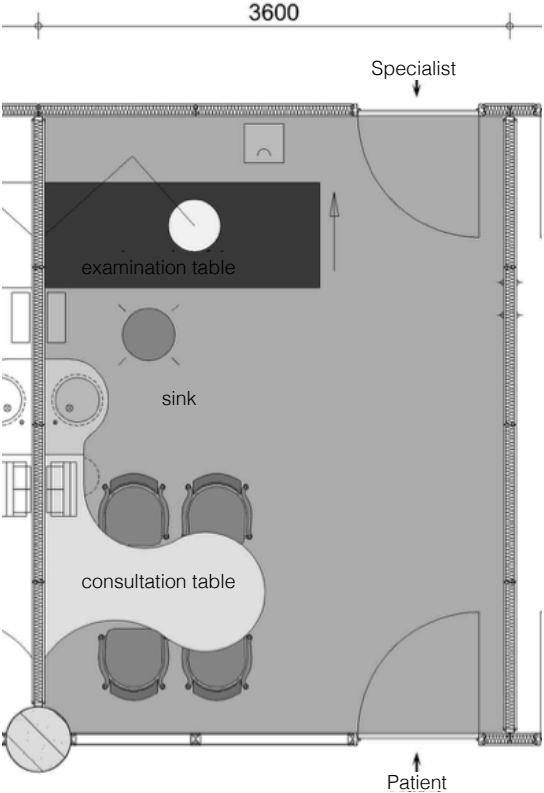
(Veldhoen & Company, 2006)

# Functional structure



(College bouw zorginstellingen, 2006)

# Outpatient department



(College bouw zorginstellingen, 2006)



# Theories

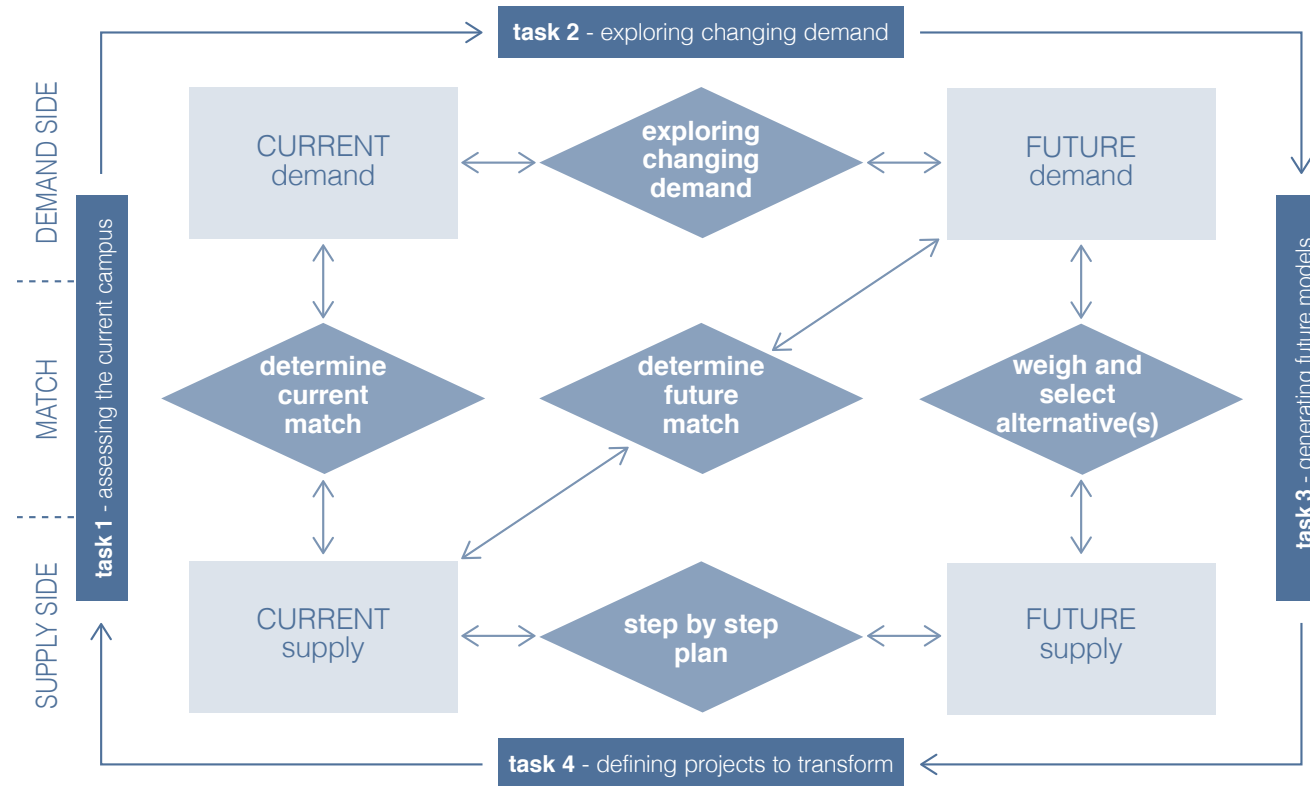
Corporate Real Estate Management

# Real Estate Management Theories

## Corporate Real Estate Management

“[...] **aligning the portfolio** and services to the **needs of the core business**, in order to **maximize the added value** for the business and to optimally **contribute to the overall performance of the corporation**” (Dewulf, Krumm & De Jonge, 2000).

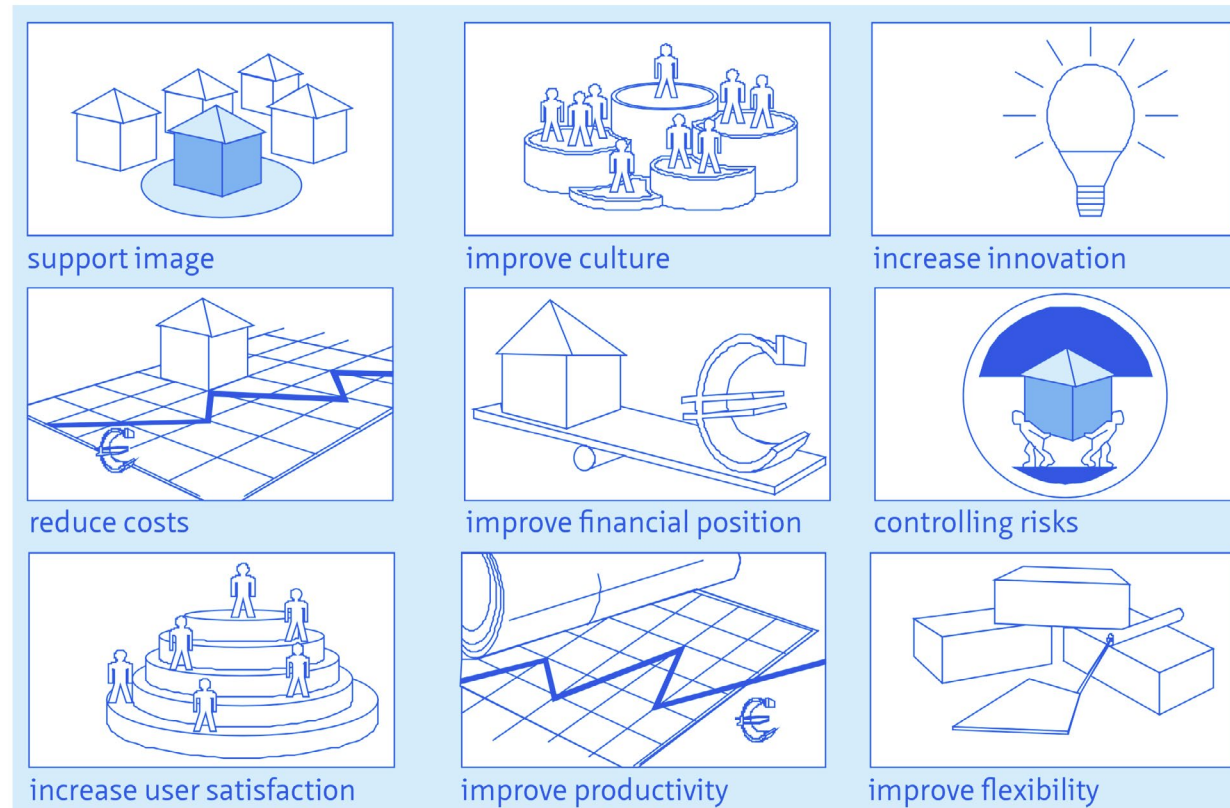
# Aligning the portfolio



“Managing real estate is a continuous process with implicit or explicit considerations about the **match between supply and demand**” (Den Heijer, 2011, p. 105).

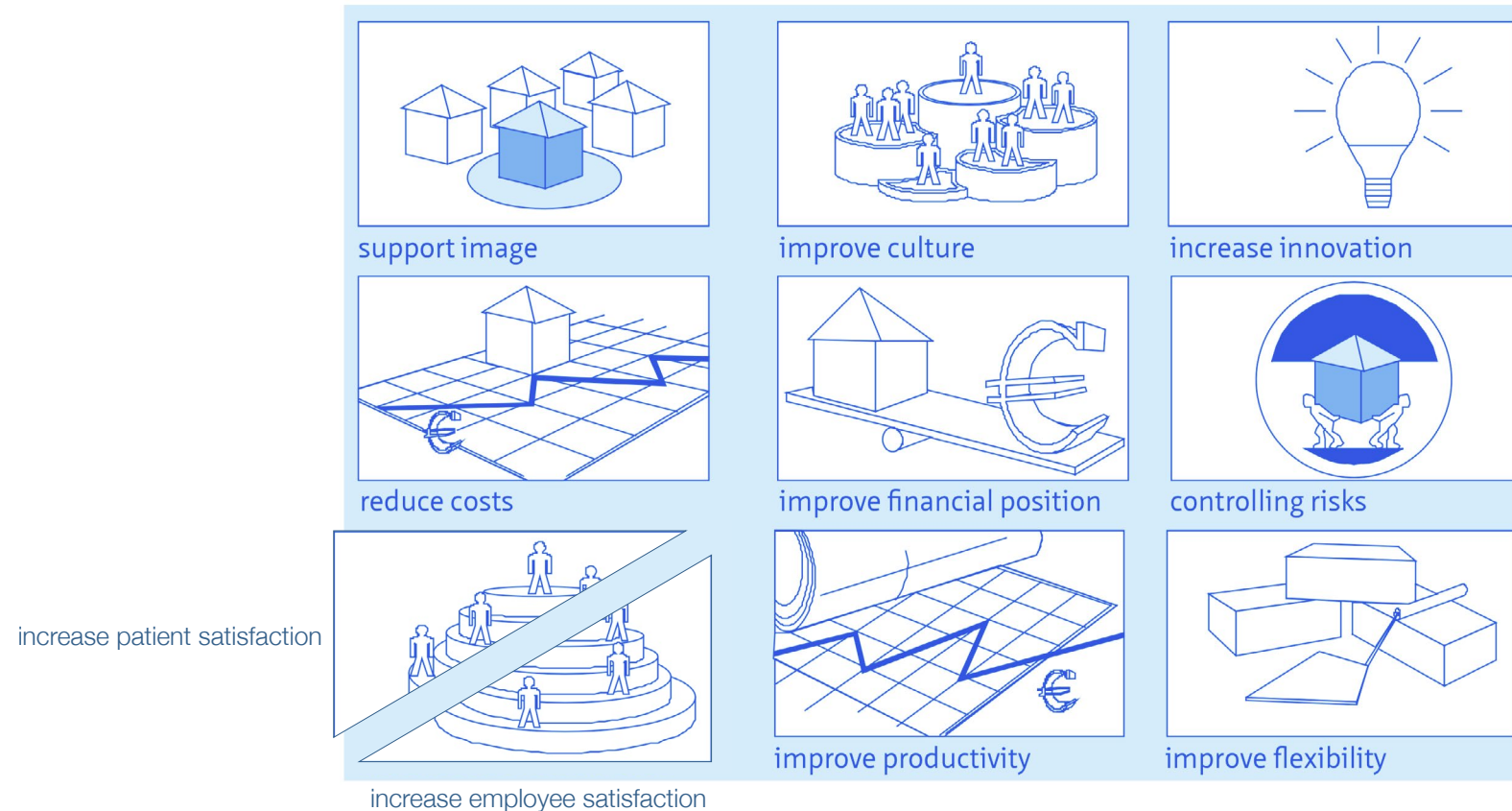


# Added values of hospital real estate



(van der Zwart, 2011, p. 240)

# Added values of hospital real estate



(van der Zwart, 2011, p. 240)



# Practices

Case study

# Cases

## What

- Explore the potential optimisations of the outpatient department
- Understand the objectives of the potential optimisations (added values)
- Assess the information required for the potential optimisations

## How

- Data collection: semi-structured interviews, observations and documentation
- Data analysis: Interviews transcribed and coded
- Data analysis based on smart tool research of Valks et al. (2016) & (2018)

Which topic	How collected	By whom
Potential optimisations	Derived from interview	Interviewee
Why: objectives	Derived from interview	Interviewee
Why: goals (strategic, functional, financial, physical)	List of added values present during interviews	Interviewee
What: measurement (frequency, occupancy, identity, activity)	Derived from mentioned objectives	Own input
How: measurement (manual, booking, sensors)	Output from interviews and derived from mentioned objectives	Interviewee and own input
User information (user, management)	Derived from interview and mentioned objectives	Interviewee and own input
Access level (management, support, users, open access)	Derived from mentioned objectives	Interviewee and own input
Current implementation (not implemented, limited implementation, implemented)	Derived from interview	Interviewee



# Cases

## How selected

- Selected outpatient department must be situated in a general hospital, which is the most common hospital in the Netherlands
- Open to a study about a smart outpatient department for the future
- Willing to share to give insight in the possibilities of the current ICT infrastructure and real estate possibilities

# Cases

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- Open to a study about a smart outpatient department for the future
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Leiderdorp 2005-2006 45.000 m2



Groningen 1979 / 2007 ~100.000 m2



Amersfoort 2010-2013 112.000 m2



Beverwijk 1974 / 1995 40.000 m2

# 14 potential optimisations indentified



# 14 potential optimisations identified



Diagnostics



Find workplace



Digital form



Find colleague



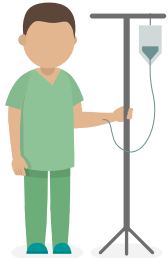
EPD



Self-measuring



e-Consult



Information provision



Wayfinding



Check-in



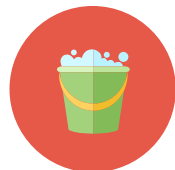
Senior service



Space use



Maintenance of equipment



Cleaning



















# Check-in

Why: Objectives	Why: goals	User information
<ul style="list-style-type: none"> <li>– Improve the check-in and identification process of the patient</li> <li>– Save time for the medical specialist</li> <li>– Give the patient information about their appointment and waiting times.</li> </ul>	<p><b>1. Functional</b></p> <ul style="list-style-type: none"> <li>– Increase patient satisfaction</li> <li>– increase employee satisfaction</li> <li>– improve productivity</li> </ul> <p><b>2. Financial</b></p> <ul style="list-style-type: none"> <li>– Reduce costs</li> </ul> <p><b>3. Strategic</b></p> <ul style="list-style-type: none"> <li>– Support image</li> <li>– increase innovation</li> </ul> <p><b>4. Physical</b></p> <ul style="list-style-type: none"> <li>– Improve flexibility</li> </ul>	<p><b>User information:</b></p> <ul style="list-style-type: none"> <li>– Appointment</li> <li>– Waiting times</li> <li>– Advised waiting location</li> <li>– Requirements check</li> </ul> <p><b>Management information:</b></p> <ul style="list-style-type: none"> <li>– Feedback on check-in and identification information of the patient.</li> <li>– Average arriving time</li> <li>– Waiting time patients</li> </ul>

What: measurement	How: measurement method	Access level	Current implementations
<ul style="list-style-type: none"> <li>– Occupancy</li> <li>– Identity</li> </ul>	<ul style="list-style-type: none"> <li>– Booking</li> <li>– Sensors</li> </ul>	<ul style="list-style-type: none"> <li>– Management</li> <li>– Support</li> <li>– Users</li> </ul>	Generally not implemented































































































# Analysis

	Potential optimisations	Main goal(s)	Increase innovation	Increase patient satisfaction	Increase employee satisfaction	Improve culture	Reduce costs	Improve productivity	Improve flexibility	Support Image	Controlling risks	Improve financial position	Reduce square metres
Medical specialist's workflow													
	Diagnostics	Functional, financial	Flag	Flag	Flag	Flag		Flag	Flag		Flag		
	Finding workplace	Functional, Strategic			Flag	Flag	Flag	Flag	Flag				Flag
	Digital forms	Functional, financial		Flag	Flag	Flag	Flag	Flag			Flag		
	Finding colleague	Functional, strategic			Flag	Flag	Flag	Flag	Flag				Flag
	Information (EPD)	Functional, Strategic		Flag	Flag	Flag		Flag			Flag		
	Self measuring / controlling	Functional, financial	Flag	Flag	Flag	Flag		Flag			Flag		
	E-consult	Functional, Strategic		Flag	Flag			Flag	Flag	Flag			
Patient experience													
	Information provision	Functional, Physical		Flag	Flag		Flag	Flag	Flag	Flag			
	Wayfinding	Functional, Physical	Flag	Flag			Flag	Flag	Flag	Flag			
	Check-in	Functional, Physical		Flag	Flag			Flag	Flag				
	Senior service	Functional, Physical		Flag	Flag			Flag	Flag		Flag		
Utilisation of space													
	Space use	Physical, Financial					Flag	Flag	Flag		Flag	Flag	Flag
	Maintenance / tracking of (medical) equipment	Physical, Financial	Flag		Flag		Flag	Flag	Flag		Flag		
	Cleaning	Functional, Physical		Flag	Flag		Flag		Flag				















# Goals

- The most mentioned goals are related to **supporting the user activities**
  - Increase the patient satisfaction
  - Increase the employee satisfaction
  - Improve productivity
  - Improve flexibility

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	Cleaning	Functional, Physical											















# Goals

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- The most potential optimisations in service of an the **medical specialist's workflow** where linked to **improve culture**.















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Medical specialist's workflow													
	Diagnostics	Functional, financial	🚩	🚩	🚩	🚩		🚩	🚩		🚩		
	Finding workplace	Functional, Strategic			🚩	🚩	🚩	🚩	🚩				🚩
	Digital forms	Functional, financial		🚩	🚩	🚩	🚩	🚩			🚩		
	Finding colleague	Functional, strategic			🚩	🚩	🚩	🚩	🚩				🚩
	Information (EPD)	Functional, Strategic		🚩	🚩	🚩		🚩			🚩		
	Self measuring / controlling	Functional, financial	🚩	🚩	🚩	🚩		🚩			🚩		
	E-consult	Functional, Strategic		🚩	🚩			🚩	🚩	🚩			
Patient experience													
	Information provision	Functional, Physical		🚩	🚩		🚩	🚩	🚩	🚩			
	Wayfinding	Functional, Physical	🚩	🚩			🚩	🚩	🚩	🚩			
	Check-in	Functional, Physical		🚩	🚩			🚩	🚩				
	Senior service	Functional, Physical		🚩	🚩			🚩	🚩		🚩		
Utilisation of space													
	Space use	Physical, Financial					🚩	🚩	🚩		🚩	🚩	🚩
	Maintenance / tracking of (medical) equipment	Physical, Financial	🚩		🚩		🚩	🚩	🚩		🚩		
	Cleaning	Functional, Physical		🚩	🚩		🚩		🚩				

# Goals

- The most mentioned goals are related to **supporting the user activities**
  - Increase the patient satisfaction
  - Increase the employee satisfaction
  - Improve productivity
  - Improve flexibility
- The most potential optimisations in service of an the **medical specialist's workflow** where linked to **improve culture**.
- The financial goals have the **biggest differentiation** between the different potential optimisations. However, there is **at least one financial goal per potential optimisation**.


	Potential optimisations	Main goal(s)	Increase innovation	Increase patient satisfaction	Increase employee satisfaction	Improve culture	Reduce costs	Improve productivity	Improve flexibility	Support Image	Controlling risks	Improve financial position	Reduce square metres
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	Digital forms	Functional, financial		🚩	🚩	🚩	🚩	🚩			🚩		
	Finding colleague	Functional, strategic			🚩	🚩	🚩	🚩	🚩				🚩
	Information (EPD)	Functional, Strategic		🚩	🚩	🚩		🚩			🚩		
	Self measuring / controlling	Functional, financial	🚩	🚩	🚩	🚩		🚩			🚩		
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	Maintenance / tracking of (medical) equipment	Physical, Financial	🚩		🚩		🚩	🚩	🚩		🚩		
	Cleaning	Functional, Physical		🚩	🚩		🚩		🚩				

# Information and Access

Potential optimisations	Information		Access levels			
	User information	Management information	Management	Support	Users	Open access
<b>Workflow</b>						
 Diagnostics	User: Information about the patient's health conditions, frequency of measurements and possible comparison with similar cases for better diagnostics.	Management: Identity check of the patient. Information and feedback about use of the application.	🚩	🚩	🚩	
 Finding workplace	User: Information a place to work that fits the personal needs and activity of the employee.	Management: Information about the usage of space and which type of workplaces are requested more often than others, the distance a user has to travel to their desired work place and information about amount of time employees spent on certain tasks. This can help with (future) accommodation decision-making.	🚩	🚩	🚩	
 Digital forms	User: Gives the patient feedback about which information is required prior to an consult or the entire medical process. It enables the medical specialist to receive the forms before an appointment, if there is need for additional information this can be requested upfront and helps with the efficiency and quality of the face to face consults.	Management: Information about the patient and which type of question are found to be more difficult and require assistance. Results can also be compared to others for better provision of care and advice.	🚩	🚩	🚩	
 Finding colleague	User: Information about the whereabouts, preferences of cooperation and availability of colleagues.	Management: Information about the preferences of users and which places are more often used for collaboration and meeting up and information about work patterns of employees. This information can help with (future) accommodation decision-making.	🚩	🚩	🚩	
 Information (EPD)	User: Gives the patient information about their medical records and make it possible for the patient to fill in missing information or edit existing information. Provides the (current) medical specialist with the same information if the patient allows to share this information.	Management: Identity check of the patient. Information and feedback about the use of the application.	🚩	🚩	🚩	
 Self measuring / controlling	User: Provides the patient with information about their health conditions, required measurements and can give reminders in case a patient forgets to do their measurement. This helps the medical specialist with remotely keeping track of the health conditions of patients and in this way control the risks.	Management: Information about their patients health conditions and patient result can be compared, which can help with providing better care.	🚩	🚩	🚩	
 E-consult	User: Gives the patient the possibility to have a digital (face-to-face) consult without going to the hospital. Gives the medical specialist to have contact with the patient more frequently without the necessity to see the patient in real-life, work probably better in combination with self-measuring / controlling.	Management: Identity check of the patient. Information and feedback about use of the application.	🚩	🚩	🚩	
<b>Patient experience</b>						
 Information provision	User: Information about the hospital, outpatient departments, openings hours, appointments, waiting times, amenities, their doctors, medication, receipts, test results and treatment processes.	Management: Information about the average waiting times of patients, which amenities they then use and feedback on which functions are most important to the patients and visitors.	🚩	🚩	🚩	🚩
 Wayfinding	User: Information about where which outpatient department is, what the best route is to the patients appointment, best waiting area, nearby amenities, preferences of using stairs or elevator depending on the mobility of the patient or visitor.	Management: Information about which routes patients and visitors really take and if they take stairs or elevators. Also gives information about the utilisation and occupation of the building, which can support (future) accommodation decision making.	🚩	🚩	🚩	🚩
 Check-in	User: Information about their appointment, waiting times, advice waiting location, and if all the requirements before the appointment are met.	Management: Feedback on check-in and identification information of the patient. Can also give information about average arriving time and waiting time patients.	🚩	🚩	🚩	
 Senior-service	User: Information about the pick-up time (at home and hospital) and get supported during their visit.	Management: Early information about the arrival and possible delays of the patient and information about travel times to the hospital in general.	🚩	🚩	🚩	
<b>Utilisation of space</b>						
 Space use	-	Management: Information about the usage and occupancy of space. Provides management with information that support (future) accommodation decision-making	🚩	🚩		
 Maintenance / tracking of (medical) equipment	-	Management: Information about the whereabouts, status and maintenance of (medical) equipment. This gives also input for the planning of appointments with patients versus the maintenance schedules.	🚩	🚩		
 Cleaning	-	Management: information about the usage of for example toilet groups. This helps with cleaning and (future) accommodation decision-making.	🚩	🚩		




# Information and Access

- For users it is mainly providing information about certain (digital) facilities or (medical) information.
- Within the 'user information' there is sometimes a separation made between patients and medical specialists.

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			Workflow			
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 Finding workplace	User: Information a place to work that fits the personal needs and activity of the employee.	Management: Information about the usage of space and which type of workplaces are requested more often than others, the distance a user has to travel to their desired work place and information about amount of time employees spent on certain tasks. This can help with (future) accommodation decision-making.	🚩	🚩	🚩	
 Digital forms	User: Gives the patient feedback about which information is required prior to an consult or the entire medical process. It enables the medical specialist to receive the forms before an appointment, if there is need for additional information this can be requested upfront and helps with the efficiency and quality of the face to face consults.	Management: Information about the patient and which type of question are found to be more difficult and require assistance. Results can also be compared to others for better provision of care and advice.	🚩	🚩	🚩	
 Finding colleague	User: Information about the whereabouts, preferences of cooperation and availability of colleagues.	Management: Information about the preferences of users and which places are more often used for collaboration and meeting up and information about work patterns of employees. This information can help with (future) accommodation decision-making.	🚩	🚩	🚩	
 Information (EPD)	User: Gives the patient information about their medical records and make it possible for the patient to fill in missing information or edit existing information. Provides the (current) medical specialist with the same information if the patient allows to share this information.	Management: Identity check of the patient. Information and feedback about the use of the application.	🚩	🚩	🚩	
 Self measuring / controlling	User: Provides the patient with information about their health conditions, required measurements and can give reminders in case a patient forgets to do their measurement. This helps the medical specialist with remotely keeping track of the health conditions of patients and in this way control the risks.	Management: Information about their patients health conditions and patient result can be compared, which can help with providing better care.	🚩	🚩	🚩	
 E-consult	User: Gives the patient the possibility to have a digital (face-to-face) consult without going to the hospital. Gives the medical specialist to have contact with the patient more frequently without the necessity to see the patient in real-life, work probably better in combination with self-measuring / controlling.	Management: Identity check of the patient. Information and feedback about use of the application.	🚩	🚩	🚩	
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 Information provision	User: Information about the hospital, outpatient departments, openings hours, appointments, waiting times, amenities, their doctors, medication, receipts, test results and treatment processes.	Management: Information about the average waiting times of patients, which amenities they then use and feedback on which functions are most important to the patients and visitors.	🚩	🚩	🚩	🚩
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 Senior-service	User: Information about the pick-up time (at home and hospital) and get supported during their visit.	Management: Early information about the arrival and possible delays of the patient and information about travel times to the hospital in general.	🚩	🚩	🚩	
			Utilisation of space			
 Space use	-	Management: Information about the usage and occupancy of space. Provides management with information that support (future) accommodation decision-making	🚩	🚩		
 Maintenance / tracking of (medical) equipment	-	Management: Information about the whereabouts, status and maintenance of (medical) equipment. This gives also input for the planning of appointments with patients versus the maintenance schedules.	🚩	🚩		
 Cleaning	-	Management: information about the usage of for example toilet groups. This helps with cleaning and (future) accommodation decision-making.	🚩	🚩		

# Information and Access















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  - feedback on which functions of the different topics are relevant or are missing (how the patient and employee satisfaction is influenced).

Potential optimisations	Information		Access levels			
	User information	Management information	Management	Support	Users	Open access
		<b>Workflow</b>				
 <b>Diagnostics</b>	User: Information about the patient's health conditions, frequency of measurements and possible comparison with similar cases for better diagnostics.	Management: Identity check of the patient. Information and feedback about use of the application.	🚩	🚩	🚩	
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 <b>Information provision</b>	User: Information about the hospital, outpatient departments, openings hours, appointments, waiting times, amenities, their doctors, medication, receipts, test results and treatment processes.	Management: Information about the average waiting times of patients, which amenities they then use and feedback on which functions are most important to the patients and visitors.	🚩	🚩	🚩	🚩
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 <b>Senior-service</b>	User: information about the pick-up time (at home and hospital) and get supported during their visit.	Management: Early information about the arrival and possible delays of the patient and information about travel times to the hospital in general.	🚩	🚩	🚩	
		<b>Utilisation of space</b>				
 <b>Space use</b>	-	Management: Information about the usage and occupancy of space. Provides management with information that support (future) accommodation decision-making	🚩	🚩		
 <b>Maintenance / tracking of (medical) equipment</b>	-	Management: Information about the whereabouts, status and maintenance of (medical) equipment. This gives also input for the planning of appointments with patients versus the maintenance schedules.	🚩	🚩		
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- Most potential optimisations require user access

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	User information	Management information	Management	Support	Users	Open access
<b>Workflow</b>						
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# Information and Access

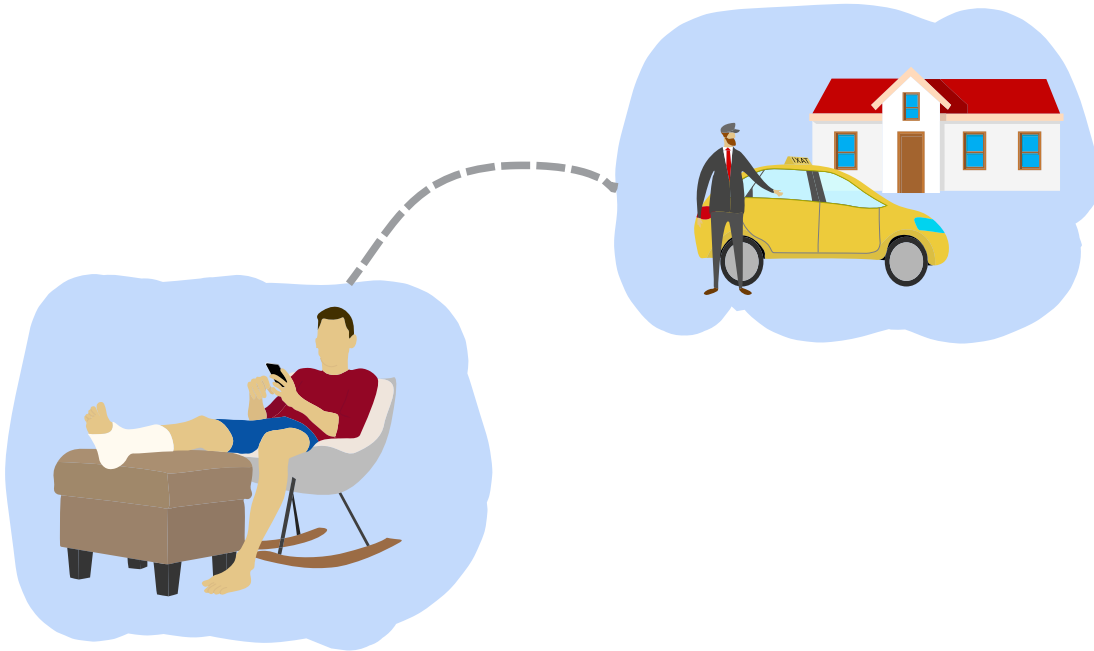
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- Most potential optimisations require user access
- No user access for space use and maintenance / tracking of (medical) equipment.
- The most interesting and important observation is that potential optimisations benefit or even need each other's information to be useful.

Potential optimisations	Information		Access levels			
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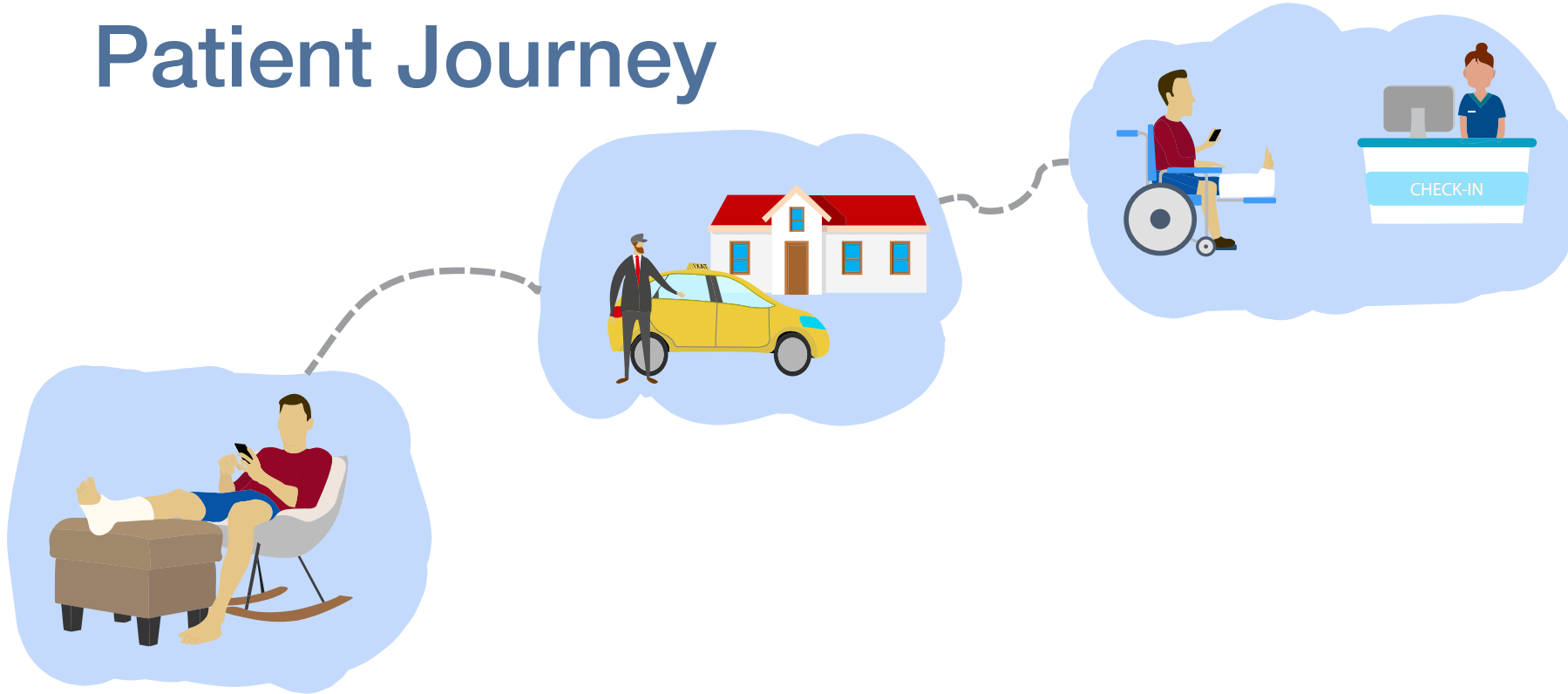
# Patient Journey



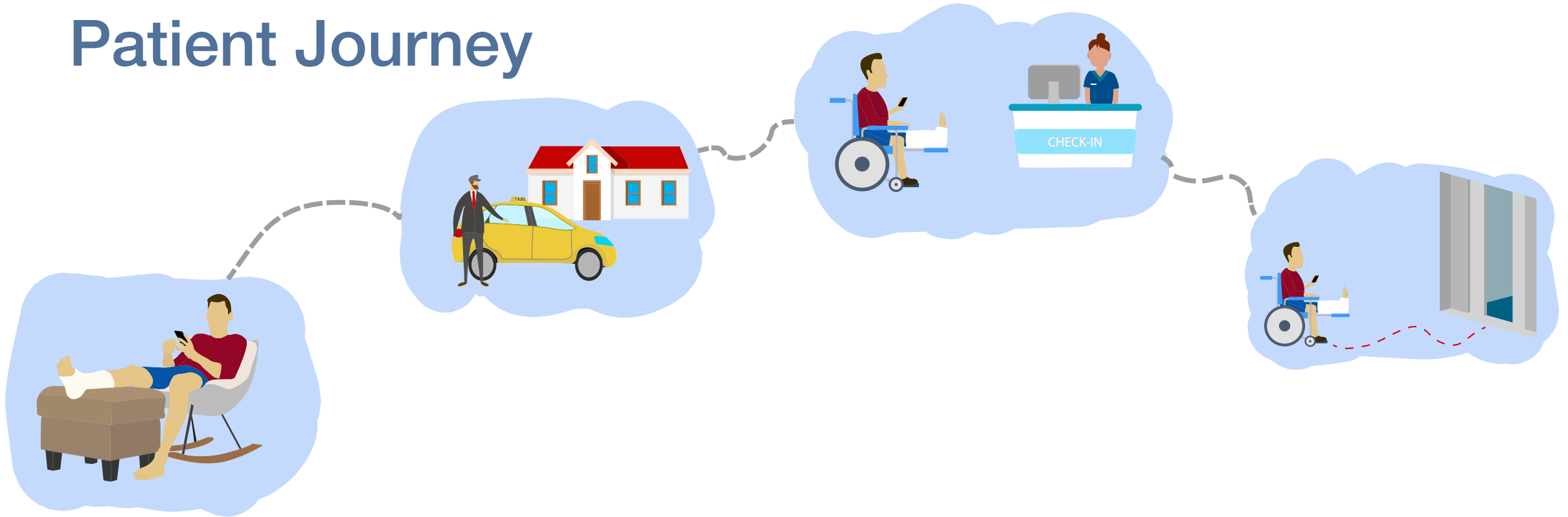
# Patient Journey



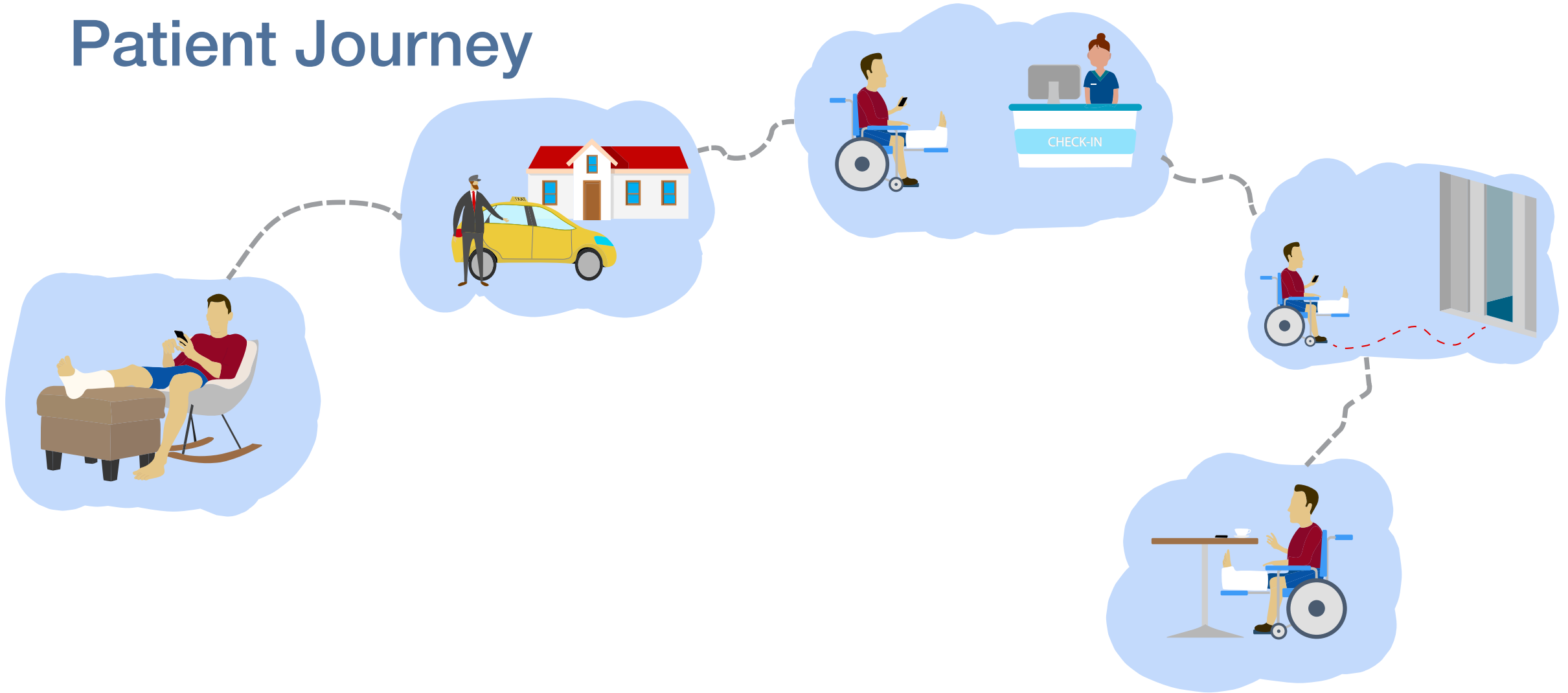
# Patient Journey



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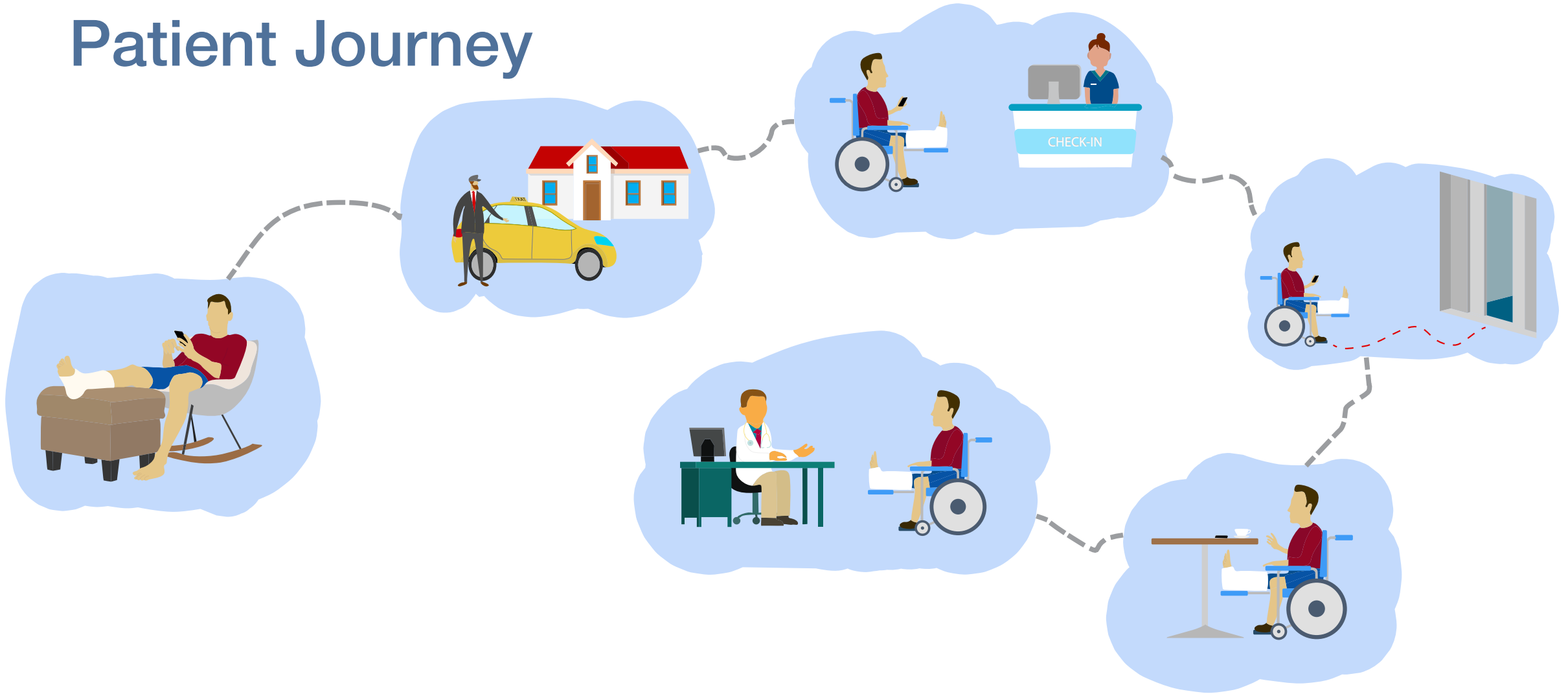


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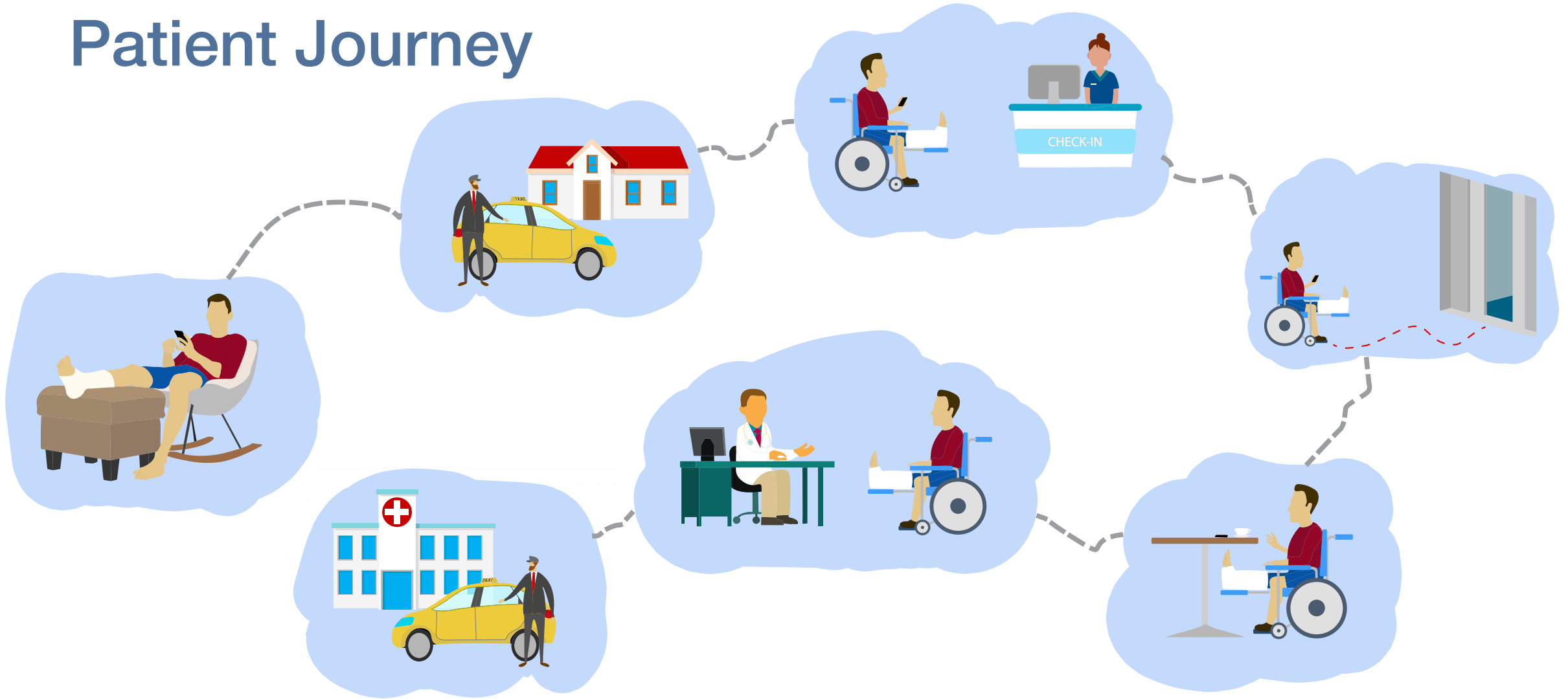




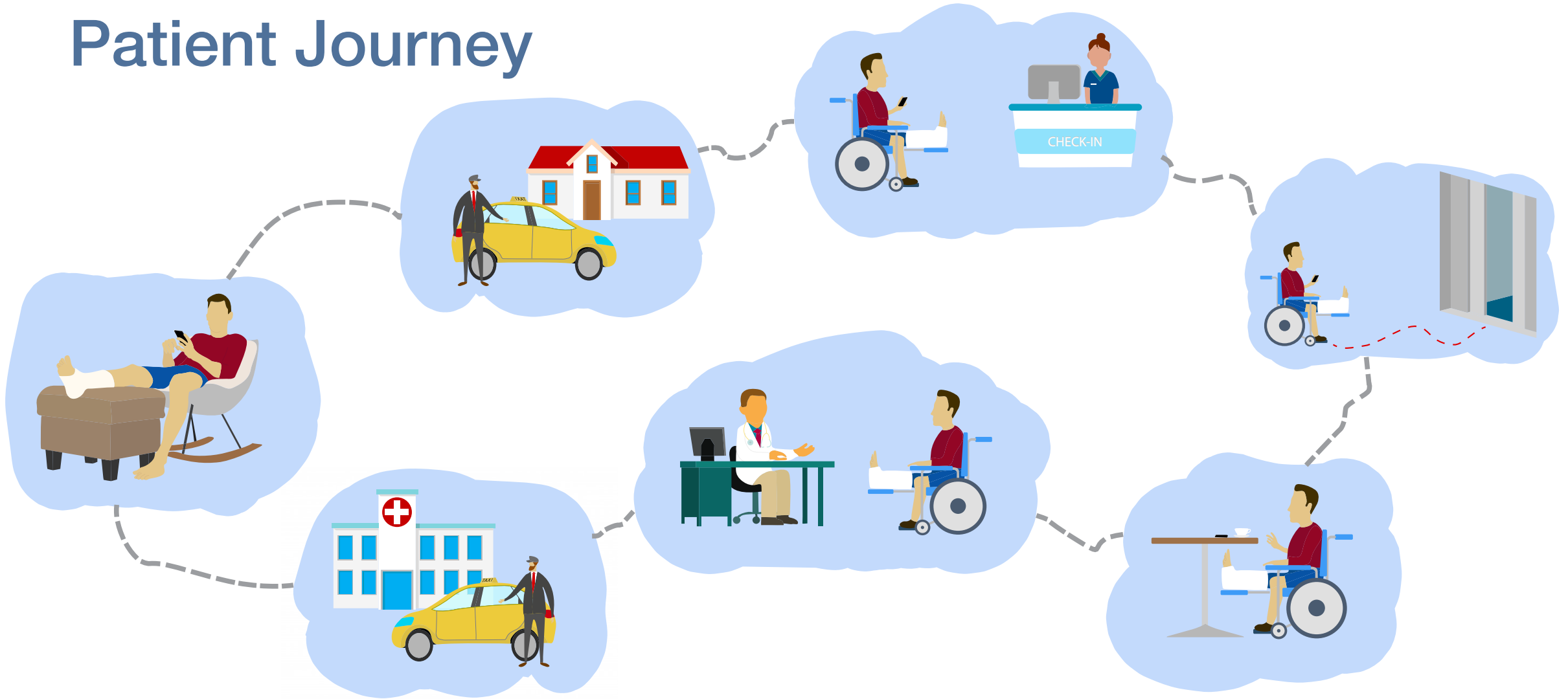
# Patient Journey



# Patient Journey



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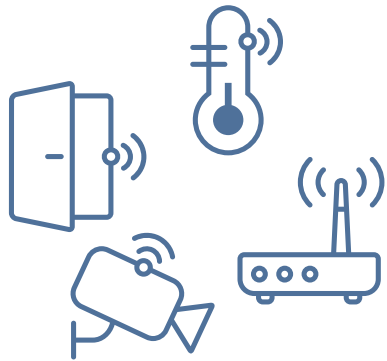


# Synthesis

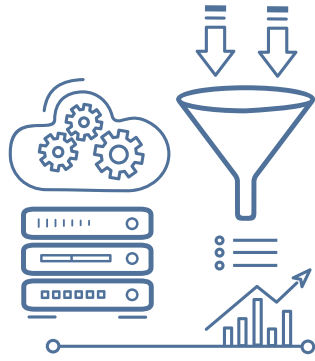
Possible solution

# Bringing optimisations together

- Example from practise
- Required functionalities
- Points of attention



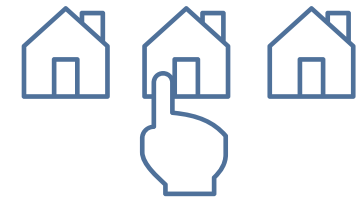
1. Collection of data



2. Processing of data



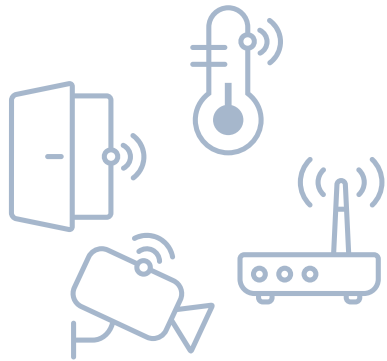
3. Provision of information



4. Future decision making

# Bringing optimisations together

- Example from practise
- Required functionalities
- Points of attention



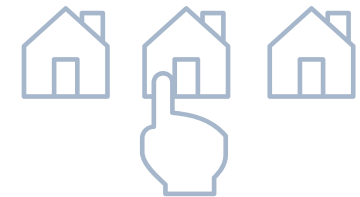
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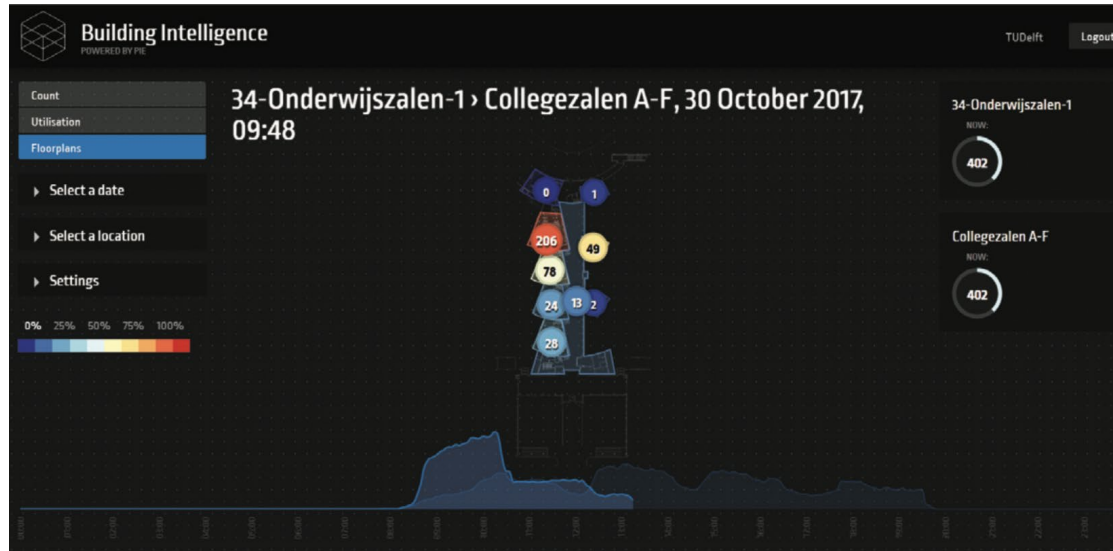


3. Provision of information



4. Future decision making

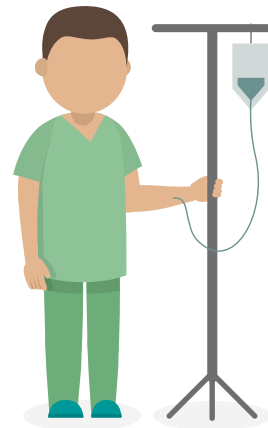
# Practise: TU Delft - PIE



(Valks *et al.*, 2018, p. 126-127)

# Required functionalities

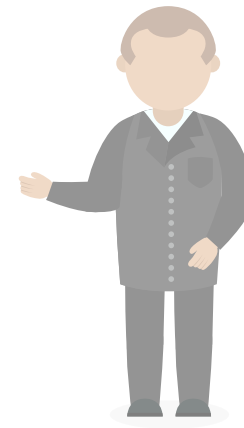
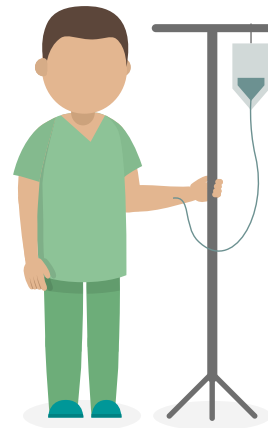
Medical staff app	Patient app	Facility app
Functionalities: <ul style="list-style-type: none"> <li>• Diagnostics</li> <li>• Find workplace</li> <li>• Find colleague</li> <li>• Information (EPD)</li> <li>• Check-in notification</li> <li>• E-consult</li> </ul>	Functionalities: <ul style="list-style-type: none"> <li>• Digital forms</li> <li>• Information (EPD)</li> <li>• Self-measuring / controlling</li> <li>• E-consult</li> <li>• Information provision</li> <li>• Wayfinding</li> <li>• Check-in</li> <li>• Senior service</li> </ul>	Functionalities: <ul style="list-style-type: none"> <li>• Space use</li> <li>• Maintenance / tracking of equipment</li> <li>• Cleaning</li> </ul>
Access: medical staff	Access: patients	Access: Facility staff



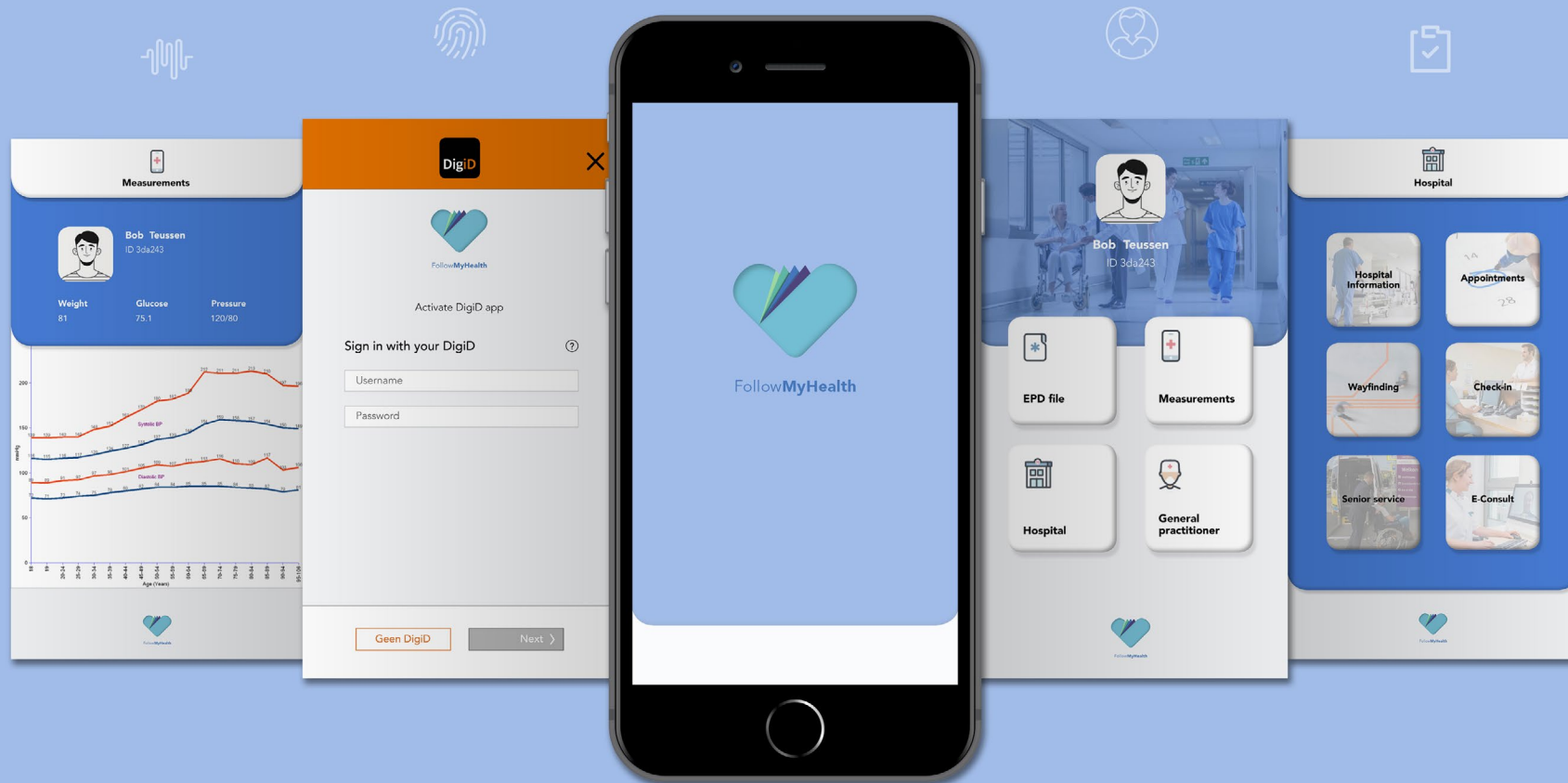


# Required functionalities

Medical staff app	Patient app	Facility app
Functionalities: <ul style="list-style-type: none"> <li>• Diagnostics</li> <li>• Find workplace</li> <li>• Find colleague</li> <li>• Information (EPD)</li> <li>• Check-in notification</li> <li>• E-consult</li> </ul>	Functionalities: <ul style="list-style-type: none"> <li>• Digital forms</li> <li>• Information (EPD)</li> <li>• Self-measuring / controlling</li> <li>• E-consult</li> <li>• Information provision</li> <li>• Wayfinding</li> <li>• Check-in</li> <li>• Senior service</li> </ul>	Functionalities: <ul style="list-style-type: none"> <li>• Space use</li> <li>• Maintenance / tracking of equipment</li> <li>• Cleaning</li> </ul>
Access: medical staff	Access: patients	Access: Facility staff



# FollowMyHealth



# Points of attention

- Accessible for everyone even for functionally illiterate or digitally illiterate users.
- Use short sentences and avoid jargon or difficult words.
- Include a functionality that reads the texts for the users.
- Always include the possibilities to request / call help within the app.
- Provide decent alternatives to digital solutions
- Integration of different services, making it as easy as possible for the patients
- For a lot of optimisations is the identity of the patient important (DigiD integration)

A person wearing a surgical cap and mask is walking away from the camera down a brightly lit hospital hallway. The floor is highly reflective, and there are colorful light trails (orange, blue, red) streaking across the scene, suggesting motion or a futuristic setting. The text is overlaid on a semi-transparent white band across the middle of the image.

**Conclusion  
Discussion  
Recommendations**

# Conclusion

Which 'smart' optimisations of the outpatient department could improve patient experience, medical specialist's workflow and utilisation of space?

# Conclusion

Which 'smart' optimisations of the outpatient department could improve patient experience, medical specialist's workflow and utilisation of space?

- Fourteen potential optimisations are identified in three areas of interest
- Potential optimisations seem influence not just one area and stakeholder group
- Come to an integrated solution:
  - Centralising the access to information
  - Letting the different areas of potential optimisation communicate
  - An app can be a possible solution to bring optimisations together
  - Will create new valuable insights, improve performance of individual optimisations and stimulate automation.
  - However take all the patients into account, also the functionally or digitally illiterate users.



# Discussion

## On Theory

Added values

Smart tools - Definition not yet clear enough during interviews / in practice

'Smart' outpatient department - Slow developments in practice make researching smart tools difficult

## On Practice

Traditional organisations - slow developments

Alternative to digital solutions

## Limitations of the research

Change sensitive topic in hospitals

Subjectivity of the research: No feedback of the interviewees asked on the results

Limited time period of the research

# Recommendations

## For Practice

Set clear objectives for future optimisations

Integration of different platforms

Include the users in the process of setting objectives

Try new innovations with pilot projects

Be aware of privacy and security risks

Have always alternatives to digital solutions

## For Further Research

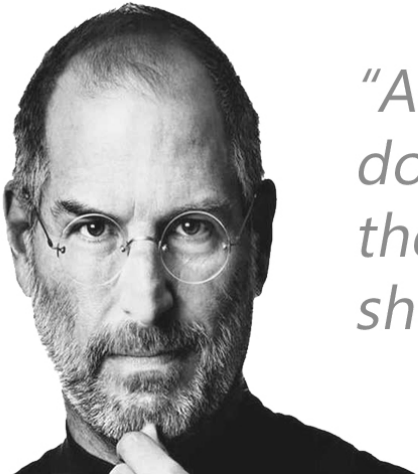
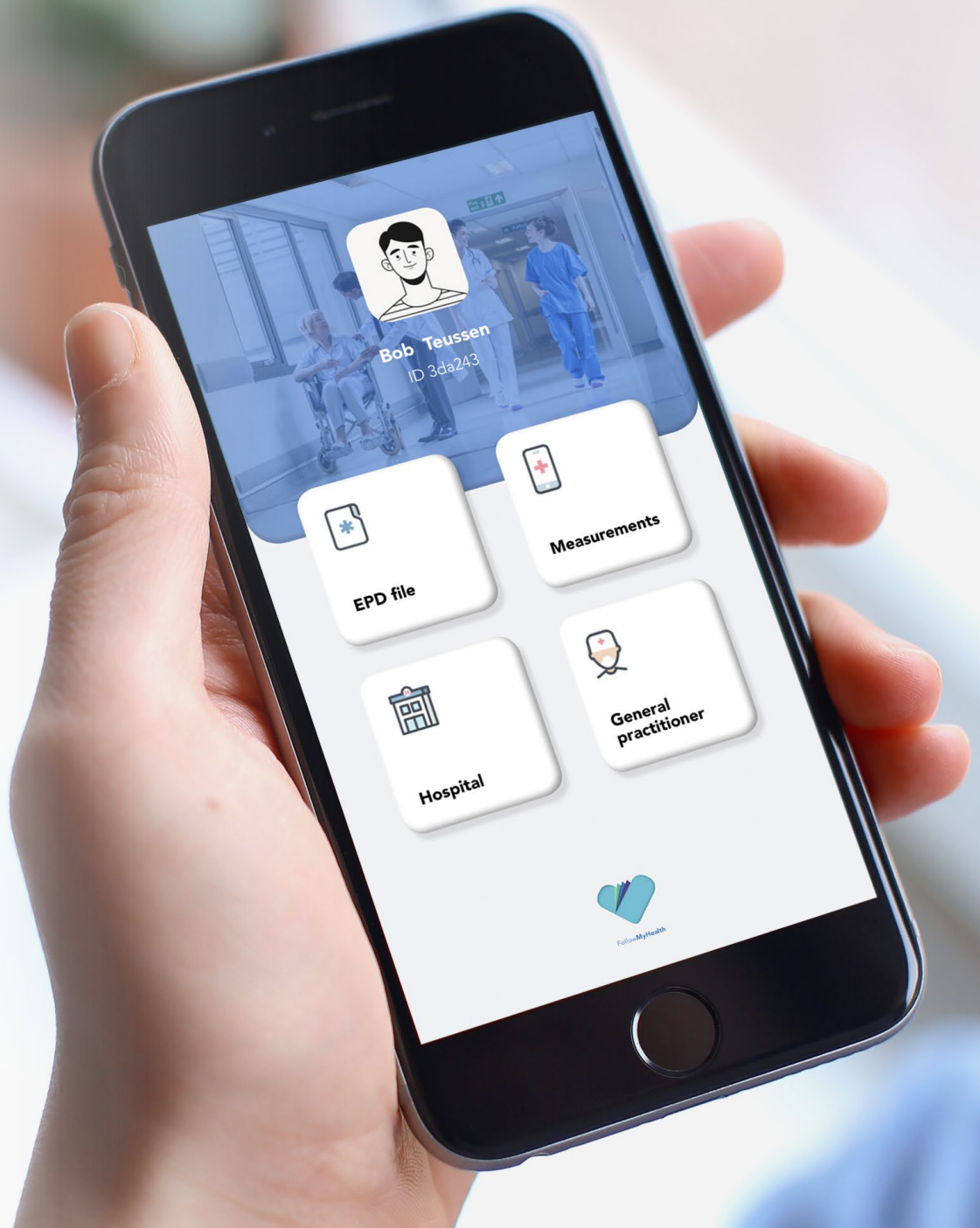
Conduct research at hospitals with smart tools implemented.

Same research again after implementation

Research the costs of smart tools in hospitals

Shift the scope of this research to other parts of the hospital





*"A lot of times people don't know what they want until you show it to them"* Steve Jobs

# Thank you!

## Any questions?

TU Delft

C+  
C

Student  
Graduation Lab  
Version  
Date  
1st mentor  
2nd mentor  
3rd mentor  
Deligate examiner  
Company supervisor

Bas Wouters  
(Public) Real Estate Management  
P4-presentation  
4 October 2019  
Prof.dr.ir. A. Den Heijer, TU Delft  
Dr.ir. A. Koutamanis, TU Delft  
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