Understanding obsolescence
A holistic model for life cycle analyses of buildings

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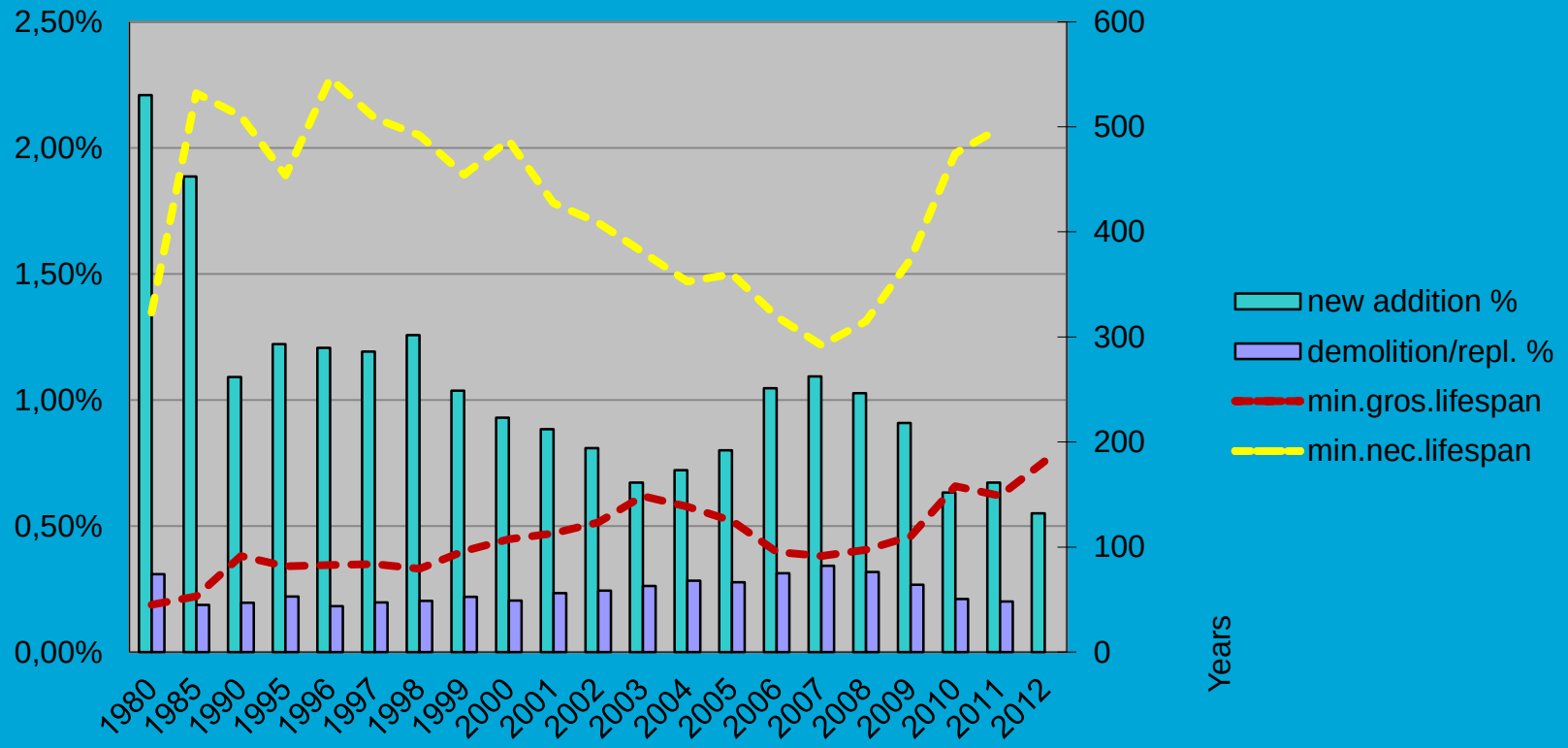
Outline

- Why? The new building paradigm
- Basic principle
- Types of obsolescence
- Cause-effect processes
- Application in practice

Paradigm change

Minimal life span = annual new addition – demolition



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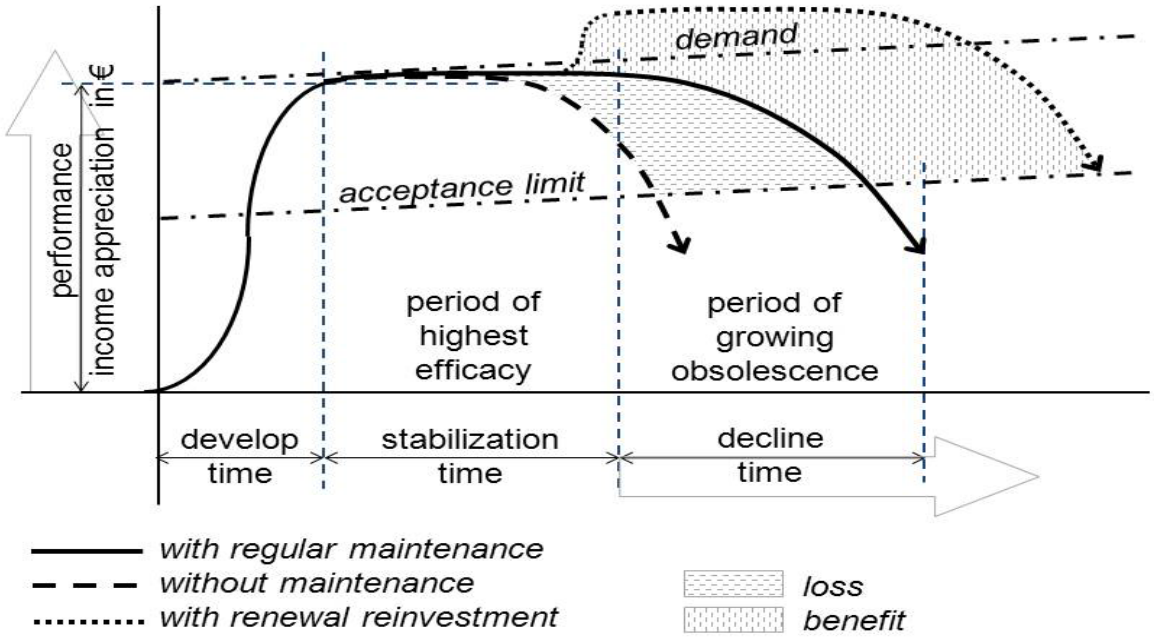
Research goals and approach

What is obsolescence?

process of declining performance of buildings



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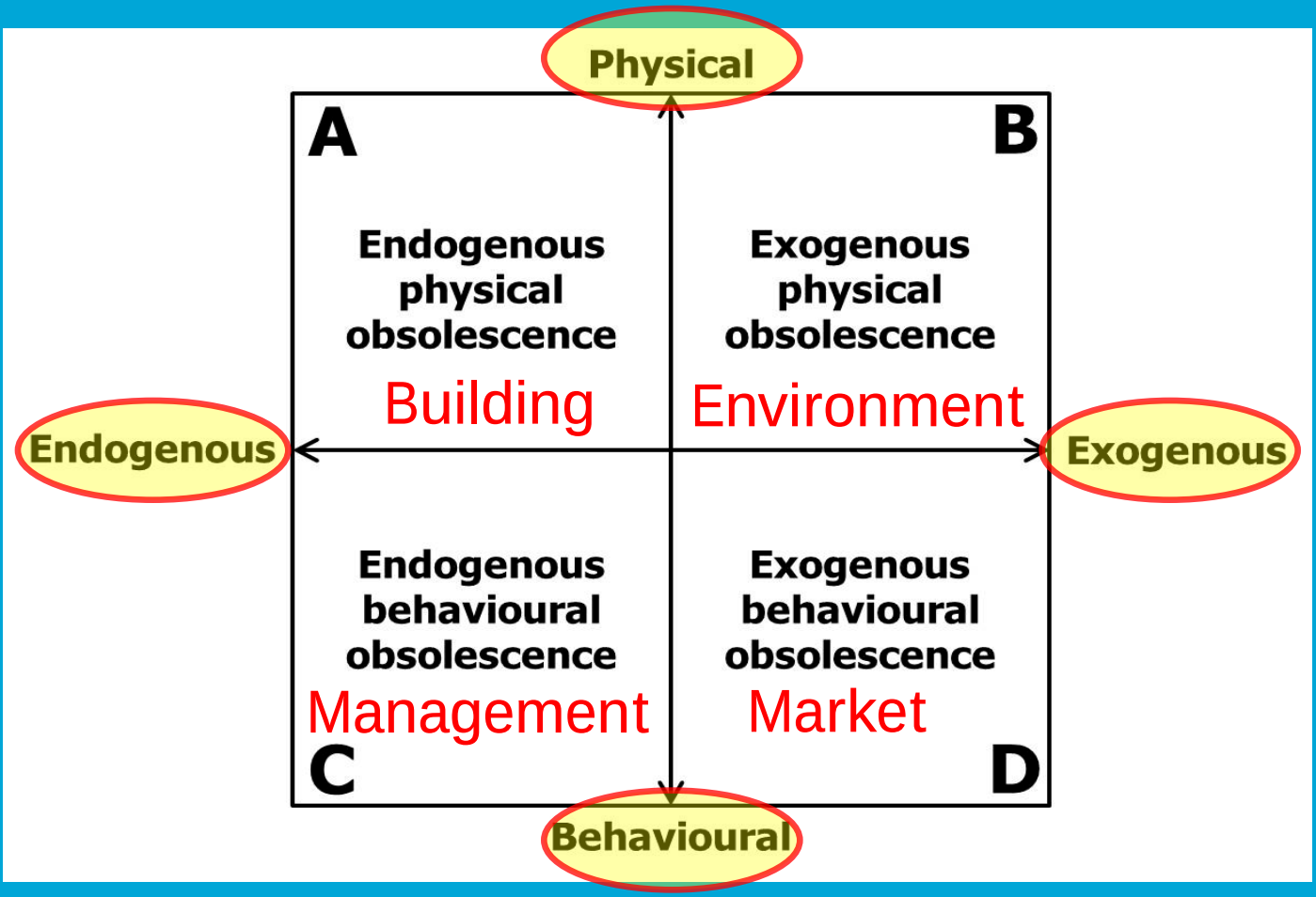
Literature assessment

Findings on decay, obsolescence, life cycle assessment:

- Disciplinary single sided:
  - 50% technical/physical, 30% economical, 20% social
- Limited scientific relevance:
  - mainly case studies, hardly scientific theory development
  - lack of systematic longitudinal data
- Conclusions:
  - growing awareness of interrelated multifactor recurrence
  - behaviour overrules technology

→ Need for integrated approach

Types of obsolescence (revised)



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Research goals and approach

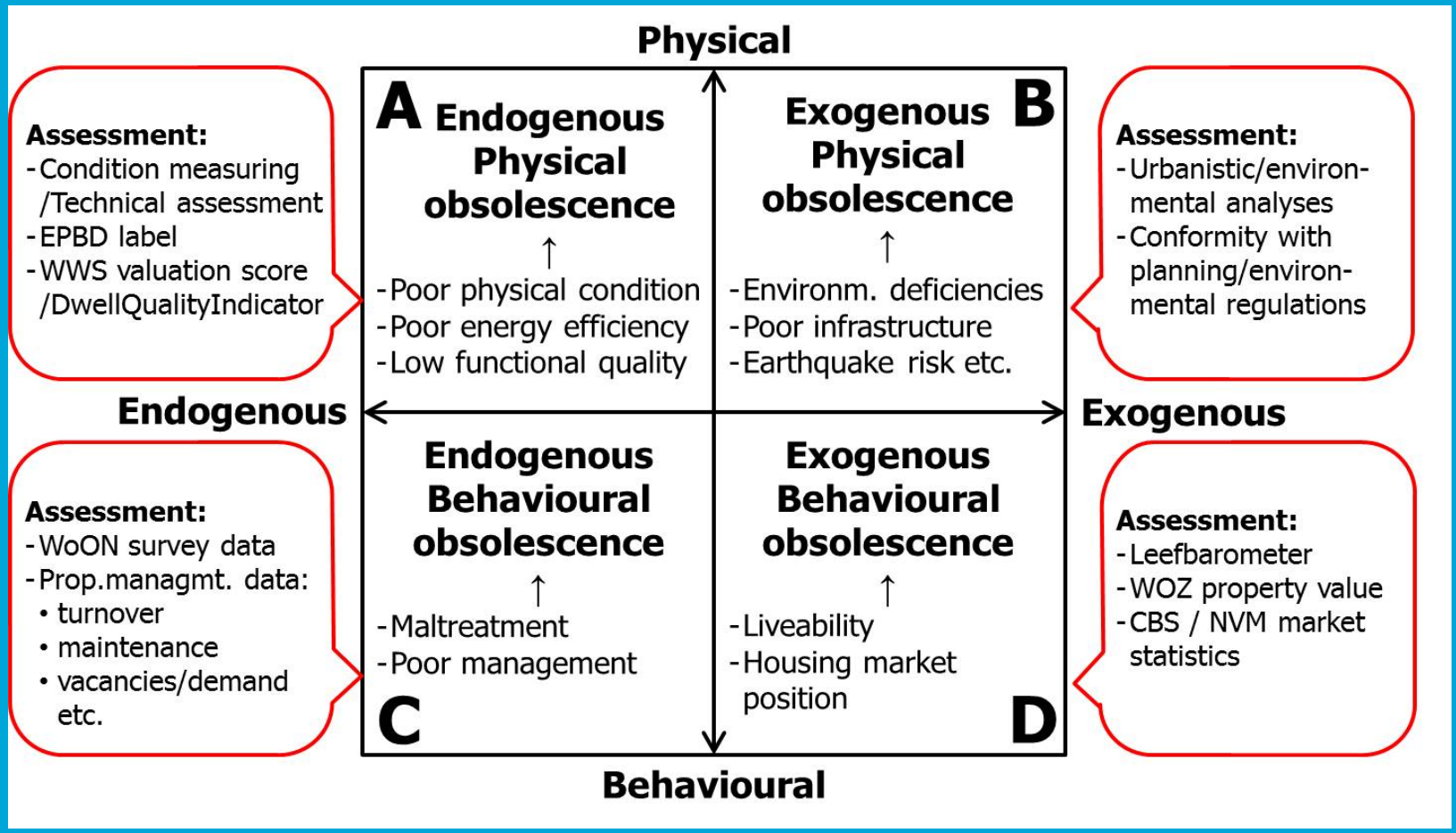
Problem:

What is the lifespan expectancy of buildings and how can the useful service life be extended?

Objective:

Model for understanding, analysis and measurement of ageing, decay and obsolescence

Elaborated model of obsolescence (revised)



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Conclusions so far

Disappointing results:

- Time series of data often not available
- Producing ratios possible, but query for additional references required

Two different application directions:

1) Longitudinal: time series of the same building(s)
2) Comparative: comparison with similar buildings

Next steps:

1) Understanding cause-effect processes:
   → in depth dossier search
2) More comparative data:
   → more comparative search: types/sectors/countries

Next step

Research question:

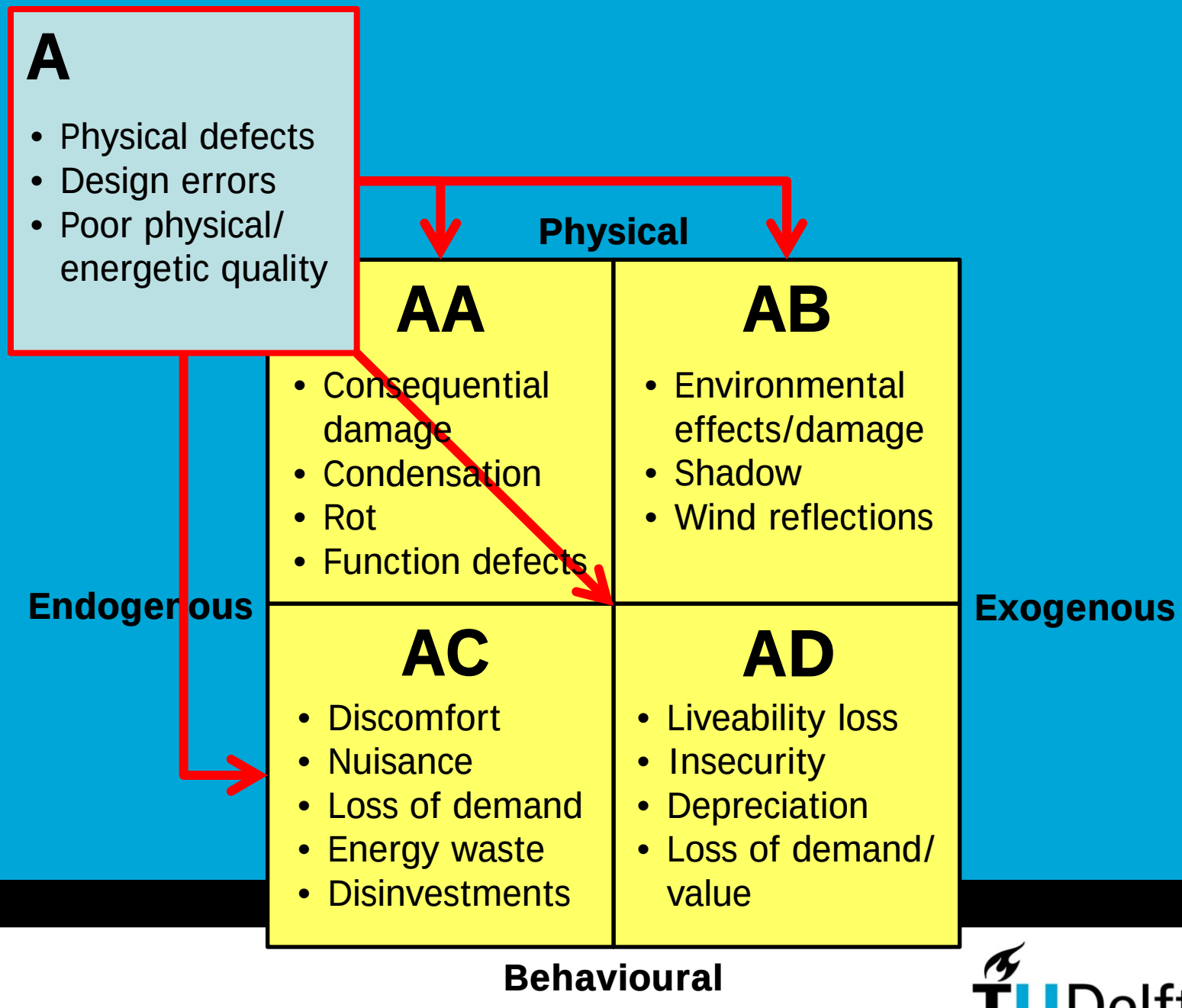
Is it possible to further elaborate the conceptual model into an instrument to

- distinguish, track and assess the underlying cause-effect processes
- understand and measure their effect on buildings
- determine a 'level' of obsolescence on different levels e.g. buildings, parts of the building stock?

Cause-effect processes

- Series of interrelated cause-effect mechanisms within and in between different types of obsolescence
- Triggering subsequent cause-effect processes
- E.g.:

  decline market value (DD) → decline rate of return (DC) → maintenance backlogs (CA) → consequential damage (AA) → discomfort (AC) → livability effects (AD) loss of demand (CD) → etc.


A
• Physical defects
• Design errors
• Poor physical/ energetic quality
Physical
AA
• Consequential damage
• Condensation
• Rot
• Function defects
AB
• Environmental effects/damage
• Shadow
• Wind reflections
Endogenous
Exogenous
AC
• Discomfort
• Nuisance
• Loss of demand
• Energy waste
• Disinvestments
AD
• Liveability loss
• Insecurity
• Depreciation
• Loss of demand/ value
Behavioural

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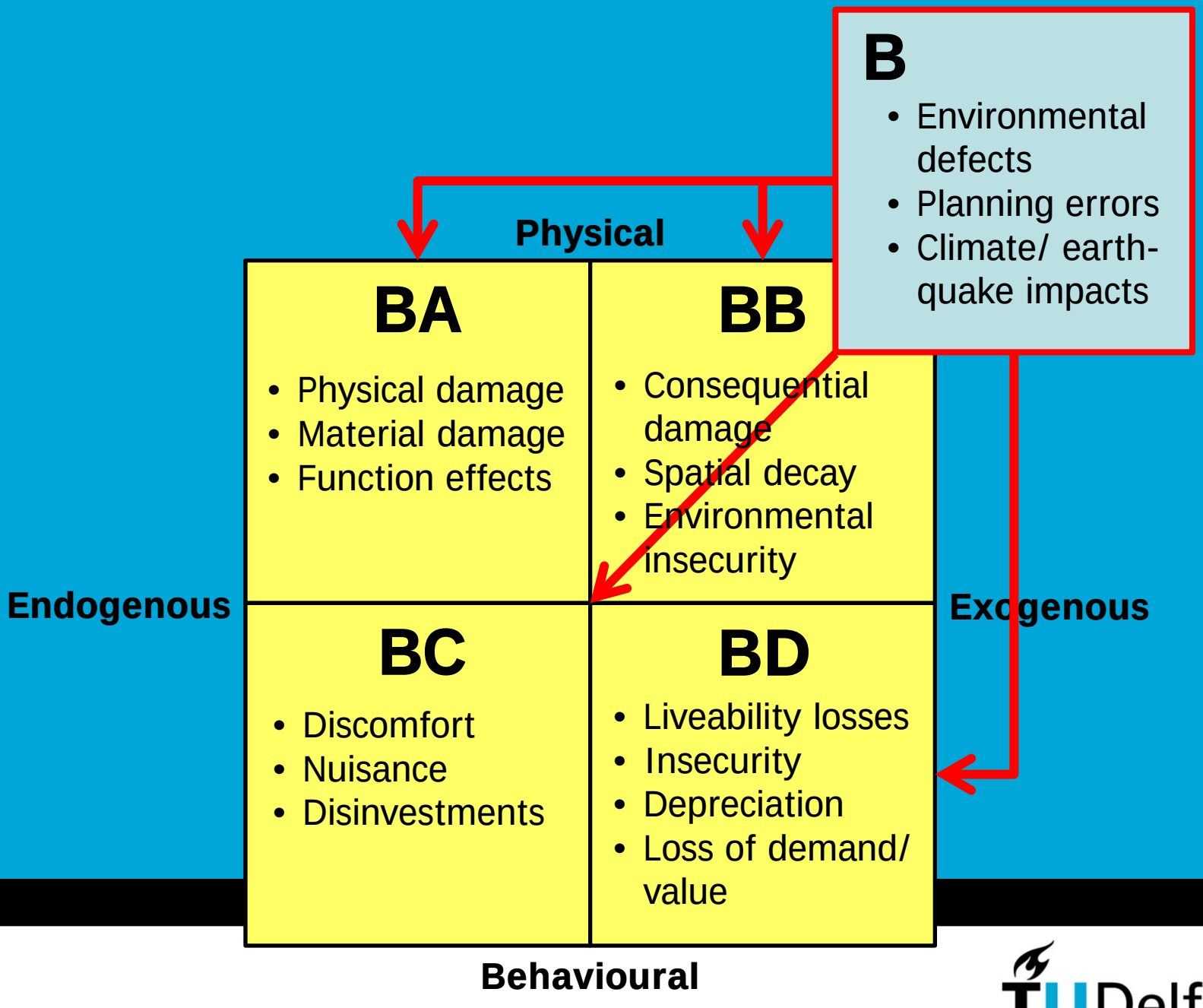
B
• Environmental defects
• Planning errors
• Climate/ earth-quake impacts
Physical
BA
• Physical damage
• Material damage
• Function effects
BB
• Consequential damage
• Spatial decay
• Environmental insecurity
Endogenous
Exogenous
BC
• Discomfort
• Nuisance
• Disinvestments
BD
• Liveability losses
• Insecurity
• Depreciation
• Loss of demand/ value
Behavioural

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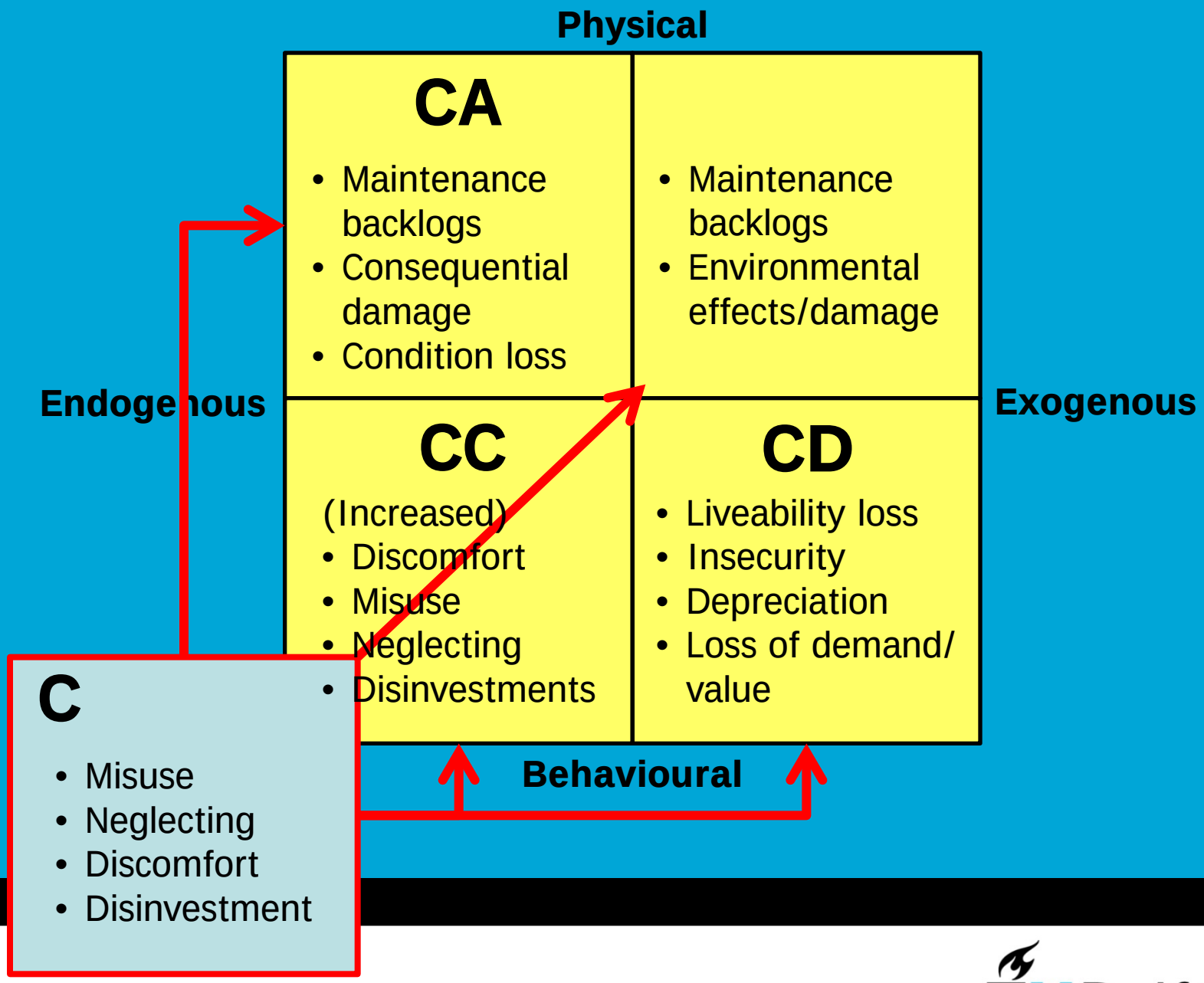
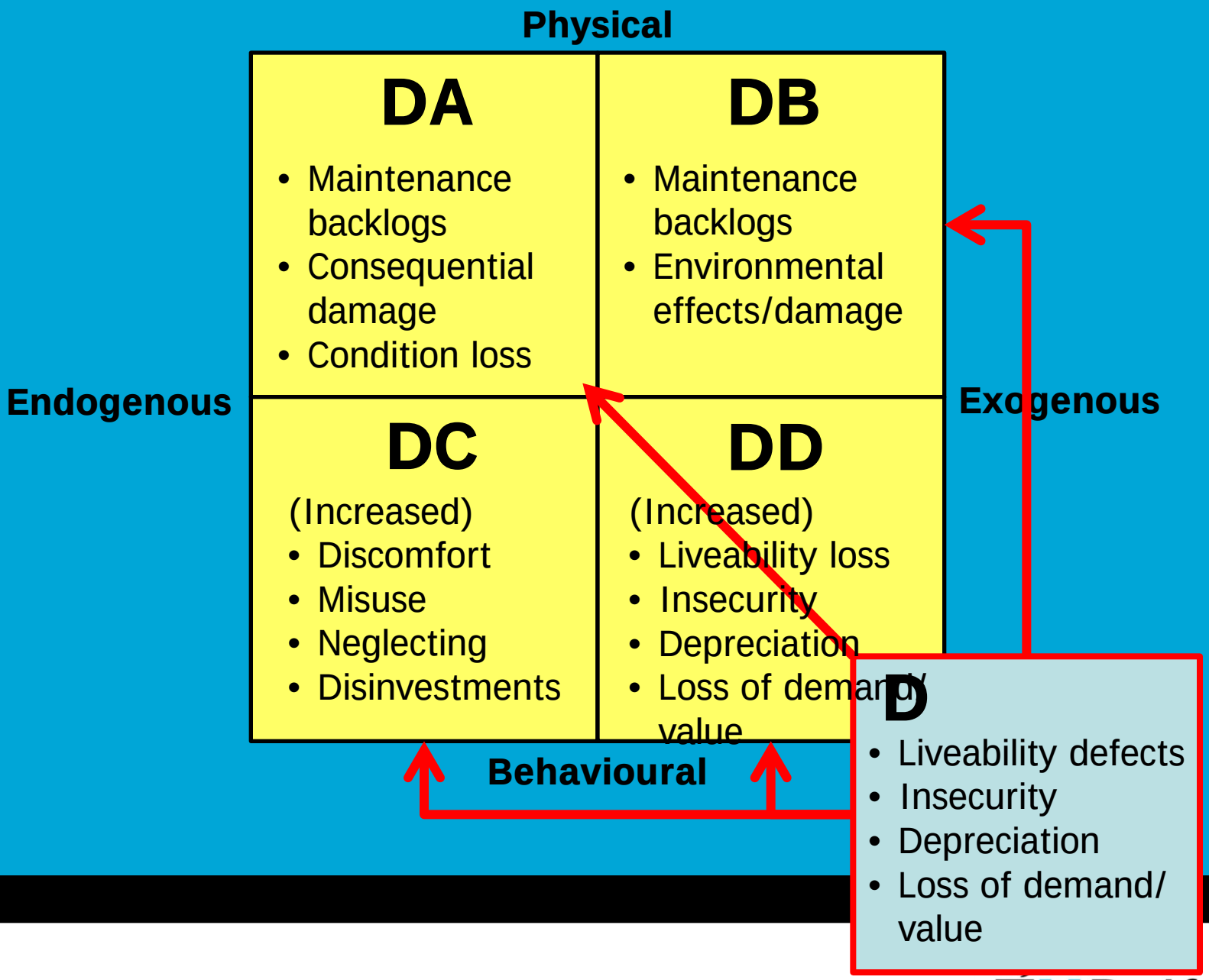

Physical
CA
• Maintenance backlogs
• Consequential damage
• Condition loss
• Maintenance backlogs
• Environmental effects/damage
Endogenous
Exogenous
CC
(Increased)
• Discomfort
• Misuse
• Neglecting
• Disinvestments
CD
• Liveability loss
• Insecurity
• Depreciation
• Loss of demand/ value
Behavioural
C
• Misuse
• Neglecting
• Discomfort
• Disinvestment


Physical
DA
• Maintenance backlogs
• Consequential damage
• Condition loss
DB
• Maintenance backlogs
• Environmental effects/damage
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Exogenous
DC
(Increased)
• Discomfort
• Misuse
• Neglecting
• Disinvestments
DD
(Increased)
• Liveability loss
• Insecurity
• Depreciation
• Loss of demand/ value
Behavioural
D
• Liveability defects
• Insecurity
• Depreciation
• Loss of demand/ value

The “Ringers” case study

- Originally a spinoff part of a broader case study about heritage values, adaption and reuse of “Ringers”
- Availability comprehensive data

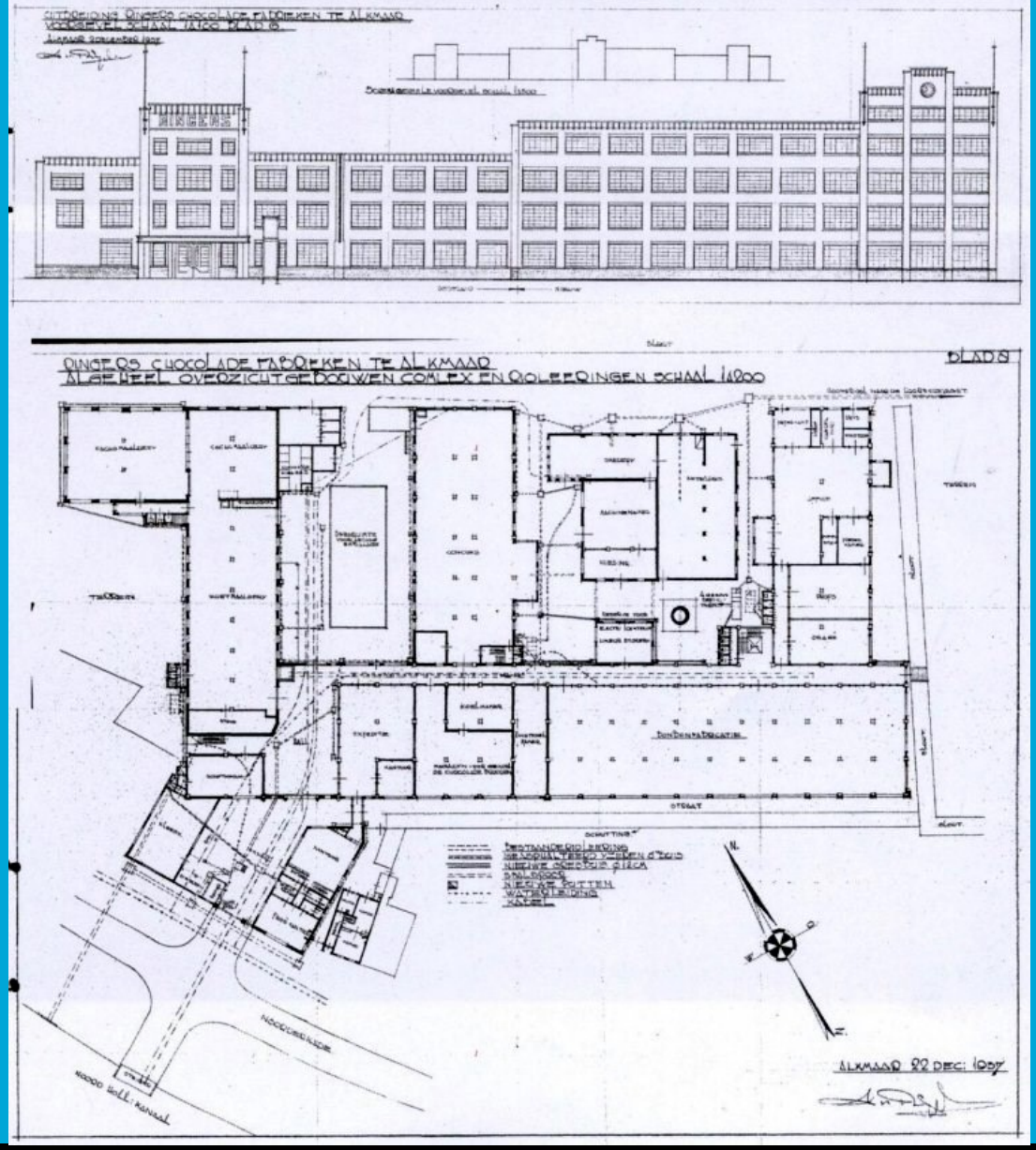
→ in search of the underlying cause-effect processes

The Ringers chocolate factory

Building history and significance:

- Interbellum
- Unique example:
    - first ‘modern’ industrial building
    - specifically designed and consistent developed
- Iconic significance:
    - determining landmark
    - part of collective memory

Ringers Masterplan 1937



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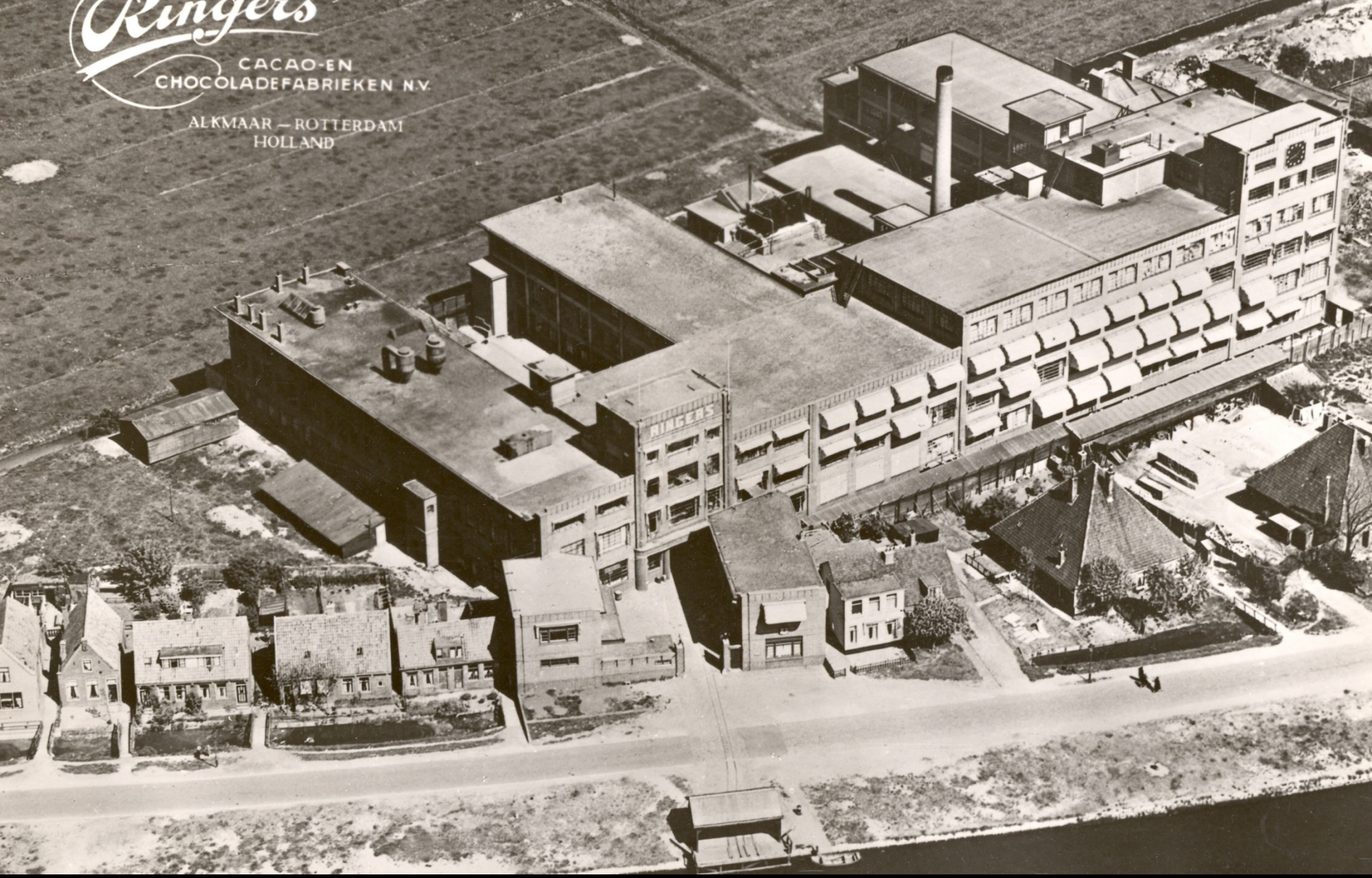
Ringers
CACAO-EN
CHOCOLADEFABRIEKEN N.V.
ALKMAAR – ROTTERDAM
HOLLAND

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The Ringers chocolate factory

Main life cycle phases:

I.	Initial phase	1920-1940
II.	Heyday phase	1940-1965
III.	First decline	1965-1974
IV.	Extended use phase	1974-2008
V.	Second decline	2008-2013
VI.	Redevelopment	2013-

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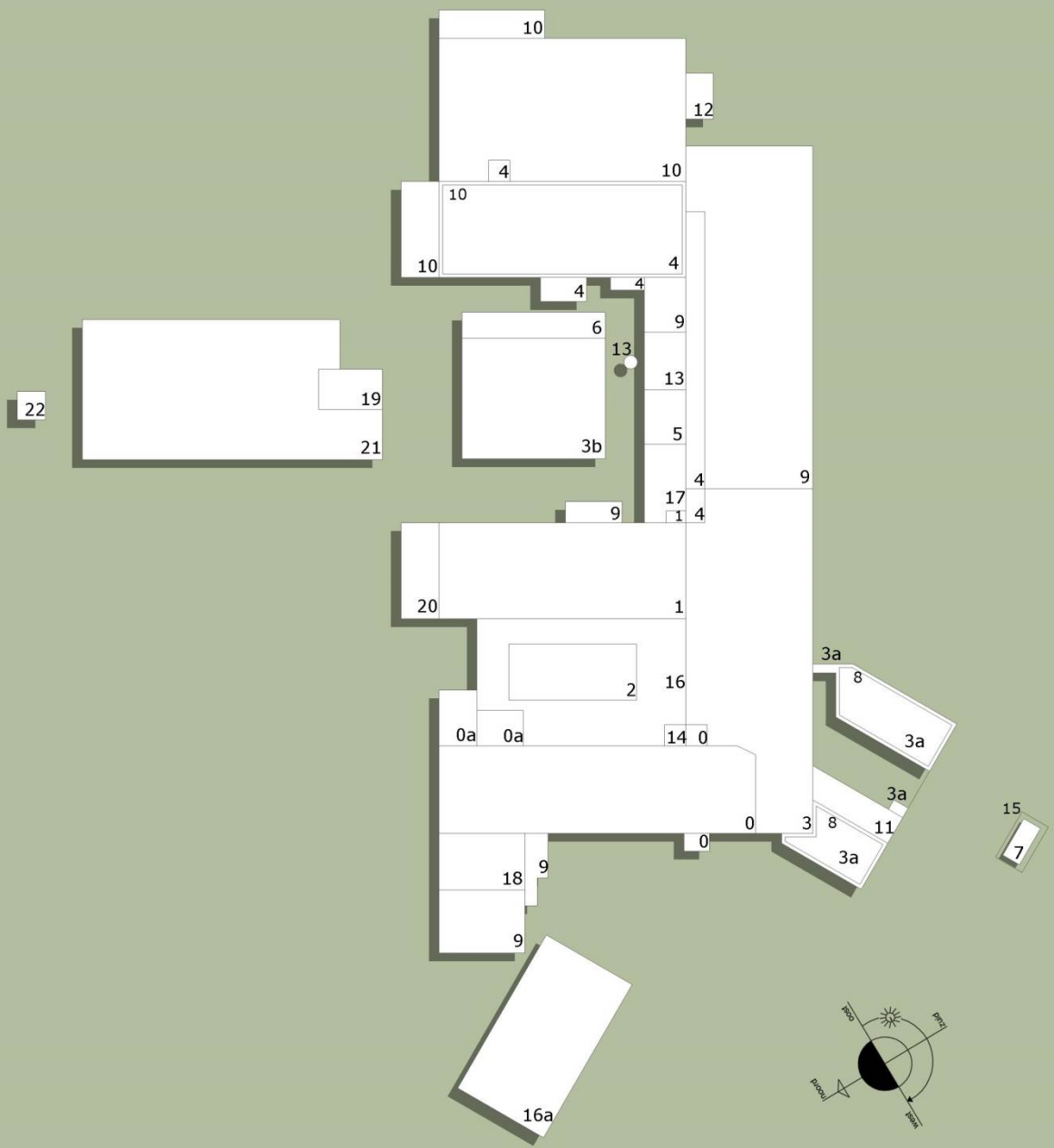
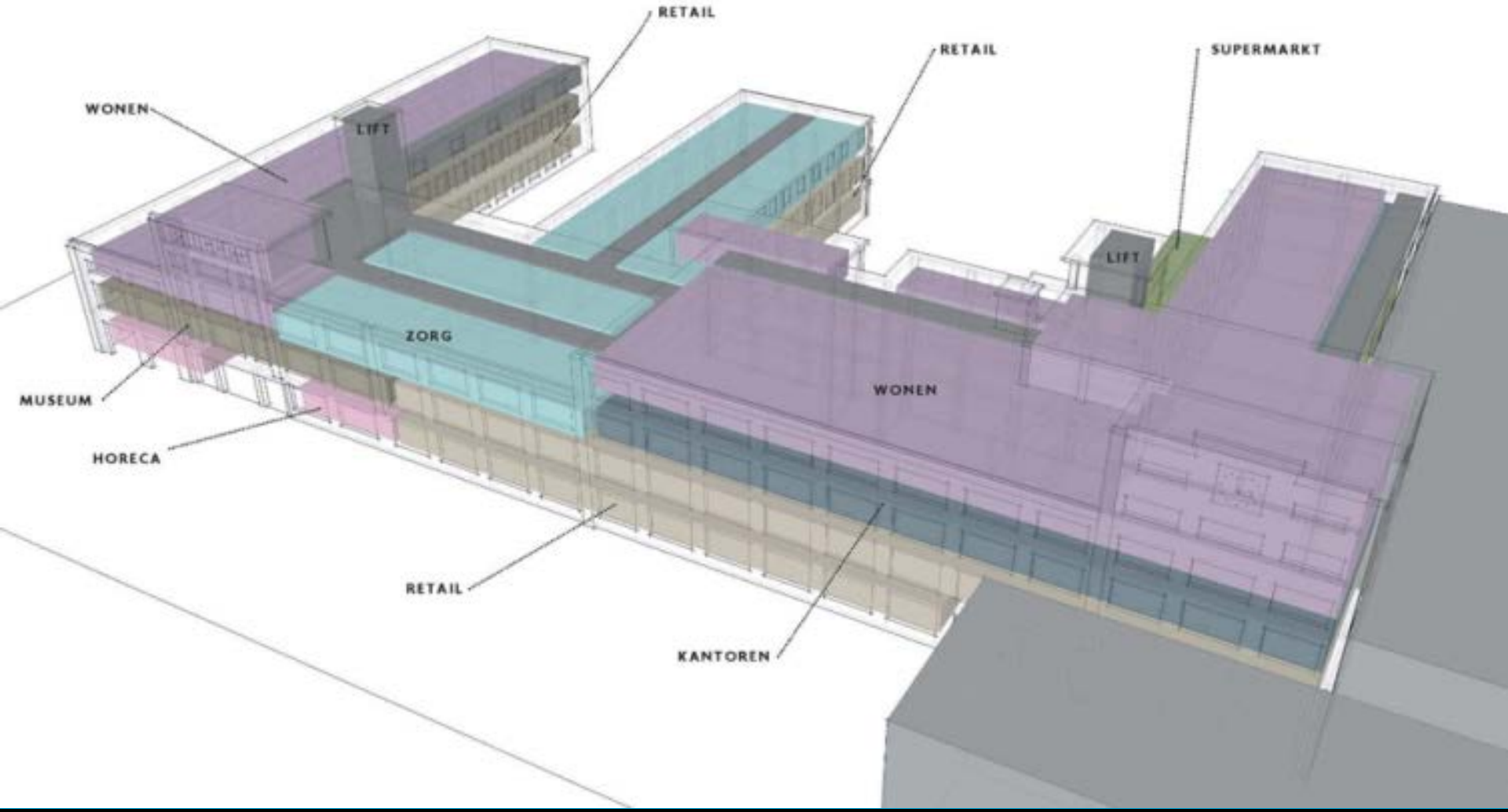
Ringers Building stages



Ringers – Feasibility study BOEI 2015



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Ringers - Life cycle analysis

Life cycle phase															
Phase	Stage		Type	Description	Impact	Type	Description	Impact	Type	Description	Impact	Type	Description	Impact
I.	1-10	Initial phase	AA	New, well built and maintained construction. Good energy efficiency (to that time standard) with partly double glazed windows. Fine architecture. Well dimensioned multi-purpose spatial structure.	++	BB	Open industrial area with accordingly infrastructure: road, waterway, nearby rail and station. Full conformity with (that time) regulations. Absence of environmental threats or conflicting neighbour interests.	++	CC	(No data). Well suited as purpose specific designed.	++	DD	Attractive valuable property; accommodate various functions. Well situated: waterfront, direct road and waterway connection, nearby rail, station and city centre. Ample extension space	++
			BA	-	o	AB	-	o	AC	Positive working environment	+	AD	Attractiveness	+
			CA	Positive	+	CB	Positive	+	BC	Positive working environment	+	BD	Attractiveness	+
			DA	Positive	+	DB	Positive	+	DC	Positive working environment	+	CD	Attractiveness	+
II.	11-18	Heyday phase	AA	As above. Well maintained.	+	BB	As above. Development mixed industrial and commercial area.	+	CC	As above. Former workers still testify love.	+	DD	As above.	+
			BA	-	o	AB	-	o	AC	As above	+	AD	As above	+
			CA	As above	+	CB	As above	+	BC	As above	+	BD	As above	+
			DA	As above	+	DB	As above	+	DC	As above	+	CD	As above	+
III.	18-19	First decline	AA	As above; emphasis on adaptability spatial structure. Energy efficiency stays behind.	+	BB	As above. Further development of adjacent shopping area.	++	CC	Closure due to negative profitability.	--	DD	Acquisition indicates acceptable market value.	+
			BA	-	o	AB	-	o	AC	-	o	AD	Attractiveness	+
			CA	Stop on investments	-	CB	Impact closure, no noted effect	o	BC	-	o	BD	-	o
			DA	As above	+	DB	As above	+	DC	Positive incentive	+	CD	Impact closure, no noted effect	o
IV.	19-26	Extended use phase	AA	Still as above, but alterations of lower quality, partly harming architecture (cladding façade); insufficient energy efficiency.	-	BB	Development of Overstad with changed urban plan: shopping centre, leisure, housing.	+	CC	Acquisition and investments indicate cost effective operation.	+	DD	As above.	+
			BA	-	o	AB	-	o	AC	-	o	AD	Impact cladding, no noted effect	o
			CA	Low maintenance investment	-	CB	-	o	BC	-	o	BD	-	o
			DA	-	o	DB	-	o	DC	No data		CD	-	o
V.	27-32	Second decline	AA	Increasing maintenance backlogs but still valuable architecture and solid structural condition	-/o	BB	Redevelopment of Overstad; changed urban plan enables demolition.	-	CC	Closure due to bankruptcy, followed by closures due to negative profitability	--	DD	Economic recession, bankruptcy of owner. Acquisition for removal likely negative for value.	-
			BA	-	o	AB	-	o	AC	-	o	AD	Impact maintenance backlog	-
			CA	No maintenance investment	--	CB	Impact vacancy, no noted effect	o	BC	-	o	BD	-	o
			DA	Some vandalism	-	DB	-	o	DC	Positive incentive, no effect	o	CD	Demolition plan of new owner	-
VI.	33-34	Redevelopment	AA	Consequential damages but still valuable architecture and solid structural condition	-/o	BB	Upgraded urban plan; formal monument status → heritage protection	++	CC	Policy change developer, willing to sell	+	DD	Ongoing negotiations/ retreat MAB/heritage protection → unknown effect on market value.	o/-
			BA	-	o	AB	Reconsideration urban planning	+	AC	Maintenance backlog	-	AD	Impact maintenance backlog vs. good reuse opportunities	o/+
			CA	No maintenance investment	--	CB	Impact vacancy, no noted effect	o	BC	-	o	BD	Positive value outlook	+
			DA	-	o	DB	Reinvestment opportunities	+	DC	Lower market value = chance	+	CD	Coalition for redevelopment	++

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Conclusions

The “Ringers” case study

- Interrelated multidimensional character performance development
- Strengths:
    - Initial building and location quality
- Vulnerabilities:
    - Dependence on market development and proprietor’s and governmental policies
    - Unprotected industrial heritage

Next steps

Refining cause-effect analysis

- A broad series of case studies
  - Similar ànd different cases
  - Diverse building types, tenures, markets, countries

International research cooperation

- COST Action MINEA
- New COST Action Obsolescence Research Group ORG

References

Thomsen, A. and Van Der Flier, K. (2011). Understanding obsolescence: a conceptual model for buildings. *Building Research & Information*, 39, 11.

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