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IAM approach in the water services sector

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Belgrade

Presentation layout

- Playing with figures
- IAM: managing a long-term time window
- Typical key bottlenecks and shortcomings
- In Portugal: from incipient to leading-edge IAM planning

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Some figures (a real-world example)

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- Average pipe age?
  (R: 20 years)
- Most used materials?
  (R: High density polyethylene;
  10% older pipes: asbestos cement)
- Average capital maintenance budget?
  (R: 500 k€ / 2,3% present accounting value)
- Utility estimate for the average useful life for those materials?
  (R: 50 years)

For the previous replies

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- The network true value is aprox. **60** % of the replacement value
  - (i.e., still young; mature infrastructures should be aprox. 50 %).

- For the current rehabilitation rate to lead to sustainable networks, pipes would need to last on average **173** years instead of 50!

- If the current rate is kept constant, in 47 years the utility would provide **NO SERVICE**.

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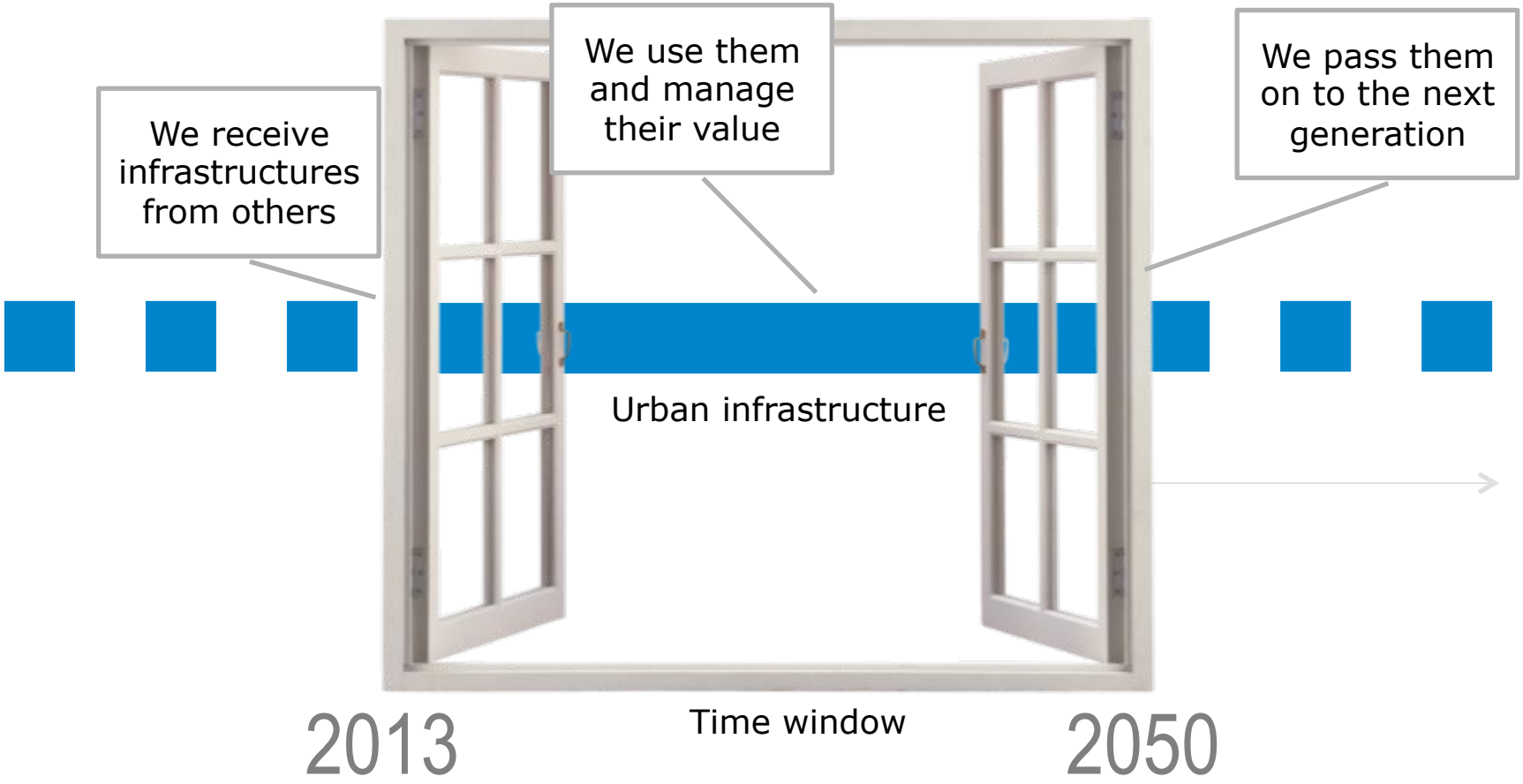
Infrastructures have indefinite lives



Where to be in 2050?
How to manage transition?

2050

2013

(ref. TRUST, www.TRUST-i.net)

Infrastructures have indefinite lives

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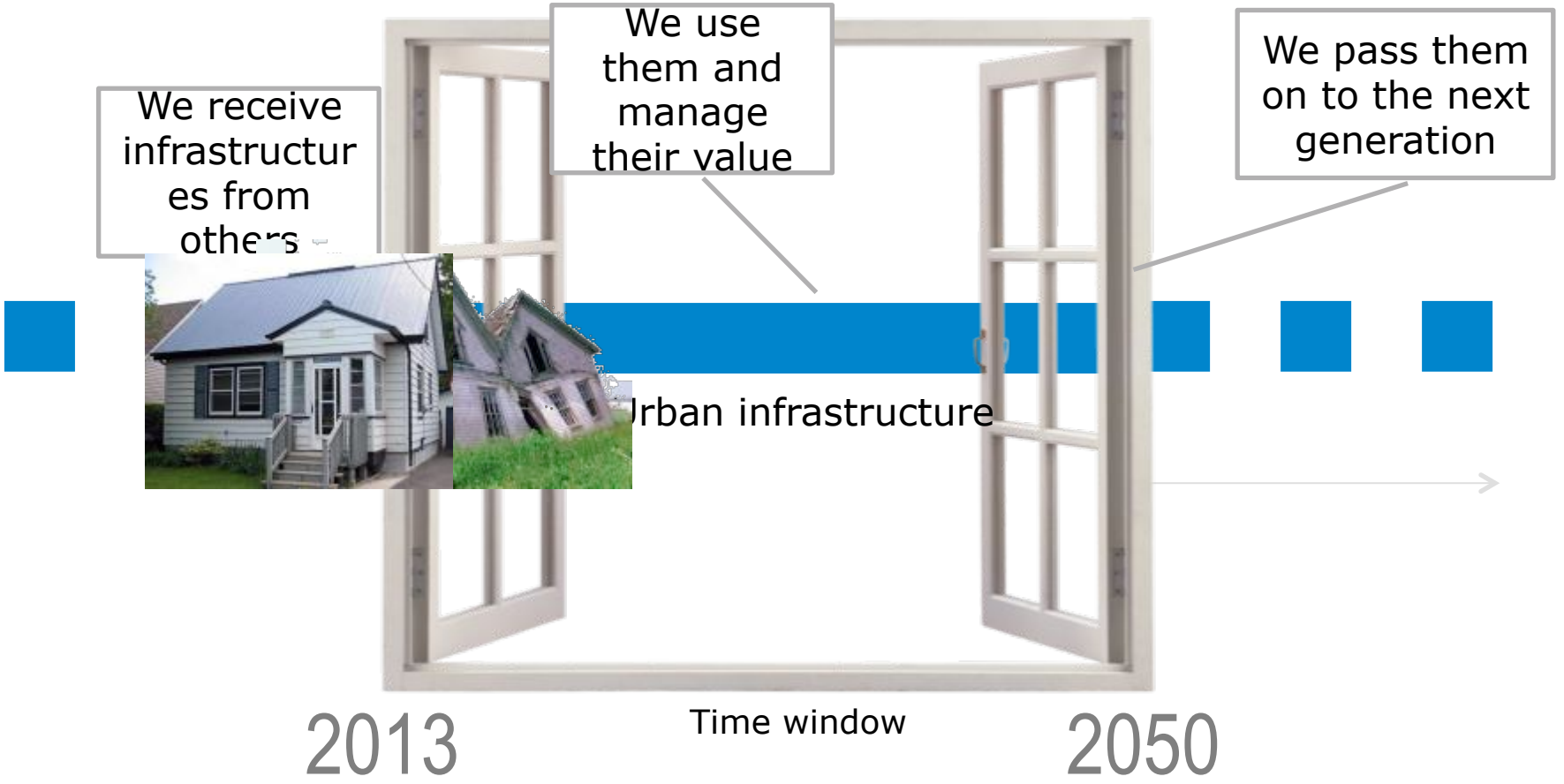

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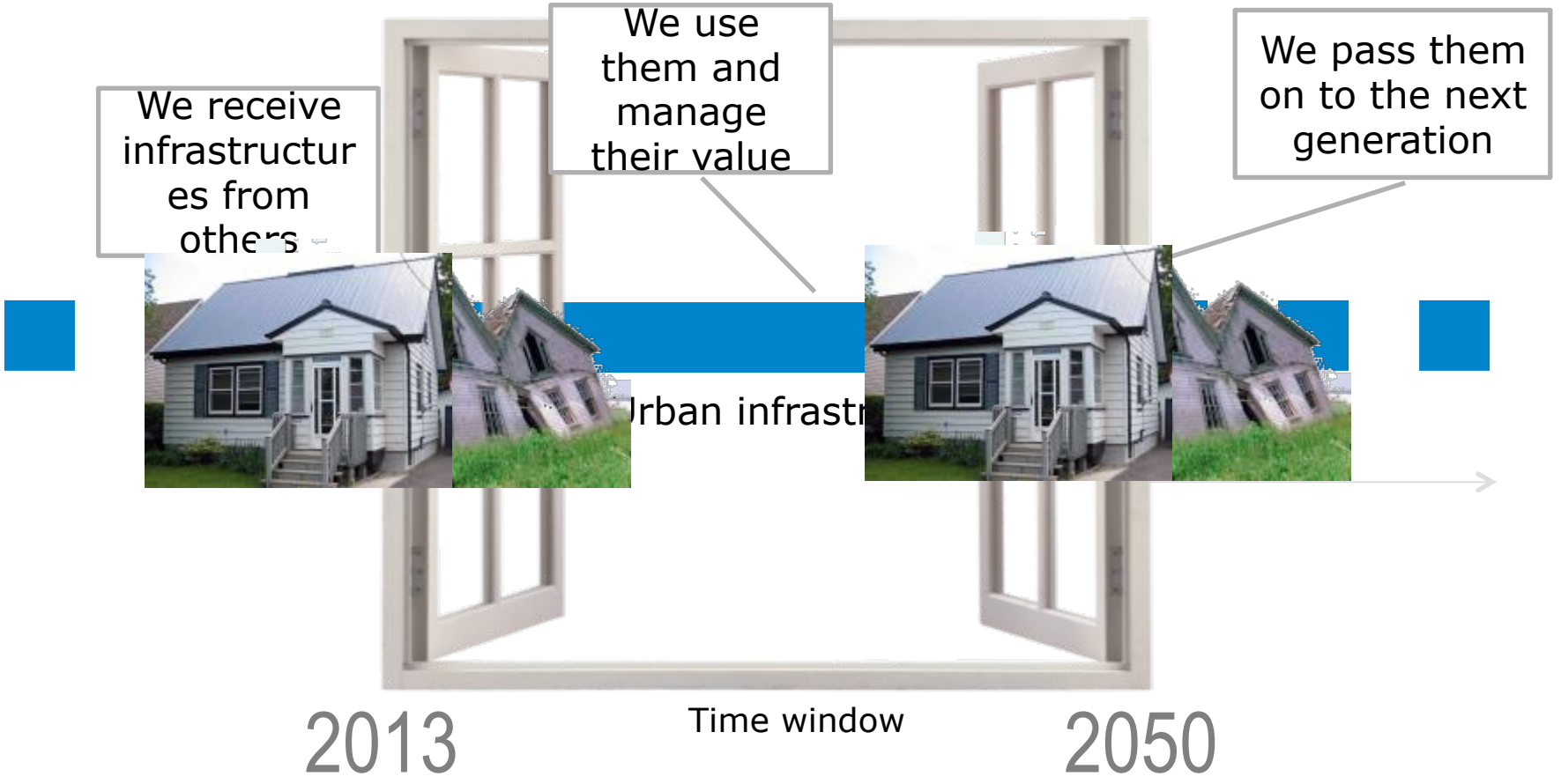

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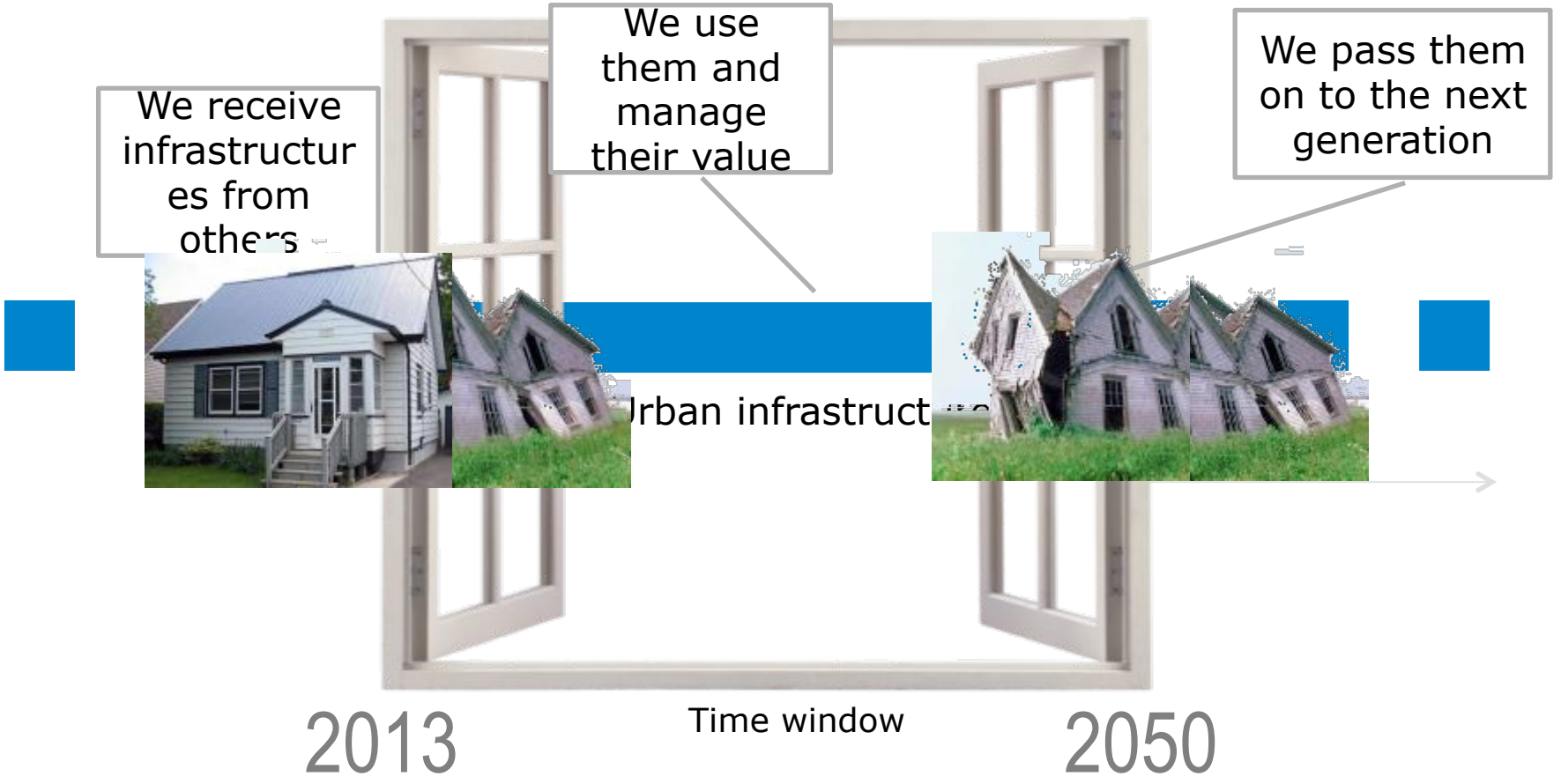

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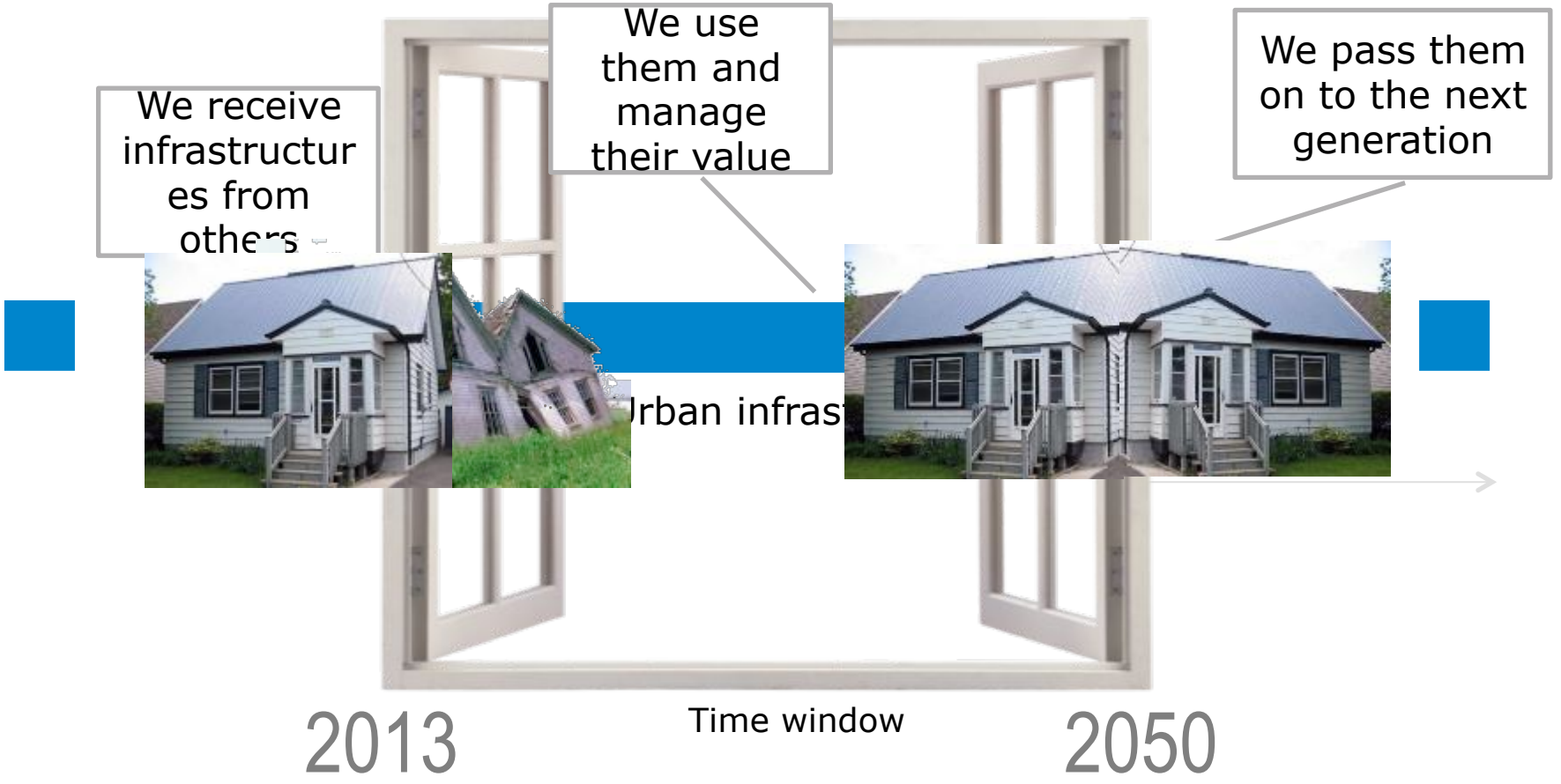

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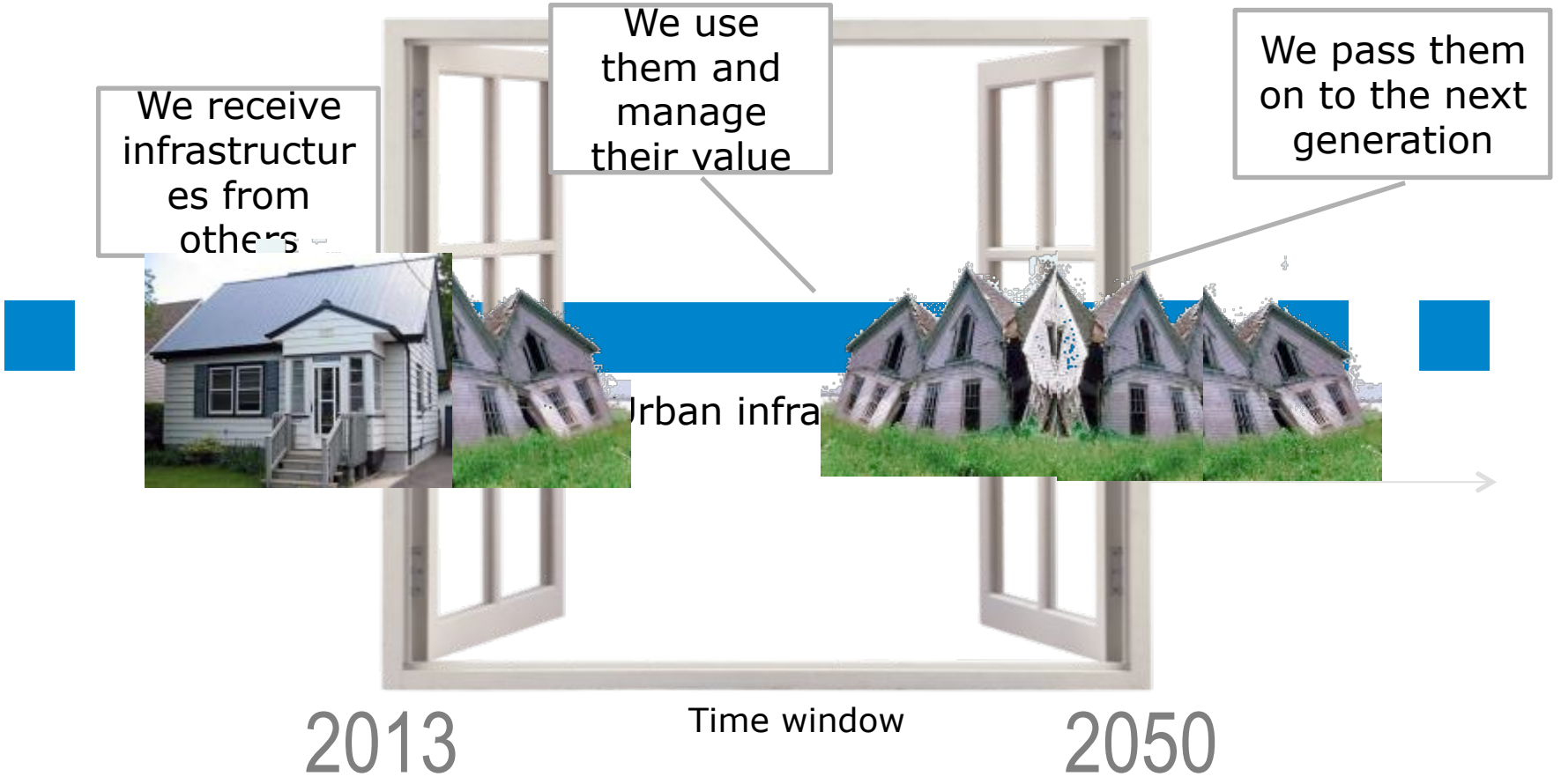

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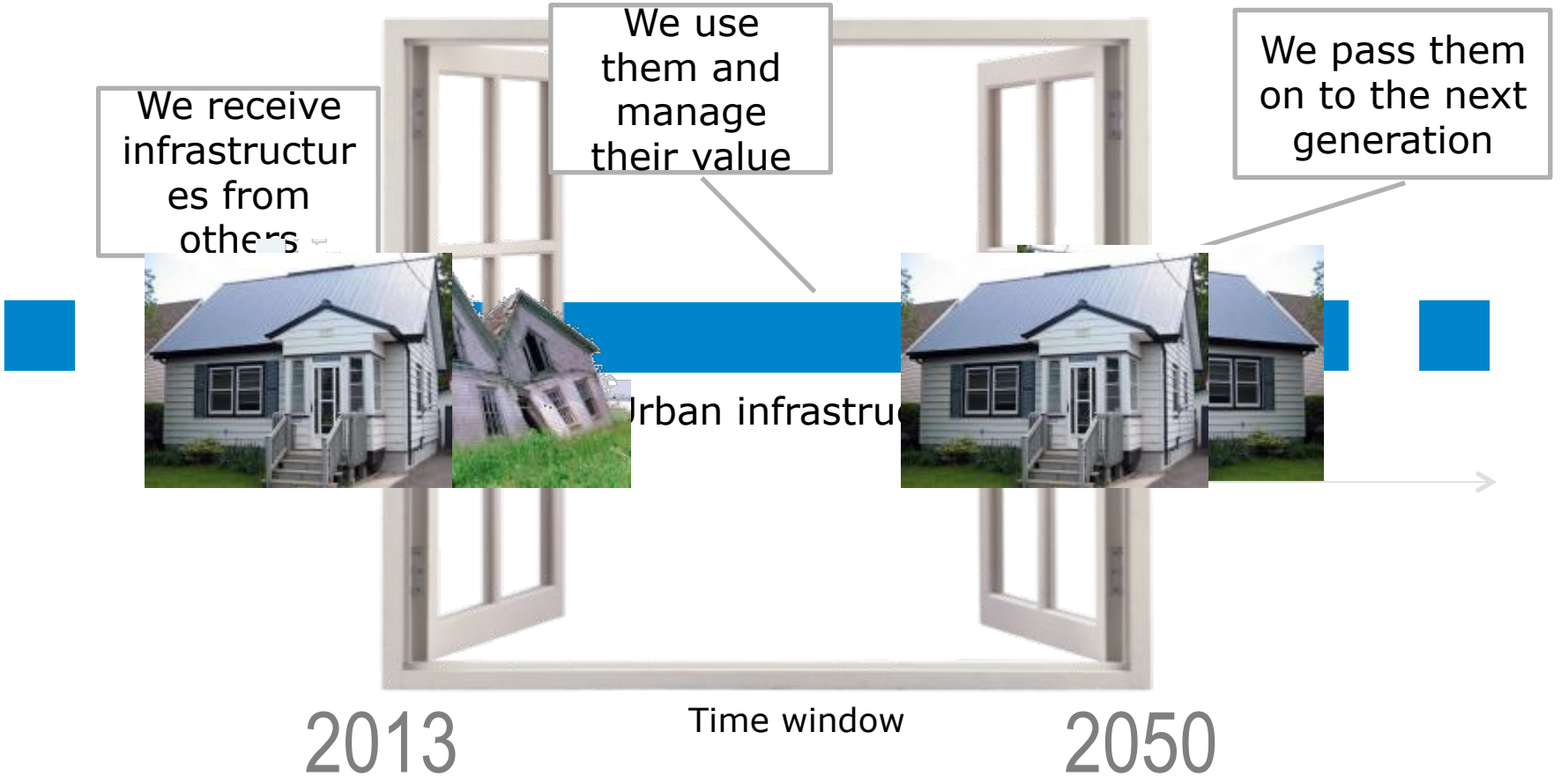

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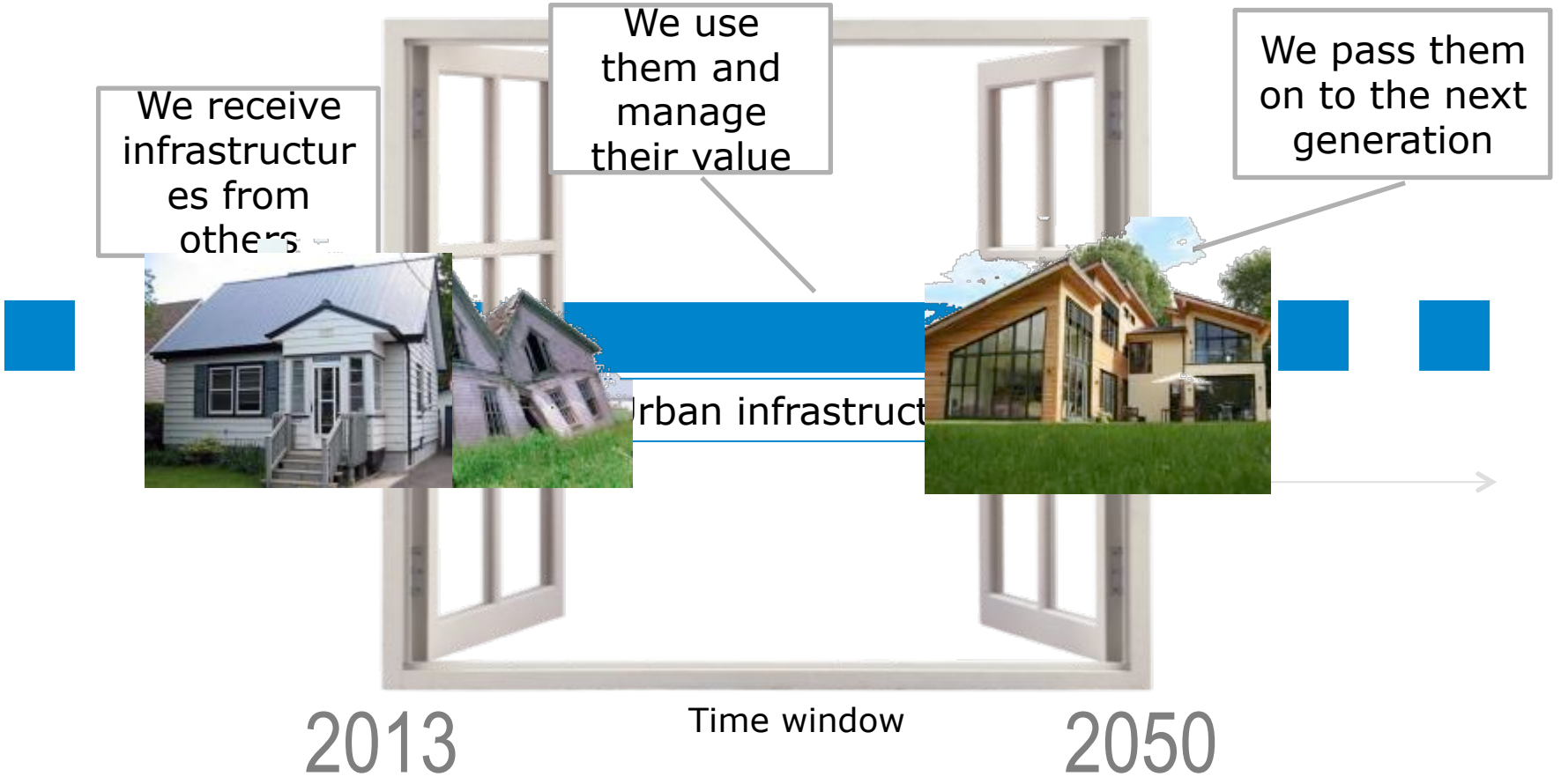

Infrastructures have indefinite lives

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Key for our success!
Key for societies' survival!

We receive infrastructures from others

We use them and manage their value

We pass them on to the next generation

Urban infrastructure

2013

Time window

2050

Key requirements for a successful implementation

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- **Strategic views** are adopted
- **Users' needs** and expectations **are duly managed**
- **Clear processes** and **good data**
- **Alignment** and **feedback** between **decision levels** are ensured (strategic/ tactical/ operational)
- **Alignment** between **management processes** are ensured

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Frequent shortcomings

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- Water services taken for granted in modern societies

  → low political impact of capital maintenance efforts

  → low willingness to pay and willingness to invest in rehabilitation

→ lack of capital maintenance

Frequent shortcomings

- Emerging challenges and long-term objectives

  e.g., adaptation to climate change, efficient use of energy, use of new paradigms for the water systems

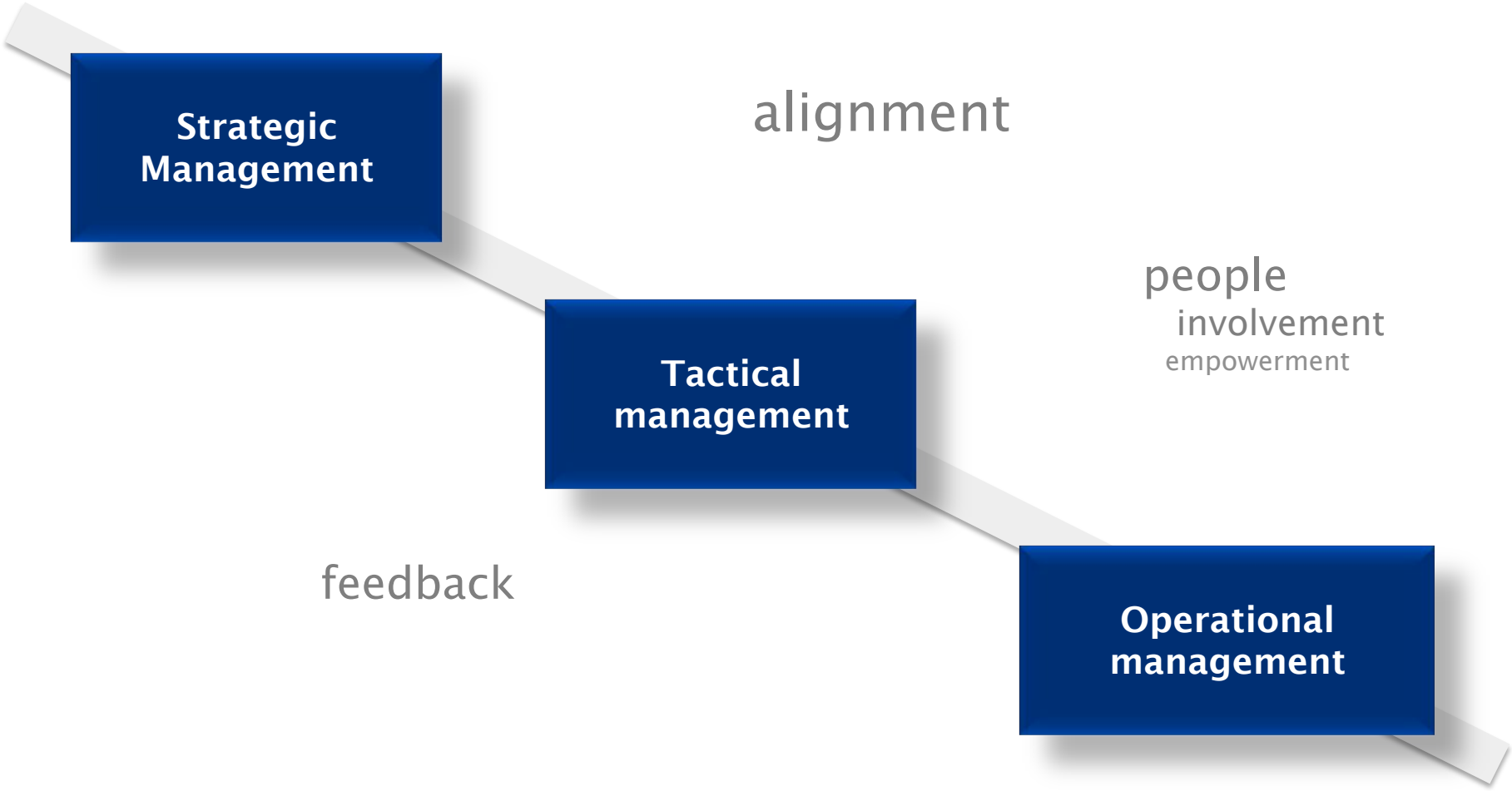
  often do not have an impact on operational management of the assets

- Capital maintenance actions tend to use a like-for-like replacement approach

  – often ignore long-term objectives and strategies

- Lack of effective alignment between strategic – tactical – operational level

Alignment through decisional levels



Frequent shortcomings

- Often, strategic planning is not long-term
  - → e.g. implementation of BSC on a yearly perspective.
  - → e.g. KPI adopted

Example: economic efficiency

Less than 5 years:

Promotes **cuts** in capital maintenance

> 15:

Sustainable capital maintenance becomes **crucial**

Frequent shortcomings

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- Data are the foundation of IAM, but in general:

  - too little data (NOT ENOUGH)

  or

  - too little GOOD data (NOT RELIABLE)

  or

  - not the right data for decision-making (NOT USEFUL)

  or

  - too many (fragmented) data and information sources (NOT EASY TO USE)

Frequent shortcomings

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Prevalent IAM - emphasis placed on:

- Asset condition
- Risks of failure
- (LOS not applicable to individual linear elements)

→ Priority on **what asset(s)**, **when**, **where**

→ Not enough thought given to **what alternative solution**

Frequent shortcomings

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The existing context differs from design assumptions

e.g.,

- Energy
- Sustainable use of materials
- DMAs' implementation changes the hydraulics
- Fire-fighting design paradigm *versus* water quality

Capital maintenance interventions are opportunities for systems' improvement!

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Portuguese context

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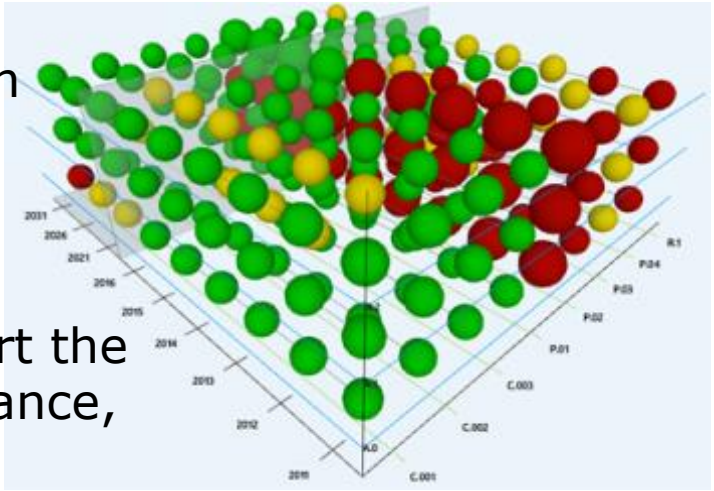
- 3 decades of capital investment on new assets
  - Good service coverage
  - Ever-widening gap in deferred rehabilitation
- Prevailing low levels of rehabilitation: unsustainable urban water services
  - a time bomb largely invisible to society and policy-makers, placing an unreasonable burden on coming generations.
- A paradigm shift in infrastructure asset management (IAM) is urgently needed

How

1. AWARE-P: A new IAM methodology

focused on strategic long-term planning

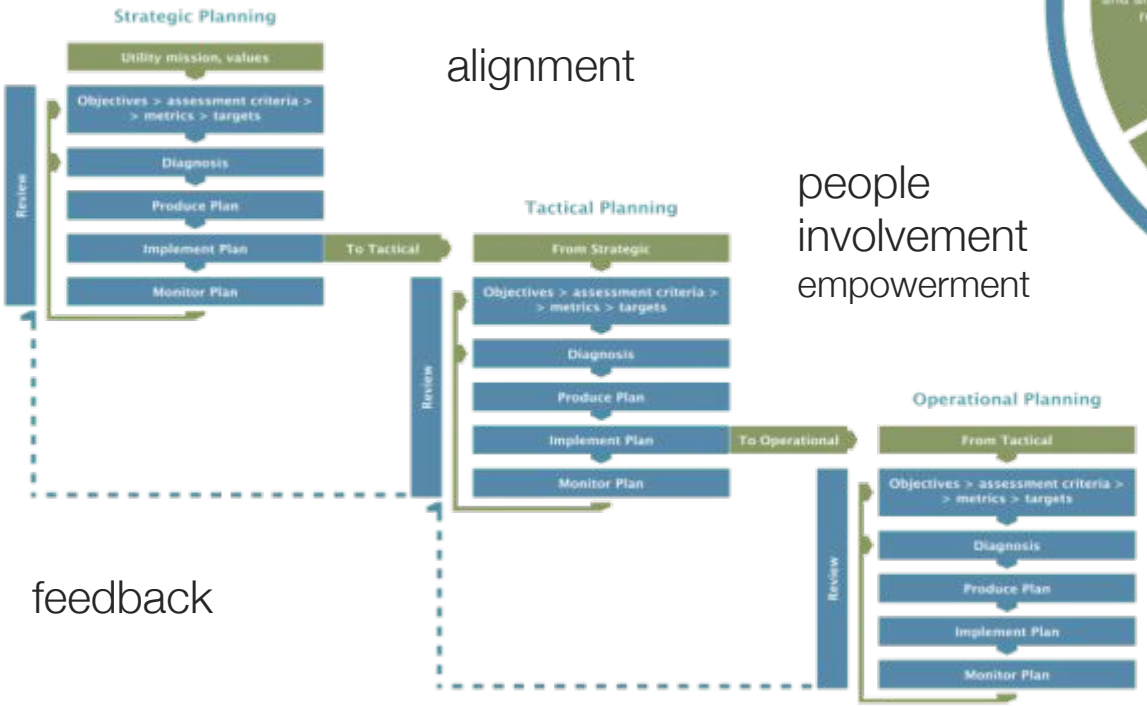
- IAM as an objective-driven, continuous improvement management process
- Service-oriented IAM planning for long-term sustainability
- Embedding key ISO 55000 requirements
- For the decision-makers: a transparent, defendable planning methodology to support the best choice of solutions, balancing performance, risk and cost



How

1. AWARE-P: A new IAM methodology

across decisional levels…



alignment

people involvement empowerment

feedback

How

2. New leading-edge methods

PLAN: Compare & decide
Where planning alternatives or competing projects are measured up and compared through selected performance, risk and cost metrics.

Performance Indicators
Assess the efficiency or effectiveness of your system through state-of-the-art, standardised PI libraries.

Performance Indices
Simulation-based, detailed technical performance assessment of capacity, water quality and energy behaviour.

Failure analysis
Use your component failure records to predict future pipe or sewer behaviours.

Inspection analysis
Use your inspection records to predict sewer behaviour.

Component Importance
Simulate the failure of each individual pipe in a network to measure its impact on nodal consumption.

Unmet demand
Calculate a service interruption risk metric expressed as the expected reduced service, the volume of unmet demand over a given period.

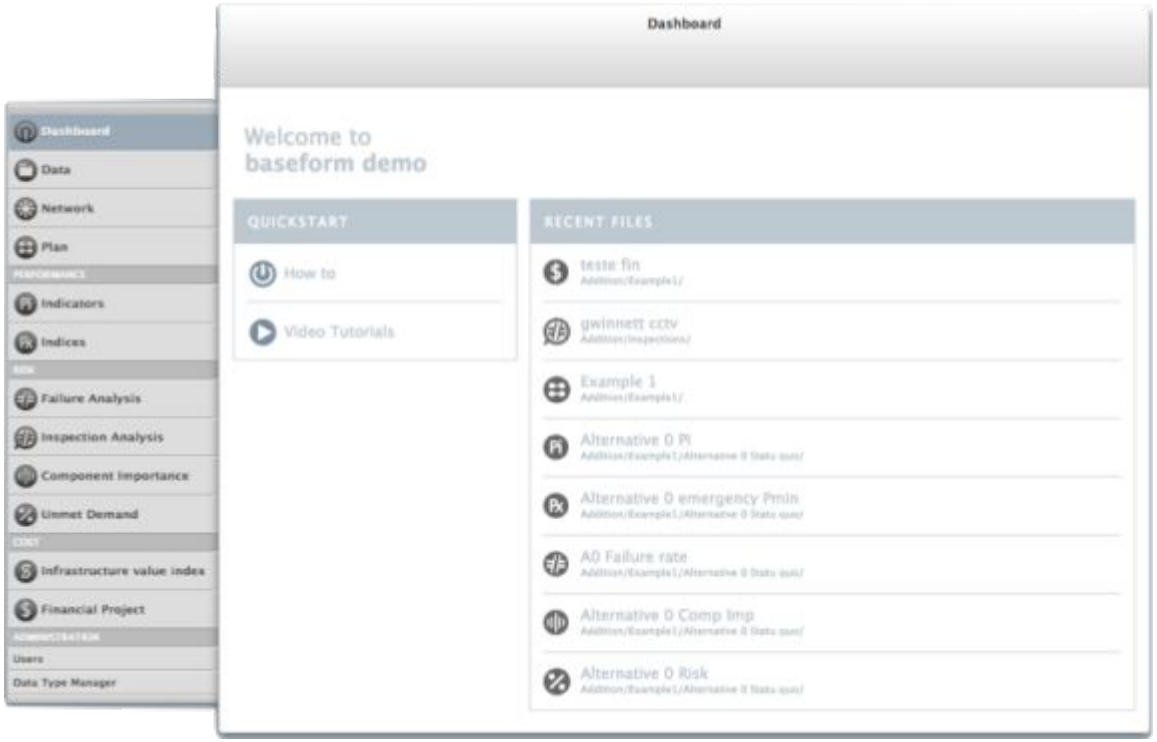
Infrastructure Value Index
Ageing degree of the infrastructure as a ratio between current value and replacement value of its components.

Financial project
Assess the net present value (NPV) and the investment return rate (IRR) of any financial project from a long-term/ asset lifecycle perspective.

How

3. Next generation integrated software

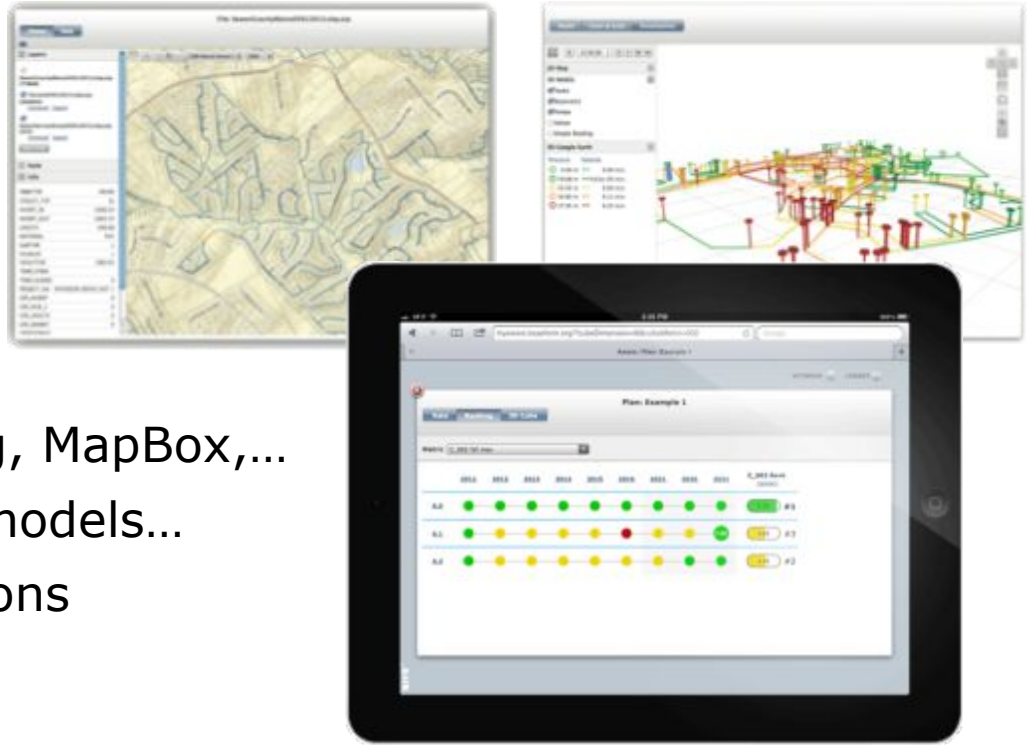
Supporting every aspect of the planning methodology



How

3. Next generation integrated software
Made for networked systems

- Open-sourced
- Web-based
- Collaborative
- Multi-platform
- Multi-user
- GIS: ESRI, Google, Bing, MapBox,…
- Records, work-orders, models…
- Advanced 3d visualisations



From R&D to the industry

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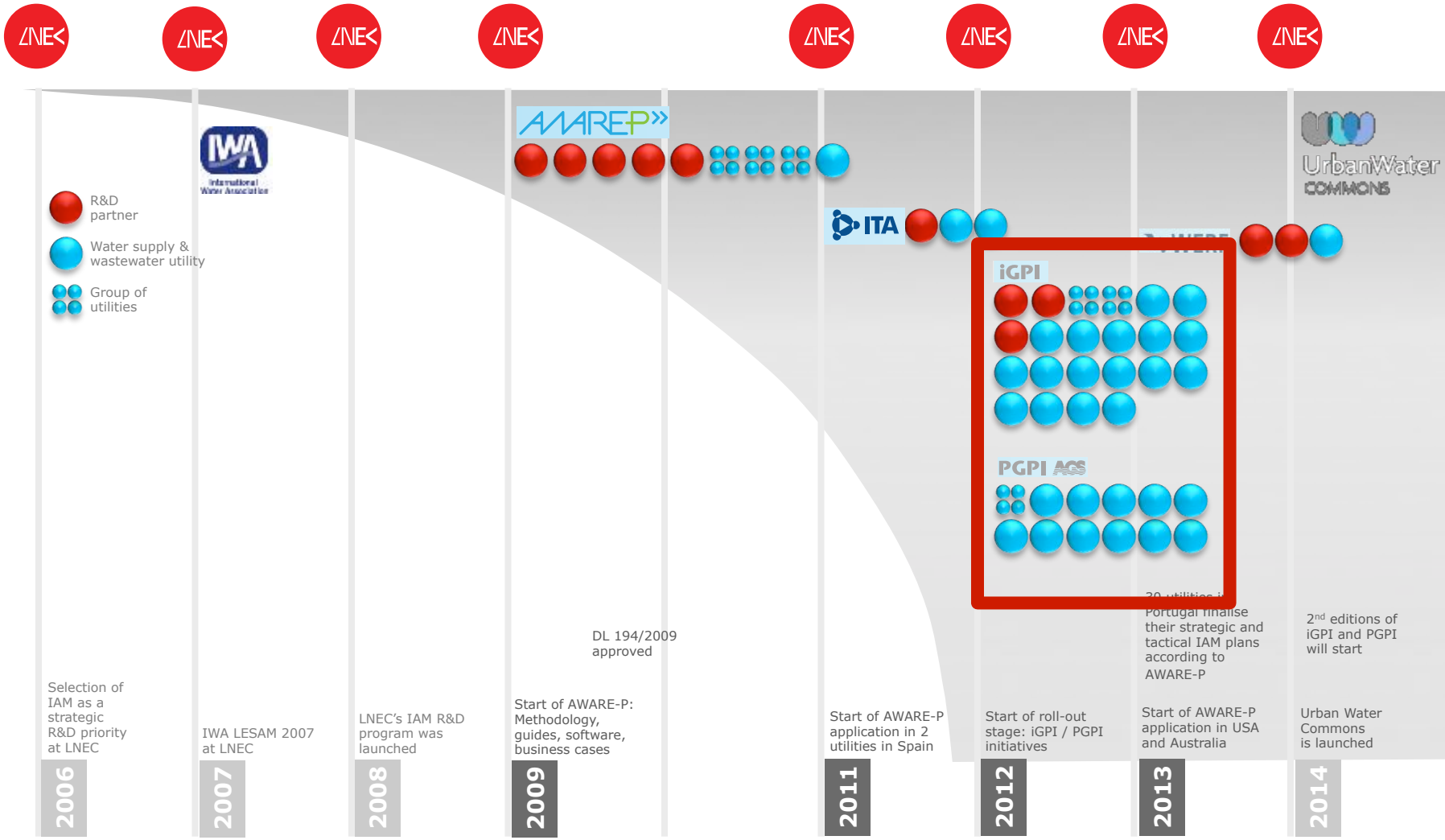

A few statistics
(Jan 2009 - Nov. 2013)

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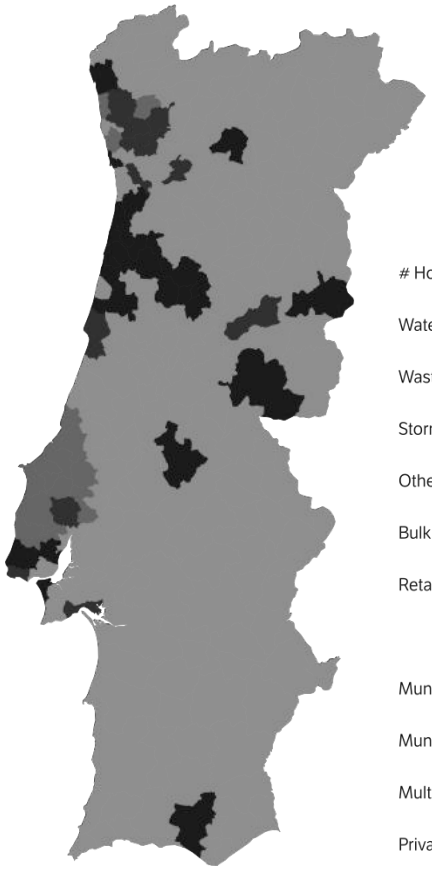
34,000	100+	30
NETWORK KMs COVERED BY IAM PLANS	UTILITY TECH STAFF DIRECTLY INVOLVED	UTILITIES
€1.8M	49,918	22
TOTAL FUNDING	LINES OF SOURCE CODE DEVELOPED	MEMBERS OF THE PROJECT'S R&D TEAM
500+	43	51
WATER PROFESSIONALS TRAINED	SCIENTIFIC & TECHNICAL PAPERS	KEYNOTES & SEMINARS WORLDWIDE

Uptake in Portugal



	Águas de Coimbra	Águas da Região de Aveiro	Águas do Planalto	CM Sabugal	EMAR Vila Real	Indaqua	Infraquinta	Inframoura	Infralobo	INOVA - Cantanhede	SM Abrantes	SMAS Almada	SM Castelo Branco	SM Loures	SMAS Sintra	SMSB Viana do Castelo	Águas do Oeste	AGERE	EAmb Esposende	Águas de Alenquer	Águas de Barcelos	Águas de Cascais	Águas da Covilhã	Águas da Figueira	Águas de Gondomar	Águas do Marco	Águas do Sado	Águas da Serra	AGS Paços de Ferreira	Tratave
# Households served	73.927	131.694	30.738	11.929	24.612	172.375	1.315	12.874	1.822	17.580	22.143	94.968	33.679	153.754	170.378	37.128	138.136	69.086	16.488	22.500	35.600	113.800	28.000	40.000	76.400	8.400	63.000	28.000	17.500	118.400
Water supply	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	○
Wastewater	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●
Storm water	●	●	○	○	●	●	●	●	○	●	●	●	●	○	●	●	○	○	●	○	○	○	●	○	○	○	○	○	○	○
Other public services	●	●	○	●	○	●	●	○	●	●	●	●	●	○	●	●	○	○	●	○	○	○	●	○	○	○	○	○	○	○
Bulk	○	●	●	○	●	○	○	●	●	●	○	○	○	○	○	●	○	○	○	●	●	●	●	●	●	●	●	●	●	●
Retail	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●	●	●	○	●	●	○
Municipal service	○	○	○	●	●	●	●	●	●	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Municipal company	●	●	○	○	○	○	○	○	○	●	●	●	●	○	●	○	○	○	●	○	○	○	●	○	○	○	○	○	○	○
Multi-municipal company	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○
Private Concession	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○	●	●	●	○	●	●	●	●	●	●	●

30 Strategic IAM Plans
30 Tactical IAM Plans

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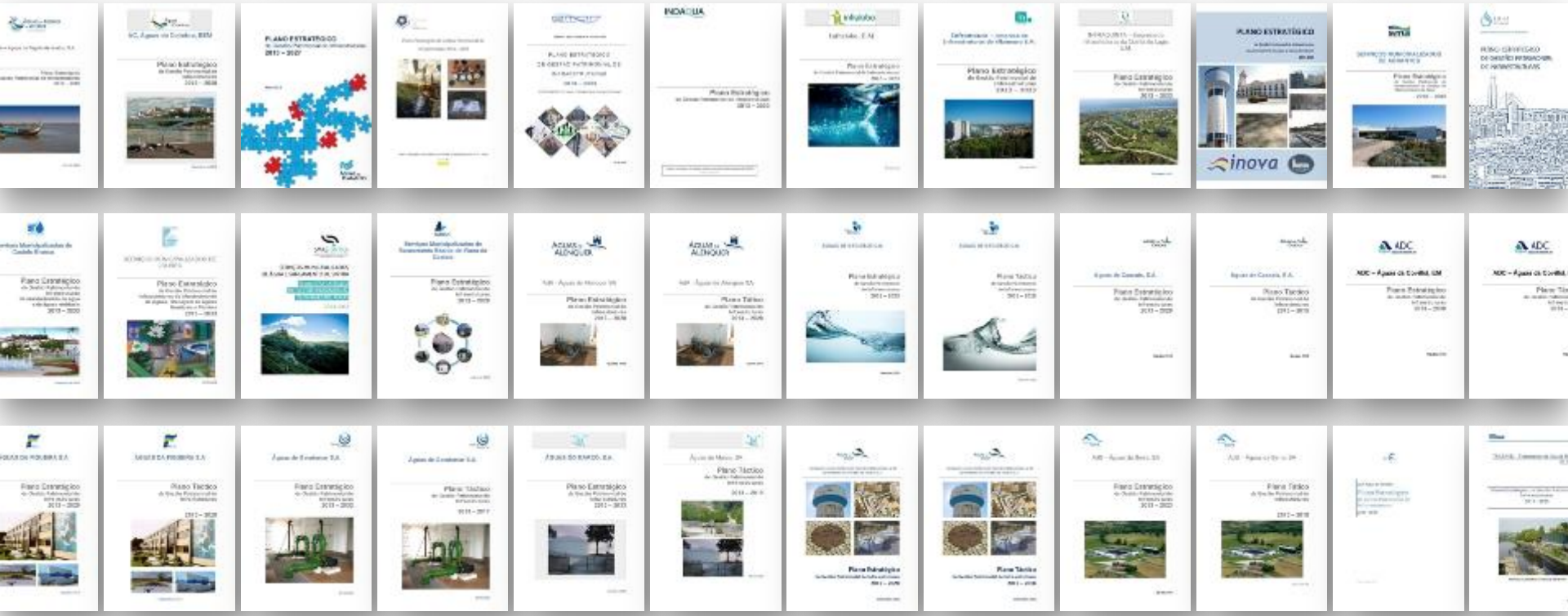

Global Software Usage (Nov 2013)

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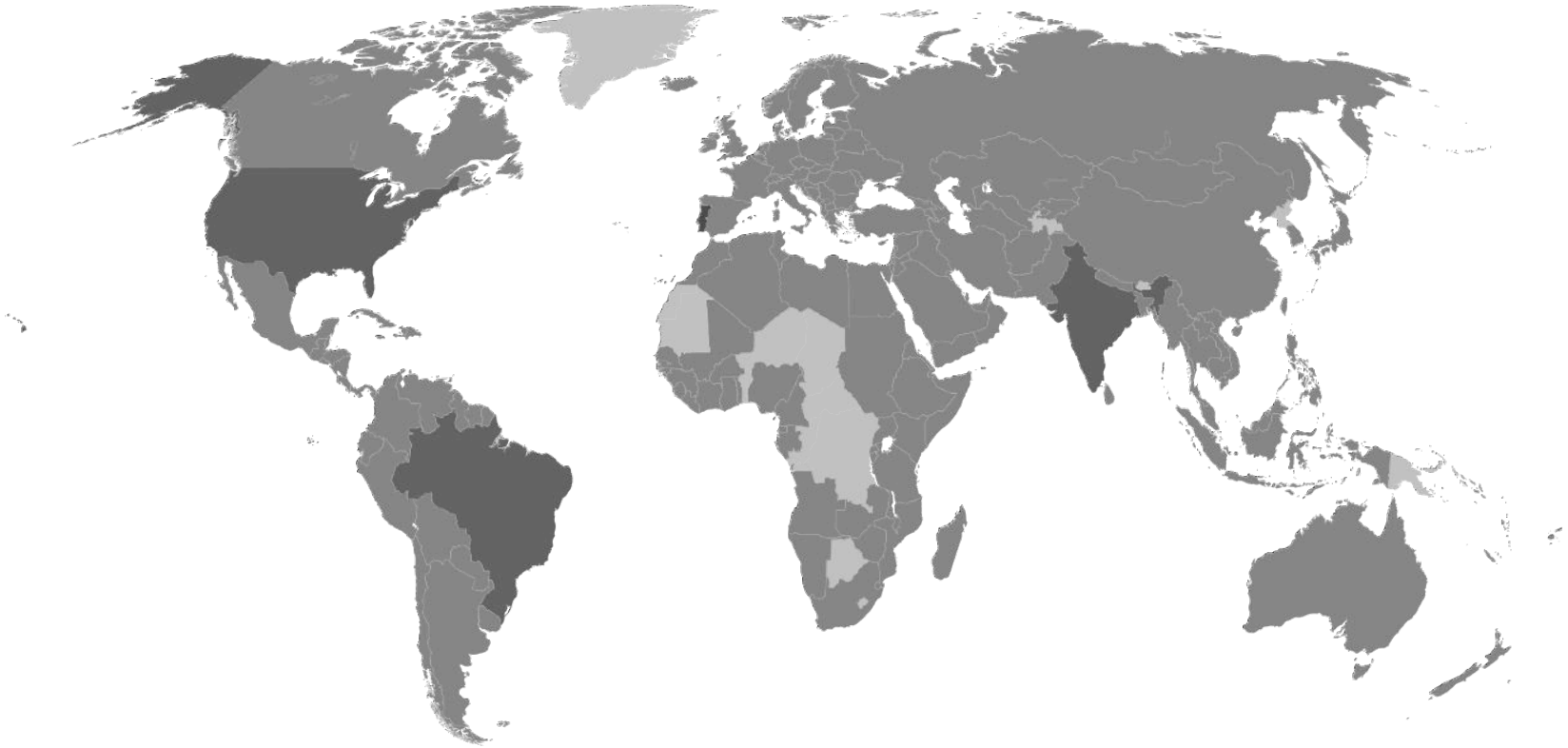
1047 registered users in 143 countries



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IWA LESAM 2013 Conclusions

- Main IAM achievements in the recent past:
  1. Recognition of the importance of the theme
  2. Agreement on key principles and best practice
     a) ISO 55000 / 55001 / 55002
     b) Projects, manuals, legislation (e.g. DL 194/2009, IAM manuals)
  3. Relevant technological evolution, e.g. inspection, information systems
  4. Countries highlighted: Australia and **Portugal**
- Way forward – need for improvements in:
  - Stakeholder-driven IAM ✔
  - Communication (internal and external) ✔
  - System perspective instead of asset-by-asset IAM ✔
  - Alignment between decision levels ✔
  - Further technological developments ✔

International Water Association

World Water Congress

Lisboa, 21-26 setembro 20

IWA World Water Congress & Exhibition will take place in Lisbon in 2014

O Congresso Mundial da Água da IWA vai realizar-se em Lisboa em 2014

Introduction to the

www.iwa2014lisbon.org

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