TECHNICAL NOTE 3

MEAL as Soft Infrastructure: Protecting the Impact of Large Water Investments and Other Complex Projects

Real-Time Evaluation of the Water Supply Improvement Project (WSIP) in Guyana – Caribbean Development Bank

Why Conventional Monitoring Falls Short in Complex Infrastructure

Large-scale **water infrastructure projects** operate within complex systems where outcomes depend not only on physical delivery but also on **institutional performance, coordination, and user behaviour.** Traditional monitoring and evaluation systems, centred on predefined indicators and ex post assessment, often provide limited support for decision-making during implementation. They typically capture results after outcomes have already materialised—or failed to materialise—reducing their usefulness for adaptive management.

The Real-Time Evaluation (RTE) of the Water Supply Improvement Project (WSIP) in Guyana illustrates the value of a theory-based monitoring, evaluation, accountability and learning (MEAL) system designed to function as an enabling component of project delivery. In this context, MEAL acts as a form of **"soft infrastructure":** an institutional capability that facilitates information flows, causal analysis, and timely decision-making, thereby helping safeguard the effectiveness of large capital investments.[1]

Rather than attempting to measure all project elements comprehensively, the WSIP MEAL architecture prioritised critical causal mechanisms and key decision moments. This approach enabled early identification of risks related to behavioural acceptance, coordination challenges, and operational readiness.

The methodological combination of RTE, process tracing, and contribution analysis proved particularly useful in this setting. Real-time engagement ensured temporal proximity to operational decisions; process tracing allowed systematic examination of causal assumptions; and contribution analysis supported structured assessment of the project's influence within a complex environment. Together, these approaches enabled evaluative activities to inform management decisions while maintaining analytical rigour.

It is important to recognise that **real-time evaluation and theory-based MEAL extend the traditional role of evaluation and may test institutional capacity to absorb and act on findings.** These approaches are therefore most suitable for complex interventions where outcomes depend on behavioural, institutional, or coordination dynamics. They require additional analytical capacity and management engagement and entail trade-offs relative to conventional evaluations, including lower standardisation and limited ex post comparability. Conventional monitoring frameworks remain essential for accountability, but they are less suited to contexts characterised by non-linear causal pathways, multiple interacting actors, and high sensitivity to early implementation dynamics. In infrastructure projects, this often leads to an emphasis on physical outputs and delayed recognition of outcome-related risks.

1 Real-time evaluation and theory-based MEAL expand traditional evaluation functions and may test institutional capacity to absorb and act on findings. They are best suited to complex interventions involving behavioural or institutional dynamics. These approaches require additional skills, sustained management engagement, and trade-offs with conventional evaluations, including lower standardisation and limited ex post comparability.

The WSIP experience illustrates this limitation. Indicators such as construction progress, production capacity, and compliance with water quality standards are necessary but insufficient for understanding whether improved services will be accepted and consistently used by communities. These indicators provide limited insight into behavioural and institutional dynamics that influence outcomes during commissioning and early operation.

MEAL as Soft Infrastructure

Within this context, the **WSIP MEAL system was designed to operate as an enabling institutional capability** rather than a standalone evaluative function. The approach repositioned MEAL as a platform for adaptive decision-making, **linking evidence generation directly to operational management.**

In practical terms, this involved prioritising outcome-critical and time-sensitive causal mechanisms and aligning data collection with decision moments rather than with reporting cycles. **The system focused on generating decision-relevant evidence:** information sufficiently robust to inform management action even when definitive causal proof is not available.

In complex systems, managerial decisions often occur under conditions of uncertainty. The role of MEAL in this context is therefore to **reduce uncertainty in a structured manner** rather than eliminate it. By embedding evaluative activities within implementation routines—such as readiness assessments, coordination reviews, and structured reflection sessions—the WSIP approach strengthened the connection between evidence and operational decisions.

This integration reflects the concept of MEAL as soft infrastructure: an institutional capability that supports the effective functioning of the broader delivery system.

Methodological Integration: RTE, Process Tracing, and Contribution Analysis

The WSIP MEAL approach rests on the **combined use of RTE, process tracing, and contribution analysis.** Each method addresses a specific challenge associated with evaluating complex infrastructure interventions.

RTE provides temporal alignment with implementation, enabling evaluative inquiry while decisions remain reversible. **Process tracing** complements this by systematically **examining whether key causal assumptions hold under real implementation conditions.** In WSIP, this included testing whether improvements in water quality would plausibly translate into increased user acceptance and service uptake.

Contribution analysis situates observed changes within a broader causal environment. Rather than attempting strict attribution, it assesses the plausibility of the project's influence relative to other contextual factors. This approach is particularly relevant for development bank operations where multiple actors and policy processes interact.

The WSIP MEAL architecture operationalised these principles through structured learning loops that connected early signals to interpretation, decision-making, and follow-up measurement. Importantly, the system did not attempt to monitor every element of the Theory of Change with equal intensity. Instead, analytical effort was concentrated on those mechanisms most likely to influence outcomes during implementation.

This prioritisation enabled efficient use of evaluative resources while maintaining analytical focus. It also encouraged dialogue among technical, social, and evaluative teams, contributing to a shared understanding of emerging risks and opportunities.

Embedding MEAL into Institutional Decision Cycles

A key lesson from the WSIP experience concerns the institutional conditions required for integrating MEAL into decision-making processes. Evaluative insights must be discussed within operational management forums rather than treated as separate reporting outputs. Achieving this requires clarity of roles, authority to act on evidence, and institutional acceptance of adaptive management practices.

For evaluation units and results teams within institutions such as the Caribbean Development Bank and its Office of Evaluation and Oversight, this implies assessing the value of evaluation not only through final reports but also through the extent to which evaluative processes inform decisions during implementation.

The WSIP MEAL architecture was intentionally designed to be modular and adaptable. Elements such as prioritised causal chains, process-tracing tests, and structured learning loops can be applied to other infrastructure projects with limited additional cost. At the portfolio level, this approach offers a pathway to greater consistency in supervising and evaluating complex operations while maintaining flexibility to address context-specific challenges.

The WSIP experience also suggests that RTE may be relevant beyond infrastructure investments. It is particularly applicable to interventions characterised by long-term horizons, non-linear change processes, and complex causal relationships. Programmatic operations, including policy-based loans and institutional reform programmes, often share these characteristics.

In such cases, traditional end-line evaluations may provide limited operational insight, as outcomes emerge gradually and are shaped by multiple external factors. Real-time, theory-based evaluation approaches can support ongoing policy dialogue, test reform trajectories, and inform mid-course adjustments. This positions RTE as a potentially valuable modality for complex development operations where learning and adaptation during implementation are as important as ex post accountability.

This Technical Note is part of the deliverables of the Real-Time Evaluation (RTE) of the Water Supply Improvement Project (WSIP), that was conducted by the Office of Independent Evaluation (OIE) of the Caribbean Development Bank (CDB), through the collaboration with two consultancy firms: Technopolis Group, and Integrated Sanitation Solutions for Urban Development (I-San).