



Discussion Note

Synchronizing Monitoring with the Pace of Change in Complexity

Monitoring & Evaluation Series

Synchronizing monitoring with the pace of change is one of three key principles underlying complexity-aware monitoring.¹ This principle emphasizes the importance of attending to the time dimension of strategies and projects, and in particular, their emergent or dynamic aspects.

Complexity-aware monitoring is intended to complement and enhance performance monitoring, USAID's standard monitoring approach. Performance monitoring systems are designed to measure the results included in country strategy results frameworks, project LogFrames and other project planning models. Performance monitoring uses indicators and targets to determine whether results are being achieved and whether implementation is on track (ADS 203.3.2). A performance monitoring system is usually based on predictability – the system is designed to measure results intended by us, achieved through pathways of change projected by us, delivered according to implementation strategies planned by us and our implementing partners, and collecting data from indicators we predict will provide useful information over the life of the project, all according to a pre-determined monitoring schedule and measured against pre-set targets. Consequently, performance monitoring, as currently practiced in the Agency, is well-suited to simple aspects of projects where certainty and agreement are relatively high and to the complicated aspects once additional expertise has been brought to bear to understand cause-effect relationships and therefore be able to measure them – in effect, to make the complicated aspects simple.²

This paper expands on USAID's Discussion Note on Complexity-Aware Monitoring, with a focus on one of the three underlying principles underlying complexity-aware monitoring – synchronize monitoring with the pace of change. Although this paper is available to all of our partners, it is written from (and for) the USAID perspective. This paper is meant for USAID staff wishing to dig deeper into complexity-aware monitoring, in order to complement traditional performance monitoring as described in ADS 203. If you have questions on about complexity-aware monitoring, please contact USAID's Office of Learning, Evaluation, and Research (PPL/LER).

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¹ The other two principles are attend to performance monitoring's three blind spots (broader range of outcomes, alternative causes, and non-linear pathways of contribution) and attend to relationships, perspectives, and boundaries. For an introduction, see U. S. Agency for International Development (2013). Complexity-Aware Monitoring Discussion Note. Washington, DC: Heather Britt.

² For a discussion of the distinction between simple, complicated, and complex problems, and more information on identifying aspects of your program that are complex, see *ibid*, pp. 2-4.

In contrast, complexity-aware monitoring informs decision making for aspects of projects where agreement on the development problem and certainty about how to solve it are both low. Stakeholders bring diverse perspectives to the situation, making consensus elusive or impractical. Cause and effect relationships are poorly understood, thereby making it difficult to identify solutions and draft detailed implementation plans in advance. In addition, changing conditions may make it necessary to revise or refine expected results to take advantage of new opportunities or to respond to emerging needs. Adaptive management is the soundest approach in such circumstances. Complexity-aware monitoring supports adaptive management by supplementing the information provided by performance monitoring.

Often the timing and frequency of monitoring is determined by the Agency's management and accountability requirements. The fiscal calendar, presidential initiative reporting, and the Performance Plan and Report (PPR) are just a few examples of reporting on a predetermined and mandatory schedule. There are good reasons for regularizing the reporting and review of monitoring data, especially for accountability. However, the result of scheduling monitoring to serve USAID's management and accountability needs is that monitoring tends to become divorced from the pace of change in the field and the needs of adaptive management.

Some good work has been done regarding the time dimension in social sciences and complexity theory³. Time is important for sequential ordering and trajectories capture how a situation evolves over time. Complex situations are characterized by non-linear dynamics, notable discontinuity (e.g. abrupt changes) and recurrence (e.g. feedback), because elements are highly interrelated and their temporal sequencing is essentially self-organized. This leads to phenomena like tipping points and emergence that are characteristic of change trajectories in complex situations.

Synchronizing monitoring with the pace of change makes good sense in all circumstances for simple, complicated and complex aspects of projects. When monitoring fails to match the pace of change, information may be provided either too early or too late to steer complex aspects of the project effectively. With simple aspects of projects, the change trajectory and pacing is known so it is straightforward to schedule monitoring accordingly. With complicated aspects of projects, expertise, evidence from research and/or monitoring is required to identify the trajectory and pace of change. For complex aspects of projects, the trajectory is unknown or uncertain and the pace may be variable. That presents special challenges. **How do you synchronize to the pace of change when the pace of change is not knowable in advance?**

This paper provides suggestions for dealing with this conundrum. Alas, to date there is not much literature or practical experience concerning the challenges related to synchronizing with the pace of change for complex aspects of projects. But naming the challenge and outlining some principles for dealing with it is a first step forward; we hope that complexity-aware monitoring practice will inform this discussion in the future.

³ See in particular Burne, David, Callaghan Gill (2014) *Complexity Theory and the Social Sciences: The state of the Art*. Routledge, New York. This book also references other relevant work on this subject e.g. by Adam, B., Elias, N. and Durkheim, E. Keep in mind that time is not considered to be an objective measure (clock time) but a social construct that changes across cultures and over history.

Four practical questions must be resolved when enhancing an existing performance monitoring system with complexity-aware monitoring:

1. What do we monitor?
2. When do we monitor?
3. What monitoring approaches and methods do we use?
4. How do we make sense of the data and apply it to decision-making to help steer the project effectively in complexity?

Naturally, this paper will focus on when we monitor, but the time dimension has implications for each one of these questions. Let's consider each one in turn.

WHAT DO WE MONITOR?

Complexity-aware monitoring attends to the pace of change in both the project and its context. With respect to a project, activity or mechanism, pace refers to the time required for implementation to take place and results to occur. Because of their goals, some interventions are necessarily long-term (e.g. reforming an education system, developing a democratic culture or changing power relations) and others more short term (building schools, providing legal assistance or supporting female entrepreneurs). The first opportunity to attend to timing is while outlining a theory of change during strategic planning or project design. The theory of change estimates when particular results can be expected to take place. The pattern of results and the relationship between the project and results across time is referred to as the change trajectory.

A project's change trajectory⁴ varies depending on whether it is simple, complicated, or complex.⁵ Simple change trajectories are linear, when there is a constant, proportionate relationship between intervention and effects that leads to constant change over time. Complicated and complex trajectories may vary considerably over time and display iterative or disproportionate qualities. For all such non-linear change trajectories effects are not proportionately related to causes. Non-linear change trajectories can take a range of shapes:⁶

- *J-shaped curve*: Typical for situations where things become worse before they improve (e.g. initial setbacks with the empowerment of marginalized groups);
- *Step-function*: Dramatic improvements after (and before) longer periods of no change, usually occur when a threshold is reached (e.g. advocacy efforts achieving a critical mass of active supporters);
- *S-pattern*: Low initial take-up, followed by a rapid expansion slowing down towards the end (e.g. institutional change projects where hard won gains endure for some time but then erode again);
- *Exponential curve*: High initial impact that fades over time (e.g. anti-corruption efforts when those in power find alternative ways to misuse funds). Or slow initial take-up followed by rapid growth (e.g. growth in AIDS awareness after a longer campaign).

⁴ A single project may include components that are following different change trajectories.

⁵ Funnell, Sue C., Rogers, Patricia J. (2011): Purposeful Program Theory: Effective Use of Theories of Change and Logic Models. Jossey-Bass, San Francisco.

⁶ Ricardo Wilson inspired by Woolcock, Michael (2009): Towards a Plurality of Methods in Project Evaluation: A Contextualised Approach to Understanding Impact Trajectories and Efficacy. BWPI Working Paper 73 (to be accessed under http://www.bwpi.manchester.ac.uk/medialibrary/publications/working_papers/bwpi-wp-7309.pdf)

Non-linear change trajectories can be either complicated or complex depending on whether they can be known in advance, or identified only in retrospect. There are three ways to plausibly identify whether your project, or distinct aspects of your project, follows one of these change trajectories -- field experience, theory, and monitoring data. Seasoned practitioners drawing on significant field experience can often provide a good sense of how long and in what form results are likely to occur. These insights should be combined with a solid theory that specifies the conditions under which, and the mechanisms by which, certain effects can be expected. Monitoring provides empirical evidence on how effects evolve across time and can be used to validate or modify the assumed change trajectories established at the project's planning stage. In many instances, the development community has a weak (or at best implicit or assumed) understanding of change trajectories associated with its projects - and even less understanding of how these trajectories vary for different kinds of projects operating in different contexts, at different scales and with varying degrees of implementation effectiveness.

Understanding effect trajectories

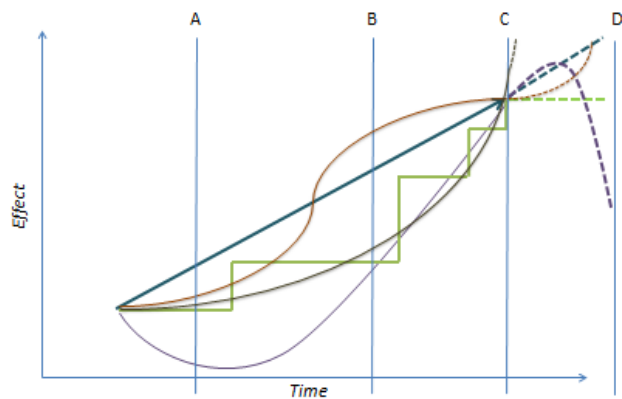


FIGURE 1: COMMON CHANGE TRAJECTORIES

Source: Ricardo Wilson inspired by Woolcock, Michael (2009): Towards a Plurality of Methods in Project Evaluation: A Contextualised Approach to Understanding Impact Trajectories and Efficacy. BWPI Working Paper 73

When experience, theory, or monitoring data make it possible to predict a project's change trajectory with a high degree of plausibility, this can be considered a complicated change trajectory. Thus even non-linear change trajectories such as those described above are often predictable. Monitoring (and managing) a project as if it is complicated allows for some efficiencies. For example, if your project follows one of these non-linear change trajectories you may more easily synchronize the monitoring schedule with the predicted pace of change. Often this reduces the time and resources required for monitoring.

A complex change trajectory is a pattern of effects that cannot be predicted in advance but can only be identified in retrospect, either because of the lack of knowledge about them or because they keep changing during implementation. The uncertain direction and pace of change for complex change trajectories makes it quite difficult to bound the monitoring tasks.

In addition to the project's change trajectory, complexity-aware monitoring should also attend to external factors and the project's context. With respect to **context**, pace of change refers to the dynamics of those developments that take place beyond an intervention's sphere of control or influence, which are relevant to its performance. Thus all actors and factors should be observed that can affect the implementation of an intervention or enhance its effects. Factors might relate to the changes of the problem situation that the intervention seeks to address, trends or developments in the respective sector(s) or thematic areas, changes in context conditions (political, administrative, social, cultural, environmental, economic etc.).

Observing the context entails more than monitoring pre-selected context indicators in performance monitoring frameworks. Pre-selected context indicators do not capture unforeseeable events or detect early signs of change. Contextual scanning addresses this limitation by expanding the horizons of observation beyond a single indicator, or collection of indicators to identify relevant developments and their dynamics. Contextual scanning can provide clues for program adaptation by identifying obstacles, threats or new opportunities which go unnoticed when performance monitoring's focused view is applied alone.

The need for contextual scanning increases with the degree of complexity of projects (or aspects thereof), as does the potential width of the 'scanning' areas. As predictability decreases and emergence increases, it is more likely that the project is producing unanticipated outcomes and that factors and actors in the context will influence the project in unexpected ways. Similarly to what has been said above for change trajectories, these challenges can make it quite difficult to bound the scanning tasks in the complex domain. Although it is not feasible to anticipate undesirable effects or success factors, it is at least possible to identify different perspectives for framing a project. This allows you to identify some contextual conditions which are relevant each perspective and then observe how those evolve across time.

In complexity, we need to monitor unpredictable change trajectories as well as keep tabs on a broad range of actors and factors in the context that may influence the project. This seems impossible, or at least impractical. Some of the techniques advocated for coping with unforeseeable events in evaluation can help focus monitoring tasks on what is most relevant to the project⁷:

- Identify all the relevant factors and actors that might affect the project and map them in a way that shows their assumed interrelationships and directions of influence. You can visualize this overview using influence diagrams, multiple cause or systems diagrams.⁸ In some cases it might make sense to cluster related factors and actors in groups (referred to as domains).
- Prioritize the domains according to their relevance for the project and focus monitoring on the most relevant domains. Separate the domains into those where you see a clear connection (e.g. for achieving results) and those that lie farther afield. Try to include all factors of the most relevant group in your monitoring and pick a sample of the next most relevant group. Be aware that priorities may change over time and some of the domains may shift from one group to the other.
- For each domain selected for monitoring, document the initial conditions of the actors and factors. Monitor and document changes. In making sense of the monitoring data over time, ask: How are the changes related to initial conditions?
- Seek surprise by paying attention to exceptions or discontinuities in the monitoring data. Unpredictable change can often be spotted by taking a closer look at the outliers in your data sets, exceptions from a general pattern, or changes of unusual speed or direction. Using different perspectives is particularly useful in this exercise of analyzing and interpreting data⁹.

⁷ Morrel, Jonathan A. (2010): Evaluation in the Face of Uncertainty. Guilford Press. New York.

⁸ The Open University provides a tutorial on various diagramming options and their uses. <http://systems.open.ac.uk/materials/T552/>.

⁹ For more information on the role of perspectives in complexity-aware monitoring, please see USAID's Discussion Note on Systemic Monitoring: Attending to Interrelationships, Perspectives and Boundaries.

WHEN DO WE MONITOR?

The challenge of applying the principle of synchronizing with the pace of change to complex projects is that we do not know what that pace of change is, or how it might evolve over time. For complex aspects of projects, the first step is to throw away pre-ordained monitoring timetable based on either bureaucratic schedules or assumptions regarding a steady march towards your project's final objectives. Synchronizing monitoring with the pace of change requires close attention to both the project's change trajectory and its context. For instance, in highly dynamic situations, monitoring may need to take place on a frequent, or even on-going, basis. In cases where significant effects can only be expected after considerable time lag, it makes sense to monitor for these results less often. It may also be useful to undertake some monitoring activities in the short term, others for a longer term, and still others over a much more extended period.

Although it is not possible to prescribe the timing and frequency of monitoring, some general guidelines can be outlined:

- As a rule of thumb, monitoring should be timed to provide rapid feedback to managers, allowing them to keep their finger on the pulse and see how their actions unfold. Thus it should take place in real-time and provide information that supports managers (and other key stakeholders) in their decision-making and accountability needs.
- Organize the monitoring activities to detect change as early as possible, which not only implies rapid feedback but also involving various stakeholders in this task.
- Adapt the timing and frequency as necessary to respond to the project's change trajectory and the project context. Be prepared for an increase or decrease in the pace of change. Also, vary the frequency of monitoring to check your assumptions about the pace and direction of change.
- Review monitoring data to see whether it reveals any of the non-linear patterns described above. Once a pattern can be detected the project (or parts thereof) can be monitored as if it were complicated – until data shows again that this is not the case (e.g. by revealing discontinuities, exceptions or surprises).

In sum, what is needed is agile monitoring which resembles the agile evaluation approach advocated when a project's development is unforeseeable¹⁰. Agile monitoring adapts quickly in the face of new circumstances. An agile monitoring approach combines an emergent monitoring design with short implementation cycles from design to findings. Emergent monitoring designs minimize initial data sets and maximize flexibility for new ones, because data needs to adapt to address to emerging results and changing circumstances. Monitoring speed can be enhanced dividing monitoring into smaller tasks, for example through quick surveys or a series of micro-level inquiries, which can be expanded if necessary.

¹⁰ See Morell, J.A. op.cit.

WHAT MONITORING APPROACHES AND METHODS DO WE USE?

All of the complexity-aware monitoring approaches recommended in the Discussion Note can be used to track change trajectories and observe contextual factors in complexity. Each approach has a specific focus. **Most Significant Change (MSC)** and **Stakeholder Feedback** methods may allow you to rapidly capture changes across sites and time, and as perceived from different perspectives. **Outcome Harvesting** identifies changes in outcomes and investigates a project's contribution to those outcomes, as well as significant contributing actors and factors in the context. **Process Monitoring of Impacts (PMI)** monitors assumptions about the achievement of results. Although none of these approaches explicitly focus on identifying change trajectories, repeating the information gathering and plotting the data across time will allow you to do so.¹¹

Sentinel Indicators is the only approach that makes explicit use of indicators.¹² However, these indicators play a different function than those used in performance monitoring. Rather than measure progress towards predicted results according to predetermined targets, Sentinel Indicators signal complex change processes which merit investigation once they occur. Located at critical points in a map of the project and its context, Sentinel Indicators provide managers early warning of the need to respond. Sentinel Indicators can be identified in much the same way that you focus monitoring tasks on what is most relevant to the project.

When indicators are used to observe change trajectories, their timing becomes crucial. In particular you should consider whether they capture a change before, during, or after the change takes place.

- *Leading indicators* signal changes before they occur
- *Coincident indicators* change at approximately the same time as the change
- *Lagging indicators* signal changes after they occur

As a rule of thumb, lead and coincident indicators are best used during the lifetime of an intervention (for on-going monitoring and reporting, formative or developmental evaluations). Lag indicators are best used at the end of an intervention (e.g. for final reports, ex-post or summative evaluations), since data for them will most likely only be available at the end of (or even after) the implementation period. **Lead indicators are most useful for monitoring complex aspects**, and care should be taken to choose indicators that are sensitive to small changes ('weak signals') and for which baseline values can be established in order to document initial conditions. They can point to unpredicted directions and timing of the change trajectory.

All five of the recommended complexity-aware monitoring approaches offer ways for guiding and bounding the monitoring tasks. For instance, PMI puts boundaries around strategically important spaces and addresses contextual factors within those areas. Sentinel Indicators alert project staff to changes in the context that require more inquiry and observation. Outcome Harvesting identifies unanticipated outcomes as well as the relevant context conditions that affected them.

¹¹ Keep in mind, that when repeat measurements are carried out as agile monitoring, data collection may involve small samples or micro-probes carried out over time.

¹² Some of the other approaches (e.g. PMI) can make use of indicators as well. In this case, selected data are summarized in indicator form; they can be revised, or eliminated when they are no longer useful.

Each of the five recommended approaches can be applied in the spirit of agile monitoring outlined above. Most Significant Change and Stakeholder Feedback can be organized as quick surveys; their design is rather open and can therefore quickly adapt to new circumstances. PMI deliberately starts with a small set of assumptions about the achievement of results, which are modified and expanded in line with unfolding realities. Outcome Harvesting has an emergent design that foresees iterative data collection which can quickly capture and validate new outcomes or evidence. Sentinel Indicators work with an emerging set of indicators, which should be regularly reviewed and updated as the project evolves.

HOW DO WE MAKE SENSE OF THE DATA AND APPLY IT TO DECISION-MAKING TO HELP STEER THE PROJECT EFFECTIVELY IN COMPLEXITY?

You've collected some monitoring data on the complex aspects of your project, and the task now is to understand it and use it for decision making. The first step is to determine whether the new information has reduced uncertainty and agreement enough to allow you to manage this aspect of the project as simple or complicated. Review complexity-aware monitoring data along with performance monitoring data for aspects of the project where higher levels of agreement and certainty allow you to predict the **change trajectory**. Plot the data across time and look for patterns. Can you detect a pattern in the change trajectory, such as one of the non-linear paths? Does the monitoring data allow you to make predictions about the pace and quality of change in your project? If so, plan the timing of the next data collection to test your new hypothesis. Critique your interpretations of the data. Data may suggest one pattern when, in fact, change is following a different trajectory. If data consistently reveals a predictable change trajectory, monitor and manage formerly complex aspects of the project as complicated or simple. If the project needs to remain adaptive to adjust to emerge needs and opportunities, continue to manage and monitor as if complex.

Complex aspects of a project are deeply entwined and interconnected with their **context**; changes in one will provoke changes in the other. Because complex aspects of project co-evolve with their context, changes in monitoring data should be interpreted in light of this interrelationship. Use complexity-aware monitoring both to inform decision making and to observe the response to project actions. Changes in the project should not be viewed as isolated phenomena.

CONCLUSION

Awareness of the variability of the pace of change in complexity will free you to adjust the time to match the pace of change and to suit decision making. There's no easy answer to the conundrum, but giving up on performance monitoring timetables for complexity-aware monitoring will improve your ability to use data to steer adaptively. These pointers will help ensure that monitoring data remains timely and relevant to decision making even when the pace of change shifts in complexity:

- Monitor the project's change trajectories and context, focusing on factors and actors most relevant to the project.
- Prioritize information that supports adaptive management and decision-making, rather than reporting.
- Continually assess the value and relevance of monitoring focus and approaches; adapt as necessary.
- Shift from advance planning to early detection.
- Vary the frequency of monitoring to respond to, and check your assumptions about, the pace and direction of change in the project's trajectory and context.
- Look for patterns in monitoring data and when possible reclassify aspects from complex to simple or complicated.
- Embrace uncertainty and remain adaptive to cope better with turbulent environments.