
Infrastructure asset management
of urban water systems

The AWARE-P integrated approach

2011-09-28

AAREP» Why IAM ?

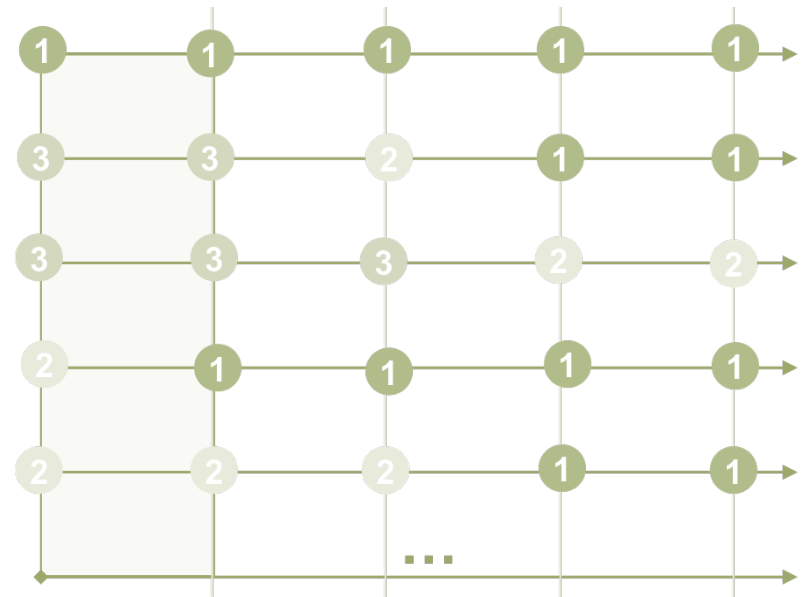
- Promote adequate levels of service;
- Strengthen long-term service reliability;
- Improve sustainable use of water and energy;
- Manage service risk, taking into account users' needs and risk acceptance;
- Extend service life of existing assets;
- Improve investment and operational efficiency;
- Justify investment priorities.

AAAREP» A planning & rehab manager

- Key strategic objective for the company:
Improve sustainable use of water and energy, while reducing carbon footprint
- Our networks:
 - undesirable failure rates;
 - high energy costs due to pumping;
 - water supply: high losses; pressure/ capacity shortages at peak hours in some sectors;
 - wastewater: flooding/ overflows in some sectors, even under moderate rainfalls.

ANAREP» Questions are due:

- How would we act?
- How can we prove that our decisions address the stated strategic objective?
- How can we quantify the impact of our decisions and actions?



AAREP» Traditional AM practice

- Probably start by an updated and reliable inventory of the existing assets
 - compile as many reliable records as possible of their condition and failure history.
- Try to identify the locations where there are pressure problems, flooding and overflows
 - also look at pump efficiency and energy consumption.
- Assess the relative importance of each asset.
- Combine such information and prioritize interventions within budget constraints.

This would contribute to the first question.

- *How would we act?*

What could be done about the other two?

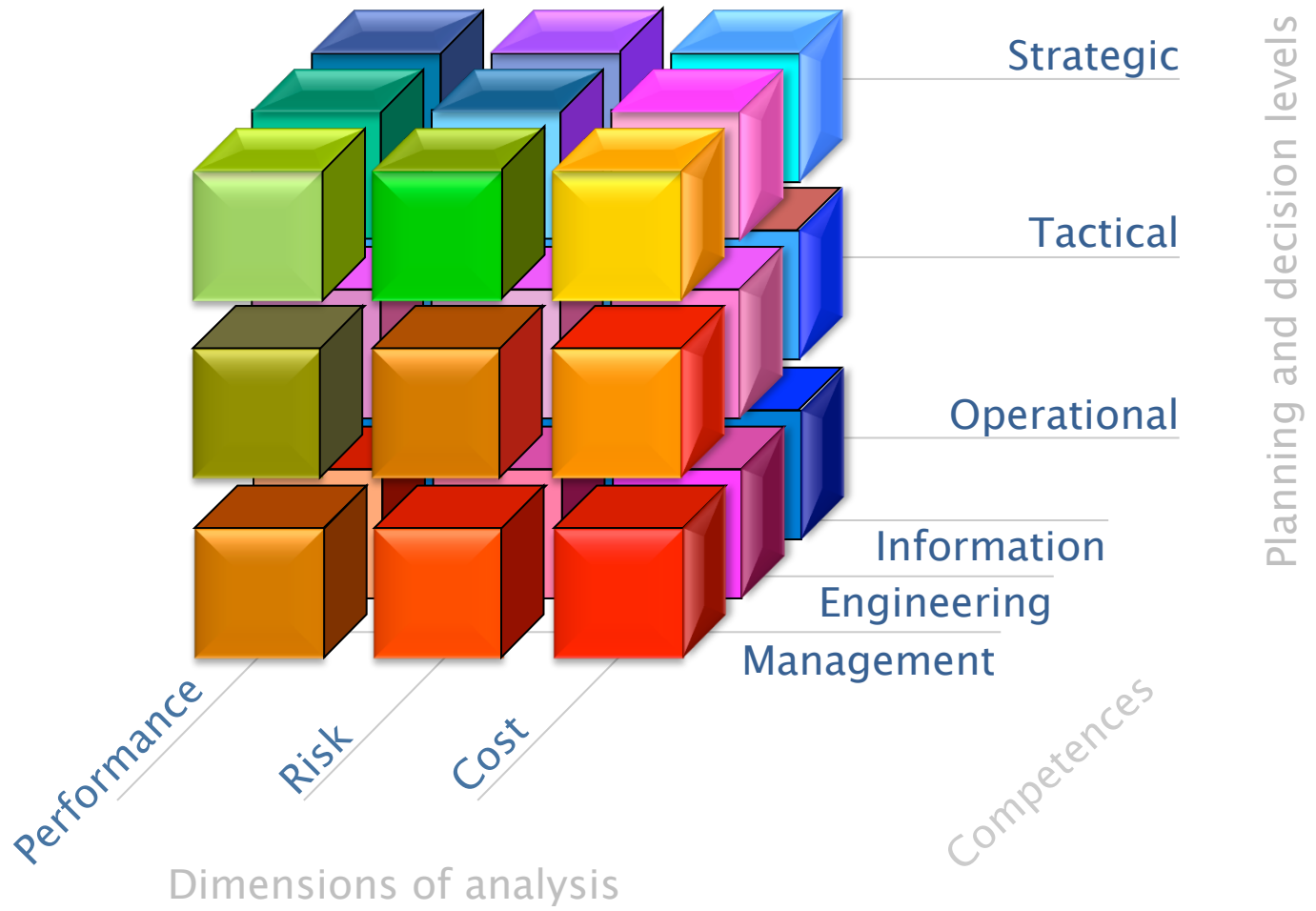
- *How can we prove that our decisions address the strategic objective?*
- *How can we quantify the impact of our decisions and actions?*

These are the types of issues that the proposed approach is designed to tackle in a structured, aligned and transparent way.

ANAREP» An integrated IAM approach

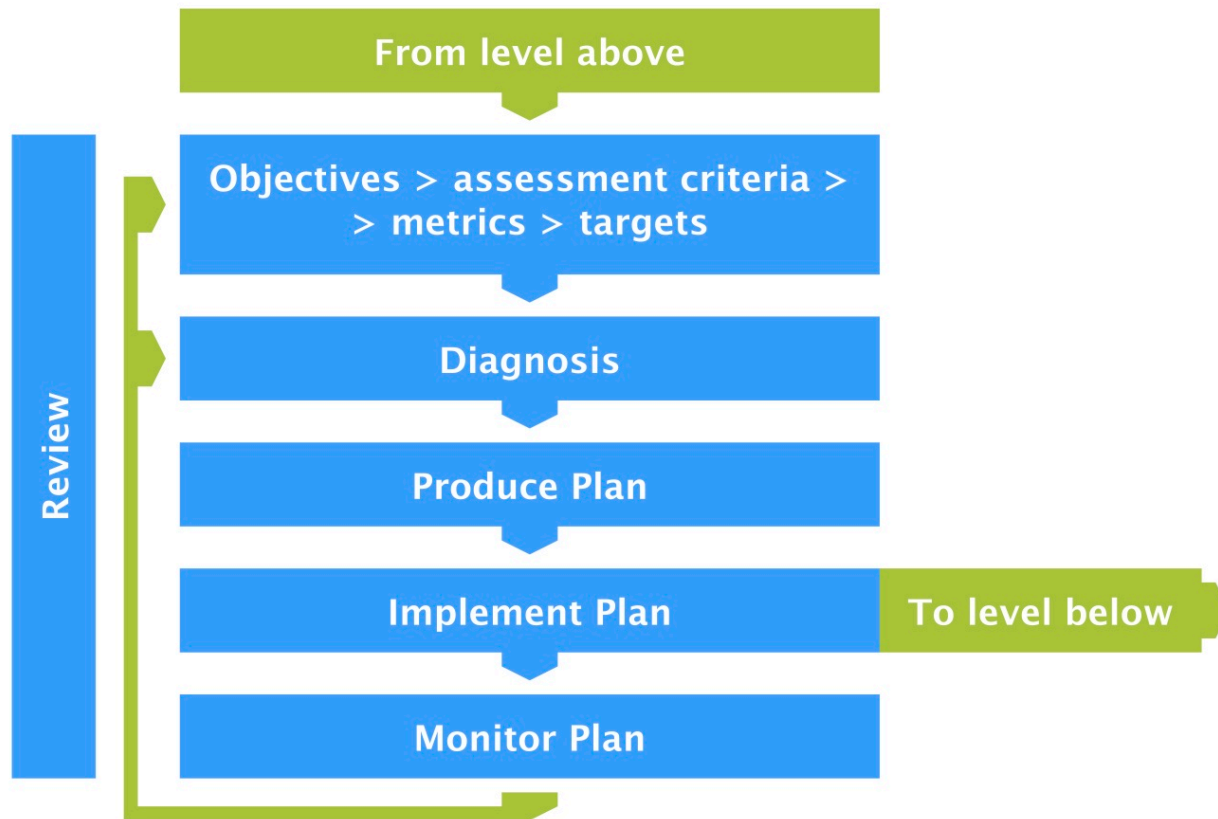
Helps answer:

- Who are we & what service do we deliver?
- What infrastructures do we own / operate?
- Where do we want to be in the long term?
- How do we get there?



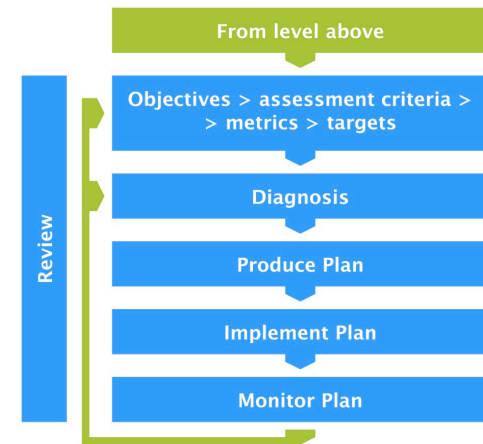
ANAREP» At each level

- A structured PDCA loop



AAREP» A word on...

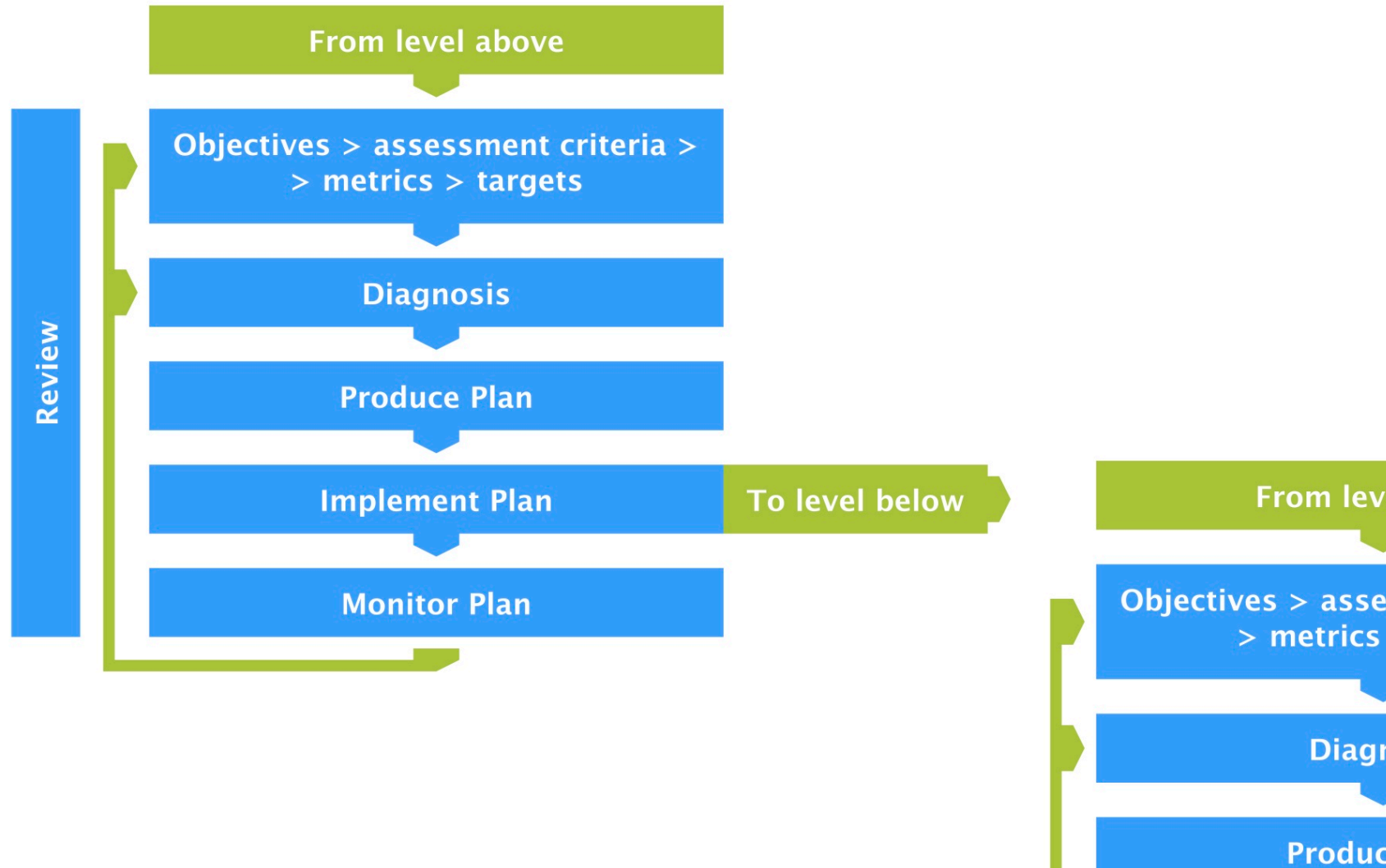
- Objectives
 - (e.g. environmental sustainability)
- Criteria
 - (e.g. water usage efficiency)
- Metrics
 - (e.g. real losses per service connection)
- Targets
 - (e.g. 100 l/conn./day)



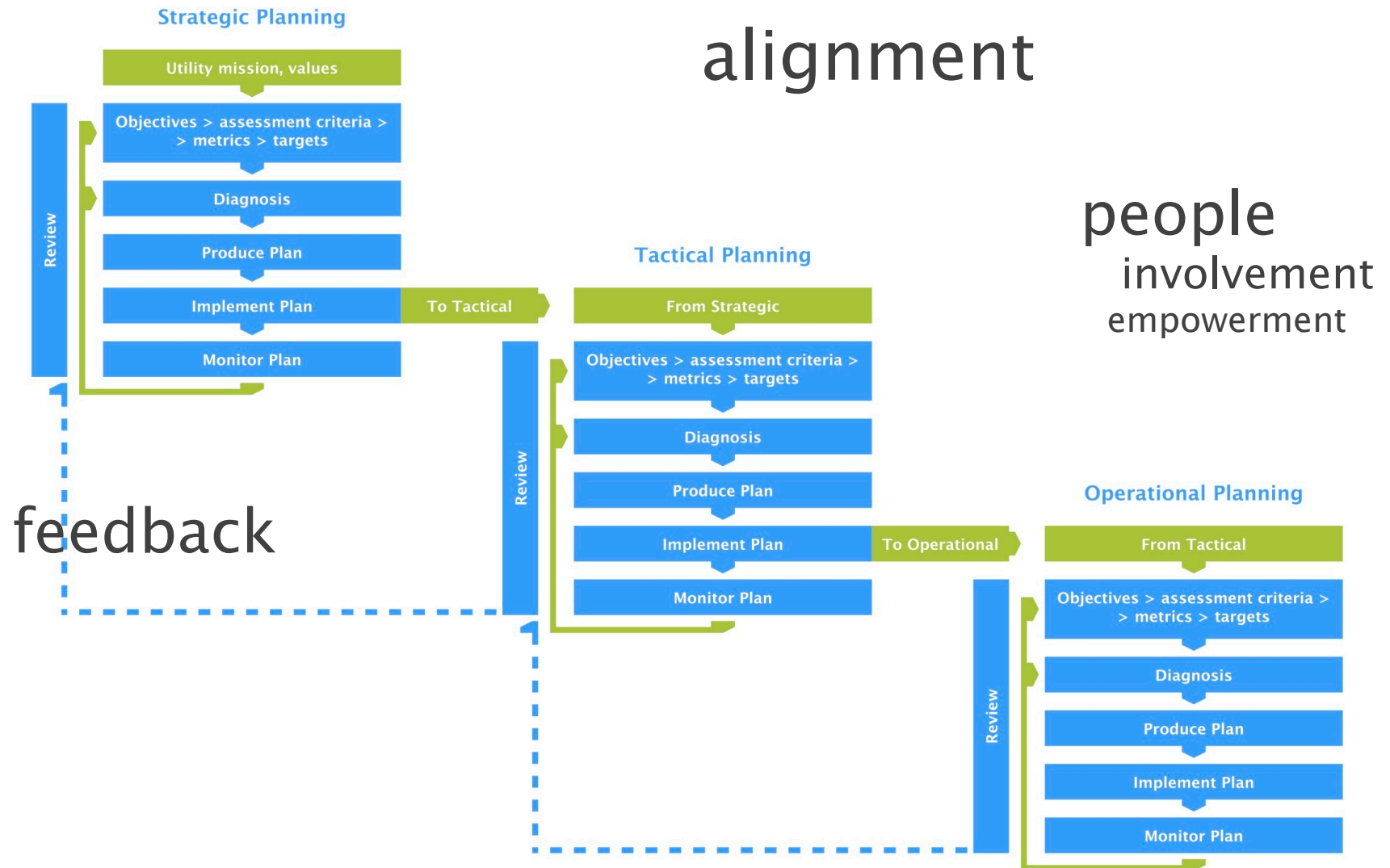
Improve the sustainable use of water and energy while minimizing carbon footprint

| Assessment metrics | Current situation | Targets | |
|--|----------------------------------|------------|-------------|
| | | In 5 years | In 20 years |
| Criteria 1: “Sustainable use of water” | | | |
| Real losses per connection (l/connection/day) | 250 (<i>poor performance</i>) | 150 | 100 |
| Wastewater reused (%) | 0 (<i>poor performance</i>) | 5 | 20 |
| ~~~~~ | ~~~~~ | ~~~~~ | ~~~~~ |
| Criteria 2: “Sustainable use of energy and minimization of carbon footprint” | | | |
| Standardized energy consumption (kWh/m ³ /100 m) | 0.6 (<i>fair performance</i>) | 0.40 | 0.40 |
| Excessive energy per revenue water⁽¹⁾ (kWh/m ³ revenue water) | 0.15 (<i>poor performance</i>) | 0.10 | 0.05 |

ANAREP» At each level



ANAREP» Through decisional levels...



What would we have done differently ?

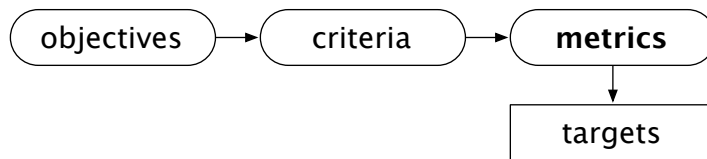
1. Clarify our understanding of the organization's vision, objectives, targets and strategies, and keep them as long-term direction.
 - our understanding - and the Board's understanding
2. From there, and based on our knowledge of infrastructure and its performance, define our own tactical objectives and targets.



3. Begin with a global, birdseye view of our systems
4. Followed by a subsystem– level evaluation
5. And finally an asset–by–asset analysis

We would have a clearer diagnosis and would have been driven to alternative designs that are globally more effective.

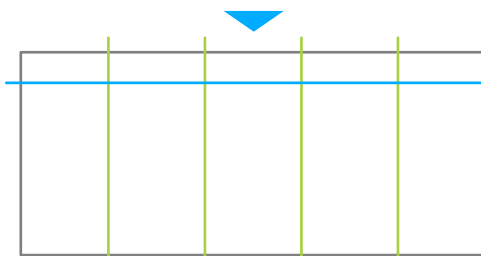
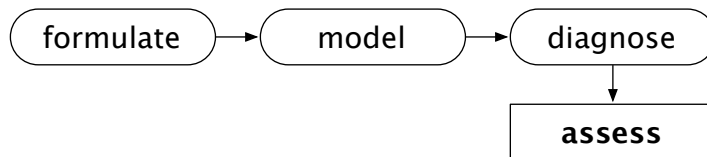
ANAREP» Planning workflow



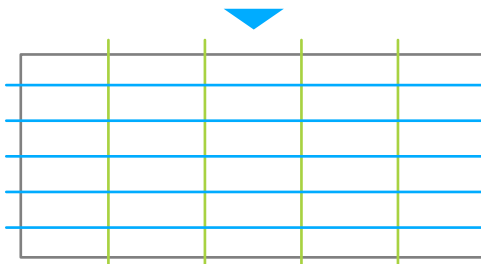
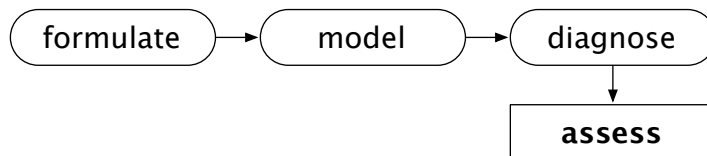
define



current



for each alternative



ANAREP» Is the network *ideal*?

- We might have also found out that the present layout and diameters are not ideal.
- Perhaps some well-devised structural changes would have a higher priority than spending entire budget on *like-for-like* replacement of poor condition assets.

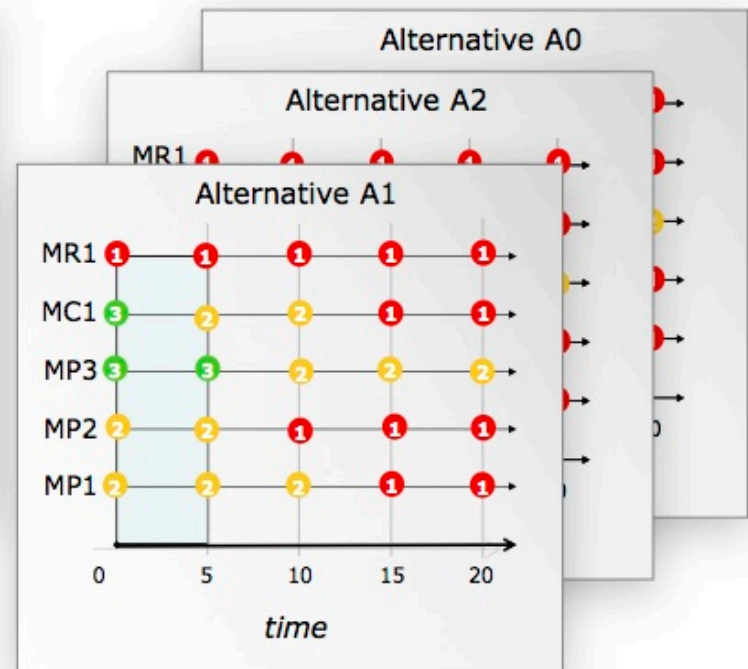
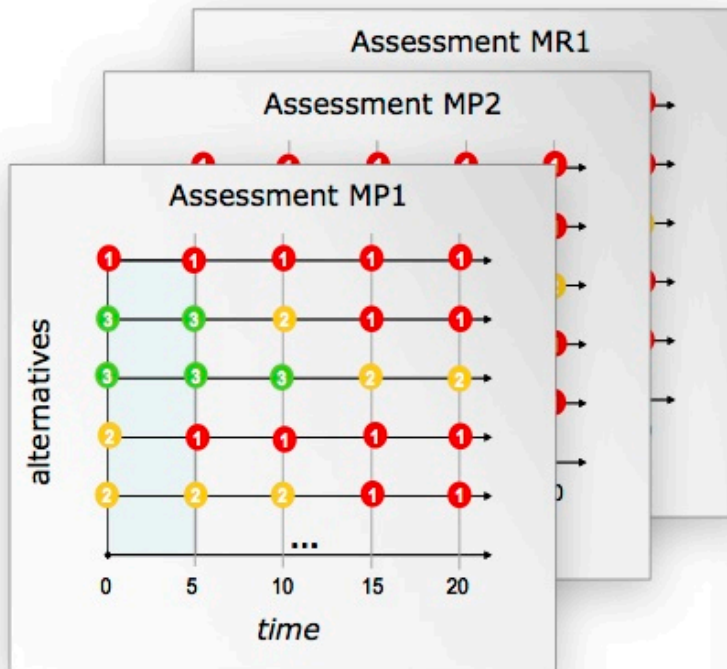


ANAREP» A path to a better system

- Asset condition and relative importance would still inform the alternatives under consideration
 - those components in most need of replacement would still be replaced...
- ...but with the broader view of a path to a better system, rather than to a collection of better parts.



- Systematic assessment and comparison of alternatives – for the relevant scenarios, based on the pre-selected metrics and targets, would have facilitated communication and negotiation among internal and external stakeholders.



- Decisions will be less subjective and more easily accountable to the board or to the elected politicians
- Their impact on corporate objectives will be better assessed.
- The utility will be able to improve monitoring of results, learn from them and act accordingly.

Practical applications and business cases in *Marques et al. (2011)*, *Cardoso et al. (2011)* and *Carriço et al. (2011)*.

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Thank you

