

# Post-pandemic Office Real Estate

A pilot study of using scenario planning to develop scenarios with quantitative office space demand for corporate real estate

Ziyao Cheng, P5 presentation





## **Overview**

- Research questions



## **Story**

- Findings & research methods



## **Recap**

- Answers to research questions



## **Discussion**

- Evaluation, limitations & recommendations



**Overview**



Story



Recap



Discussion



- Proposed a **scenario planning methodology** that incorporates an **office space demand forecasting formula**.



- Applied this methodology to a pilot study case to develop **quantitative office space demand scenarios** on a corporate level

**Main research question:**

**How can scenario planning give quantitative outputs on post-pandemic office space demand for corporate real estate?**

**Sub-RQ1:** What is a suitable methodology of scenario planning that can develop quantitative office space demand scenarios on the corporate level?

**Sub-RQ2:** What is a suitable mathematical formula of office space demand forecasting for corporate real estate in the post-pandemic context?

**Sub-RQ3:** How can the proposed scenario planning methodology and office space demand forecasting formula be applied for corporate real estate?



Overview



**Story**



Recap



Discussion



How much  
office space  
do we need?



$$D = \sum \Delta D_i = \text{Workplace implementation plan} \times i$$

Where:

$D$  = Total demand of office space

$D_i$  = Demand every person

$i$  = Headcount





1000 Employees

$$D = \sum \Delta D = \sum \Delta \gamma \times \Delta \theta$$

Where:

D = Total demand of office space

$\gamma$  = Workplace **implementation plan**

$\theta$  = The **employment headcount** classified by task groups



## Activity-based Working (ABW)

$$D = \sum \Delta D = \sum \Delta \gamma \times \Delta \beta \times \Delta \theta$$

Where:

D = Total demand of office space

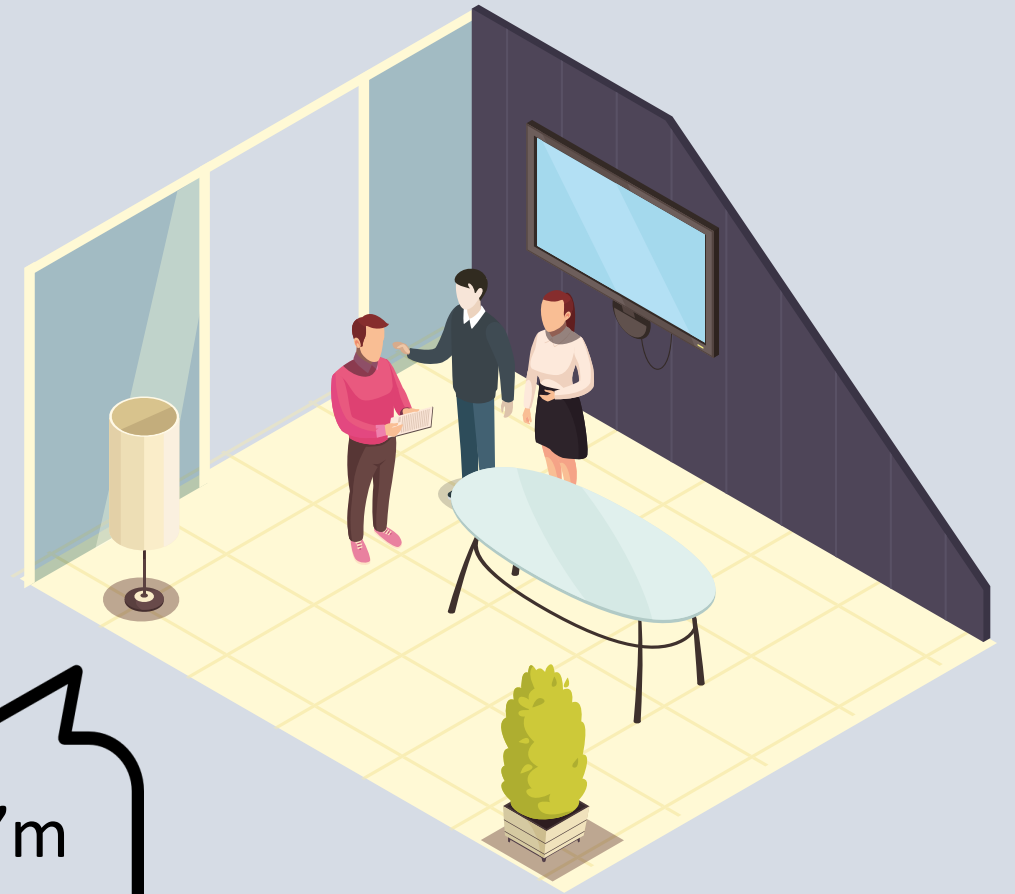
$\gamma$  = **ABW workplace implementation plan**

$\beta$  = **1 / share-ratio**

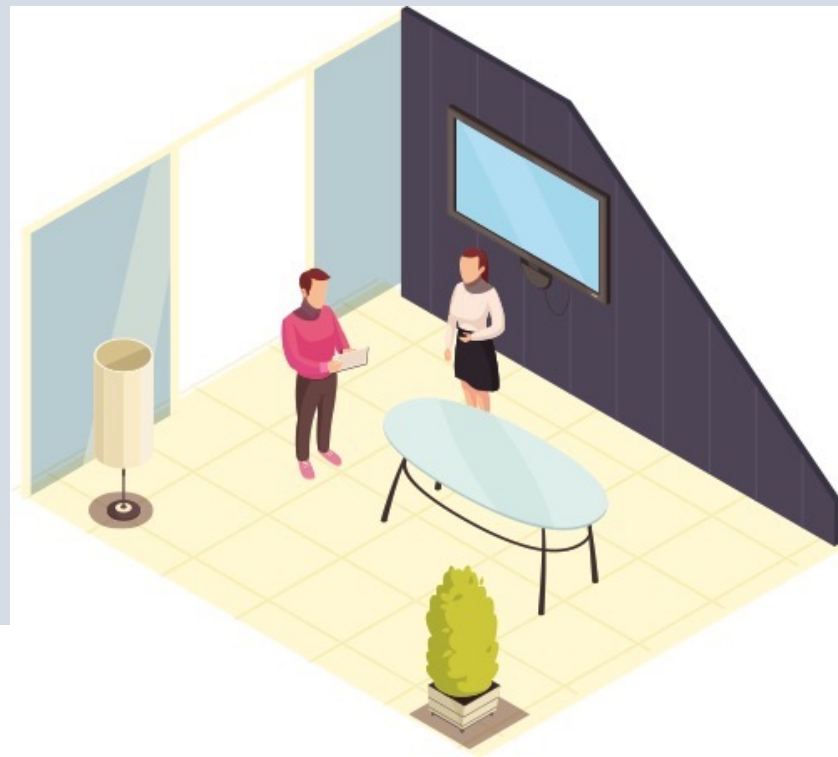
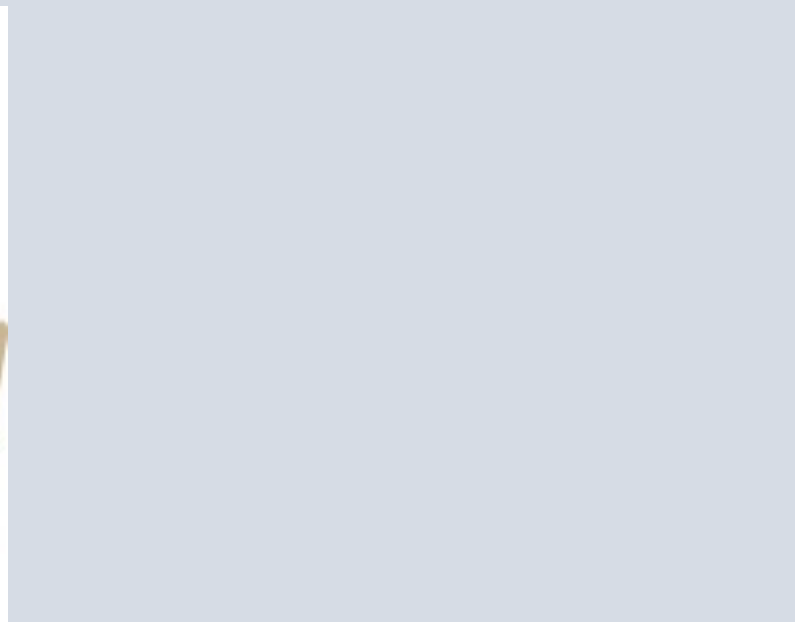
$\theta$  = The **employment headcount** classified by different employee groups

**Share-ratio** = employee headcount / individual seat count

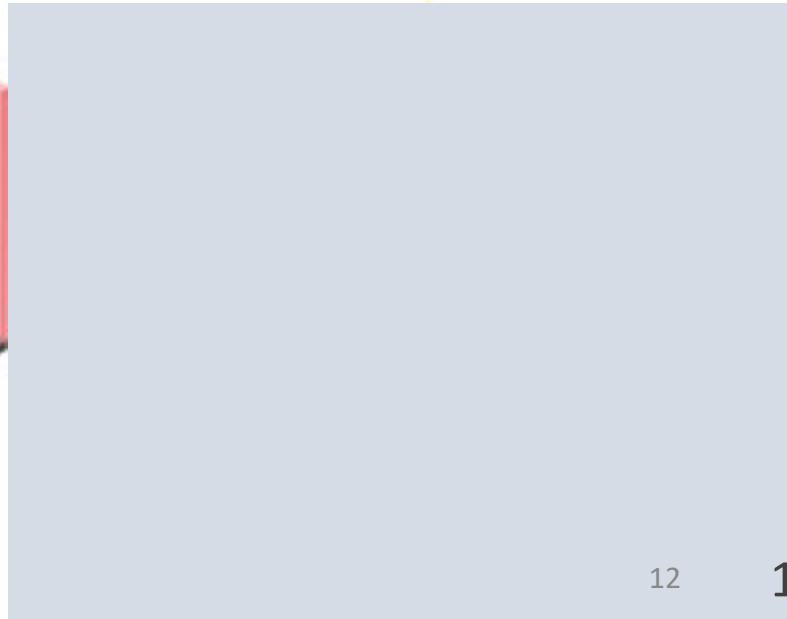
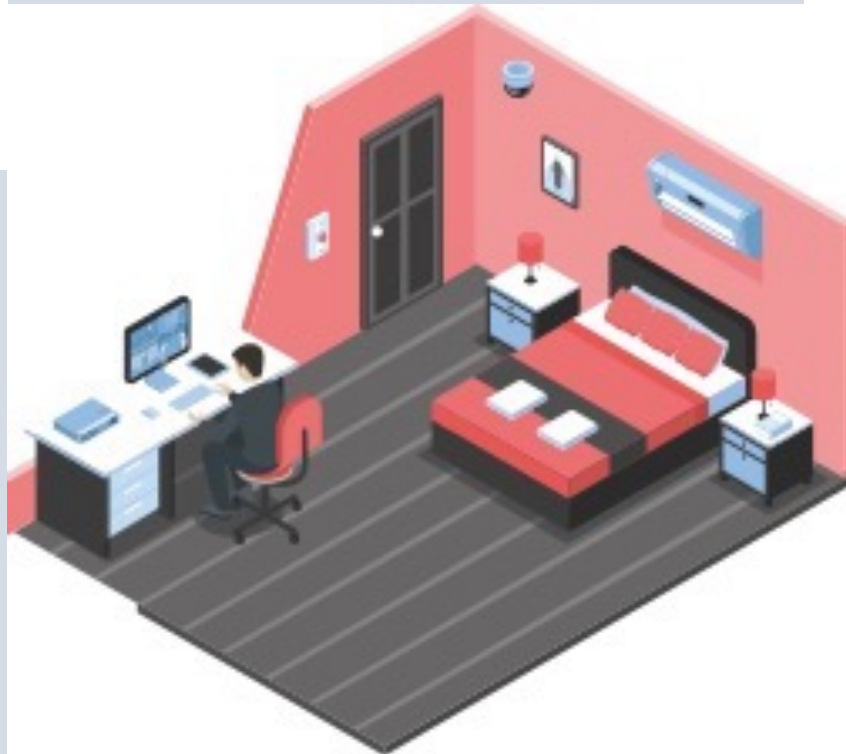
<b>Task Group</b> / <b>Persona Group</b>	<b>Adaptive</b>	<b>Assigned</b>	<b>Desk</b>	<b>Mobile</b>
<b>Confidential</b>				
<b>Individual</b>				
<b>Location Dependent</b>				
<b>Team</b>				



Hey I'm  
Dwight.



Hey I'm Dwight  
and I'm working  
from home today





# Hybrid working

$$D = \sum \Delta D = \sum \Delta \gamma \times \Delta \beta \times \Delta \theta$$

Where:

D = Total demand of office space

$\gamma$  = **ABW workplace implementation plan**

$\beta$  = **1 / share-ratio = 1 /  $\delta$**

$\theta$  = The **employment headcount** classified by different employee groups

**Share-ratio** = employee headcount / individual seat count =  $\delta$

$$\text{Modified share-ratio} = \frac{5 * \delta * \eta}{\alpha}$$

Where:

$\delta$  = current share-ratio sheerly based on ABW group = employees/seats,

$\alpha$  = average number of days employees work in the office in a week,

$\eta$  = desk occupancy rate

$$D = \sum \Delta D = \sum \Delta \gamma \times \Delta \beta \times \Delta \theta$$

Where:

$D$  = Total demand of office space

$\gamma$  = **ABW workplace implementation plan**

$\beta$  = **1 / share-ratio**

$\theta$  = The **employment headcount** classified by different employee groups

**Four independent variables of the formula are:**

- (1) ABW implementation plan,**
- (2) the average number of days employee work in the office in a week,**
- (3) desk occupancy rate,**
- (4) employment structure.**



# Scenario planning

Appropriate to be used to develop corporate real estate demand when the external strategic environment has low predictability and the internal data of the organisation has high reliability  
(O'Mara, 2000)

'A disciplined method for imagining possible futures in which organisational decisions may be played out' (Schoemaker, 1995)

~~Forecast of a relatively unsurprised prediction / Visions that describe the desired future~~  
Vivid descriptions of plausible futures  
(Lindgren & Bandhold, 2003)

## Research gap

A suitable scenario planning methodology  
that can develop quantitative office space demand scenarios  
on a corporate level does not yet exist.

Scenario generation steps	
The topic	1. Defining the issue and time period of analysis
Key decision	2. Identifying key indicators
Influencing factors	3. Identifying the possible future trends
Cross-impact analysis	4. Identifying impacts of trends on trends and key indicators 5. Establishing cross-impact analysis model
Initial scenarios	6. Developing initial scenarios by 2x2 impact matrix approach or morphological analysis.
Detailed scenarios	7. Projecting bandwidths of key indicators 8. Preparing office space demand forecasts
Implications	9. Studying implications

# Pilot study

**Step 1**

- Defining the issue and time period of analysis

**Step 2**

**Step 3**

**Step 4**

**Step 5**

**Step 6**

**Step 7**

**Step 8**

**Step 9**



## **Philips Center, Amsterdam**

Global headquarter of Royal Philips

- Lease of the property expiring by the end of 2024
- A typical and representative corporate real estate
- High reliability of internal data required for forecasting
- Facing low predictability of external strategic environment

Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9

- Identifying key indicators

$$D = \sum \Delta D = \sum \Delta \gamma \times \Delta \beta \times \Delta \theta$$

Where:

D = Total demand of office space

$\gamma$  = **ABW workplace implementation plan**

$\beta$  = **1 / share-ratio**

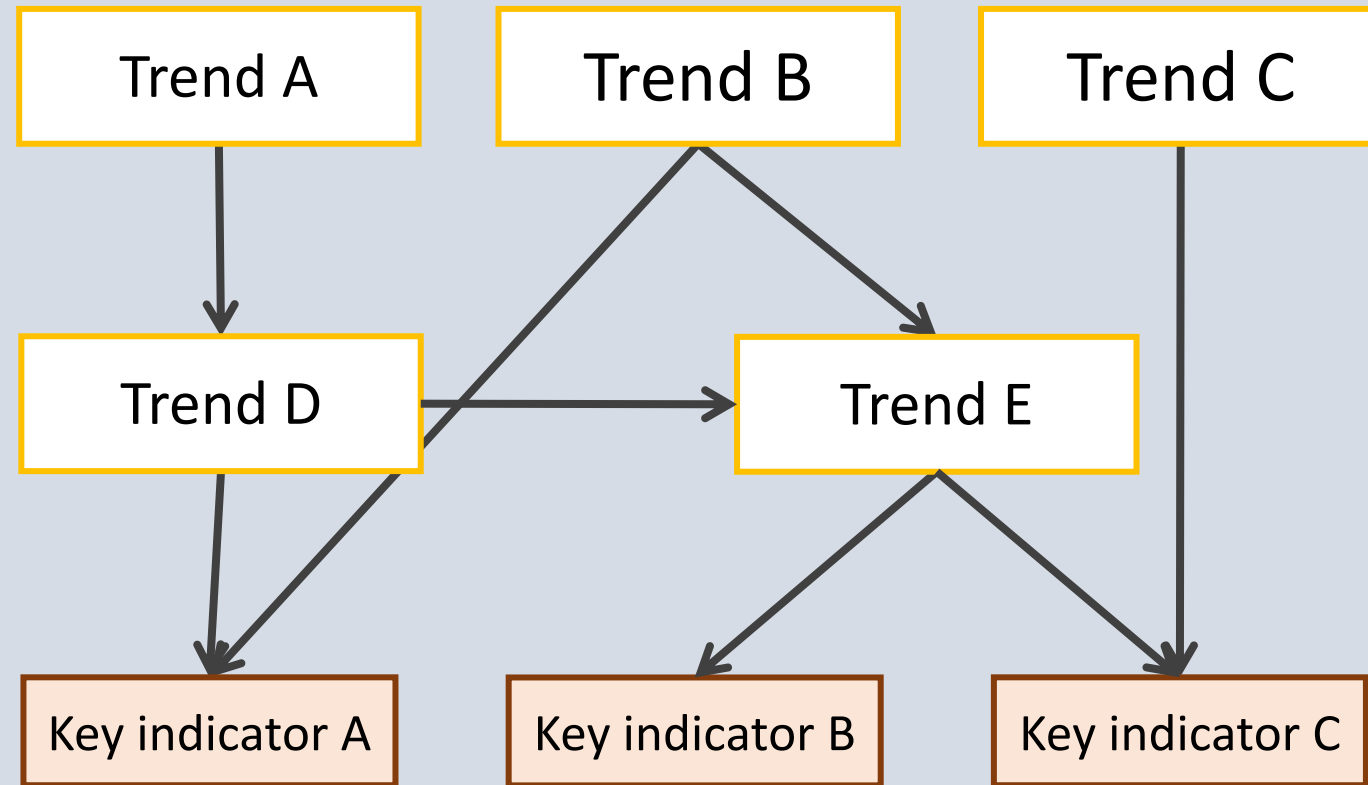
$\theta$  = The **employment headcount** classified by different employee groups

**Four key indicators = Independent variables =**

- (1) ABW implementation plan,**
- (2) the average number of days employee work in the office (or work from home) in a week,**
- (3) desk occupancy rate,**
- (4) employment structure.**

Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9

- Identifying the possible future trends
- Identifying impacts of trends on trends and key indicators
- Establishing cross-impact analysis model



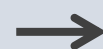
### Legends



Possible Future Trends

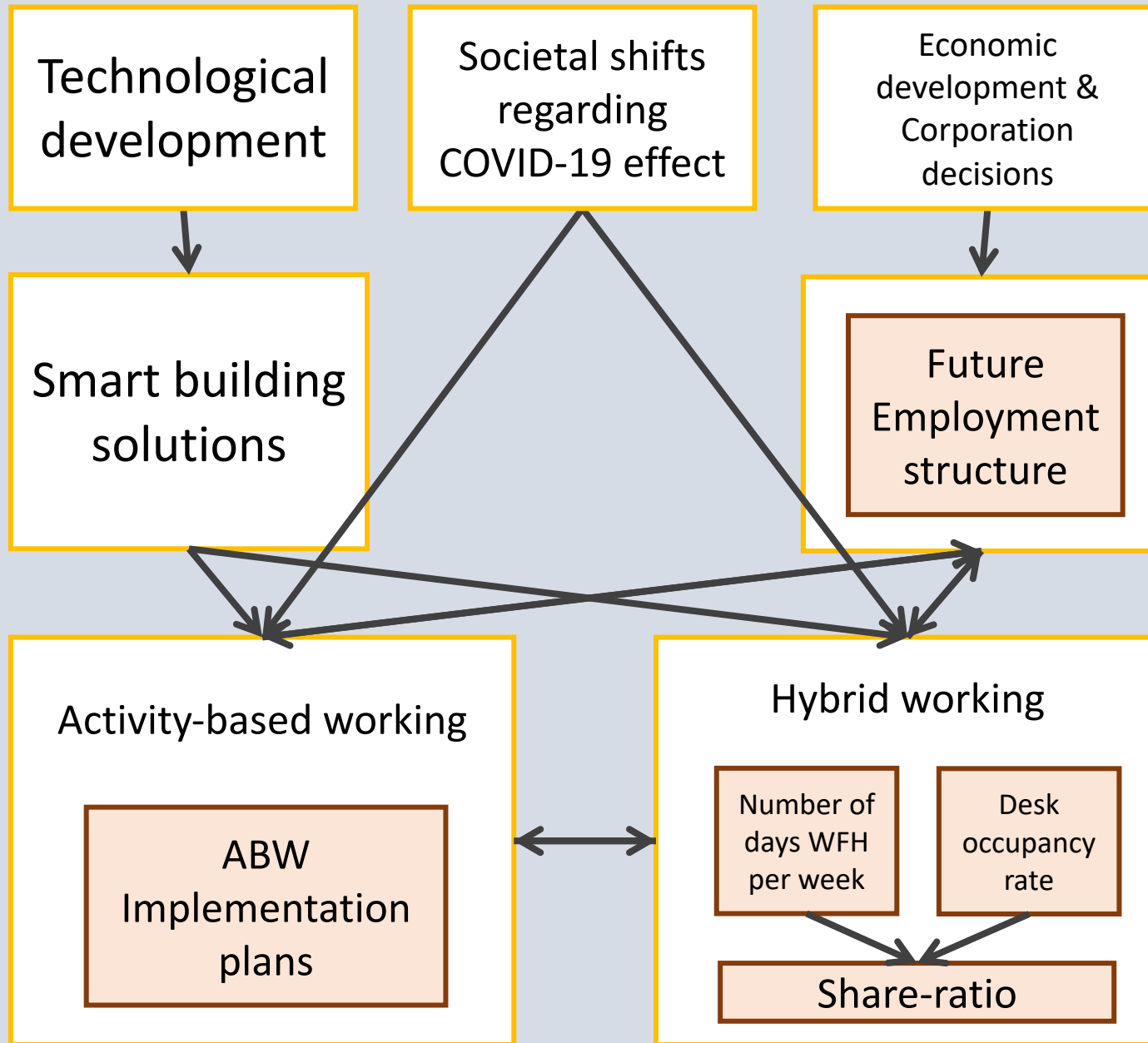


Key Indicators  
(independent variables) with  
bandwidths



Impacts from trends to  
trends/key indicators

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7
- Step 8
- Step 9

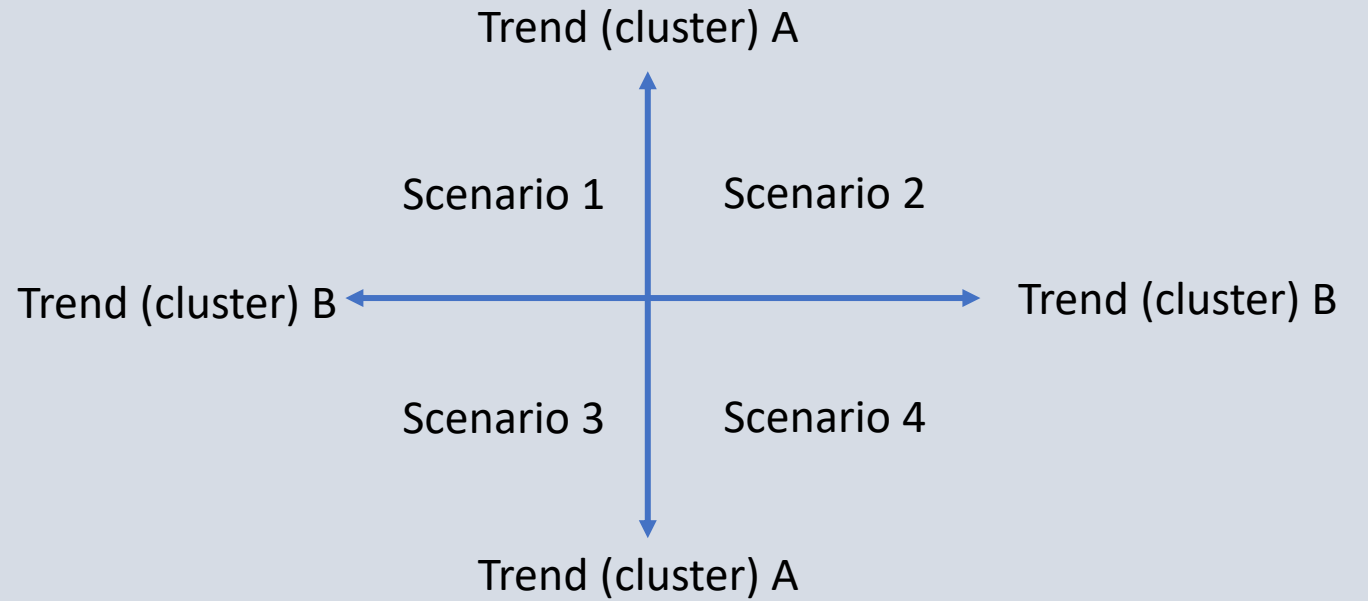


### Legends

- Possible Future Trends
- Key Indicators (independent variables) with bandwidths
- Impacts from trends to trends/key indicators

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6**
- Step 7
- Step 8
- Step 9

- Developing initial scenarios by 2x2 impact matrix approach or morphological analysis.



	①	Element 1	Element 2	Element 3	Element 4	③
Variation A	②	1A	2A	3A	4A	Scenario 1
Variation B		1B	2B	3B	4B	Scenario 2
Variation C		1C	2C	3C	4C	Scenario 3
Variation D		1D	2D		4D	
Variation E			2E		4E	Scenario 4

④

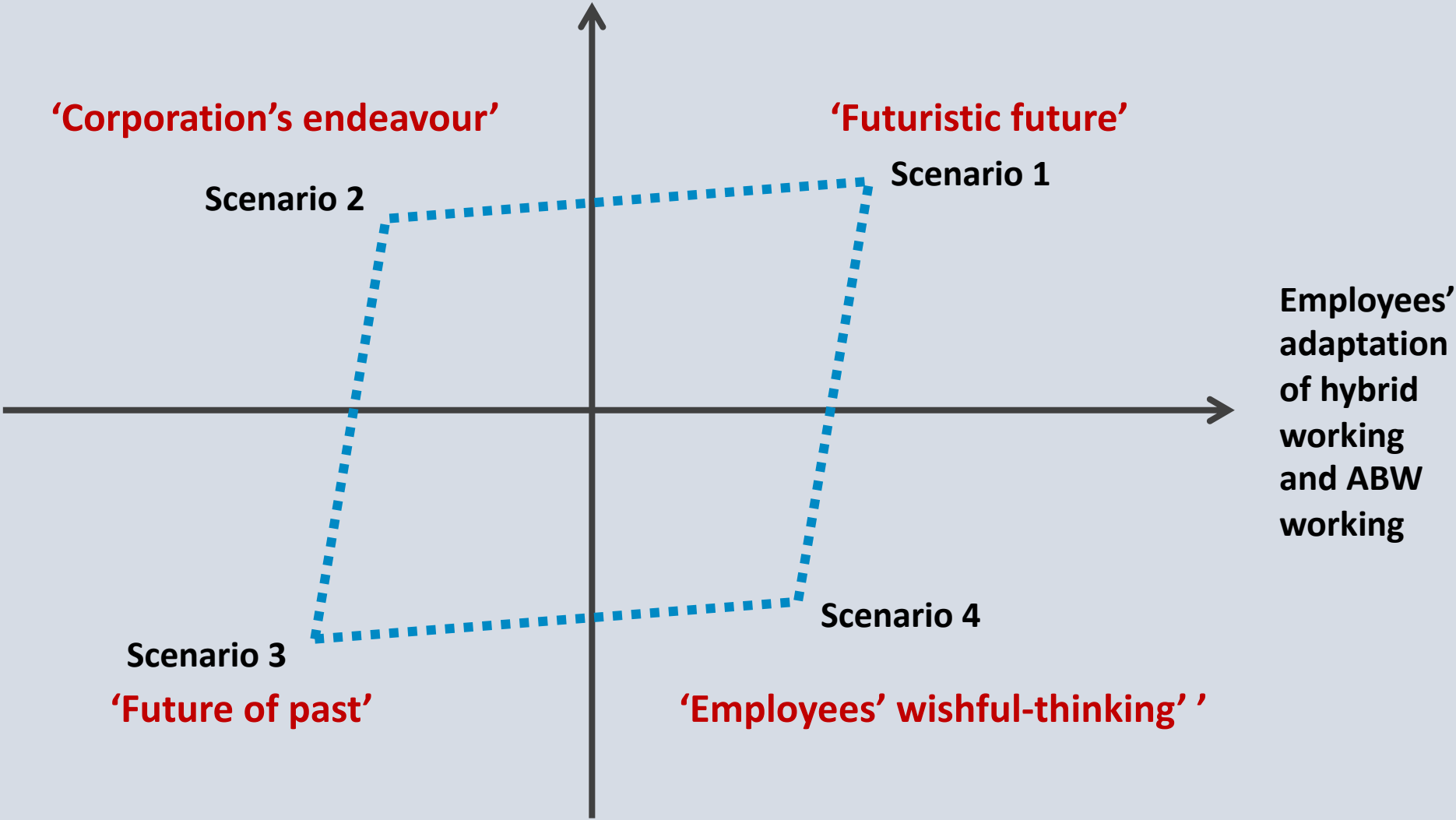


Step 1
Step 2
Step 3
Step 4
Step 5
<b>Step 6</b>
Step 7
Step 8
Step 9

- ***Corporation's performance of implementing and applying technology in the office*** has impacts on  
(1) ABW implementation plan, and  
(2) desk occupancy rate
- ***Employees' adaptation of hybrid working and ABW working*** has impacts on  
(1) employment structure, and  
(2) the average number of days employees work in the office per week

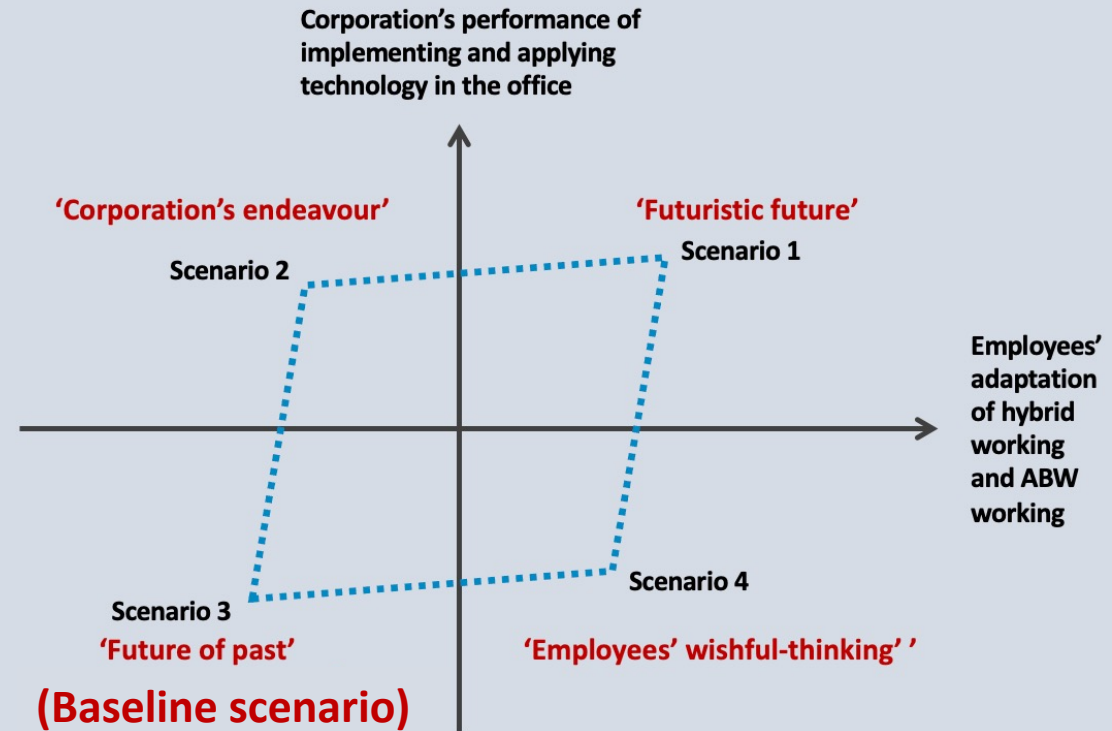
Corporation's performance of implementing and applying technology in the office

Step 1
Step 2
Step 3
Step 4
Step 5
<b>Step 6</b>
Step 7
Step 8
Step 9



Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
<b>Step 7</b>
Step 8
Step 9

- Projecting bandwidths of key indicators



## Research methods:

- Literature study
- Survey and data analytics
- Interview

*Example of employment structure at baseline scenario*

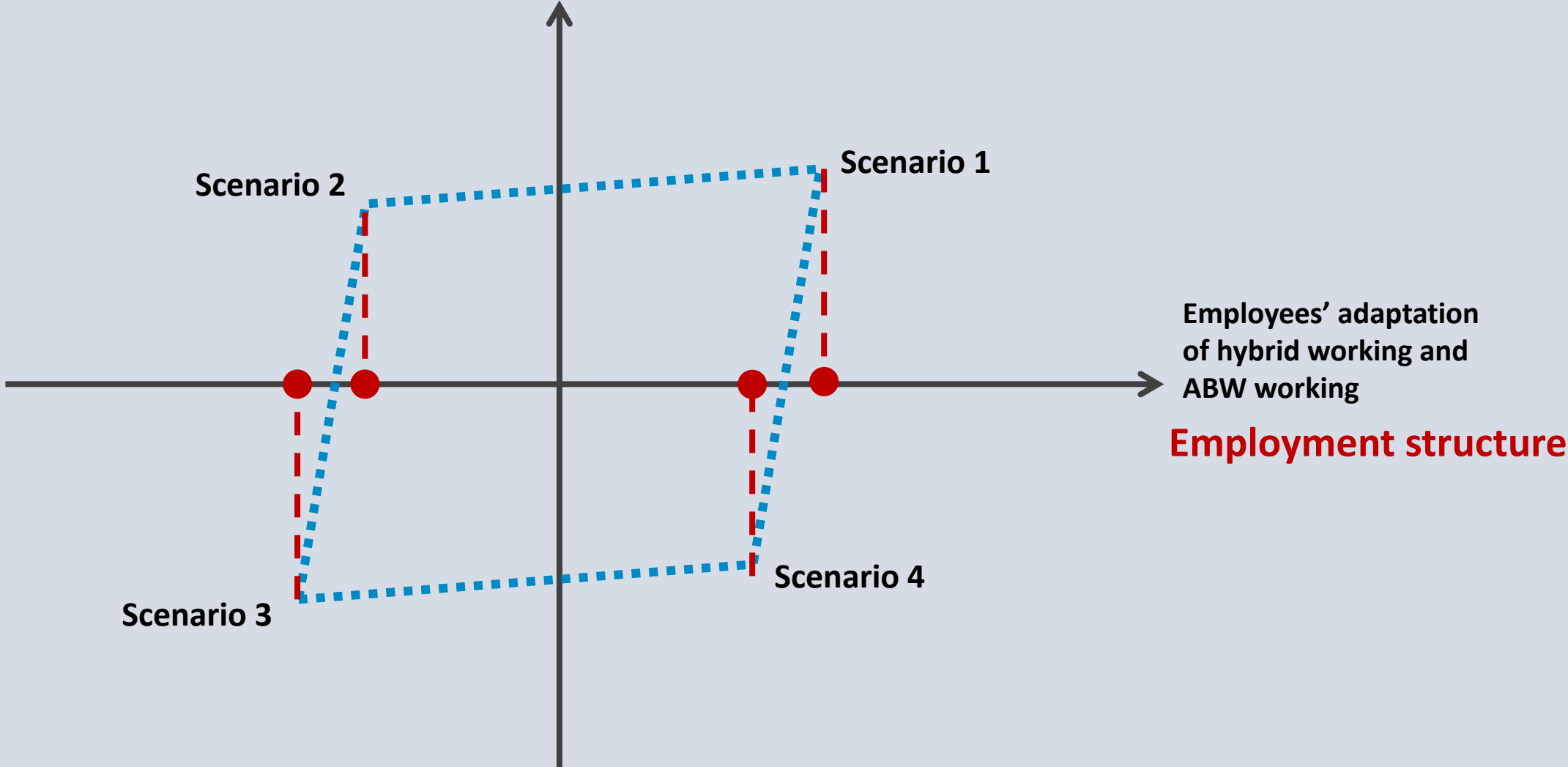
Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
<b>Step 7</b>
Step 8
Step 9

Persona group	Adaptive	Assigned	Desk	Mobile
Task group				
Confidential				
Individual				
Location Dependent				
Team				

**Employment structure**

Corporation's performance of implementing and applying technology in the office

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7**
- Step 8
- Step 9



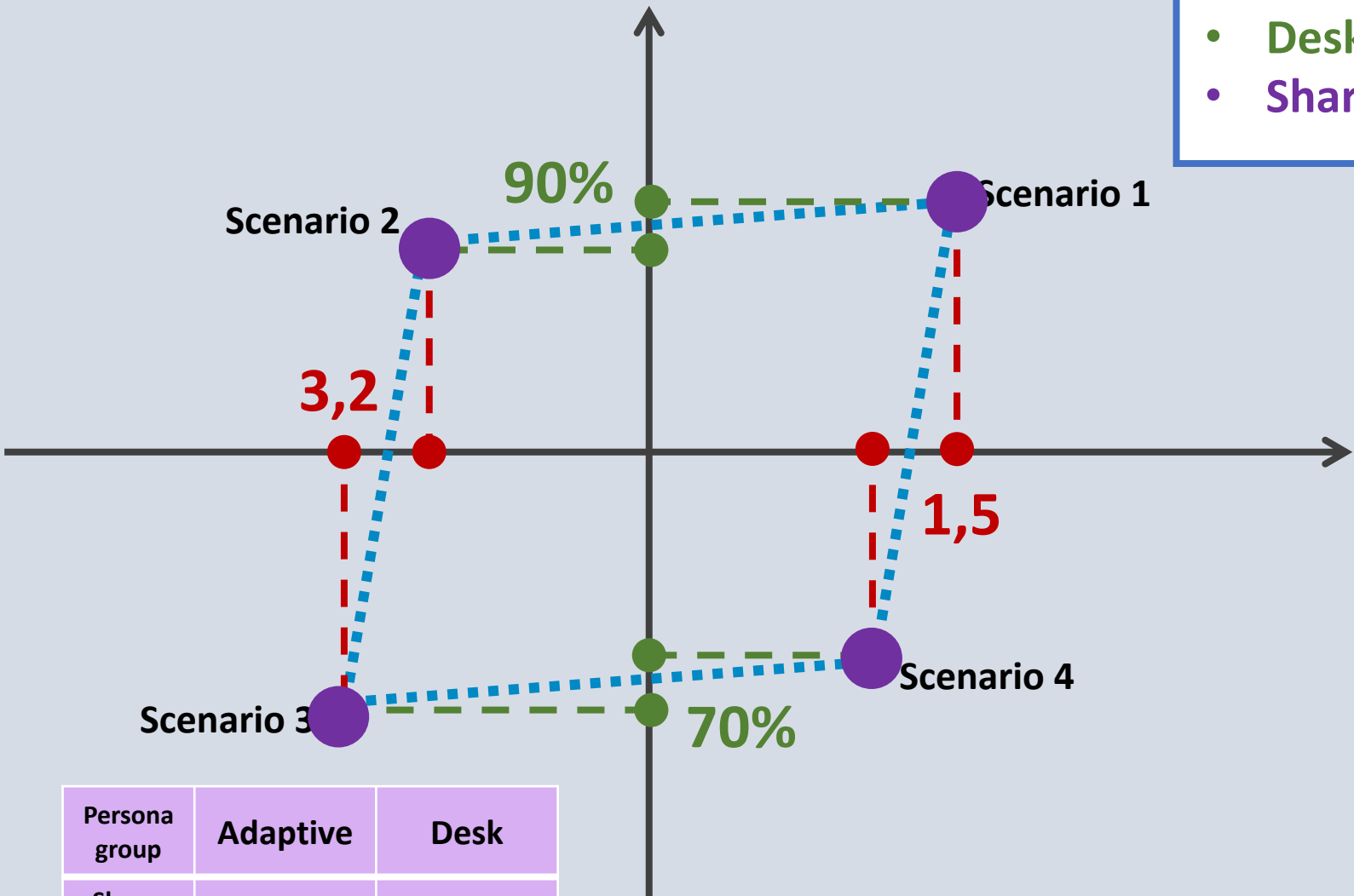
Employees' adaptation of hybrid working and ABW working

**Employment structure**

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7
- Step 8
- Step 9

Corporation's performance of implementing and applying technology in the office

Desk occupancy rate



- Average number of days employees work in the office in a week
- Desk occupancy rate
- Share-ratio

Employees' adaptation of hybrid working and ABW working

Average number of days employees work in the office in a week

Persona group	Adaptive	Desk
Share-ratio	2,19	1,31

*Example of ABW implementation plan at baseline scenario*

**ABW implementation plan**

- Step 1**
- Step 2**
- Step 3**
- Step 4**
- Step 5**
- Step 6**
- Step 7**
- Step 8**
- Step 9**

Worksettings	Number of worksettings			
	Individual tasks	Team tasks	Location dependent tasks	Confidential tasks
Open Worksetting (within Seat Count)				
Focus Room (soms within Seat Count)				
Touch Down Worksetting (soms within Seat Count)				
Phone Booth				
Break Out Area				
Small Meeting Room				
Medium Meeting Room				
Large Meeting Room				
Collaboration Space				
Collaboration Room				
Training Room				

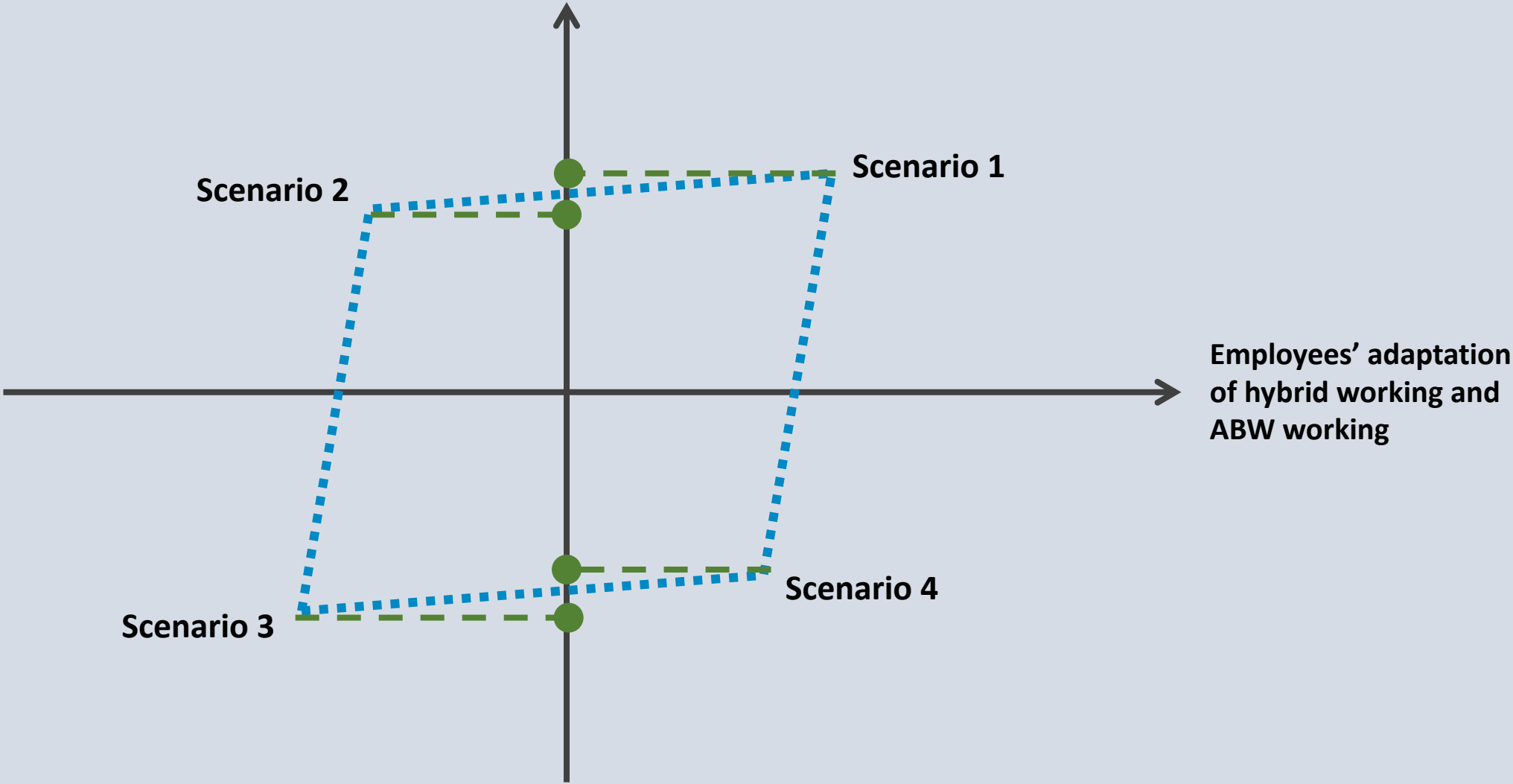
TSC = Total Seat Count of the task group

**ABW implementation plan**

Corporation's performance of implementing and applying technology in the office

**ABW implementation plan**

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7**
- Step 8
- Step 9





Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9

- Preparing office space demand forecasts
- Studying implications

Key indicator	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Summary
Total office space	5426 ± 272 sqm	7114 ± 356 sqm	8417 ± 421 sqm	6375 ± 319 sqm	5154 ~ 8838 sqm
Office demand compared with current space area	Demand is lower than supply by 34% - 31%	Demand is lower than supply by 22% - 15%	Demand is lower than supply by 10% - 2%	Demand is lower than supply by 28% - 22%	Demand is lower than supply by 34% - 2%

- ***The total office space demand in all scenarios are lower than the current office space area.***
- In terms of the influence on ***adjusting office space demand***
  - Clustered trends:***  
Employees' adaptation of conducting hybrid working and ABW > Corporation's performance of implementing and applying technology in the office
  - Key indicators (independent variables):***  
The number of days employees work in the office in a week > desk occupancy rate > employment structure > ABW implementation plan



Overview



Story



**Recap**



Discussion

**Main research question:**

**How can scenario planning give quantitative outputs on post-pandemic office space demand for corporate real estate?**

**Sub-RQ1:** What is a suitable methodology of scenario planning that can develop quantitative office space demand scenarios on the corporate level?

**Sub-RQ2:** What is a suitable mathematical formula of office space demand forecasting for corporate real estate in the post-pandemic context?

**Sub-RQ3:** How can the proposed scenario planning methodology and office space demand forecasting formula be applied for corporate real estate?

**Sub-RQ1:** What is a suitable methodology of scenario planning that can develop quantitative office space demand scenarios on the corporate level?

Scenario generation steps	
The topic	1. Defining the issue and time period of analysis
Key decision	2. Identifying key indicators
Influencing factors	3. Identifying the possible future trends
Cross-impact analysis	4. Identifying impacts of trends on trends and key indicators 5. Establishing cross-impact analysis model
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Detailed scenarios	7. Projecting bandwidths of key indicators 8. Preparing office space demand forecasts
Implications	9. Studying implications

**Sub-RQ2:** What is a suitable mathematical formula of office space demand forecasting for corporate real estate in the post-pandemic context?

$$D = \sum \Delta D = \sum \Delta \gamma \times \Delta \beta \times \Delta \theta$$

Where:

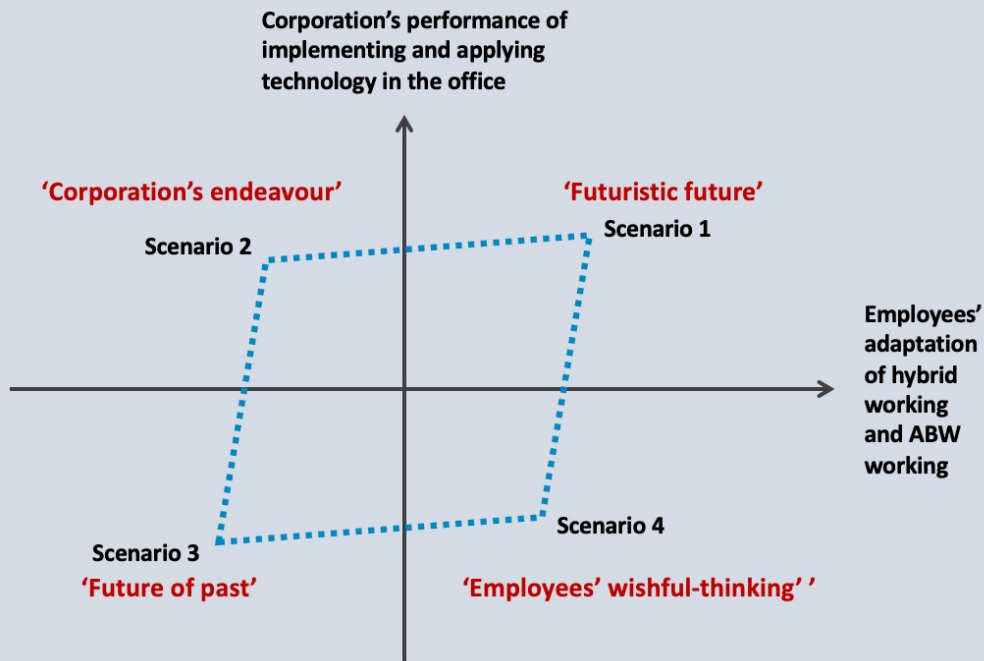
D = Total demand of office space

$\gamma$  = **ABW workplace implementation plan**

$\beta$  = **1 / share-ratio**

$\theta$  = The **employment headcount** classified by different employee groups

**Sub-RQ3:** How can the proposed scenario planning methodology and office space demand forecasting formula be applied for corporate real estate?



Key indicator	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Summary
<b>Total office space</b>	5426 ± 272 sqm	7114 ± 356 sqm	8417 ± 421 sqm	6375 ± 319 sqm	5154 – 8838 sqm
<b>Office demand compared with current space area</b>	Demand is lower than supply by 34% - 31%	Demand is lower than supply by 22% - 15%	Demand is lower than supply by 10% - 2%	Demand is lower than supply by 28% - 22%	Demand is lower than supply by 34% - 2%

## Main research question:

**How can scenario planning give quantitative outputs on post-pandemic office space demand for corporate real estate?**



Scenario planning *can* give quantitative output on (post-pandemic) office space demand for corporate real estate.



By applying the methodology to cases, scenarios can be developed. However, flaws exist in the current office space demand forecasting formula, it needs to be improved.



Different scenarios will be developed when applying the proposed scenario planning methodology in different scopes. While the same methodology can be applied to different scopes, specific research must be done to apply the methodology and develop credible outputs.



Overview



Story



Recap



**Discussion**



# Research evaluation

- Expert panel
- Interview of PACT model
  
- **Replicability**
- **External validity**
- **Internal validity**
- **Measurement validity**

# Research limitations

- The limitation in research methodology
- Design process cycle is run only once
- Data collection and analytics
- The completeness of literature study
- Confidentiality-related issue during interviews

# Research recommendations

## For future research

- Strengthening the methodology of scenario planning
- Improving office space demand forecasting formula
- Research on future personnel change
- Research regarding productivity change
- Research regarding possible revenue and expenditure

## For practice

- Applying the proposed scenario planning methodology for CRE
- Evaluating strategies based on scenarios

**Thank you**