P5 Presentation

Reimagining industrial heritage.

facilitating tomorrow's manufacturing industry towards a circular city

Christiaan Hanse
MSc. Management in the Built Environment | 2022/2023
First Mentor Hilde Remøy | **Second Mentor** Karel Van den Berghe | **Delegate Board of Examiners** N. Katsikis
Delft University of Technology June 2023

Presentation structure

- [1] **Introduction:**
  - **Problematisation & main concepts**
  - **Research questions**
- [2] **Methods**
- [3] **Literature review**
- [4] **Empirical research**
- [5] **Framework design & use**
- [6] **Conclusion & Discussion**

Introduction.

Problematisation

Research question

Reimagining industrial heritage.

Adaptive reuse of Industrial heritage

to facilitate the urban manufacturing industry

Adaptive reuse > Industrial heritage > Urban manufacturing > Circular city

towards a circular city

Adaptive reuse - Industrial heritage

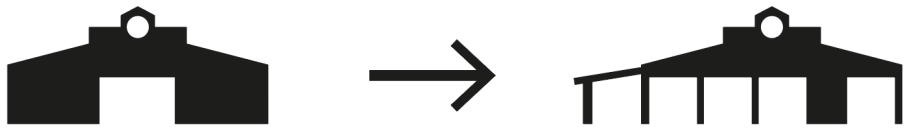
Adaptive reuse – Industrial heritage - Urban manufacturing

Adaptive reuse

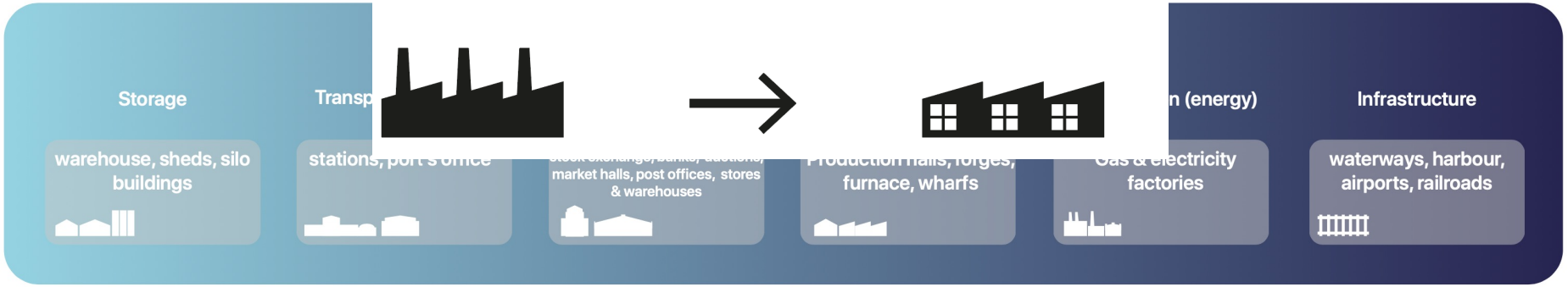
'Reuse of a building, converting the function to something different than the original, to improve the social and economic performance of a building or site, by transforming them to objects with a new purpose'

(Arfa et al., 2022; Gaballo et al.,2021)

Industrial heritage

"the remains of industrial  *architectural, or scientific*

(ICOMOS, 2003, p. 2)

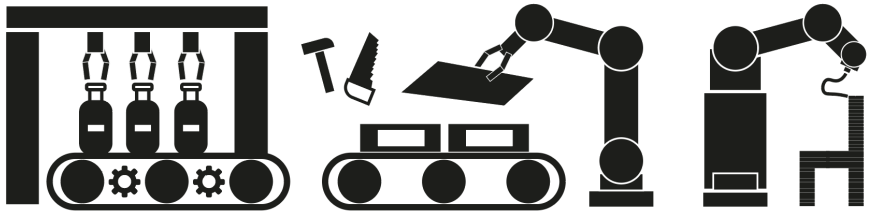


Urban Manufacturing

Adaptive reuse – Industrial heritage - Urban manufacturing

Urban Manufacturing

'Manufacturing on the urban scale, city oriented'

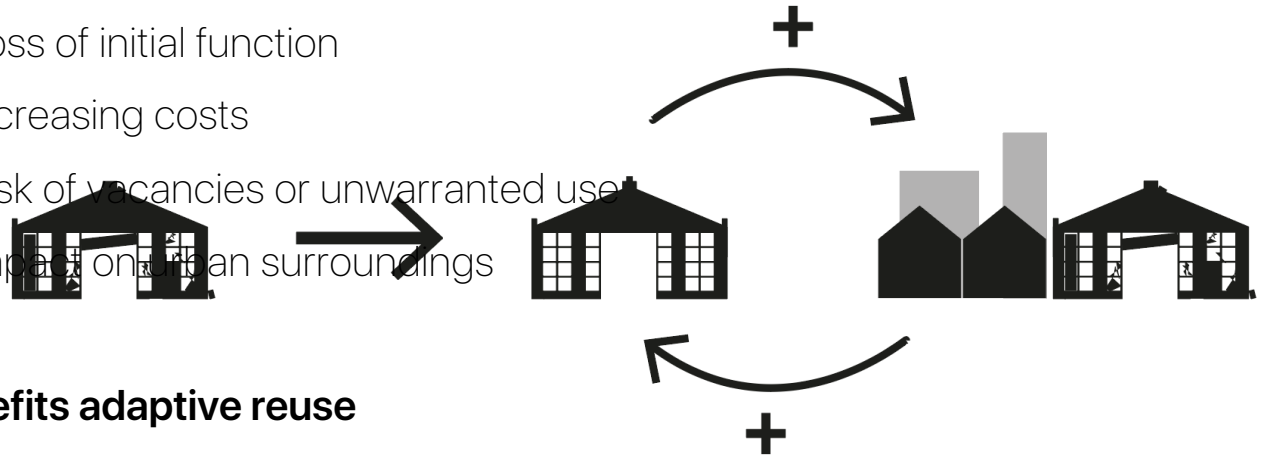


Adaptive reuse - Industrial heritage

Adaptive reuse – Industrial heritage

Need for adaptive reuse

- Societal, economic & environmental developments: Changing standards and requirements by users
- Loss of initial function
- Increasing costs
- Risk of vacancies or unwarranted use
- Impact on urban surroundings



Benefits adaptive reuse

- Social, economic & environmental values of heritage
- Reduction of material and energy use
- Promote (circular) relationships with surroundings
    - Circular economy development as regenerative practice: producing positive impacts (Girard & Gravagnuolo, 2017)

Circular economy

Adaptive reuse – Industrial heritage

Current practice

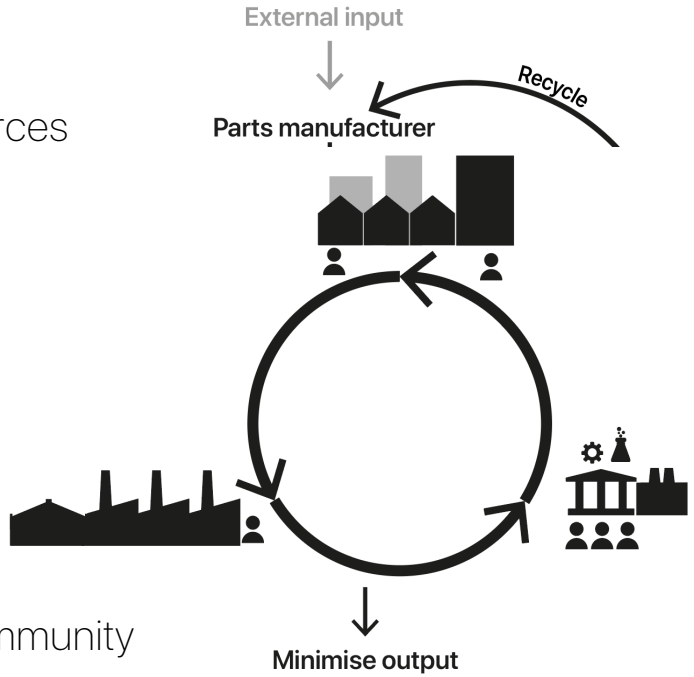
Circular economy

Circular economy (Ellen MacArthur Foundation, 2013)

- Closing loops, decoupling economic activity from finite sources
- Eliminating waste and pollution
- Circulating products and materials at highest value

Circular city (ICLEI Europe, 2020)

- Promotes transition from linear to circular economy
- In collaboration with citizens, businesses, and research community



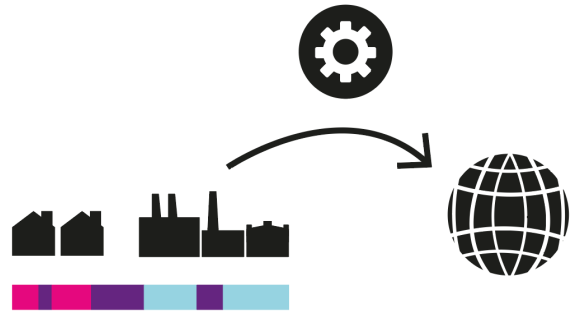
Current practice

Adaptive reuse – Industrial heritage

Current practice

Current & past practice

- Productive facilities moving out of cities (offshoring)
- Availability of large scale, industrial assets close to urban areas →
- Transformed into highly urban residential and commercial areas



Limitations current practice

- Linear urban systems, separation between consumption and production
- Lack of functional diversity
- Issues of commercialisation, gentrification, standardisation

Future opportunities

Adaptive reuse – Industrial heritage

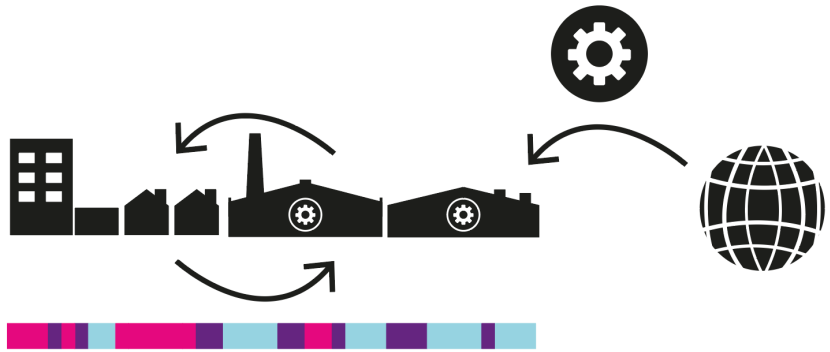
Current practice

Circular economy

Future opportunities

Need for balanced redevelopment – circular city

- Facilitating new functions that fit within the circular economy strategies:
- Urban manufacturing
- Recoupling consumption and production
- (Re)use local resources, deliver skills & innovation
- Functional diversity → resilience
- Need to reserve space
    - Challenged by commercial developments & demand for housing



Problem statement

Adaptive reuse – Industrial heritage

- Changing requirements & need for circular economy
- Risk of vacancy & demand for manufacturing space

Current practice

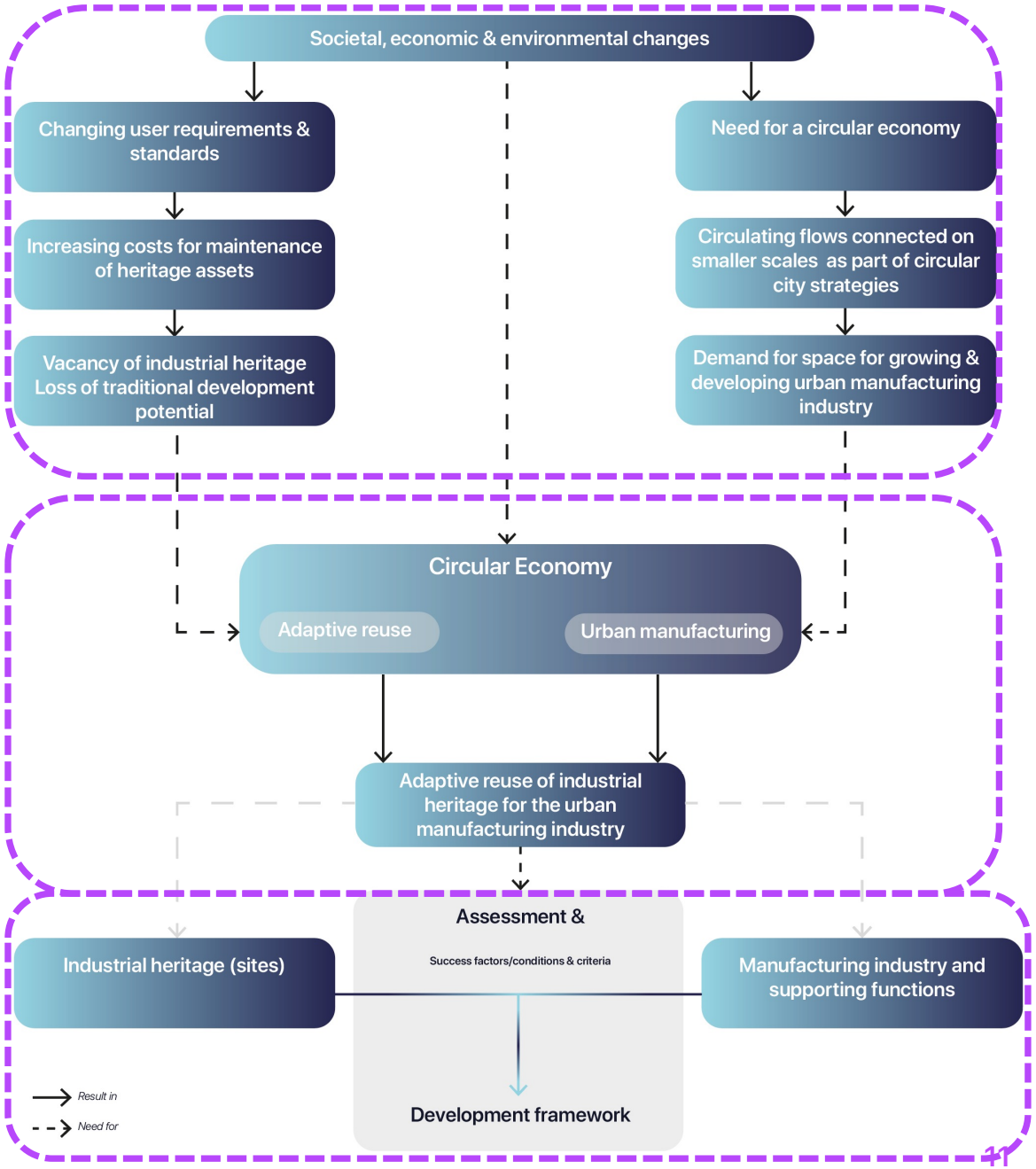
- Adaptive reuse & urban manufacturing →
- Adaptive reuse for urban manufacturing

Circular economy

- Missing specific values of heritage, requirements and success factors for assessment & development
  (Yazdani Mehr & Wilkinson, 2021 ; Bosone et al., 2021; Kaya et al., 2021)
- Development of framework required
  (Abastante et. al, 2020; Arbab & Alborzi, 2022)

Future opportunities

Research gap



Research questions.

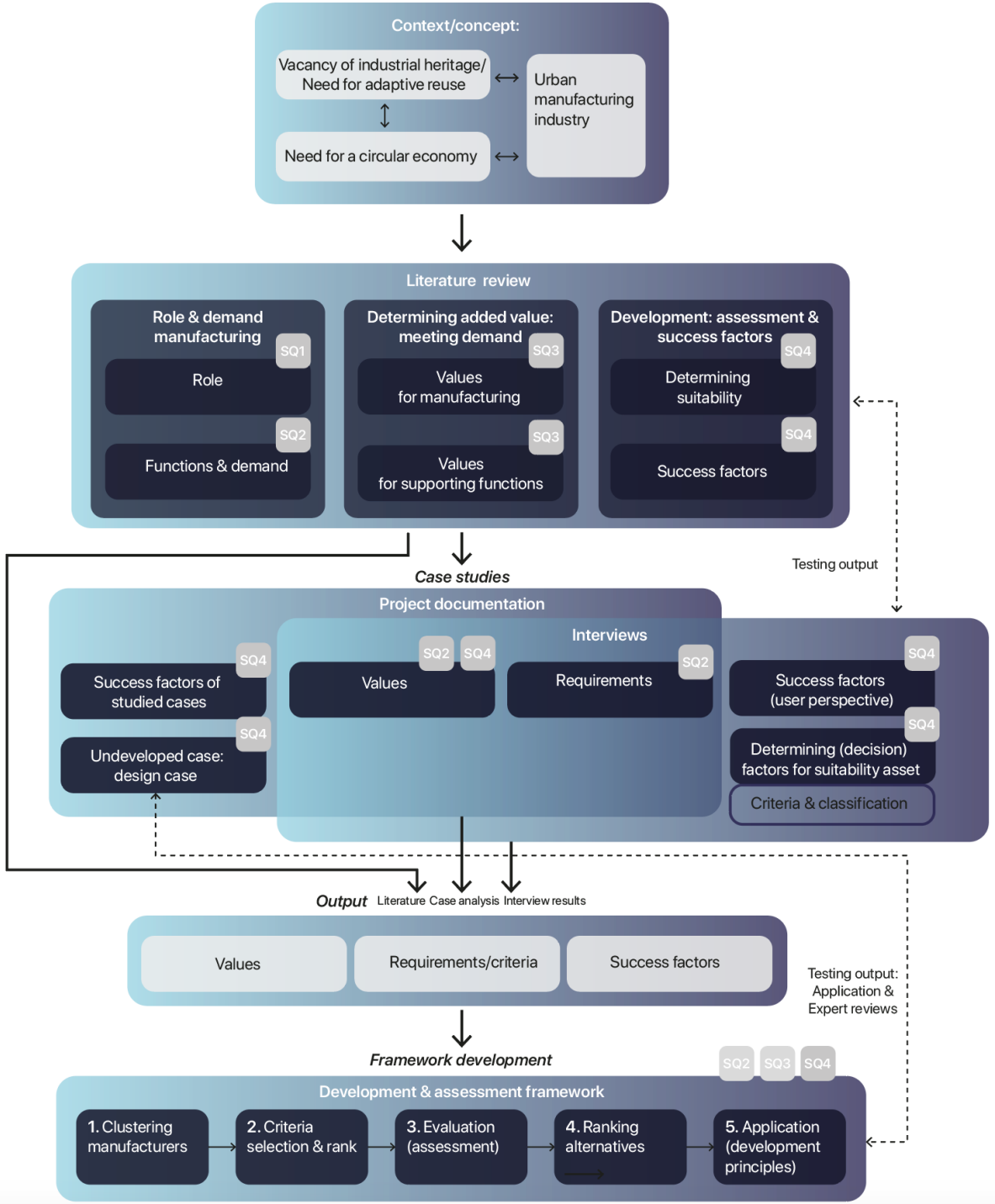
Research questions

"How can industrial heritage facilitate the developing urban manufacturing industry?"

- SQ1 **What is the role** of urban manufacturing towards the circular city**?**
- SQ2 **What functions** does the **urban manufacturing industry and its urban support network** consist of and **what are their requirements?**
- SQ3 **What are the added (tangible and intangible) values and synergies** of adaptive reuse of Industrial heritage for the Manufacturing industry**?**
  - 3.a What are the **added values** of Industrial heritage**?**
  - 3.b What are the **synergies of combining** adaptive reuse of industrial heritage and the manufacturing industry**?**
- SQ4 **How, and to what extent can these values strategically be used** through adaptive reuse of heritage for the manufacturing industry**?**
  - 4.a **What are criteria for the suitability** of industrial heritage for the urban manufacturing industry**?**
  - 4.b **What are success factors** for adaptive reuse of industrial heritage for development of the urban manufacturing industry**?**

Methods.

Research framework

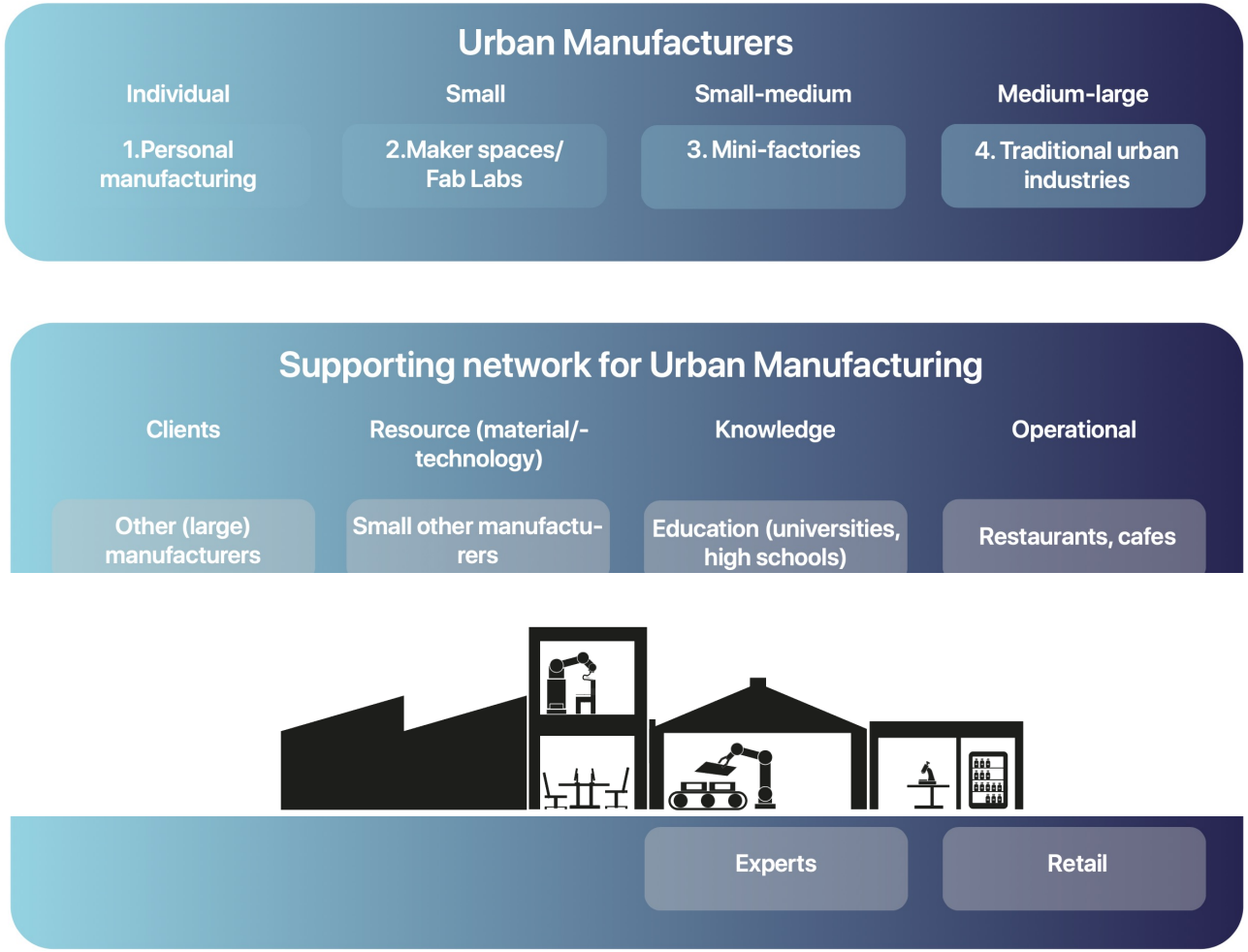


Literature review.

Urban manufacturing

Role & demand

- **4 Categories**
- **Transition**
  - Decentralised, on-demand & hybrid
  - Urban
    - New forms of production, reduced nuisance + smaller
    - Local supply chains
    - Support functions
- **Requirements**
  - Accessibility for employees & clients
  - Logistic accessibility
  - Flexibility

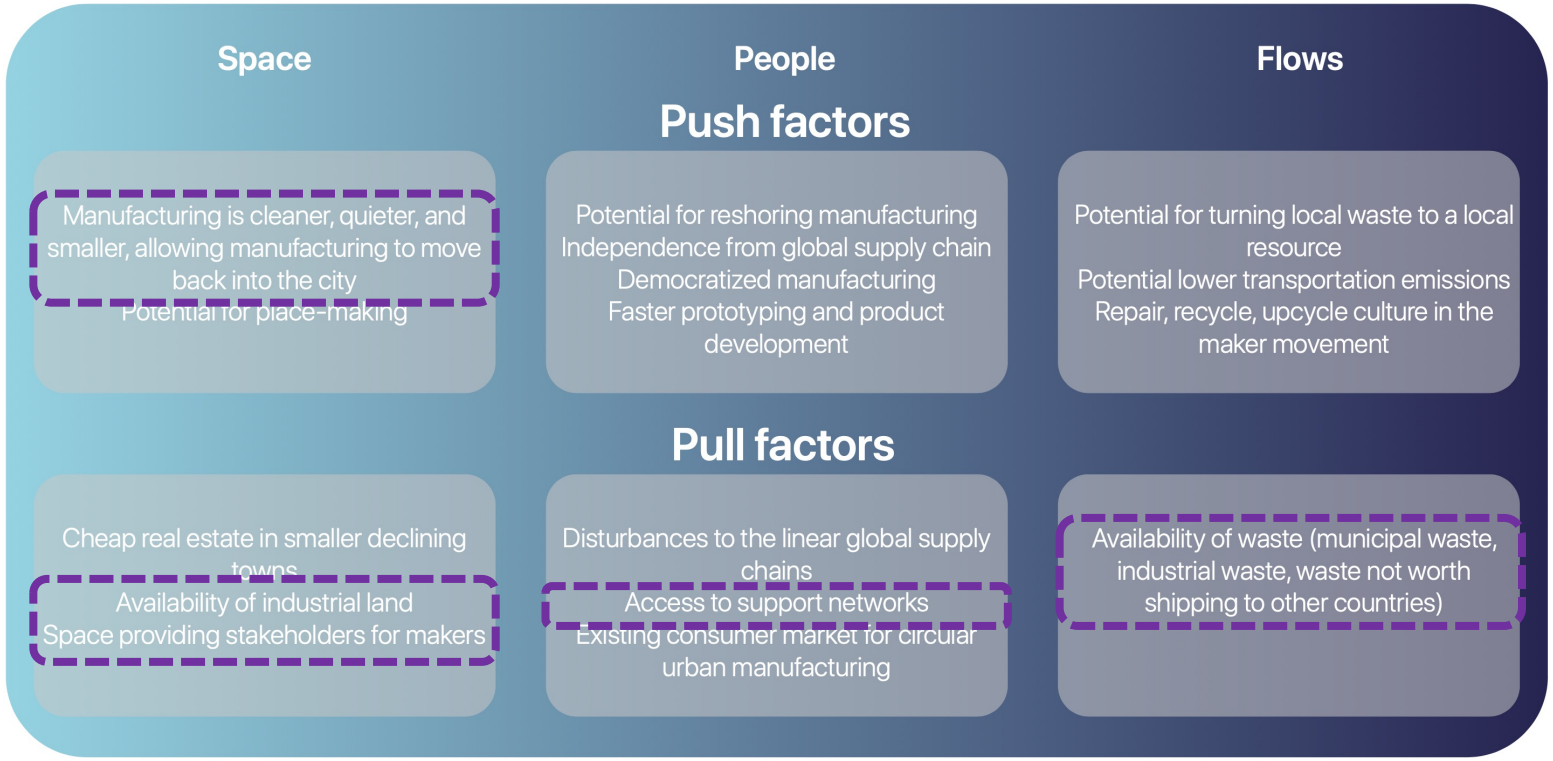


Industrial heritage values

Development

- **Criteria & success factors**
  - Diverse, flexible spaces
  - Access to (material, human & knowledge) resources
  - Colocation
  - Concept
  - Relation surroundings

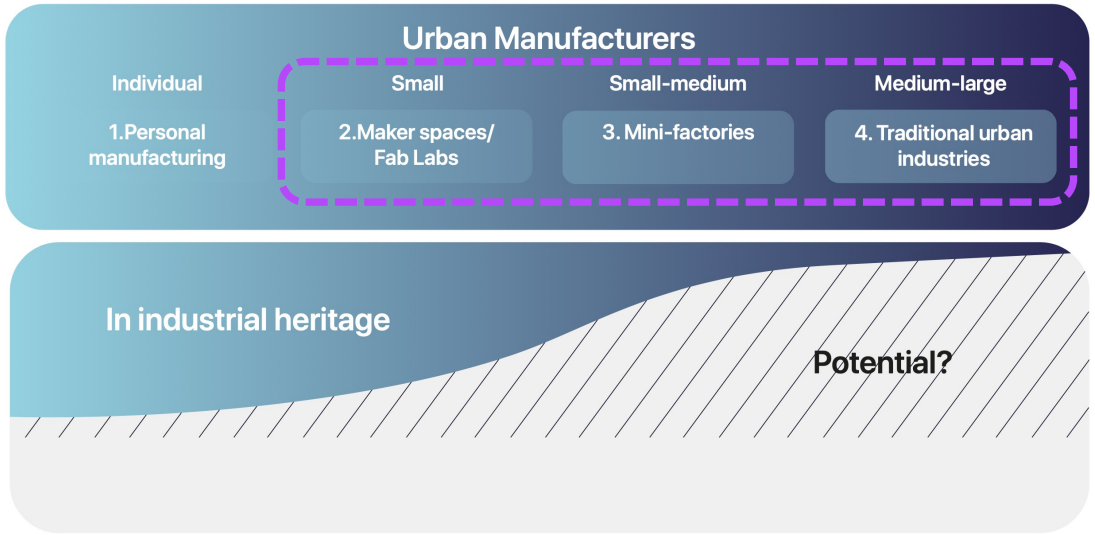
- **Circular success factors**
  - Innovation (Industry 4.0)
  - Available space
  - (space for) Support networks
  - Resources (circular)



Success factors for circular urban manufacturing based on (Tsui et al., 2021)

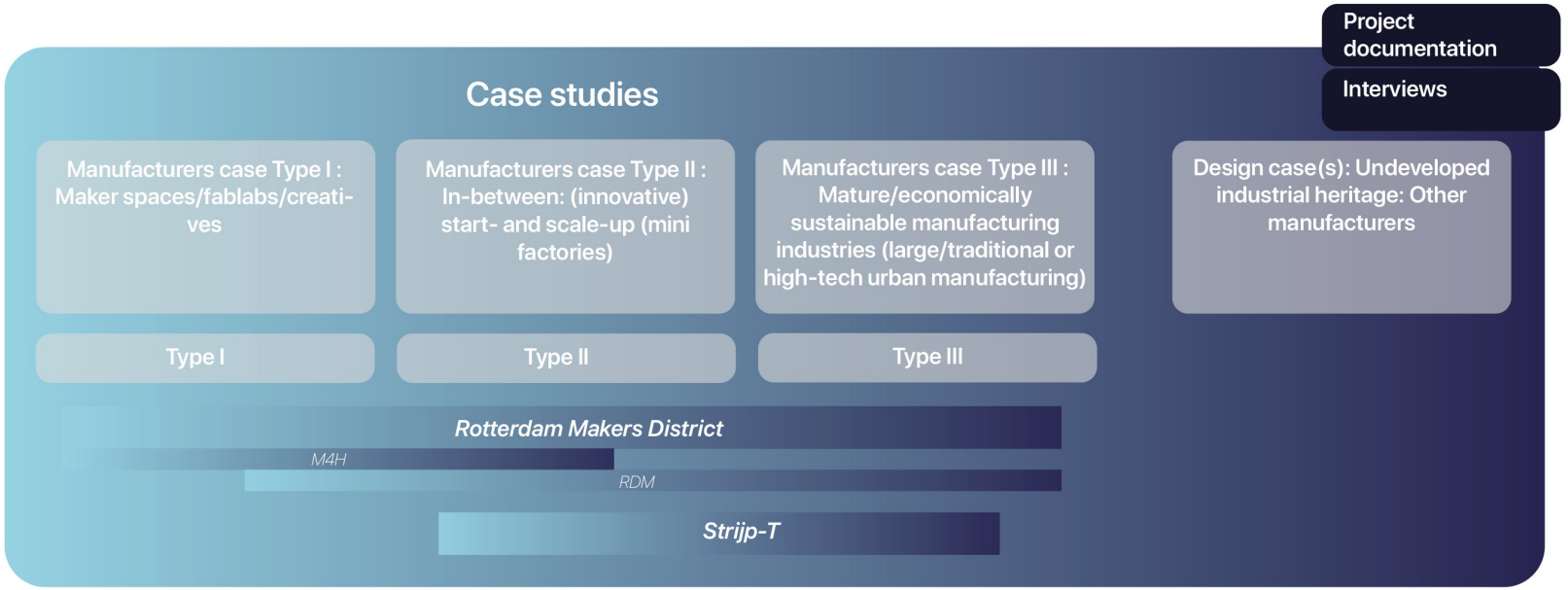
Case studies.

Case studies



Case studies

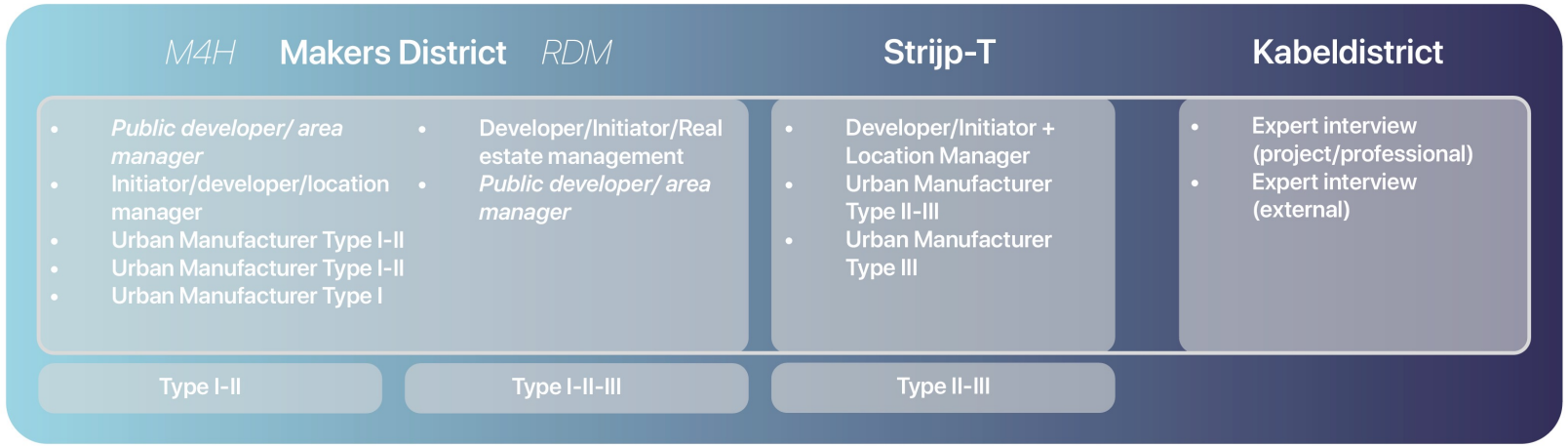
- 3 types of manufacturers
- In adaptive reuse project of industrial heritage
- One or multiple functions, at least 1 manufacturer of category 2-4, Type I-III) per case



Case studies

- 3 types of manufacturers
- In adaptive reuse project of industrial heritage
- One or multiple functions, at least 1 manufacturer of category 2-4, Type I-III) per case

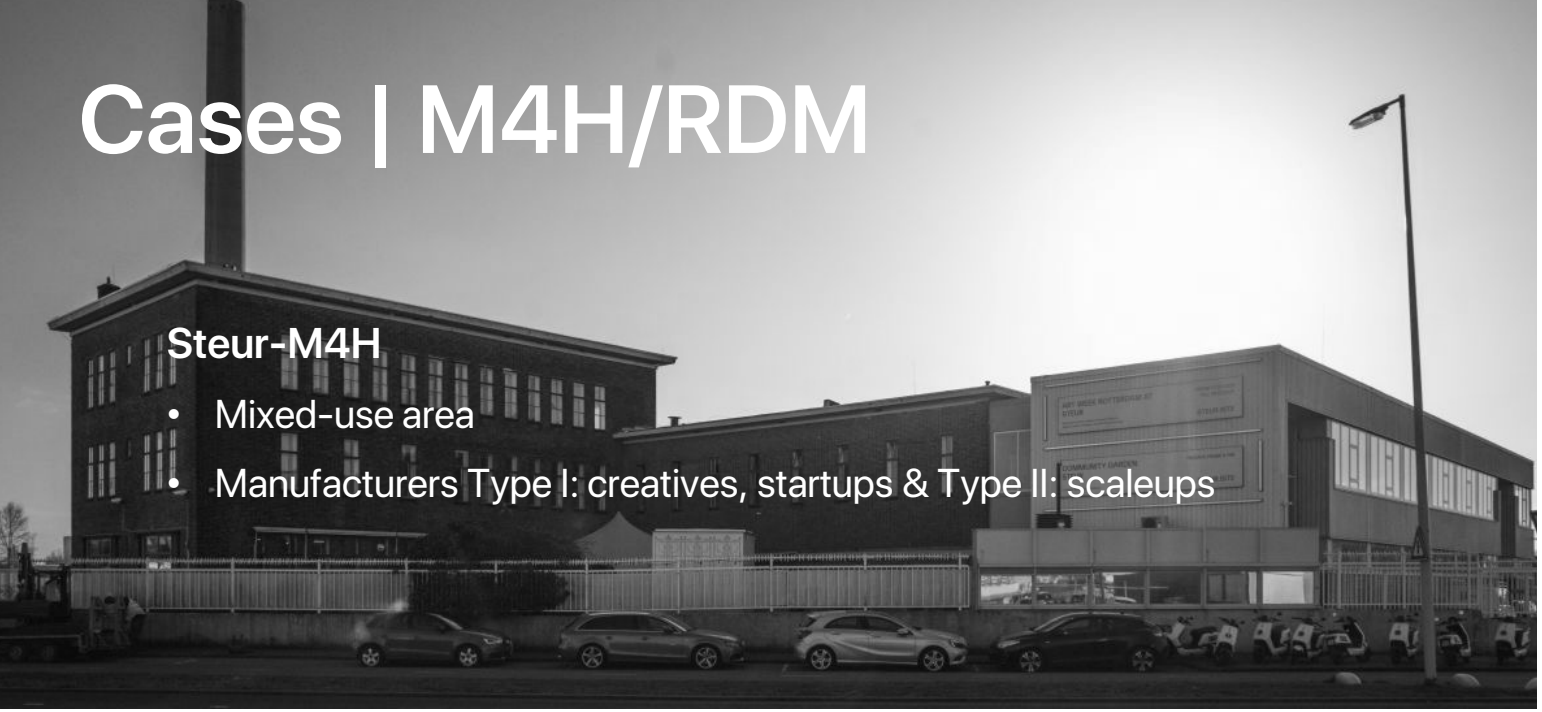
- Interviews
  - Manufacturers in case
  - (public) Initiator/location manager/developer
  - Questionnaire (criteria)
- Expert reviews



Cases | Rotterdam Makers District

RDM Campus

Cases | M4H/RDM



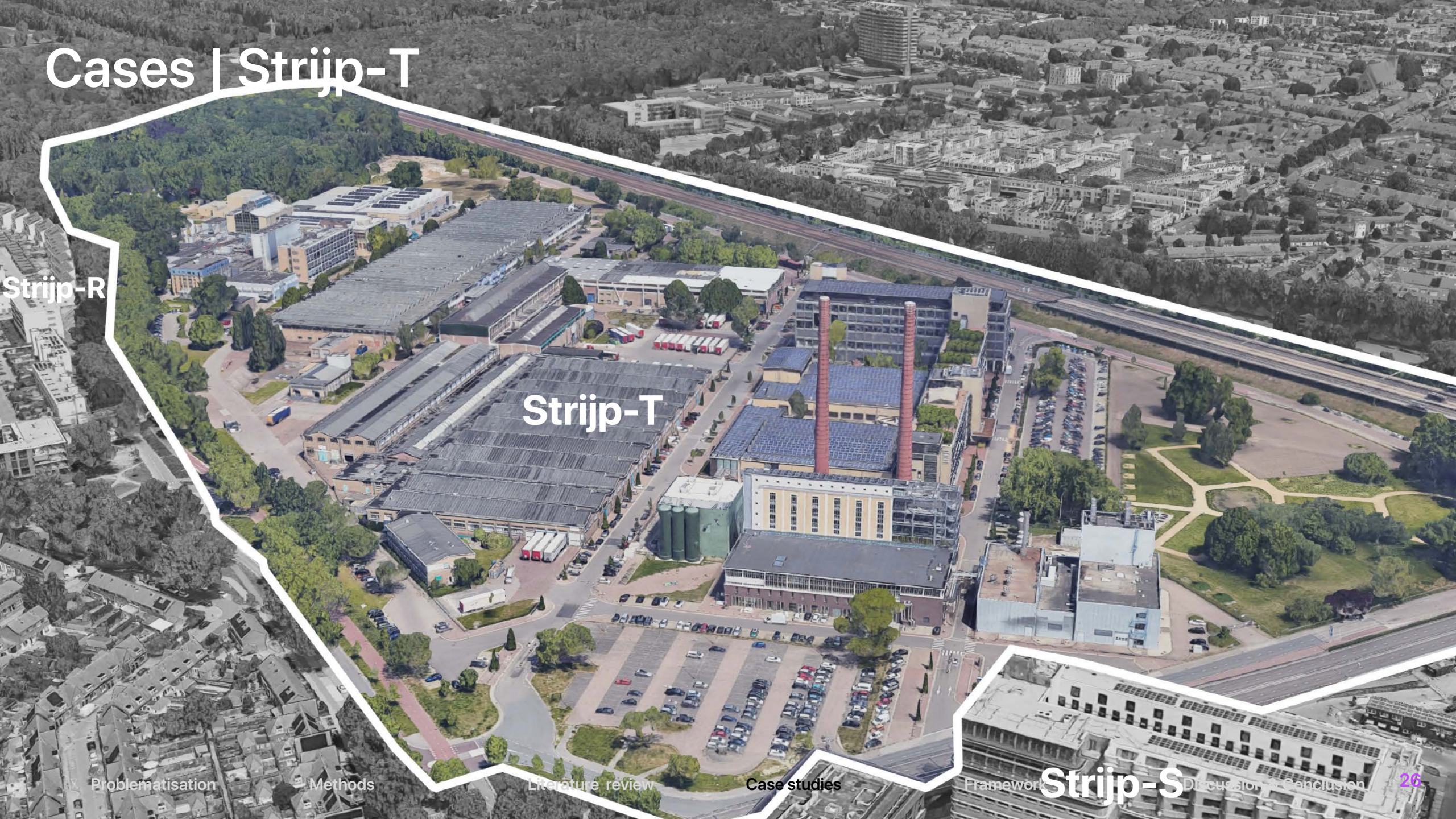
Steur-M4H

- Mixed-use area
- Manufacturers Type I: creatives, startups & Type II: scaleups

RDM Campus

- Industry, Maritime & Education
- Multi-company buildings & single-use
- Manufacturers Type I: startups Type II: scaleups & Type III Mature

Cases | Strijp-T



Cases | Strijp-T

- Mixed-use
- Education, support functions & high-tech manufacturing
- Manufacturers Type II: scaleups & Type III: mature industries

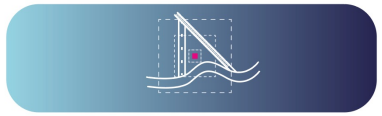
Interviews | code groups

- **Background**
  - Type, development & role
- **Requirements**
  - Current & future
- **Values**
  - Building, location & heritage
- **Success factors**
  - Success factors & challenges

Interviews | requirements

- **Building**
  - Flexibility
  - Functionality
  - Visual quality
  - Affordability
- **Location/site**
  - Accessibility (employees +logistics)
  - Other manufacturers
  - Regulations
- **Support functions**
  - Complementary
- **Future requirements**
  - Aesthetics, atmosphere
  - Connectivity
  - Maintaining space for growth
  - Independence of support functions

'The next generation of employees still values salary, but many other factors too: a workplace should be nice, inspiring, sustainable, green, well accessible' (SL1)



Interviews | values

- **General**
  - aesthetics & (productive) atmosphere
    - workplace, positioning, distinguishing
  - connector (surroundings & like-minded)
  - regulations

'I find this much more attractive than a newly built kind of: you know, the average Dutch company that you see in the company parks somewhere with this typical bend sheet metals, very functional' (RM3)

'this has so much effect on how people assess our company and what they think of us' (SM2)

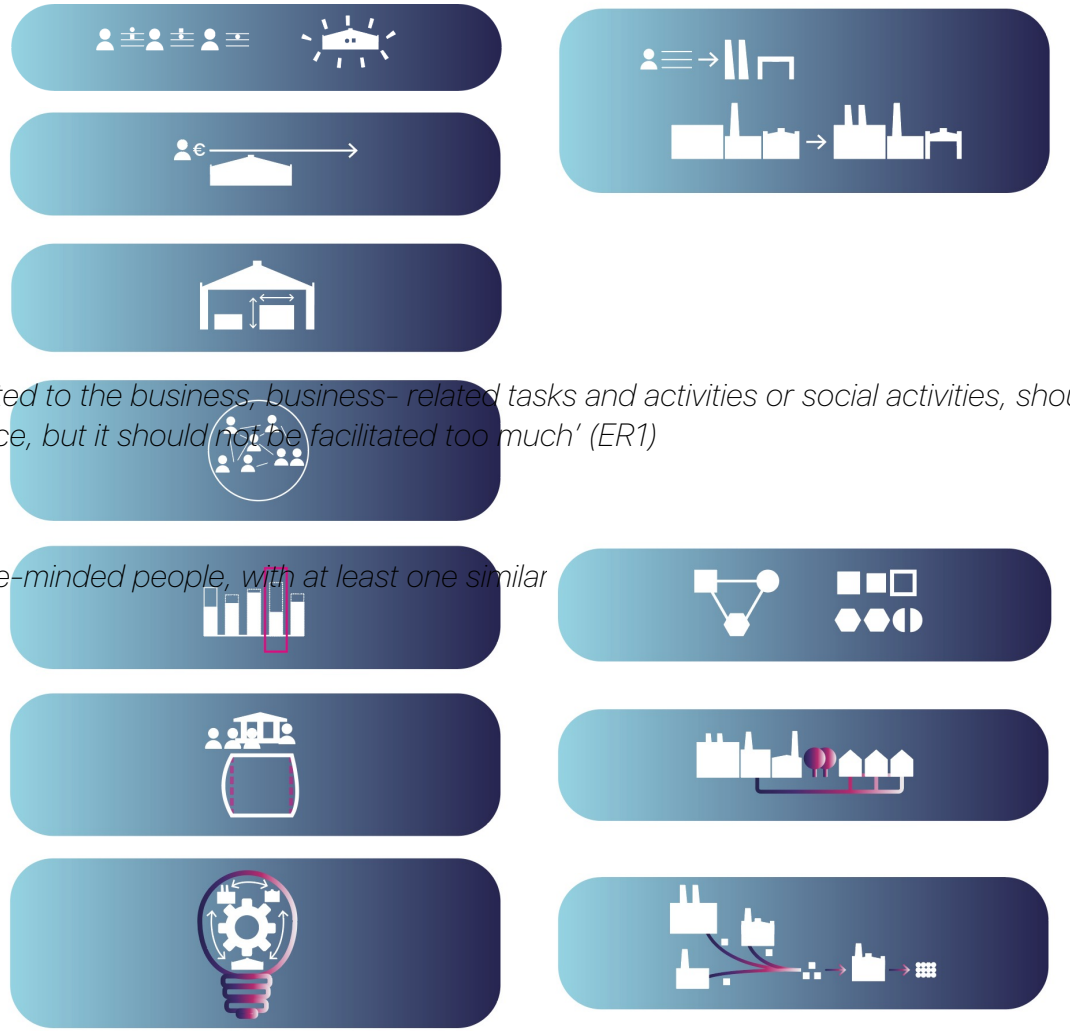
- **Building**
  - present infrastructure
  - physical capacities
  - flexibility

- **Location**
  - central & accessible
    - employees, services & clients
    - related cultural/economic hubs
  - (logistic) infrastructure

'Spaces like this are barely built anymore and they can barely be found in the city centre' (RM3)

Interviews | success factors

- **Tailored**
  - current & future employees
  - long-term involvement
- **Flexibility**
  - accommodation
  - contract
- **Community**
  - creating the conditions
  - network access
- **Concept**
  - embedded in context
  - selecting companies
- **Environment**
  - cooperation& flexibility from public parties & developers
  - relationships with surroundings
- **Circularity**
  - Clustering



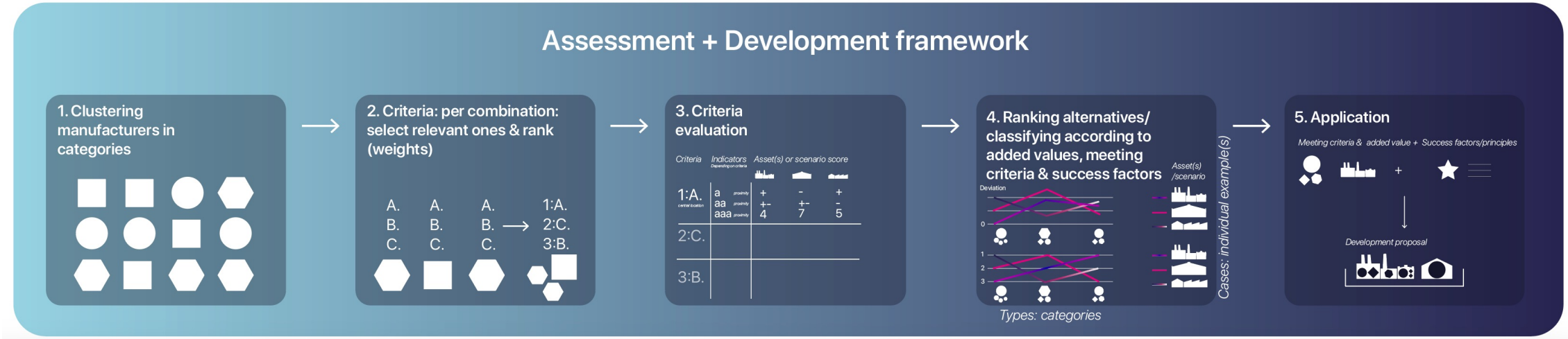
'everything related to the business, business- related tasks and activities or social activities, should be able to take place, but it should not be facilitated too much' (ER1)

'A place with like-minded people, with at least one similar

Framework.

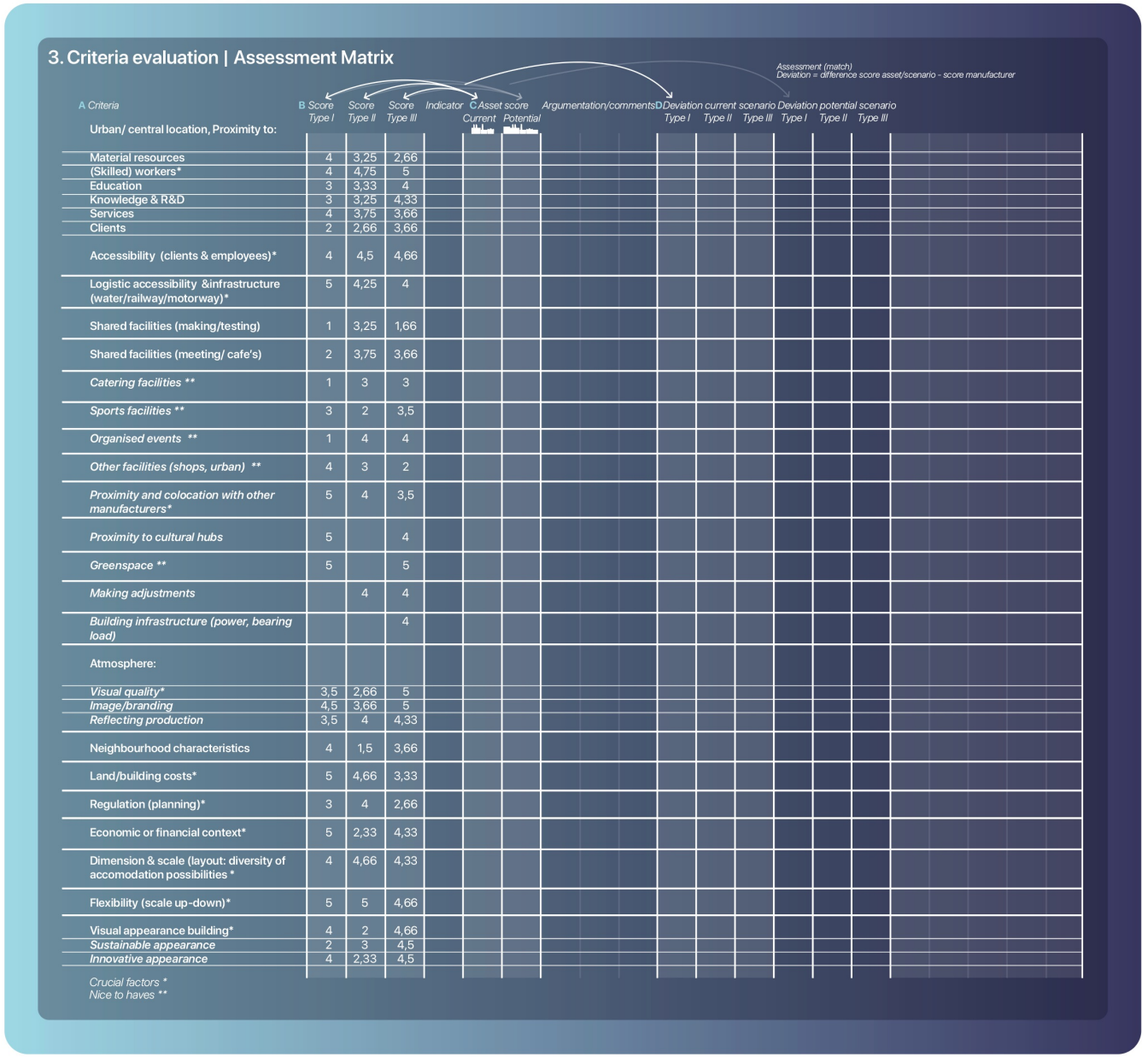
Framework

- Decision-making tool
- Input →
  - Requirements (criteria) [SQ2]
  - Values [SQ3]
  - Success factors [SQ4]



Assessment matrix

- **Literature**
  - Criteria
- **Questionnaire**
  - Score of criteria
  - Per type of manufacturer



3. Criteria evaluation | Assessment Matrix

Assessment (match)
Deviation = difference score asset/scenario - score manufacturer

A *Criteria*	B *Score Type I*	*Score Type II*	*Score Type III*	*Indicator*	C *Asset score Current*	*Potential*	*Argumentation/comments*	D *Deviation current scenario Type I*	*Type II*	*Type III*	*Deviation potential scenario Type I*	*Type II*	*Type III*
Urban/ central location, Proximity to:													
Material resources	4	3,25	2,66										
(Skilled) workers*	4	4,75	5										
Education	3	3,33	4										
Knowledge & R&D	3	3,25	4,33										
Services	4	3,75	3,66										
Clients	2	2,66	3,66										
Accessibility (clients & employees)*	4	4,5	4,66										
Logistic accessibility &infrastructure (water/railway/motorway)*	5	4,25	4										
Shared facilities (making/testing)	1	3,25	1,66										
Shared facilities (meeting/ cafe's)	2	3,75	3,66										
*Catering facilities ** *	1	3	3										
*Sports facilities ** *	3	2	3,5										
*Organised events ** *	1	4	4										
*Other facilities (shops, urban) ** *	4	3	2										
*Proximity and colocation with other manufacturers**	5	4	3,5										
Proximity to cultural hubs	5		4										
*Greenspace ** *	5		5										
Making adjustments		4	4										
Building infrastructure (power, bearing load)			4										
Atmosphere:													
*Visual quality**	3,5	2,66	5										
Image/branding	4,5	3,66	5										
Reflecting production	3,5	4	4,33										
Neighbourhood characteristics	4	1,5	3,66										
Land/building costs*	5	4,66	3,33										
Regulation (planning)*	3	4	2,66										
Economic or financial context*	5	2,33	4,33										
Dimension & scale (layout: diversity of accomodation possibilities *	4	4,66	4,33										
Flexibility (scale up-down)*	5	5	4,66										
Visual appearance building*	4	2	4,66										
Sustainable appearance	2	3	4,5										
Innovative appearance	4	2,33	4,5										

*Crucial factors **
*Nice to haves ***

Assessment matrix

Criteria evaluation | Assessment example

Assessment (match)
Deviation = difference score asset/scenario - score manufacturer

A Criteria	B Score Type I	Score Type II	Score Type III	Indicator	C Asset score Current	Asset score Potential	Argumentation/comments	D Deviation current scenario Type I	Deviation current scenario Type II	Deviation current scenario Type III	Deviation potential scenario Type I	Deviation potential scenario Type II	Deviation potential scenario Type III
Proximity to clients	2	2,66	3,66		3	4		+1	+0,33	-0,66	+2	+1,33	+0,44
Logistic accessibility & infrastructure (water/railway/motorway)*	5	4,25	4		4	5		-1	-0,25	0	0	+0,75	+1
Regulation (planning)*	3	4	2,66		4	3		0	-1	+1,33	0	-1	+0,33
Flexibility (scale up-down)*	5	5	4,66		4	4,5		-1	-1	-0,66	-0,5	-0,5	-0,16
Visual appearance building*	4	2	4,66		3	4		-1	+1	-1,66	0	+2	-0,66

*Crucial factors **

Assessment results

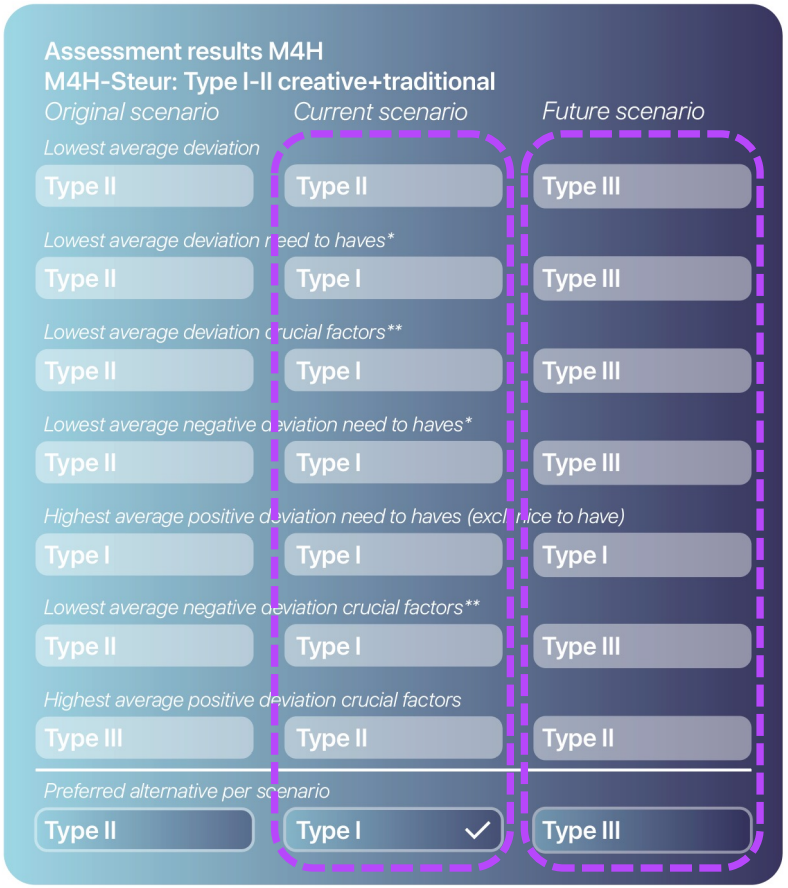
	Type I	Type II	Type III	Type I	Type II	Type III
(Lowest) average deviation (+/-)	0,8	0,72	0,87	0,5	1,12	0,55
(Lowest) average negative deviation	-1	-0,75	-1	-0,5	-0,75	-0,52
(Lowest) average negative deviation crucial factors*	-1	-0,75	-,1,16	-0,5	-0,75	-0,52

Assessment results example

	Current scenario	Potential scenario
Lowest average deviation	Type II	Type I
Lowest average negative deviation	Type II	Type I
*Lowest average negative deviation crucial factors**	Type II	Type I
Preferred alternative per scenario	Type II	Type I

Assessment output

- **Application on case studies**
  - Indicates same type of manufacturers
  - Future Type III
    - Increased costs, professionalisation and regulations



Development principles | development phase

Development principles

Start development phase

Tailor buildings to company requirements

Focus on the requirements of main user: current & future employees

Make use of the values of heritage

Select a well accessible location

Create flexibility

Facilitate a network & community

Embed development and concept in (future) economic context

Create concept & facilitate this

Select companies within concept

Look for ownership & long-term commitment

Cooperation & flexibility of public parties

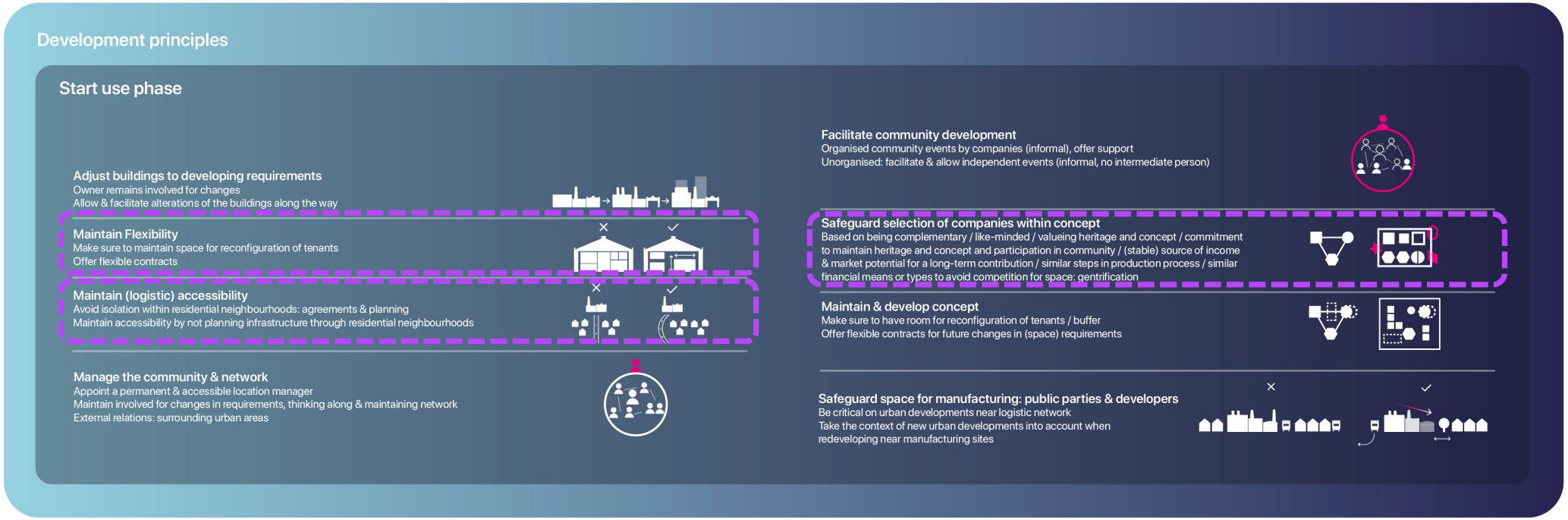
Select & design locations for production

Clustering complementary companies for innovation

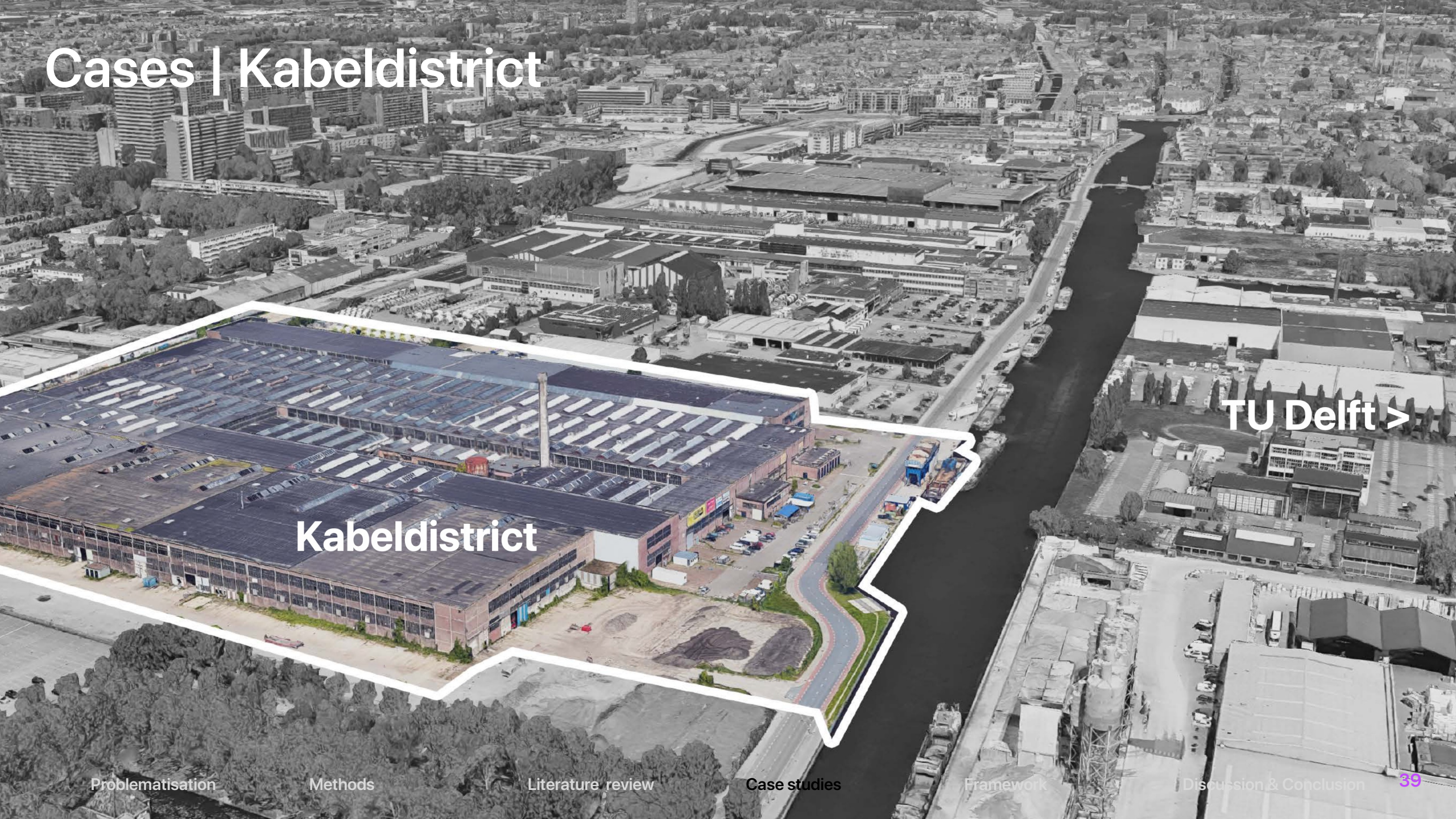
Clustering similar companies for circular flows

Invest in relations with surroundings

Development principles | use phase



Cases | Kabeldistrict



Framework application | design case

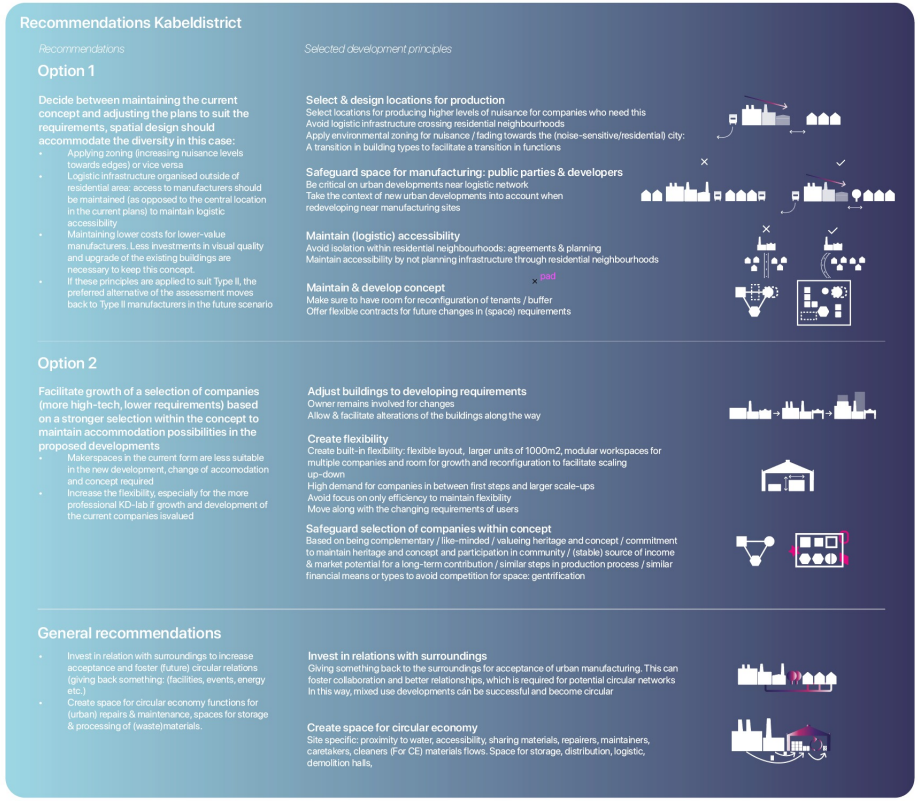
- **Assessment**
  - Matching current Type (II)
  - Future highly urban environment (- regulations, logistics,+ appearance)

- **Comparison: document analysis & review**
  - Concept (+)
  - Flexibility (-)
  - Temporary use (-)
  - Shared spaces for making/testing (future) (+/-)

Framework application | design case

- **Proposal KD**
  - General: Invest in relation with surroundings & create space for circular economy
  - Option 1: Maintain concept and adjust plans to diverse requirements
  - Option 2: Facilitate growth of a selection = new concept

- **Conclusion application**
  - Application is limited to specific manufacturers
  - Types of manufacturers include more variables in practice
  - Development principles to maintain (circular) manufacturing not applied



Discussion & conclusion.

Discussion

Discussion

- **Role of manufacturing – circular city [SQ1]**
  - Circular production methods → practice
  - Challenging to scale up
  - Increasing dependency on material availability > urban locations closer to resources

- **Manufacturing & demand [SQ2]**
  - Similar requirements
  - Differences: shared (maker)spaces & visual appearance
  - Ranking depends on type + scale, maturity & sector
  - More variables to types in practice

Discussion

- **Values of industrial heritage [SQ3]**
  - Combination of meeting standard requirements + added values for manufacturers
  - Relevance increasing (developing industry)

- **Success factors, criteria & development principles [SQ4]**
  - Using heritage to create conditions for circular production (principles)
  - Urban edges (under pressure)

  - Need to reserve space remains
    - Capitalising socio-economic values
    - Current policy transition & future economic context

Conclusion

"How can industrial heritage facilitate the developing urban manufacturing industry?"

- **Industrial heritage can**
  - Contribute to a circular urban manufacturing industry for a circular city through **building and location characteristics**, creating the **conditions** for use of local resources and supply chains and accommodate innovation processes [SQ1]
  - Provide **suitable accommodation** for the **developing manufacturing industry** that is **increasingly urban**, requires access to skilled workers, attractive and flexible urban accommodation, accessibility and a support network [SQ2]
  - Offer **social, economic and environmental values** that can be used by assessing the buildings to **match manufacturers** and applying several development **principles to successfully realise urban manufacturing** [SQ3, SQ4]
  - Help to create the **conditions for urban manufacturing for a long term** by linking heritage to a well embedded **concept**, providing a **flexible** and **stable accommodation** for manufacturers [SQ4]

Limitations

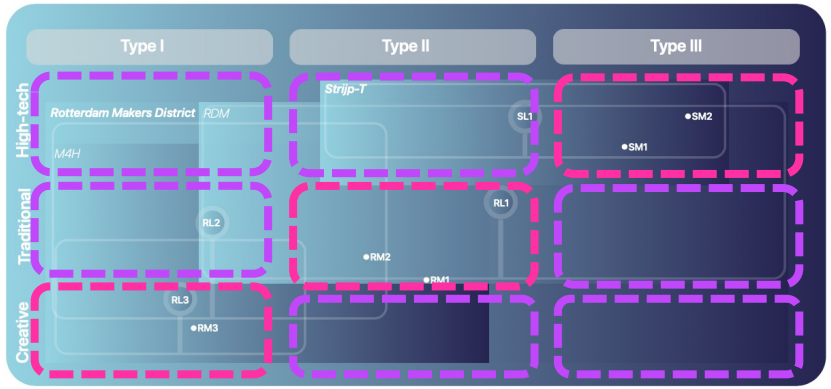
- **Literature review & empirical research**
  - Suitability validated for a limited number of manufacturer (types) only
  - Qualitative research, =/= quantitative data or financial feasibility
  - Potential for manufacturing sector only

- **Framework**
  - Limited respondents: qualitative assessment criteria, individual preferences
  - Background knowledge required
  - Detailed relative ranking of criteria missing

Recommendations

- **Research**
  - Cover a wider range of manufacturers, including more traditional ones
  - Include financial aspects (assessment & development)
  - Investigate the most optimal use for industrial heritage (e.g. preserving heritage values)
  - Elaborate on the contribution of different manufacturing types to circular economy

- **Framework**
  - Detailed (relative) ranking based on larger set of respondents
  - → Translate for quantitative assessment
  - Complete range of manufacturers (all variables)



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Christiaan Hanse
MSc. Management in the Built Environment | 2022/2023
Delft University of Technology June 2023

Appendix

Strijp-T	AVG Type I:	AVG Type II	AVG Type III	Average I-III	Original scor	Current scor	Potential sco	Notes
Urban, central location. Proximity of:	AVERAGES PER TYPE			I-III	SCORE ASSESSMENT			
· Material resources (circular)	4	3,25	2,66		2	2	4	
· Education (research)	3	3,33	4		4	4,5	4,5	
· Knowledge industry & R&D	3	3,25	4,33		5	5	5	
· Services	4	3,75	3,66		3	4	4,5	
· Clients/relations	2	2,66	3,66		3	4	4	
Shared spaces for making/testing	1	3,25	1,66			1	3	
Shared spaces for meeting/restaurants/cafe's (at location)	2	3,75	3,66		1	3	4	
Cultural hubs city, museum, etc. in city*	5		4		4	4	4,5	
Being able to make adjustments yourself		4	4			3	4	
Building infrastructure/power supply/bearing loads etc.			4		5	5	5	
......								
Atmosphere building/site for:								
· Image/branding	4,5	3,75	5			5	5	
· Reflecting productive (manufacturing) activities (productive, industrial environment)	3,5	4	4,33		4	4	4	
(Surrounding) Neighbourhood/district (quality, appearance, status)	4	2,33	3,66		4	5	5	
· Skilled workers (employees)	4	4,75	5		5	5	5	
Accessibility/location for clients & employees	4	4,5	4,66		4,5	4,5	5	
Logistic accessibility (close to water/railways/motorways)	5	4,25	4		4,5	4,5	4,5	
Proximity and colocation with other (manufacturing) companies	5	4	3,5		3	5	5	
· Appearance/expression (aesthetic/visual, architecture of the building/environment)	3,5	3	5		4	4,5	5	
Costs for land/building (lower=more costs in assessment score)	5	4,75	3,33		4	3	3	
Regulation (lower=more strict regulation in assessment score)	3	4,25	2,66		3	4	3	
Economic/financial context (business case)	5	3,66	4,33		5	5	5	
Dimensioning/size building (diversity of possibilities in accommodation, functionality)	4	4,5	4,33		5	4,5	5	
Flexibility building (facilitating scaling up and down production/growth)	5	4,75	4,66		5	5	4,5	
Visual appearance building (accomodation)	4	2,66	4,66		4	4,5	5	
*Innovative appearance***	2	3	4,5			4,5	5	
*Sustainable appearance***	4	3	4,5			3	4,5	
Organised events (community)**	1	4	4			5	5	
Catering**	1	3	3		1	3	3	
Sports facilities**	3	2	3,5			5	5	
Other facilities, shops etc.)*	4	3	2			1	4	
*Greenspace***	5		5		4,5	5	5	
	* bij missend, hele rij assessment weg				* Bij missend, enkel vak assessment weg			

Strijp-T	I Original	I Current	I Potential	I Original	I Current	I Potential
Urban, central location. Proximity of:	DEVIATION			POSITIVE or NEGATIVE		
· Material resources (circular)	2	2	0	-2	-2	0
· Education (research)	1	1,5	1,5	1	1,5	1,5
· Knowledge industry & R&D	2	2	2	2	2	2
· Services	1	0	0,5	-1	0	0,5
· Clients/relations	1	2	2	1	2	2
Shared spaces for making/testing		0	2		0	2
Shared spaces for meeting/restaurants/cafe's (at location)	1	1	2	-1	1	2
Cultural hubs city, museum, etc. in city*	1	1	0,5	-1	-1	-0,5
Being able to make adjustments yourself						
Building infrastructure/power supply/bearing loads etc.						
......						
Atmosphere building/site for:						
· Image/branding		0,5	0,5		0,5	0,5
· Reflecting productive (manufacturing) activities (productive, industrial environment)	0,5	0,5	0,5	0,5	0,5	0,5
(Surrounding) Neighbourhood/district (quality, appearance, status)	0	1	1	0	1	1
· Skilled workers (employees)	1	1	1	1	1	1
Accessibility/location for clients & employees	0,5	0,5	1	0,5	0,5	1
Logistic accessibility (close to water/railways/motorways)	0,5	0,5	0,5	-0,5	-0,5	-0,5
Proximity and colocation with other (manufacturing) companies	2	0	0	-2	0	0
· Appearance/expression (aesthetic/visual, architecture of the building/environment)	0,5	1	1,5	0,5	1	1,5
Costs for land/building (lower=more costs in assessment score)	1	2	2	-1	-2	-2
Regulation (lower=more strict regulation in assessment score)	0	1	0	0	1	0
Economic/financial context (business case)	0	0	0	0	0	0
Dimensioning/size building (diversity of possibilities in accommodation, functionality)	1	0,5	1	1	0,5	1
Flexibility building (facilitating scaling up and down production/growth)	0	0	0,5	0	0	-0,5
Visual appearance building (accomodation)	0	0,5	1	0	0,5	1
*Innovative appearance***		2,5	3		2,5	3
*Sustainable appearance***		1	0,5		-1	0,5
Organised events (community)**		4	4		4	4
Catering**	0	2	2	0	2	2
Sports facilities**		2	2		2	2
Other facilities, shops etc.)*		3	0		-3	0
*Greenspace***	0,5	0	0	-0,5	0	0

Strijp-T	II Original	II Current	II Potential	*II Original*	*II Current*	*II Potential*
Urban, central location. Proximity of:	DEVIATION			POSITIVE or NEGATIVE		
· Material resources (circular)	1,25	1,25	0,75	-1,25	-1,25	0,75
· Education (research)	0,67	1,17	1,17	0,67	1,17	1,17
· Knowledge industry & R&D	1,75	1,75	1,75	1,75	1,75	1,75
· Services	0,75	0,25	0,75	-0,75	0,25	0,75
· Clients/relations	0,34	1,34	1,34	0,34	1,34	1,34
Shared spaces for making/testing		2,25	0,25		-2,25	-0,25
Shared spaces for meeting/restaurants/cafe's (at location)	2,75	0,75	0,25	-2,75	-0,75	0,25
Cultural hubs city, museum, etc. in city*						
Being able to make adjustments yourself		1	0		-1	0
Building infrastructure/power supply/bearing loads etc.						
......						
Atmosphere building/site for:						
· Image/branding		1,25	1,25	-3,75	1,25	1,25
· Reflecting productive (manufacturing) activities (productive, industrial environment)	0	0	0	0	0	0
(Surrounding) Neighbourhood/district (quality, appearance, status)	1,67	2,67	2,67	1,67	2,67	2,67
· Skilled workers (employees)	0,25	0,25	0,25	0,25	0,25	0,25
Accessibility/location for clients & employees	0	0	0,5	0	0	0,5
Logistic accessibility (close to water/railways/motorways)	0,25	0,25	0,25	0,25	0,25	0,25
Proximity and colocation with other (manufacturing) companies	1	1	1	-1	1	1
· Appearance/expression (aesthetic/visual, architecture of the building/environment)	1	1,5	2	1	1,5	2
Costs for land/building (lower=more costs in assessment score)	0,75	1,75	1,75	-0,75	-1,75	-1,75
Regulation (lower=more strict regulation in assessment score)	1,25	0,25	1,25	-1,25	-0,25	-1,25
Economic/financial context (business case)	1,34	1,34	1,34	1,34	1,34	1,34
Dimensioning/size building (diversity of possibilities in accommodation, functionality)	0,5	0	0,5	0,5	0	0,5
Flexibility building (facilitating scaling up and down production/growth)	0,25	0,25	0,25	0,25	0,25	-0,25
Visual appearance building (accomodation)	1,34	1,84	2,34	1,34	1,84	2,34
*Innovative appearance***		1,5	2		1,5	2
*Sustainable appearance***		0	1,5		0	1,5
Organised events (community)**		1	1		1	1
Catering**	2	0	0	-2	0	0
Sports facilities**		3	3		3	3
Other facilities, shops etc.)*		2	1		-2	1
*Greenspace***						

Strijp-T	III Original	III Current	III Potential	*III Original*	*III Current*	*III Potential*	*Crucial factors*
Urban, central location. Proximity of:	DEVIATION			POSITIVE or NEGATIVE			
· Material resources (circular)	0,66	0,66	1,34	-0,66	-0,66	1,34	
· Education (research)	0	0,5	0,5	0	0,5	0,5	
· Knowledge industry & R&D	0,67	0,67	0,67	0,67	0,67	0,67	
· Services	0,66	0,34	0,84	-0,66	0,34	0,84	
· Clients/relations	0,66	0,34	0,34	-0,66	0,34	0,34	
Shared spaces for making/testing		0,66	1,34		-0,66	1,34	
Shared spaces for meeting/restaurants/cafe's (at location)	2,66	0,66	0,34	-2,66	-0,66	0,34	
Cultural hubs city, museum, etc. in city*	0	0	0,5	0	0	0,5	
Being able to make adjustments yourself		1	0		-1	0	
Building infrastructure/power supply/bearing loads etc.	1	1	1	1	1	1	
......							
Atmosphere building/site for:							
· Image/branding		0	0		0	0	
· Reflecting productive (manufacturing) activities (productive, industrial environment)	0,33	0,33	0,33	-0,33	-0,33	-0,33	
(Surrounding) Neighbourhood/district (quality, appearance, status)	0,34	1,34	1,34	0,34	1,34	1,34	
· Skilled workers (employees)	0	0	0	0	0	0	
Accessibility/location for clients & employees	0,16	0,16	0,34	-0,16	-0,16	0,34	
Logistic accessibility (close to water/railways/motorways)	0,5	0,5	0,5	0,5	0,5	0,5	
Proximity and colocation with other (manufacturing) companies	0,5	1,5	1,5	-0,5	1,5	1,5	
· Appearance/expression (aesthetic/visual, architecture of the building/environment)	1	0,5	0	-1	-0,5	0	
Costs for land/building (lower=more costs in assessment score)	0,67	0,33	0,33	0,67	-0,33	-0,33	
Regulation (lower=more strict regulation in assessment score)	0,34	1,34	0,34	0,34	1,34	0,34	
Economic/financial context (business case)	0,67	0,67	0,67	0,67	0,67	0,67	
Dimensioning/size building (diversity of possibilities in accommodation, functionality)	0,67	0,17	0,67	0,67	0,17	0,67	
Flexibility building (facilitating scaling up and down production/growth)	0,34	0,34	0,16	0,34	0,34	-0,16	
Visual appearance building (accomodation)	0,66	0,16	0,34	-0,66	-0,16	0,34	
*Innovative appearance***		0	0,5		0	0,5	
*Sustainable appearance***		1,5	0		-1,5	0	
Organised events (community)**		1	1		1	1	
Catering**	2	0	0	-2	0	0	
Sports facilities**		1,5	1,5		1,5	1,5	
Other facilities, shops etc.)*		1	2		-1	2	
*Greenspace***	0,5	0	0	-0,5	0	0	
	**Currently Type III*						

		TOTAL DEVIATION TYPE I						
	TOTAL	16,5	33	32,5				
AVERAGE D	AVERAGE	0,75	1,14	1,12				
AVERAGE EXCL NICE TC		0,80	1,04	1,14				
						TOTAL DEVIATION POS/NEGTYPE I		
total potentia	AVG OF 3 A\	1,00				*-1,50*	*14,00*	*25,50*
(in all scenari	AVG excl nic	0,99						
			SUM		AVERAGE D	-0,07	0,48	0,88
				Excl nice to h	AVERAGE E	-0,05	0,38	0,73
			AVG of 3 AV	total potentia	AVG OF AV(	0,43		
				(in all scenari	AVG excl nic	0,35		
				AVERAGES OF ONLY NEGATIVE AND POSITIVE				
			AVG	Incl nice to ha	Negative de	-1,13	-1,58	-0,88
					Positive devi	0,94	1,38	1,53
			AVG	Excl nice to	Negative de	-1,21	-1,30	-0,88
					Positive devi	0,94	1,11	1,31
DEVIATION CRUCIAL FACTORS								
SUM DEVIATION CRUCI/		6,50	7,00	8,50				
AVERAGE DEVIATION C		0,59	0,64	0,77				
				AVERAGE CRUCIAL (SUM)				
					AVERAGE D	-0,04545	0,181818	0,227273
				AVERAGES OF ONLY NEGATIVE AND POSITIVE CRUCIAL				
			SUM	Totaal	Negative de	-3,50	-2,50	-3,00
					Positive devi	3,00	4,50	5,50
			AVG	Average	Negative de	-1,17	-1,25	-1,00
					Positive devi	0,75	0,75	1,10

	TOTAL DEVIATION II						
	19,11	29,61	30,11				
	0,96	1,06	1,08				
	0,90	0,98	1,04				
					TOTAL DEVIATION POS/NEG II		
	1,03				*-4,14*	*11,11*	*23,11*
	0,98						
					-0,20	0,40	0,83
					-0,11	0,38	0,75
					0,34		
					0,34		
		AVG		Negative de	-1,69	-1,32	-0,88
				Positive devi	0,85	1,27	1,29
		AVG	Excl nice to	Negative de	-1,64	-1,21	-0,88
				Positive devi	0,85	1,17	1,20
TOTAL DEV	7,93	8,43	11,43				
AVERAGE D	0,72	0,77	1,04				
					0,175455	0,402727	0,448182
				Negative de	-3,00	-2,00	-3,25
				Positive devi	4,93	6,43	8,18
				Negative de	-1,00	-1,00	-1,08
				Positive devi	0,70	0,92	1,02

	TOTAL DEVIATION III							
	14,99	18,17	18,39					
	0,65	0,59	0,59					
	0,59	0,58	0,55					
					TOTAL DEVIATION POS/NEG III			
	0,61				*-4,59*	*4,25*	*16,75*	
	0,58							
					-0,20	0,14	0,54	
					-0,10	0,11	0,47	
					0,16			
					0,16			
		AVG		Negative de	-0,89	-0,63	-0,27	
				Positive devi	0,58	0,80	0,81	
		AVG	Excl nice to	Negative de	-0,81	-0,60	-0,27	
				Positive devi	0,58	0,73	0,73	
TOTAL DEV	5,51	5,67	4,85					
AVERAGE D	0,50	0,52	0,44					
					0,079091	0,306364	0,351818	
				Negative de	-2,32	-1,15	-0,49	
				Positive devi	3,19	4,52	4,36	
				Negative de	-0,58	-0,29	-0,25	
				Positive devi	0,53	0,75	0,62	

Appendix

Kabeldistrict	AVG Type I:	AVG Type II	AVG Type III	Average I-III	Original scor	Current scor	Potential score
Urban, central location. Proximity of:	AVERAGES PER TYPE			I-III	SCORE ASSESSMENT		
· Material resources (circular)	4	3,25	2,66	3,30	3	2	4
· Education (research)	3	3,33	4	3,44	5	5	5
· Knowledge industry & R&D	3	3,25	4,33	3,53	4,5	4,5	5
· Services	4	3,75	3,66	3,80	3	3	3,5
· Clients/relations	2	2,66	3,66	2,77	3	3	3,5
Shared spaces for making/testing	1	3,25	1,66	1,97		4	1
Shared spaces for meeting/restaurants/cafe's (at location)	2	3,75	3,66	3,14		3	4
Cultural hubs city, museum, etc. in city*	5		4	4,50	4	4	4,5
Being able to make adjustments yourself		4	4	4,00	5	2	4
Building infrastructure/power supply/bearing loads etc.			4	4,00	5	5	5
.....							
Atmosphere building/site for:							
· Image/branding	4,5	3,75	5	4,42		4	5
· Reflecting productive (manufacturing) activities (productive, industrial environment)	3,5	4	4,33	3,94	4	3	3,5
(Surrounding) Neighbourhood/district (quality, appearance, status)	4	2,33	3,66	3,33	3,5	3,5	4,5
· Skilled workers (employees)	4	4,75	5	4,58	5	5	5
Accessibility/location for clients & employees	4	4,5	4,66	4,39	4	4	5
Logistic accessibility (close to water/railways/motorways)	5	4,25	4	4,42	4	4	4
Proximity and colocation with other (manufacturing)companies	5	4	3,5	4,17	4	4	4,5
· Appearance/expression (aesthetic/visual, architecture of the building/environment)	3,5	3	5	3,83	3	3,5	4,5
Costs for land/building (lower=more costs in assessment score)	5	4,75	3,33	4,36	3,5	3	2,5
Regulation (lower=more strict regulation in assessment score)	3	4,25	2,66	3,30	4	4	3
Economic/financial context (business case)	5	3,66	4,33	4,33	4,5	5	5
Dimensioning/size building (diversity of possibilities in accommodation, functionality)	4	4,5	4,33	4,28	5	4,5	4,5
Flexibility building (facilitating scaling up and down production/growth)	5	4,75	4,66	4,80	5	4	4,5
Visual appearance building (accomodation)	4	2,66	4,66	3,77	3	3,75	4,5
*Innovative appearance***	2	3	4,5	3,17	0	3	4
*Sustainable appearance***	4	3	4,5	3,83	0	2	4,5
Organised events (community)**	1	4	4	3,00		2	3
Catering**	1	3	3	2,33		3	
Sports facilities**	3	2	3,5	2,83	2	3	3
Other facilities, shops etc.)*	4	3	2	3,00	2	2	4
*Greenspace***	5		5	5,00	0	0	3,5

* Missing weight=delete line

* Missing weight = delete cell

	I Original	I Current	I Potential	II Original	II Current	II Potential	III Original	III Current	III Potential	Crucial factors
DEVIATION	1	2	0	0,25	1,25	0,75	0,34	0,66	1,34	
	2	2	2	1,67	1,67	1,67	1	1	1	
	1,5	1,5	2	1,25	1,25	1,75	0,17	0,17	0,67	
	1	1	0,5	0,75	0,75	0,25	0,66	0,66	0,16	
	1	1	1,5	0,34	0,34	0,84	0,66	0,66	0,16	
		3	0		0,75	2,25		2,34	0,66	
		1	2		0,75	0,25		0,66	0,34	
	1	1	0,5				0	0	0,5	
				1	2	0	1	2	0	
							1	1	1	
		0,5	0,5		0,25	1,25		1	0	
0,5	0,5	0		0	1	0,5	0,33	1,33	0,83	
0,5	0,5	0,5		1,17	1,17	2,17	0,16	0,16	0,84	
1	1	1		0,25	0,25	0,25	0	0	0	
0	0	1		0,5	0,5	0,5	0,66	0,66	0,34	
1	1	1		0,25	0,25	0,25	0	0	0	
1	1	0,5		0	0	0,5	0,5	0,5	1	
0,5	0	1		0	0,5	1,5	2	1,5	0,5	
1,5	2	2,5		1,25	1,75	2,25	0,17	0,33	0,83	
1	1	0		0,25	0,25	1,25	1,34	1,34	0,34	
0,5	0	0		0,84	1,34	1,34	0,17	0,67	0,67	
1	0,5	0,5		0,5	0	0	0,67	0,17	0,17	
0	1	0,5		0,25	0,75	0,25	0,34	0,66	0,16	
1	0,25	0,5		0,34	1,09	1,84	1,66	0,91	0,16	
2	1	2		3	0	1	4,5	1,5	0,5	
4	2	0,5		3	1	1,5	4,5	2,5	0	
	1	2			2	1		2	1	
	2				0			0		
	0	0			1	1		0,5	0,5	
2	2	0		1	1	1		0	2	
5	5	1,5					5	5	1,5	* negative, re

TOTAL DEVIATION TYPE I				TOTAL DEVIATION TYPE II			TOTAL DEVIATION TYPE III			
TOTAL (SUM	30	34,75	24	17,86	22,86	27,11	26,83	29,88	17,17	
AVERAGE D AVERAGE	1,30	1,20	0,86	0,81	0,82	1,00	1,07	0,96	0,57	
AVERAGE EXCL NICE TO	1,10	1,03	0,90	0,80	0,83	1,00	0,95	0,90	0,49	

	TOTAL DEVIATION POS/NEG TYPE I			TOTAL DEVIATION POS/NEG II			TOTAL DEVIATION POS/NEG III		
total potentia AVG OF 3 A	-14,00	-4,75	9,00	0,88			0,87		
(in all scenari AVG excl nic				0,88			0,78		
AVERAGE DEVIATION	-0,61	-0,16	0,31	AVERAGE DEVIATION	-0,12	-0,13	0,41	AVERAGE DEVIATION	-0,54	-0,50	0,11
AVERAGE EXCL NICE	-0,33	-0,03	0,40	AVERAGE EXCL NICE	-0,06	-0,07	0,42	AVERAGE EXCL NICE	-0,32	-0,31	0,16
All scenarios AVERAGE DEVIATION A	-0,16			All scenarios AVERAGE DEVIATION A	0,05			All scenarios AVERAGE DEVIATION A	-0,31		
AVERAGE excl nice to hav	0,01			AVERAGE excl nice to hav	0,09			AVERAGE excl nice to hav	-0,17		

AVERAGES OF ONLY NEGATIVE AND POSITIVE

AVG	Incl nice to ha	Negative dev	-1,57	-1,41	-1,00	AVG		Negative dev	-1,14	-1,02	-1,00	AVG		Negative dev	-2,01	-1,26	-0,58
		Positive devi	1,14	1,36	1,21			Positive devi	0,76	0,87	1,15			Positive devi	0,64	0,90	0,74
AVG	Excl nice to	Negative dev	-1,25	-1,06	-0,92	AVG	Excl nice to	Negative dev	-1,16	-0,93	-1,00	AVG	Excl nice to	Negative dev	-1,68	-1,01	-0,44
		Positive devi	1,14	1,33	1,15			Positive devi	0,76	0,86	1,14			Positive devi	0,61	0,90	0,68

DEVIATION CRUCIAL FACTORS												
SUM DEVIATION CRUCIAL	8,50	7,75	8,50	TOTAL DEVI	4,43	6,68	9,93	TOTAL DEVI	7,51	6,74	4,17	
AVERAGE DEVIATION CRU	0,77	0,70	0,77	AVERAGE DE	0,40	0,61	0,90	AVERAGE DE	0,68	0,61	0,38	
AVERAGE CRUCIAL (SUM)												
AVERAGE DE	-0,2272727	-0,25	-0,0454545				-0,0063636	-0,0290909	0,17545455			-0,1027273	-0,1254545	0,07909091

AVERAGES OF ONLY NEGATIVE AND POSITIVE CRUCIAL

SUM	Totaal	Negative dev	-5,50	-5,25	-4,50			Negative dev	-2,25	-3,50	-4,00			Negative dev	-4,32	-4,06	-1,65
		Positive devi	3,00	2,50	4,00			Positive devi	2,18	3,18	5,93			Positive devi	3,19	2,68	2,52
AVG	Average	Negative dev	-0,92	-1,05	-1,13			Negative dev	-0,56	-0,70	-1,00			Negative dev	-1,44	-0,81	-0,41
		Positive devi	1,00	0,83	0,80			Positive devi	0,44	0,80	0,99			Positive devi	0,53	0,67	0,50

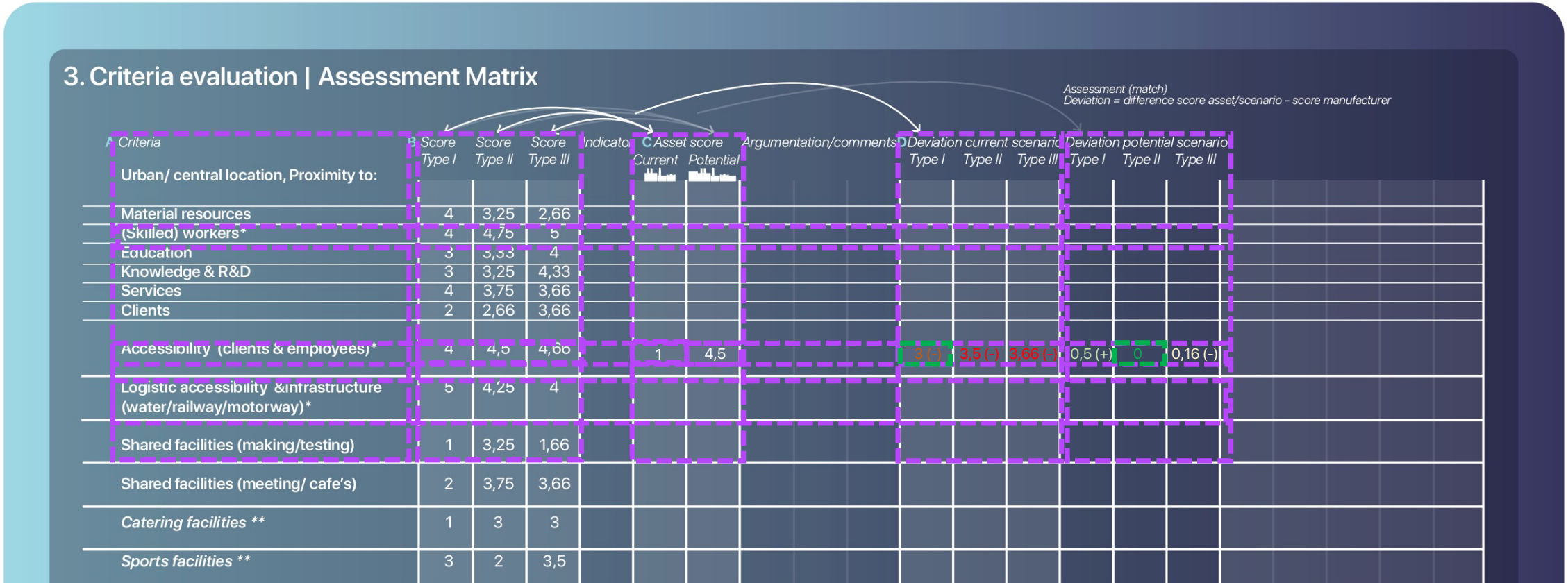
Appendix

3. Criteria evaluation | Assessment matrix round II

A Criteria	Indicator	B Asset score Manufacturer X Current	Potential	Argumentation/comments
Urban/ central location, Proximity to:				
Material resources				
(Skilled) workers*				
Education				
Knowledge & R&D				
Services				
Clients				
Accessibility (clients & employees)*				
Logistic accessibility &infrastructure (water/railway/motorway)*				
Shared facilities (making/testing)				
Shared facilities (meeting/ cafe's)				
*Catering facilities **				
*Sports facilities **				
*Organised events **				
*Other facilities (shops, urban) **				
*Proximity and colocation with other manufacturers**				
Proximity to cultural hubs				
*Greenspace **				
Making adjustments				
Building infrastructure (power, bearing load)				
Atmosphere:				
*Visual quality**				
Image/branding				
Reflecting production				
Neighbourhood characteristics				
Land/building costs*				
Regulation (planning)*				
Economic or financial context*				
Dimension & scale (layout: diversity of accomodation possibilities *				
Flexibility (scale up-down)*				
Visual appearance building*				
Sustainable appearance				
Innovative appearance				

*Crucial factors **
*Nice to haves ***

Assessment matrix



Appendix

Assessment method

Criteria	Weight of criteria indicated by manufacturer (score low-high)	Score building or scenario	Deviation = difference between scores
A	4 (medium high)	2 (medium low)	2
B	1 (low)	5 (medium)	4

Deviation	Positive/negative deviation Score building - score manufacturer
2	(2-4)= -2
4	(5-1)= +4

Average Deviation ((2+4)/2) = 3	(4/1)= +4 (-2/1)= -2	**Average Positive deviation** **Average Negative deviation**

Appendix

Assessment results RDM
RDM Campus | Type I-II-III Mainly traditional + Innovative start & scale-ups

	Original scenario		*Future scenario*
Lowest average deviation	Type II	Type II	Type III
*Lowest average deviation need to haves**	Type II	Type II	Type III
*Lowest average deviation crucial factors***	Type I	Type I	Type I
*Lowest average negative deviation need to haves**	Type II	Type II	Type III
Highest average positive deviation need to haves (excl. nice to have)	Type I	Type I	Type I
*Lowest average negative deviation crucial factors***	Type III	Type II + III	Type III
Highest average positive deviation crucial factors	Type I	Type II	Type II
Preferred alternative per scenario	Type (I) - II - (III)*	Type (I) - II - (III)* ✓	Type III

Assessment results Strijp-T
Strijp-T | Type II-III Innovative + High-tech

	Original scenario	*Current scenario*	*Future scenario*
Lowest average deviation	Type III	Type III	Type III
*Lowest average deviation need to haves**	Type III	Type III	Type III
*Lowest average deviation crucial factors***	Type III	Type III	Type III
*Lowest average negative deviation need to haves**	Type III	Type III	Type III
Highest average positive deviation need to haves (excl. nice to have)	Type I	Type II	Type I
*Lowest average negative deviation crucial factors***	Type III	Type III	Type III
Highest average positive deviation crucial factors	Type I	Type II	Type I
Preferred alternative per scenario	Type III	Type III ✓	Type III