

ENVIRONMENTAL ENFORCEMENT NETWORKS: DEVELOPMENT OF A NETWORK EVALUATION MATRIX

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SUMMARY

Despite sharing relatively common purposes, Environmental Enforcement Networks are each unique. Part of this is because the circumstances vary under which they were established. A range of factors influence their development and ultimately determine their relative capability and potential maturity as a network.

This paper postulates five possible phases of development through which Environmental Enforcement Networks may transition. Further, it suggests that the application of Capability Maturity Model processes, like those used as part of organisational assessments, is worthy of consideration by Environmental Enforcement Networks. The ability to determine the phase of development that an Environmental Enforcement Network is going through enables mapping the progression of the network through that phase.

The authors consider that this conceptual model framework may assist and guide networks to reach their next level of maturity more effectively and efficiently. This paper proposes a Network Evaluation Matrix that has been informed by the foundational Capability Maturity Model framework.

1 INTRODUCTION^{1 2}

1.1 Development of Environmental Enforcement Networks

All Environmental Enforcement Networks (networks) direct time, effort and resources toward development. For the purposes of this paper, the evolution of a network includes, but is not limited to:

- *establishing* the network;
- *maintaining* the network; and
- ongoing *development* of the network.

In an associated paper, the authors have comprehensively documented the establishment, maintenance, development and growth of the Australasian Environmental Law Enforcement and Regulators neTwork (AELERT).³ AELERT is a regional environmental enforcement network operating throughout Australasia.

In documenting the evolution of AELERT and in undertaking the research, the authors considered the various phases through which networks progress. Using three overarching categories: *establishing*, *maintaining* and *developing* as a base, the authors considered four questions:

- What are the levels of network maturity?
- How can network maturity be assessed?
- What type of factors should be considered in determining the maturity level of networks?
- What is a network's current level of maturity?

During the discussions and deliberations around the four questions, the potential benefit of applying a Capability Maturity Model to networks was considered then explored in some detail. Following analysis and modification, this paper proposes a Network Evaluation Matrix that has been informed by the foundational Capability Maturity Model framework.⁴ This matrix determines network maturity by applying a series of indicators, and establishes a typology of networks.

2 BACKGROUND

2.1 Capability Maturity Models

The Capability Maturity Model is a framework that was designed and developed during the 1980s, by the Software Engineering Institute at Carnegie Mellon University, to assess and improve software development capability.⁵ In its simplest form, the Capability Maturity Model is a framework that outlines the improvement and maturity and '...guide[s] process improvement across a project, a division, or an entire organization'⁶ through five or six stages (six stages where level *zero* or *none* is included).

A currently documented six level Capability Maturity Model, with process as the main focus, is shown in *Diagram 1*.⁷

Diagram 1: Capability Maturity Model– Six levels of a process

				L4	L5
		L2	L3	MEASURED	OPTIMIZING
	L1	STRUCTURED	STANDARDIZED	All processes quantitatively managed & controlled.	All processes optimized & continuously improved.
NOT PERFORMED	INFORMAL	All processes managed, planned & tracked. Plan, control, verify & track performance.	All processes well defined & documented. Define, maintain, document & use standard process.	Establish measurable quality goals & use metrics to manage performance	Continuously improved enterprise capability & process effectiveness

Similarly, the Capability Maturity Model with five levels of progression has been established for integration into an organisation and details a more comprehensive approach with focus points and processes being considered:

Diagram 2: Capability Maturity Model – Five levels of an integrated process⁸
Capability Maturity Model – Integrated

Level	Focus	Process Areas	Result
5 Optimizing	Continuous process improvement	Organizational Innovation & Deployment Causal Analysis and Resolution	Productivity & Quality
4 Quantitatively Managed	Quantitative management	Organizational Process Performance Quantitative Project Management	
3 Defined	Process standardization	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management Risk Management Decision Analysis and Resolution	
2 Managed	Basic project management	Requirements Management Project Planning Project Monitoring & Control Supplier Agreement Management Measurement and Analysis Process & Product Quality Assurance Configuration Management	
1 Initial	Competent people and heroics		

Diagrams 1 and 2 show the levels ranging from *Not Performed* or *Initial* through to those that are considered *Optimal* and involve continuous improvement. Typically, the foundational Capability Maturity Model is shown in five levels as in *Diagram 2* and tend to describe the levels as *initial, repeatable, defined, managed, and optimised*.

Capability Maturity Models provide a framework by which the relative maturity of a process can be determined. Capability Maturity Models have been modified and used as part of organisational assessments. It is for this reason that modification of the Capability Maturity Model seemed appropriate for determining network maturity.

2.2 Environmental Enforcement Networks

Generally, environmental matters have gained momentum as public policy issues and major areas of public concern since the 1960s. In response, and with increasing frequency especially since 1990, governments have introduced environmental protection legislation.⁹

In an attempt to build capacity to enforce environmental protection legislation, regulators have become involved in the establishment and development of Environmental Enforcement Networks around the world. Some of these Environmental Enforcement Networks have existed in various forms for over twenty years, across various regions, covering wide-ranging jurisdictions, issues and commodities.¹⁰

These Environmental Enforcement Networks have operated independently, bilaterally, or multilaterally, dependent upon the nature of the issues they specifically sought to address. Environmental Enforcement Networks have also partnered and joined together to access the broader reach of the International Network for Environmental Compliance and Enforcement (INECE) on global initiatives. This is consistent with INECE being a 'network of networks'.¹¹

3 DESIGNING AND DEVELOPING AN EVALUATION FRAMEWORK FOR ENVIRONMENTAL ENFORCEMENT NETWORKS

3.1 What are the levels of network maturity?

In 2002, during the sixth International Conference on Environmental Compliance and Enforcement, participants from six regions¹² gathered separately within their respective regional networks and considered a range of issues affecting networks. They determined that networks fall within the three categories: *absent*, *fragile* or *well established*.¹³

Whilst *absent*, *fragile*, and *well established* are reflective of several fixed levels of networks, these three levels are possibly limiting, as they do not capture and reflect the ongoing evolutionary processes of networks, as well as potential regression.

Integrating the earlier observations of the INECE model¹⁴ with the foundational Capability Maturity Model, the authors consider it useful to include emerging and maturing as two additional *transitional phases*. These additions result in five comprehensive and representative levels of network maturity: *absent*, *emerging*, *fragile*, *maturing* and *well established*.

Table 1 compares the five levels of the foundational Capability Maturity Model against the five levels of the Network Evaluation Matrix. It also shows whether the phase is fixed or transitional.

Table 1: Capability Maturity Model Levels aligned with Network Evaluation Matrix Levels and Type

<i>Capability Maturity Model levels</i>	<i>Network Evaluation Matrix Levels</i>	<i>Type</i>
Initial/Ad hoc	Absent	Fixed
Repeatable	Emerging	Transitional
Defined	Fragile	Fixed
Managed	Maturing	Transitional
Optimised	Well established	Fixed

3.2 How can network maturity be determined?

The Capability Maturity Model process defines the behaviours or factors within each level of maturity. More specifically, the Capability Maturity Model process can assist:

“... in measuring and enhancing your process improvement capability ... [t]he model offers a simple yet comprehensive assessment of process improvement capabilities and promotes the definition of distinct levels of maturity (i.e. development) for the set of capabilities. Each level of maturity is supported by layers of detail pertaining to the individual capabilities for that model. A maturity assessment can then be made for each individual capability with regards to both current and target states.”¹⁵

As such, drawing upon the Capability Maturity Model methodology, the assessment of Environmental Enforcement Networks with the Network Evaluation Matrix results in identifying and documenting a number of capabilities that span the five distinct levels of maturity.

Various assessment processes may be used by Environmental Enforcement Networks to establish where they fit within the Network Evaluation Matrix. Options include self-assessment by Secretariats, governing bodies or by members, and can extend to external review (which may take the form of review by another Environmental Enforcement Network Secretariat, governing body or independent third party). This paper seeks to establish the basis for such assessments. The capabilities and associated levels of network maturity are now considered in greater detail.

3.3 What factors should be considered in determining the maturity level of networks?

In his book, entitled *Handbook of Environmental Protection and Enforcement: Principles and Practice*, Farmer states that successful networks:

“... require a full commitment by members ... an active secretariat and adequate funding. [And if]... the network is seen to be of value, that is, it delivers what the members need”¹⁶

Distilling the above, the authors postulate that the five major themes contain core criteria that should be used to assess Environmental Enforcement Networks, namely:

- *members,*
- *finances,*
- *governance,*
- *support and*
- *deliverables.*

Sub-topics of the major themes have been developed to provide greater functionality. The five themes are now considered briefly in turn.

Members – involves issues associated with members such as the; total number of members, location (geographic distribution) of members, type (individual, agency, etc.) and/or category of member (full, affiliate, observer, etc.), contribution of members (whether it be; in-kind, financial, advocacy, or leadership); and value of membership.

Sub issues of this category include:

- *membership,*
- *leadership,* and
- *value.*

Finances – relates to the finances required to staff the secretariat function. Environmental Enforcement Networks also seek funds to hold conferences and workshops and other enabling activities so that network projects can be undertaken.

Sub issues of this category include:

- *budget,*
- *contributions,* and
- *project funding.*

Governance – involves finding the balance between being over-prescriptive (so as to not fetter involvement or participation) and so relaxed that it leads to concerns about a lack of accountability. Governance remains an iterative issue that should be revisited as the network addresses issues.

Sub issues of this category include:

- *access,*
- *review,* and
- *structures.*

Support – occurs through playing a liaison role between members. Support is based upon a mutual exchange where members support the network and the network and members support other members directly.

Sub issues of this category include:

- *liaison,*
- *support base,* and
- *supporting function.*

Deliverables – involves being able to demonstrate the value of networks. As such, Environmental Enforcement Networks tend to focus on tangible benefits. Such benefits usually take the form of outputs such as publications, manuals, conferences, workshops, and other events.

Intangible benefits such as reputation, association and peer support, are generally unreported and unrecognized. Notwithstanding, they need to be recognized and factored into any assessment of maturity. The five major themes aim to recognise and attribute some value to the intangible benefits of Environmental Enforcement Networks.

Sub issues of this category include:

- *events,*
- *outcomes,* and
- *products.*

4 THE NETWORK EVALUATION MATRIX

In combining the five levels of network maturity with the five capability categories of networks, a matrix begins to take shape. The *Network Evaluation Matrix* details the core capability indicators across the levels of network maturity. The complete Network Evaluation Matrix is shown in *Appendix 1* at the conclusion of this paper.

For convenience of publication, the full Network Evaluation Matrix has been broken down by maturity level. The levels are now considered in turn.

4.1 Absent level

Given that a network has not yet been established, the *Absent* level of network maturity has no criteria available for assessment. See *Table 2*.

Table 2: Network Evaluation Matrix – Absent Criteria

Members	Finances	Governance	Support	Deliverables
N/A	N/A	N/A	N/A	N/A

4.2 Emerging level

Once established, networks transition to the *Emerging* phase of development. This level forms the basis for the network and its future directions and activities. See *Table 3*:

Table 3: Network Evaluation Matrix – Emerging Criteria

Members	Finances	Governance	Support	Deliverables
<p>Membership Typically low within network's sphere of influence Restricted to core member agencies or individuals operating within network's sphere of influence</p>	<p>Budget Nonexistent or modest to initiate / commence the network</p>	<p>Access Member access to foundational and guiding documents No open source access to networks guiding documents</p>	<p>Liaison Limited or no liaison with other networks</p>	<p>Events A few events for members Limited number of members working together on specific projects</p>
<p>Leadership Few individuals / member agencies take lead role</p>	<p>Contributions Limited in-kind contributions restricted to core member agencies or</p>	<p>Review Informal review by foundation members</p>	<p>Support base Network effectiveness reliant on core members providing ad</p>	<p>Outcomes Prospective members considering potential of network</p>

across network	individuals		hoc coordination	Limited functionality within network to deliver outcomes
Value Negligible or questionable value to non-core members Core members only active participants with few benefits realised	Project funding Non-existent or minimal	Structures General Aims and Objectives laid down Typically developing and fluid No written procedures	Supporting functions Base level administrative tasks undertaken for network A few key individuals maintain the network	Products Low number of publications disseminated Publication limited to contributions of members

4.3 Fragile level

Networks that continue to develop may then progress to the *Fragile* level. This level involves an expansion of the network's membership and support base. Also, governance structures and processes continue to develop with an increase in the deliverables. See *Table 4*:

Table 4: Network Evaluation Matrix – Fragile Criteria

Members	Finances	Governance	Support	Deliverables
Membership Generally increasing across significant actors within network sphere of influence	Budget Contributions are spasmodic and are made by small number of sources Not sustainable	Access Central repository of information and communiqués to members Limited open source access to network's guiding documents	Liaison Emergent and exploratory liaison with other networks undertaken Information sought from other networks	Events Irregular events with increasing frequency Preliminary attempts to undertake cooperative exercises
Leadership Wider range of key individuals / member agencies taking on leadership roles across network	Contributions Few core member agencies / individuals providing in-kind support	Review Regular changing of operating rules, Constitutional documents, etc. to fit circumstances	Support base Growing level of support base Increasing numbers of interested individuals	Outcomes Low level coordination to deliver outcomes Members seeking benefits

Value Tangible benefits available for active members Most members inactive / passive and question value of network Low level communications disseminated to members from core members	Project funding Very limited, if available Sourced from lead member in project team	Structures Guiding documentation developed reactively to situations. Clear Aims and Objects set out for network	Supporting functions Central support function to support membership and administrative tasks only	Products Infrequent publications being developed and disseminated Range of network members contributing to publications
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4.4 Maturing level

The *Maturing* phase sees significant increases in the deliverables provided to and/or available to members. It also includes greater transparency of the network governance to members.

The *Maturing* level is appropriately named, as it is the point at which the network has consolidated its direction, focussed its efforts, and has an increasing number of procedures and processes to inform and guide its activities. See *Table 5*:

Table 5: Network Evaluation Matrix – Maturing Criteria

Members	Finances	Governance	Support	Deliverables
Membership Expanded to reach critical / core number of potential members within relevant network area of operation	Budget Sufficient funding for network to continue for short to medium term (2-3 years)	Access Increasing access of members to network steering / guiding documents Open source access to limited network produced documents	Liaison Interest by and liaison with other networks Capacity and capability discussions to identify areas of commonality	Events Held on semi regular basis Delivered across network Range of events relevant to all members Restricted range of members working conjointly

<p>Leadership Critical mass of individuals / member agencies take on leadership roles Wide range of membership not represented in leadership roles</p>	<p>Contributions In-kind support provided by central member agencies / individuals</p>	<p>Review Third Party review of constitutional documents and guidance considered</p>	<p>Support base Widening support base across network sphere of influence</p>	<p>Outcomes Member agencies receiving identifiable benefits Individuals professionally realise benefits</p>
<p>Value Leading members displaying demonstrable benefits through active participation Level of inactive / passive members reducing Increasing engagement and communication between members</p>	<p>Project funding Project funding - increasing but ad hoc Project leaders are able to source limited funding to support project</p>	<p>Structures Proactive development of guiding documentation with consultation across membership Development of Operation and Strategic Plans to set direction of network</p>	<p>Supporting functions Administrative tasks major part of function Low level of coordination and project capacity</p>	<p>Products Are of useable standard and considered as a step toward better practice across industry Contributions from those outside of network being included</p>

4.5 Well Established level

The *Well Established* level is the most advanced level in terms of network development. Within this level of maturity, the network reaches the saturation point for its membership, has a comprehensive support base, includes active contributions from across the network, and has a secure source of funding for network services. Deliverables in the *Well Established* network are regular, tangible and of high standard. The deliverables in turn provide a catalyst for promoting the network, attracting new members, and marketing the network. This level tends to involve more aspects of review and continuous improvement. See *Table 6*.

Table 6: Network Evaluation Matrix – Well Established Criteria

Members	Finances	Governance	Support	Deliverables
<p>Membership Maximum or near maximum of possible members within relevant operation of network coverage</p>	<p>Budget Secured on permanent basis Sustainable arrangements</p>	<p>Access Open and transparent access to network steering papers across membership and support base Foundational and guiding documents available as open source</p>	<p>Liaison Level of support from other networks seen through interaction and joint activities Good working relationships between networks</p>	<p>Events Held regularly and well attended Coordinated centrally for delivery across membership Members readily work collaboratively</p>
<p>Leadership Large proportion of members taking leadership roles across network</p>	<p>Contributions High proportion of members contributing in-kind support to projects, events and initiatives</p>	<p>Review Governance structures reviewed and consistent with better practice Subject to external scrutiny and review</p>	<p>Support base Strong support and contribution base from practitioner and senior management alike</p>	<p>Outcomes Delivering tangible benefits to members Serve as attractor, drawing new members into network Members overtly promoting the benefits of involvement</p>
<p>Value Majority of members realise benefits of membership attained through active participation Open communication across members</p>	<p>Project funding Projects driven by / within network are readily funded Projects undertaken by network bring in associated funding</p>	<p>Structures Robust written governance structures in place Membership well represented on guiding body</p>	<p>Supporting functions Central function for coordinating network activities, project and events Administrative tasks are a minor part of the function</p>	<p>Products High standard and considered better practice across industry Subject to review and improvement process Wide range of contributors to network publications</p>

5 ASSESSMENTS USING THE NETWORK EVALUATION MATRIX

5.1 What is a network's current level of maturity?

The purpose of the Network Evaluation Matrix is to categorise the maturity levels of existing networks and establish a typology of networks. To assist in this assessment, numerical values can be given for each sector of the matrix. These values establish the maturity of an aspect of the network and can be added together to determine an indicative overall level of network maturity.

The following numerical values (point scores) have been allocated for the various maturity levels;

- 0 - *Absent*,
- 1 - *Emerging*,
- 2 - *Fragile*,
- 3 - *Maturing*, and
- 4 - *Well Established*.

Table 7 below displays how these ratings for part of the Network Evaluation Matrix.

Table 7: Levels of Network Maturity: Factors

Environmental Enforcement Network Level of Maturity	Five Capability Areas					Network Evaluation Matrix – Grand Total
	Members	Finances	Governance	Support	Deliverables	
Well Established	4	4	4	4	4	
Maturing	3	3	3	3	3	
Fragile	2	2	2	2	2	
Emerging	1	1	1	1	1	
Absent	0	0	0	0	0	
<i>Capability sub-total</i>	-	-	-	-	-	

To assist in determining the relevant level of maturity, the following threshold and transition values or scores have been allocated:

- 0 = *Absent*,
- 1 – 7 = *Emerging*,
- 8 – 13 = *Fragile*,
- 14 – 17 = *Maturing*, and
- 18 – 20 = *Well Established*.

As the evolution of the AELERT paper¹⁷ took shape, it became clear that AELERT had transitioned through a number of phases. In preparing both papers, the authors tested the Network Evaluation Matrix by using AELERT as a self-assessment case study.

The assessment considered the first, third and seventh year of AELERT's operation. The results indicate that AELERT has transitioned from *Emerging* to *Fragile* and now may be considered as *Maturing*. See Table 8:

Table 8: AELERT Self-assessment

Year	Members	Finances	Governance	Support	Deliverables	Total and rating
2005	1	1	1	1	1	(5) Emerging
2007	2	2	1	2	1	(8) Fragile
2010	2	3	3	4	3	(15) Maturing

6 A BENEFICIAL MATRIX OR NOT?

6.1 The value of the Network Evaluation Matrix

The Network Evaluation Matrix is designed as a detailed assessment tool of a network's development. It enables an isolation and categorisation of improvements as well as areas of shortfall. This provides targeting data for future review, management and evolution. In addition, the model can provide an overall picture of the network's status. On both these levels, the Network Evaluation Matrix offers criteria and a process for both internal and external quality review.

By determining the current phase of development of an Environmental Enforcement Network, the Environmental Enforcement Network is then able to map progression through future phases of development. This conceptual model may assist and guide networks to reach their highest level of maturity more effectively and efficiently.

Moreover, it provides a platform for Environmental Enforcement Networks to perform a self-assessment to direct network effort and strategic planning, and also allows for peer assessment by other networks or independent third parties.

7 CONCLUSION

The Network Evaluation Matrix framework has emerged from the specific experience of assessing AELERT as the Australasian Environmental Enforcement network. Its broader applicability has yet to be tested. It is anticipated that the model will find use in the assessment of other Environmental Enforcement Networks globally and that amendments, modifications, uses, and applicability of the model will be conveyed back to the authors. This paper should be the opening of a dialogue on assessing Environmental Enforcement Networks.

Such a dialogue could best be coordinated by INECE in partnership with its regional Environmental Enforcement Networks. Network secretariats, coordinating bodies, and sponsor organisations may be interested in refining some of the ideas and concepts contained in this paper further in an attempt to provide Environmental Enforcement Networks with a 'roadmap' to assist network development.

The Network Evaluation Matrix builds on the work of Jones¹⁸ and postulates that there are five levels of maturity for Environmental Enforcement Networks. In addition, the Network Evaluation Matrix offers five discreet capability areas that may be considered for standardising a range of possible assessments.

As an assessment framework, the Network Evaluation Matrix enables networks to self-assess their level of maturity. This assists Environmental Enforcement Networks in identifying areas in which to concentrate effort in order to advance to the next level of maturity. It also provides a set of criteria and benchmark standards for independent evaluation.

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² The authors acknowledge the assistance of Dr Matthew Marshall, Senior Policy Project Officer, Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) for his insightful comments and critique of reviewing this paper. Additionally, review comments from Dr Robyn Bartel, Senior Lecturer, University of New England were positive.

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