

Supplementary Material

Table S1: The 5-point scale and the 7 maturity indicators of Volker et al. (2013) as used in FAIR.

Maturity indicator	Asset Management Decisions	Information Management	Internal Coordination	External Coordination	Outsourcing activities	Processes and roles	Culture and Leadership
Optimized	Life cycle costing is embedded in strategic, tactical and operation decisions and forms the basis of the evaluation of risks and opportunities.	Assets information that is: collected once and used many times, up to date and readily available is used by all stakeholders.	Departments coordinate their asset management at strategic, tactical and operational contexts. Departments have an active role in drawing up and optimisation of the framework.	Prioritisation and planning are undertaken in collaboration with the other asset owners and wider stakeholders with a legitimate interest in the assets.	A combination of internal expertise is maintained with respect to programming and execution with some activities and assets outsourced where necessary to deliver added value through innovation in planning, financing and execution.	Clearly defined and understood and supported by a continuous process of structural evaluations and internal/external auditing, to drive improvement.	AM is an integral component of the organisational culture. Management is open to new AM approaches and employees are pro-active when it comes to proposing improvements.
Well Managed	All risks for objects and network-level components are systematically prioritized. The evaluation of risk-management decisions on a tactical and operational level is supported by cost calculations.	Data is being used to generate management reports which are frequently updated to incorporate new insights. Asset information is available integrated and is being reported.	Departments coordinate all their infrastructure management internally and work for the most part within the set-up framework. Departments communicate common bottlenecks related to the framework back to the board (management).	The water authority prioritizes their own maintenance, but coordinates the planning of maintenance of network-level components with other asset owners and end users.	Some activities and assets outsourced to private sector parties and managed through operational standards expressed with performance criteria. Added value focused largely on execution.	Clearly defined and understood relying upon an ad hoc process of interviews and internal audits to drive improvement.	AM is generally considered as one of the most important organizational principles. All employees are familiar with the basic principles of AM and there is a broad variety of AM trainings available.

Standard	A systematic prioritization of the most important risks and risk management decisions is available for critical objects and network-level components.	Static and dynamic data of all relevant objects is stored in databases according to standard procedure. Data on asset performance is accessible any time.	Departments coordinate tasks internally and solve problems within the budget framework.	The water authority informs other asset owners and end users about the scheduled maintenance of objects and network-level components. On an operational level coordination is limited.	The water authority uses its knowledge of the market by using their own portfolio planning for maintenance on an object and network level, to coordinate with the private sector parties while reflecting the content.	Clearly defined and understood relying upon an but discrepancies between strategic, tactical and operational contexts exist.	AM is one of the organizations targets, but the is no formal route for employee driven innovation and few employees given the opportunity for AM specific training.
Repeatable	A couple of risks and risk management decisions are prioritized in an ad hoc manner.	Information of a few objects are stored according to comparable methods. The importance of standardized Asset-databases is acknowledged.	Departments solve problems themselves within the set budget framework and coordinate internally on an ad hoc basis.	The water authority informs both end users and other asset owners on the execution of maintenance of objects (before and after maintenance).	The water authority outsources preset activities on object and network level to private sector parties.	There is a shared view of processes and roles of asset management but these are not clearly defined and described.	AM is promoted by ambassadors across the organization, bringing attention to AM where considered to be needed.
Ad Hoc	No attempt to make an inventory of and systematically prioritize risk management decisions.	Knowledge of objects are known on the work floor. Information is decentralized maintained in own database.	Departments solve problems internally within the set budget framework.	The water authority operates autonomously and informs end users on the maintenance of objects (before and after maintenance).	The water authority outsources preset activities on an object level to private sector parties.	There is no shared view of processes and roles within asset management.	There is no specific attention towards AM and particular AM skills.

Table S2: The 5-point maturity levels and definitions linked to the 3 decision contexts in the FAIR framework.

Level of maturity	Strategic 1-3	Tactical 4, 5 & A	Operational B-D
<i>Relevant steps in framework</i>	<ol style="list-style-type: none"> 1. <i>Threats & opportunities</i> 2. <i>Objectives & requirements</i> 3. <i>Measures for system</i> 	<ol style="list-style-type: none"> 4. <i>Adaptive plan</i> 5. <i>Performance of network</i> D. <i>Performance of assets</i> 	<ol style="list-style-type: none"> A. <i>Measures for assets</i> B. <i>Design & construct</i> C. <i>Monitor & maintain</i>
Optimized	A long term vision on system development is present, and a consistent method is applied in order to continuously translate this vision into a well-defined asset management strategies, based on cost, risk and performance as indicators.	There is a continuous evaluation of asset performance that informs network performance. Long term plans are updated both following significant changes in network performance and periodically. These long term plans translate to optimized planning for measures, of which the performance is measured by the main AM indicators.	Performance of assets is reported using a standardized method, based on generally defined performance indicators that are used for all similar assets. There is a continuous evaluation of performance, optimized implementation of measures is realized based on the main asset management indicators.
Well Managed	All decisions for long term investments are evaluated using a consistent method based on a small number of the well-defined AM indicators. Performance indicators are specifically defined.	Long term plans result in asset interventions based on general and measurable performance indicators. Asset performance is translated to performance of the network, but doesn't automatically instigate a re-evaluation of the long term vision and/or plan.	Performance of assets is measured using quantitative and measurable performance indicators. The performance is monitored continuously and plans are periodically updated and executed based on the most recent insights.
Standard	Decisions on long term investments are made based on ideas but not a vision, a consistent decision making method is available but only uses the main asset management indicators in a generalised manner (often qualitative only).	There is a standardized method for translating long term planning to asset interventions. This uses the main AM indicators in a qualitative way. The measurement of performance is also mostly qualitative.	Maintenance plans and plans for interventions on an asset level are common practice. A standardized method for determining performance is used as input. Interventions are based on these plans, but there is no continuous monitoring of the performance of the implemented strategy.
Repeatable	Long term decisions are transparent but not made using a consistent decision making method. The main asset management indicators (performance, risk and cost) are not used.	Long term strategies translate into asset decisions. However there is no relation between performance and performance requirements defined on a strategic level. Reporting of performance of assets is not done in a standardized way.	Interventions are based on daily issues and qualitative decisions. These decisions are made transparent integration of planning of larger interventions and maintenance plans are scarce.
Ad hoc	Long term decisions are taken at an ad hoc basis, based on daily issues. The basis for these decisions is not transparent. Performance is not measured or evaluated.	There is no clear relation between long term decisions and decisions for specific assets. The performance of assets is not translated into performance of the network, so any long term decision disregards the actual performance of the network.	Performance of assets is not measured. Interventions are based on daily issues. There is no connection between maintenance, larger interventions and performance.

