

MERL Tech State of the Field

The Evolution of MERL Tech

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Foreword

If there ever was a compelling time to take a hard look at the lessons from five years of convenings of thousands of monitoring, evaluation, research, and learning technology (MERL Tech) innovators and entrepreneurs, it is now, in the midst of the historic global COVID-19 pandemic. The urgent need to know what is happening, where, and to what extent has never been more important. It can literally mean the difference between life and death.

We all remember the inspiring example a decade ago of the Crisis Mapping Community that, through brilliant use of innovative technology, SMS, and crowdsourced reports, produced real-time maps and data that transformed responses to earthquakes in Haiti and Pakistan. This was truly inspiring leadership and innovation in the use of available technology for real-time monitoring that saved lives and, in doing so, disrupted and reimaged disaster response monitoring and learning systems.

While some might say these are extreme examples, moments of crisis often test and define the real value of a field. We live in extreme times — with climate change emergencies, growing inequality and vulnerability, and pandemics. The coming decade will demand nimble use of data for adaptive management and longer-term understanding of impact. Perhaps most importantly, in 2020 and beyond we need to ensure the meaningful involvement of those whose voices matter most.

With a few notable exceptions, I believe our field of monitoring and evaluation has lagged behind in evolving and responding to global challenges; learning from technology and innovation; and adapting our approaches, methods, capacities, and incentives. Most importantly, perhaps, we have been slow to change and modernize our mindsets.

I applaud Linda Raftree, the founder of MERL Tech, for taking up the challenge of looking at the past five years of MERL Tech convenings with innovators, technology providers, and MERL practitioners to identify lessons, trends, and issues in this rapidly changing field. No longer is it a nascent field. Tough lessons have been learned over the past decade and much good has been done, but complex ethical questions remain. This State of the Field series should make us think about the roles we will play in ensuring that the next phase of MERL Tech development is responsible, ethical, and focused on helping those most in need.

We invite you to learn with us, help shape this exciting field, and make our MERL field stronger and better equipped for the future. Will we be thoughtful innovators and early adopters, or will we be followers? It is for us to decide.

Nancy MacPherson

Former Managing Director, Evaluation, Rockefeller Foundation; Independent advisor and cheerleader for the next generation of MERL leaders

**“What is now
proven was
once only
imagined.**

/ William Blake

The MERL Tech State of the Field Team

The following people worked on the MERL Tech State of the Field Reports:

- **Overall coordination and MERL Tech State of the Field: The Evolution of MERL Tech:** Linda Raftree, independent consultant and MERL Tech Conference organizer.
- **What We Know About Traditional MERL Tech: Insights from a Scoping Review:** Zach Tilton, Michael Harnar, and Michele Behr, University of Western Michigan; Soham Banerji and Manon McGuigan, independent consultants; and Paul Perrin, Gretchen Bruening, John Gordley and Hannah Foster, University of Notre Dame.
- **Big Data to Data Science: Moving from “What” to “How” in the MERL Tech Space:** Kecia Bertermann, Luminare; Alexandra Robinson, Moonshot Global; Michael Bamberger, independent consultant; Grace Lyn Higdon, Institute of Development Studies; Linda Raftree, independent consultant and MERL Tech Conference organizer.
- **Emerging Technologies and Approaches in Monitoring, Evaluation, Research, and Learning for International Development Programs:** Kerry Bruce and Joris Vandelanotte, Clear Outcomes; and Valentine Gandhi, The Development CAFE and Social Impact.

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We thank the wider MERL Tech community for insights and inputs over the past five years, the enthusiasm and critical approaches that they have shared and tested, and their thoughtfulness as they move the field forward.

We also thank the sponsors and supporters of the MERL Tech conferences that have taken place since 2014, including Comic Relief, DevResults, the Digital Impact Alliance, Esri, FHI 360, Genesis Analytics, GitHub, the GSMA Foundation, IMC Worldwide, International Solutions Group, JoziHub, Learning Lab, Mercy Corps, Oxfam GB, Praekelt.org, the Rockefeller Foundation, Social Impact, Synergy, TechChange, Wellcome Trust, and the World Bank International Evaluation Group.

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Executive Summary

This is the first paper in the State of the Field series on the role and impact of technology on monitoring, evaluation, research, and learning (MERL). As a public good to enrich the wider MERL Tech community, the series provides collective knowledge on trends, issues and challenges in the MERL Tech field from 2014 to 2019, as well as opportunities for the MERL Tech community to responsibly advance the field.

This first report builds on the 2014 landscape report on emerging opportunities for monitoring and evaluation (M&E)¹, in which trends in the use of technology for MERL were identified, yet with scarce evidence. The landscape report spurred the first MERL Tech Conference in 2014 and a series of follow-on conferences between 2014 and 2019.² Out of the conferences, a MERL Tech Community emerged — a confluence of people and discussions at the intersection of technology and MERL in international development, social impact, and humanitarian initiatives.

In a series of four papers, the State of the Field of MERL Tech reports look at a range of trends, lessons, and findings. Where available, we based our findings on the academic literature. Where the evidence base is weak or nonexistent, we have aimed to identify trends and possibilities, gaps in knowledge, and areas where more systematic analysis would help to define what is needed to achieve inclusive and people-centered MERL that benefits from technology, rather than MERL that is driven by technology and digital data.

Our goal is to stimulate commentary and engagement in defining where the community should be heading in 2020 and beyond, and on what we need to do to achieve inclusive and people-centered MERL. Ultimately, we hope the community will contribute to a vision of how MERL can *benefit from* technology rather than being *driven by* technology and digital data.

We explore three waves of MERL Tech that emerged from our analysis: (see Figures 3 and 4).

1

First Wave: Tech for Traditional MERL

- Use of technology (including mobile phones, satellites, and increasingly sophisticated data bases) to “do what we’ve always done,” with a focus on digital data collection and management.
- There is a growing evidence base for these uses of MERL Tech.
- **Chapter 1** is a scoping review of MERL Tech.

2

Second Wave: Big Data

- Exploration of big data and data science for MERL purposes.
- While plenty has been written about big data for other sectors, the literature on the use of big data and data science for MERL is somewhat limited, and it focuses more on potential than actual use.
- **Chapter 2** explores how big data is moving from “what” to “how” in the MERL Tech space.

3

Third Wave: Emerging Approaches

- Technologies and approaches that generate new sources and forms of data, offer different modalities of data collection, provide ways to store and organize data, and discuss new techniques for data processing and analysis.
- Their potential has been explored, but little evidence is found on their actual use for MERL.
- **Chapter 3** considers emerging technologies and approaches in MERL for international development programs.

¹Linda Raftree and Michael Bamberger (2014) Emerging Opportunities: Monitoring and Evaluation in a Tech-Enabled World. <https://www.rockefellerfoundation.org/report/emerging-opportunities-monitoring/>

² MERL Tech conferences have been held annually in Washington DC since 2014, twice in London and once in Johannesburg.

Background

Enormous economic, demographic, and technological upheaval have characterized the past decade. These include a stark increase in wealth and income inequality; shifting global population movements and migration due to violence, conflict, and climate change; an increase in the number of populist leaders across the world; and the growth and prominence of large technology companies that are changing how supply chains, information chains, social interactions, and politics and democracy work. The World Economic Forum's 2019 Global Risks Report describes the current situation as a time when long-mounting, interconnected risks — global warming, cyberattacks, political and economic conditions, inequality, and fractures in the global community — create an unsettled geopolitical environment. The COVID-19 pandemic, which began to expand globally in early 2020, exacerbated the situation, spotlighting the fragility of health systems and economies and demonstrating the potential of digital data for focused health surveillance but also for broad and oppressive surveillance of citizens and non-citizens.³

New Tech Players and New Finance Changed the Game

As new tech players and investors entered the traditional development and humanitarian fields, a wider group of players from the public, not-for-profit, and private sectors and public-private partnerships began to drive expectations for more timely, data-driven feedback and decisions. As the business model for technology and data matured, the phrase “data is the new oil” became common.

The complexity of development and humanitarian contexts also became more apparent to development and humanitarian actors over the past decade. As we enter the “Fourth Industrial Revolution,”⁴ the data economy has become essential to how international and national non-governmental agencies work, as well as how that work is evaluated. The constantly shifting environment has challenged development and humanitarian organizations and the MERL practitioners who work with them.

Despite the strong efforts of local organizations and local evaluators to hold ground and space for their own voices and rights, in many cases the advent of digital technologies has diverted power and control of data and decisions from these communities and organizations upward to headquarters offices, data experts, and the largest agencies.

However, individuals, organizations, and MERL practitioners have not remained on the sidelines. Digital devices — especially mobile phones — are increasingly available to populations targeted by development and humanitarian funding. Estimates hold that at least 50 percent of the world's population now have at least some level of access to the Internet.

³ World Economic Forum (2019). The Global Risks Report. http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

⁴ World Economic Forum (2019). The Fourth Industrial Revolution: what it means, how to respond. <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>

Technology-Enabled MERL Has Grown Exponentially

Advances in technology have led to an increase in the number of tech-enabled development programs and a proliferation of uses of new technology tools and approaches to data collection and use in development, humanitarian, peacebuilding, and related non-profit, human rights, and socially focused programming. Digital data and new media and information technologies are changing MERL.

Technology-enabled MERL has grown by leaps and bounds over the past five years. From adaptive management supported by real-time data to faster, higher-quality data collection using mobile devices to remote data collection through sensors and self-reporting by mobile phone to big data and social media analytics to story-triggered methodologies and text analytics — the field is in constant flux with emerging methods, tools, and approaches.

“Digital data and new media and information technologies are changing MERL.”

From a Thousand Flowers Blooming to More Intentional Tech-Enabled MERL and Development

Championing these developments is a growing and diverse community of MERL practitioners in a variety of fields, from innovative field implementers and independent evaluators to headquarters staff. Driven by diverse approaches, theories, and incentives and varying levels of expertise, these differences have, on occasion, led to mutual mistrust and fragmentation. Nonetheless, collective progress is being made in documenting and assessing technology-enabled MERL initiatives. Good practice guidelines are emerging, and agency-level efforts to document and share learning are making new initiatives easier to start, build on, and improve. At the same time, a swarm of ethical questions related to these new and emerging methods and approaches has focused greater attention on ethical areas and the development of policies, guidelines, and minimum ethical standards for digital data.

Although the academic literature base is growing, on-the-ground digital service providers (whether NGO, government, or commercial) working within real-world constraints report that they lack the time, capacity, and resources to process this information and put it to use. Academics do not necessarily produce knowledge that helps practitioners resolve the real-world situations they face. Evaluators often lack expertise in technology and the workings of the digital ecosystem, and technologists are often unfamiliar with inclusive or rights-based approaches or strategies for working with excluded populations.

Commercial actors tend to prefer their own research, perhaps because their incentives differ from those of non-profit, development, and humanitarian organizations; and commercial research tends to remain proprietary. Donors do not always use evidence and practitioner knowledge to frame realistic requests for proposals, and commercial entities and investors often lack expertise in developing, designing, and investing in digital products and services for the most vulnerable.

The Rise of Ethics, Evidence, and Do No Harm

The lack of a consolidated and accessible evidence base (including grey literature, commercial sector learning, and practitioner-informed experiences) has contributed to duplication of effort, wasted resources, poorly coordinated investments, and misaligned donor initiatives that encourage approaches and tools that are not informed by evidence or good practice. There have also been accusations of unsafe innovation, harmful practices, and insufficient attention to unintended consequences and sustainability.

Three Waves of Technology-Enabled MERL

The State of the Field series aims to provide collective knowledge on the trends, issues, challenges, and opportunities in the MERL Tech field and to stimulate discussions on what is needed to responsibly advance the field. Ultimately, we hope the MERL Tech community will define what is needed to achieve inclusive and people-centered MERL that benefits from technology, rather than MERL that is driven by technology and digital data.

Our research, combined with discussions among multi-stakeholders, identified three waves of technology in MERL:

First wave: Tech for Traditional MERL

The use of digital technology (mobile phones, satellites, and increasingly sophisticated databases, among others) to conduct traditional MERL activities in new and more efficient ways, with a focus on digital data collection and management. There is a growing academic evidence base for the use of these technologies for MERL.

Second wave: Big Data

The use of big data and data science to expand and build knowledge for MERL purposes. Evidence and good practices for big data in MERL are beginning to appear in both academic and grey literature, but the focus is still often on potential rather than actual use.

Third wave: Emerging Approaches

Technologies and approaches that generate new sources and forms of data; present different ways to collect, organize, and store data; and provide new possibilities for data processing and analysis. To date, the evidence base on actual use of these approaches for MERL remains limited.

The State of the Field series aims to identify trends and to map and make sense of emerging evidence and practitioners' knowledge on the use of technology for MERL and changes in the field over the past five years. Where the evidence base is slim, we suggest key questions and the kinds of information and evidence required to answer them. We also identify evidence gaps and recommend next steps to develop a more robust understanding of the MERL Tech field.

This overview paper explores the wider state of MERL Tech and provides a starting point for discussions and intentional efforts to responsibly advance the MERL Tech field over the next five years. The sub-papers explore the three waves in more detail.

The MERL Tech Conference and MERL Tech Community

MERL Tech is a platform and space for discussion, learning, and sharing experiences and challenges with the use of technologies for MERL in the social impact, humanitarian, and international development fields. MERL Tech aims to strengthen understanding of the value, impact, and risks of digital technology in MERL and to support learning and discussion on new approaches and tools for MERL work. We are interested in strengthening the evidence base and learning around technology used in MERL and technology in development.

The MERL Tech community strives to be a dynamic and inclusive space where researchers, evaluators, development practitioners, headquarters and management personnel, humanitarian aid workers, technology developers, data analysts and scientists, funders, and others involved in this emerging field can come together for multidisciplinary conversations, learning, and collaboration.

The community has been gathering at conferences in Washington, D.C.; London; and Johannesburg since 2014.

Members of the community also meet for deep dives into specific topics, for example, in New York in 2014, and within MERL Tech Tracks at regional conferences such as the South African Monitoring and Evaluation Association Conference, Asia Pacific Evaluator Association Conference, American Evaluation Association Conference, and European Evaluation Association Conference.

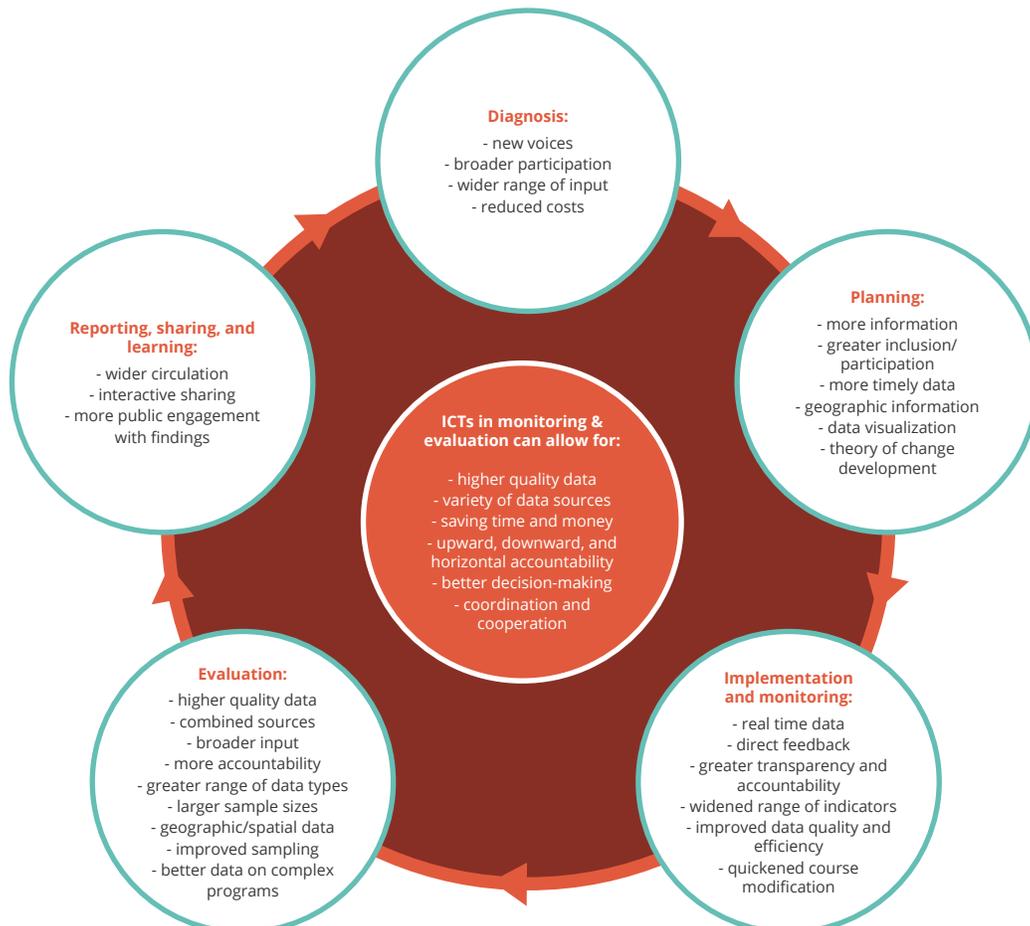
The MERL Tech Conference covers topics such as:

- *How newer technologies and digital data are being used in MERL.*
- *How new approaches and ways of thinking are changing MERL, and what this means for how development and social impact work are done.*
- *How participation and voices can be enhanced through new technologies.*
- *The impact and measurement of digital development programs.*
- *How digitized data collection, use, and sharing can increase risk, and how we can be more responsible throughout the data life cycle.*
- *Key areas that require attention: organizational, methodological, technological, and ethical.*

History of MERL Tech (2014–2019)

When the MERL Tech space was first identified in 2014, the humanitarian and development sectors were at the height of excitement over innovations and information and communication technologies (ICTs) for development. The role of ICTs in the M&E field had not been systematized, and it was unclear whether there actually was “a field.” A discussion paper by Raftree and Bamberger⁵ aimed to explore how and why new technologies were being tested and used in a traditional planning, monitoring, and evaluation cycle (see Figure 1).

Figure 1: The potential for ICTs in the Planning, Monitoring, and Evaluation Cycle (from Raftree and Bamberger, 2014)



⁵ Raftree and Bamberger, op. cit.

Innovative uses of technologies and the approaches highlighted in 2014 focused on mobile phones — for example, text messaging (SMS), mobile data gathering, photography, and audio and video recordings — and mapping with handheld global positioning system (GPS) devices or GPS installed in mobile phones. Promising technologies included tablets, which were just beginning to be used for M&E; “the cloud,” which enabled easier updating of software and applications; remote sensing and satellite imagery; dashboards; and online software that helped evaluators do their work more easily. Social media, also emerging and scaling in 2014, was recognized for its potential to monitor discussions among and gather feedback from program participants; it was considered an underutilized tool for broadly disseminating evaluation results and learning. Real-time data and big data were also mentioned as tools to improve program monitoring and enable quicker adaptation.

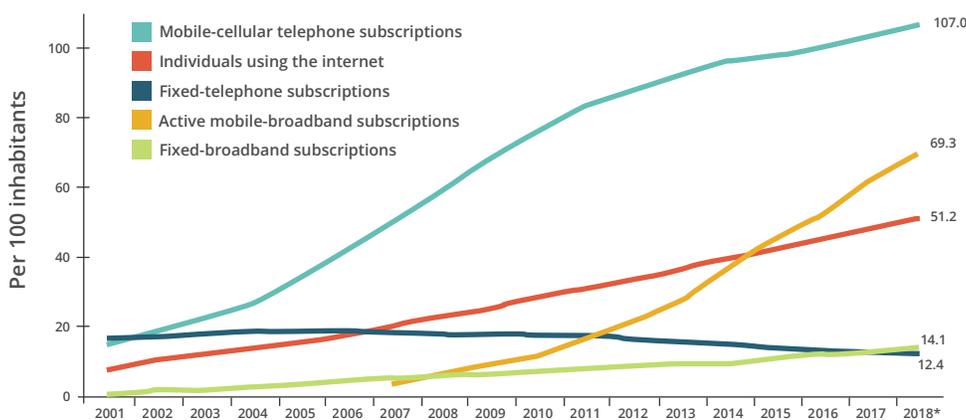
The authors outlined five main challenges for the use of ICT for M&E: selectivity bias; technology- or tool-driven M&E processes; overreliance on digital data and remotely collected data; low institutional capacity and resistance to change; and privacy and protection. They also suggested key areas to consider when integrating ICTs into M&E, quality M&E planning; design validity; the added value (or not) of ICTs; using the right combination of tools; adapting and testing new processes before rollout; technology access and inclusion; motivation to use ICTs; privacy and protection; unintended consequences; local capacity; measuring what matters (not just what can be measured); and effectively using and sharing M&E information and learning.

They concluded that:

- **The field of ICTs in M&E is emerging, and activity is occurring at multiple levels and with a wide range of tools, approaches, and actors.**
- **The field needs more documentation on the utility and impact of ICTs for M&E.**
- **Pressure to show impact may open up space for testing new M&E approaches.**
- **In designing evaluation plans that involve ICTs, practitioners must avoid a number of pitfalls.**
- **Investment in the development, application and evaluation of new M&E methods could help evaluators and organizations adapt their approaches throughout the program cycle, increasing flexibility and the ability to adjust to the complex environments in which development initiatives and M&E take place.**

Many changes since 2014 in the wider field of technology, communications, infrastructure, and society have influenced the MERL Tech space (see Figure 2). The early focus on basic mobile phones, SMS, mobile surveys, mapping, and crowdsourcing might now appear quaint, since global access to smartphones has expanded beyond the expectations of many. Some MERL practitioners now use advanced artificial intelligence, machine learning, biometrics, and sentiment analysis in their work. And, as smartphone and Internet use continue to grow, people around the world will produce more data. As a result, MERL practitioners' access to and use of data will likely continue to shift.

Figure 2: Global ICT Developments Between 2001 and 2018⁶



Note: *Estimate

Source: ITU World Telecommunication/ICT indicators database

The excitement in 2014 over the potential for innovation and new technologies might be seen as naive, considering some negative consequences that have emerged. These include smartphone “addiction,”⁷ social media-inspired violence such as that in Myanmar,⁸ and the race to the bottom through the online gig economy.⁹ By 2019, too, a widespread “techlash” had emerged in which, rather than being the recipients of glowing praise, technology companies were the targets of growing resentment due to business models, invasive data collection techniques used for targeted advertising, use of mobile data and location data for tracking and surveillance, their contribution to misinformation and disinformation, and their startling influence on polarization and democracy.¹⁰ In this changed context, we embarked on a second round of research and analysis to provide an updated State of the Field for MERL Tech that looks at changes in the space between 2014 and 2019.

⁶ ITU World Telecommunication / ICT Indicators database, accessed November 3, 2019. <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

⁷ Alice G. Walton, “Phone addiction is real, and so are its mental health risks.” *Forbes*, December 11, 2017. <https://www.forbes.com/sites/alicegwalton/2017/12/11/phone-addiction-is-real-and-so-are-its-mental-health-risks/#18a5641a13df>

⁸ Tom Miles, “UN Investigators cite Facebook role in Myanmar Crisis.” *Reuters*, March 12, 2018. <https://www.reuters.com/article/us-myanmar-rohingya-facebook-idUSKCN1GO2PN>

⁹ Alana Semuels, “The Online Gig Economy’s ‘Race to the Bottom.’” *The Atlantic*, August 31, 2018. <https://www.theatlantic.com/technology/archive/2018/08/fiverr-online-gig-economy/569083/>

¹⁰ Knight Foundation and Gallup (2020) “Techlash: America’s growing concern with major technology companies.” <https://knightfoundation.org/reports/techlash-americas-growing-concern-with-major-technology-companies/>

Three Waves of Innovation in the MERL Tech Space

Through MERL Tech Conference submissions, focus group discussions at MERL Tech conferences, and wider conversations in the MERL Tech space, the research team identified three general waves of technology emergence in MERL between 2014 and 2019.



First Wave: Technology for Traditional MERL

This first wave of technology in MERL could be described as technology that enabled MERL practitioners to continue doing what they had always done — but do it better or differently. The assumption was that incorporating technology into MERL and moving from paper to digital would allow for faster, cheaper, higher quality, more efficient data collection and use. The advent of mobile phones would allow for greater reach and for more voices to contribute to the various stages of the MERL process. Use of technology (including smartphones, satellites, and increasingly sophisticated databases), it was hoped, would enable MERL practitioners to do their jobs more easily and communicate better. However, although the initial discussion paper by Raftree and Bamberger in 2014 highlighted trends, little evidence was available to determine whether the promise of these technologies was being realized.

“Use of technology (including smartphones, satellites, and increasingly sophisticated databases), it was hoped, would enable MERL practitioners to do their jobs more easily and communicate better.”

To find out whether technology was delivering on its potential, a team¹¹ conducted a scoping review of MERL Tech to identify key concepts and gaps in the knowledge base, report on types of evidence that inform practice, and synthesize conclusions and recommendations. The team explored the question: *What types of evidence, activities, and conclusions related to MERL Tech for development assistance in lower- to middle-income countries have been reported in academic literature since the end of 2014?* The team searched seven academic databases for studies related to or focused on MERL Tech, screened nearly 3,400 eligible studies, extracted quantitative data from 886 relevant studies, and synthesized qualitative data from 256 studies.

The majority of the available literature was related to:

Sub-Saharan Africa

East Asia & the Pacific

Europe & Central Asia

Sectors with the highest representation in the literature were:

health

environment / climate change / natural resource management

energy / infrastructure / urban planning

The types of technology most represented in the literature were:

geographic information systems

quantitative data analysis software

management information systems

mobile phones

Other types of technology mentioned included online surveys, SMS, data visualization, qualitative data analysis software, mobile tablets, dashboards, real-time data, crowdsourcing, telephones, digital photography, social media, open source tools and applications, interactive voice response, GPS, and audio recording.

The most common activities mentioned were:

data analysis

implementation and monitoring

data collection

Once they had mapped the literature, the team reviewed abstracts for a qualitative look at what general conclusions or lessons learned they could glean.

The team found that most reports of MERL Tech practice describe work in the sub-Saharan Africa or Asia and the South Pacific regions. Geographic information system (GIS) and quantitative data analysis software account for half of all reported technologies. The health sector increased its evidence share over the years observed and alone accounts for 39 percent of all identified evidence. The most frequently reported MERL activity is data analysis.

¹¹ The team was made up of Zach Tilton, Michael Harnar, and Michele Behr, University of Western Michigan; Soham Banerji and Manon McGuigan, independent consultants; and Paul Perrin, Gretchen Bruening, John Gordley, and Hannah Foster, University of Notre Dame.



Second Wave: Big Data and Data Science

The second wave focused on big data and data science for MERL. Although this topic was discussed at the first MERL Tech Conference in 2014 there was little actual use of big data at that time. A speaker at the conference quipped, “Big data is like teenage sex: No one is actually doing it, but everyone wants to and everyone says they are.”

Much has been written about the use of big data in other sectors, yet the literature on its application to MERL is limited, with most reports focusing more on its potential than actual use. Big data in MERL was an emerging idea in 2014; by 2018 it had begun to take off in practice, based on an increase in big data and related session submissions to MERL Tech starting that year.

To understand more about how MERL practitioners use big data and what encouraged or deterred adoption, the team¹² reviewed MERL Tech session submissions from the **seven** MERL Tech conferences between 2014 and 2019 and conducted **11** key informant interviews with people from organizations that said they were working with big data for MERL.

Key informant interviews and conference session analysis highlighted four main types of technologies used to collect big data:

satellites

remote sensors

mobile technology

M&E platforms

in addition to a number of other tools and methods.¹³

Conference session analysis and key informant interviews noted six main types of tools used to analyze big data:

artificial intelligence and machine learning

geospatial analysis

data mining

data visualization

data analysis software packages

social network analysis

Artificial intelligence and machine learning were not discussed in MERL Tech Conference descriptions until 2017, but the terms were commonly used at MERL Tech 2019.

¹² The team consisted of Kecia Bertermann, Luminate; Alexandra Robinson, Moonshot Global; Michael Bamberger, independent consultant; Grace Lyn Higdon, Institute of Development Studies; and Linda Raftree, independent consultant and MERL Tech organizer.

¹³ Other data collection methods mentioned included blockchain, call-in radio, drones, specialized data collection applications, and websites. Other data analysis methods mentioned included open source programming, M&E packages, and cloud storage.

The study found that perceived benefits of big data included enhanced analytical possibilities, increased efficiency, scale, data quality, accuracy, and cost-effectiveness. Big data is contributing to improved targeting and better value for money. It is also enabling remote monitoring in areas that are difficult to access for reasons such as distance, poor infrastructure, or conflict.

MERL practitioners cited a number of drawbacks and limitations that make them cautious about using big data. These include lack of trust in the data; misalignment of objectives, capacity, and resources when partnering with big data firms and the corporate sector; and ethical concerns related to privacy, bias, and magnification of inequalities. Barriers to adoption include insufficient resources, absence of relevant use cases, lack of skills for big data, difficulty in determining return on investment, and challenges in pinpointing the tangible value of using big data in MERL. The authors recommend that the MERL community engage actively in this space and lead the way in identifying further use cases for applying big data.



Third Wave: Emerging Approaches

Following closely on the second wave (or perhaps appearing simultaneously), a third wave of technologies and approaches has the potential to influence how MERL practitioners do their work. The growth in use of smartphones and the Internet, digitization of existing data sets, and collection of digital data make data increasingly available for MERL activities. This changes how MERL is conducted and, in some cases, who conducts it. Emerging hardware, software, and approaches to data analysis allow for continuous collection, processing, merging, storage, and analysis of increasing volumes of quantitative and qualitative data.

New disciplines (such as software development and data science) are entering the MERL field, bringing new ideas and ways of working. The potential of these new approaches and data sources for MERL is being tested and explored, but there is little evidence base or documentation of their appropriateness for MERL purposes. This wave emerged early in our period of interest (2014–2019), and we are still exploring it.

The team¹⁴ hypothesized that emerging technology is revolutionizing the types of data that can be collected and accessed and the ways that it can be processed and used for better MERL. However, improved research on and documentation of how these technologies are being used is required so the sector can better understand where, when, why, how, and for which populations and which types of MERL they would be appropriate.

¹⁴ The team comprised of Kerry Bruce and Joris Vandelanotte, Clear Outcomes; and Valentine Gandhi, Development Cafe.

The team reviewed application data, sensor data, drones and the Internet of Things (both of which collect data through sensors), secondary data, biometrics, distributed ledger technologies (blockchain), machine learning, and text analytics to consider their possibilities for MERL. The risks, biases, and ethical issues that accompany these technologies are also discussed.

Some challenges include:

- clearly defined problems so the choice of data, tool, or technique is appropriate
- non-representative selection bias when sampling
- insufficient data to train artificial intelligence systems
- missing lexicons for development and humanitarian aid sectors
- data privacy and anonymity
- reduced researcher or evaluator control
- change management to adapt how organizations manage data
- ability to nimbly adapt and change
- potential risks in use of the cloud

To address emerging challenges and make best use of the new data, tools, and approaches, the team recommends a focus on capacity strengthening for MERL practitioners, greater collaboration among social scientists and technologists, incorporation of more systems thinking among MERL practitioners, and greater attention to ethics and privacy.

How Is Innovation Happening in the MERL Tech Space?

For illustrative purposes, the three waves can be plotted on the Gartner Hype Cycle.^{15,16,17,18} (See Figure 3.) The Hype Cycle offers a way to represent the maturity and adoption of technologies and applications and depicts a common pattern in the way new technologies are launched to great fanfare and an expectation that they will resolve myriad problems. Then they tend to move into a period of backlash and criticism. Some applications survive the backlash and, as they are improved, their utility is tested and documented, they become more commonplace and more affordable, and evolve into an ecosystem for support and scaling develops around them, they are more widely adopted and used.

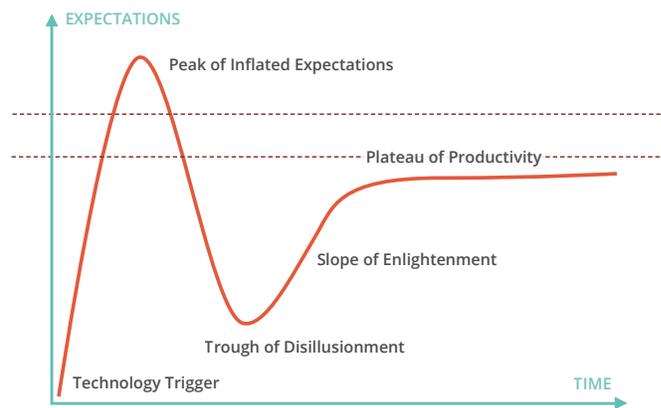


Figure 3: Gartner's Hype Cycle (1995)

The first of MERL Tech's waves seems to have moved over the past five years from the early stage of the hype cycle through to Gartner's Plateau of Productivity. Methodologies and good practices have been developed; certain early solutions have moved through to enterprise solutions; and these kinds of tools, platforms, and approaches have become cemented as an integral part of MERL Tech.

¹⁵ Gartner Hype Cycle. Accessed December 20, 2019. <https://www.gartner.com/en/research/methodologies/gartner-hype-cycle>

¹⁶ The Gartner Hype Cycle has been criticized for being unscientific and not backed by sufficient data, for not objectively describing where particular technologies sit, for introducing misleading terms (people often don't understand the "trough of disillusionment" in the way it is meant), for not offering an action perspective for moving technology to a next phase, and for being a simplified description of a complex system. For our purposes, we use it to illustrate how hype cycles tend to happen.

¹⁷ Graphic by Jeremy Kemp at English Wikipedia, CC BY-SA 3.0. Accessed December 20, 2019. <https://commons.wikimedia.org/w/index.php?curid=10547051>

¹⁸ Michael Mullany, "8 Lessons from 20 Years of Hype Cycles." LinkedIn, December 7, 2016. <https://www.linkedin.com/pulse/8-lessons-from-20-years-hype-cycles-michael-mullany/>

As depicted in Figure 3, the second wave sits somewhere between Gartner's Trough of Disillusionment and Slope of Enlightenment. Excitement over the possibilities of big data for MERL has been tempered by the difficulties of actually using it and questions about when it is a useful approach, and for what type of organization. At the same time, many early concerns about the ethics of big data remain. Although only a few examples of good practices and applicable uses for MERL have been documented, they are starting to emerge. The lexicon has also shifted since 2014, and the term big data has given way to data science, artificial intelligence, and machine learning.

The third wave (see Figure 4) is generally still climbing up the Peak of Inflated Expectations or, in some cases, (such as blockchain), is quickly on its way to or is already in the Trough of Disillusionment. Because many uses of this set of technologies and approaches are still in the early phases of implementation, there are only a few documented examples of their use for MERL, and good practices are just emerging.

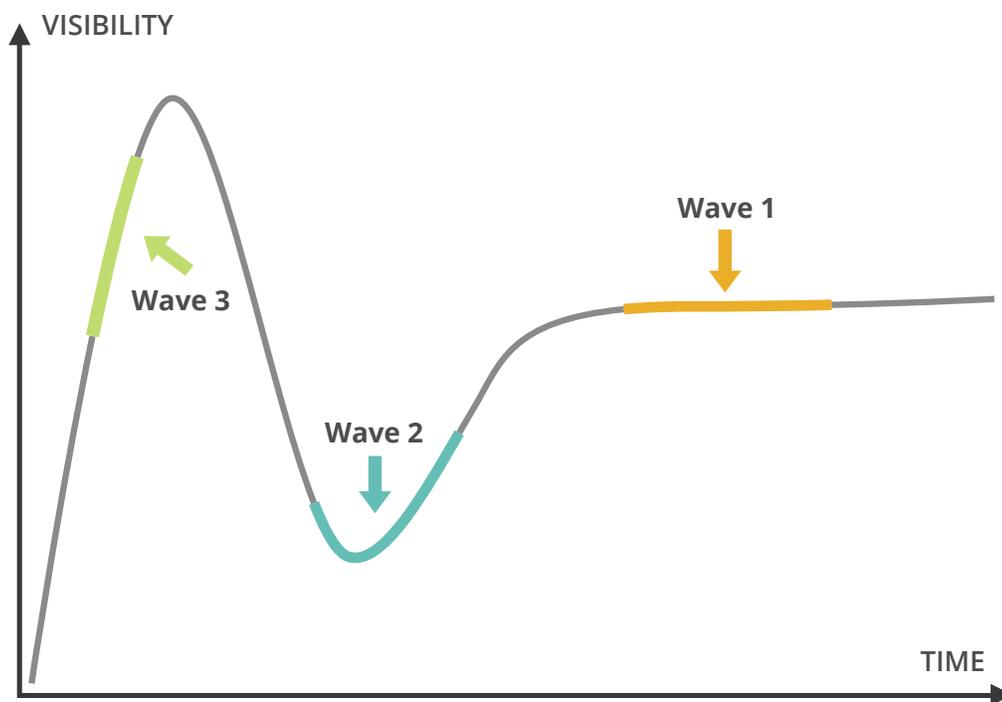


Figure 4: MERL Tech Waves of Innovation Plotted on the Gartner Hype Cycle

How are MERL Tech Innovations Diffusing?

A second frequently cited framework, Rogers' Diffusion of Innovation Theory,¹⁹ is a starting point for examining the state of the field and responsible use of technology in MERL. Rogers sees the main elements of diffusion of new ideas as "1) an innovation, 2) which is communicated through certain channels, 3) over time, 4) among the members of a social system." He posits that the newness of an innovation can cause uncertainty and that the remedy is information for understanding it. "We call this innovation-evaluation information; it leads to a reduction in uncertainty about an innovation's expected consequences."

1. The innovation. The application of technologies and approaches to MERL.

2. Communication channels. The ways that information and experiences about technology for MERL are communicated and shared within and beyond the MERL Tech community.

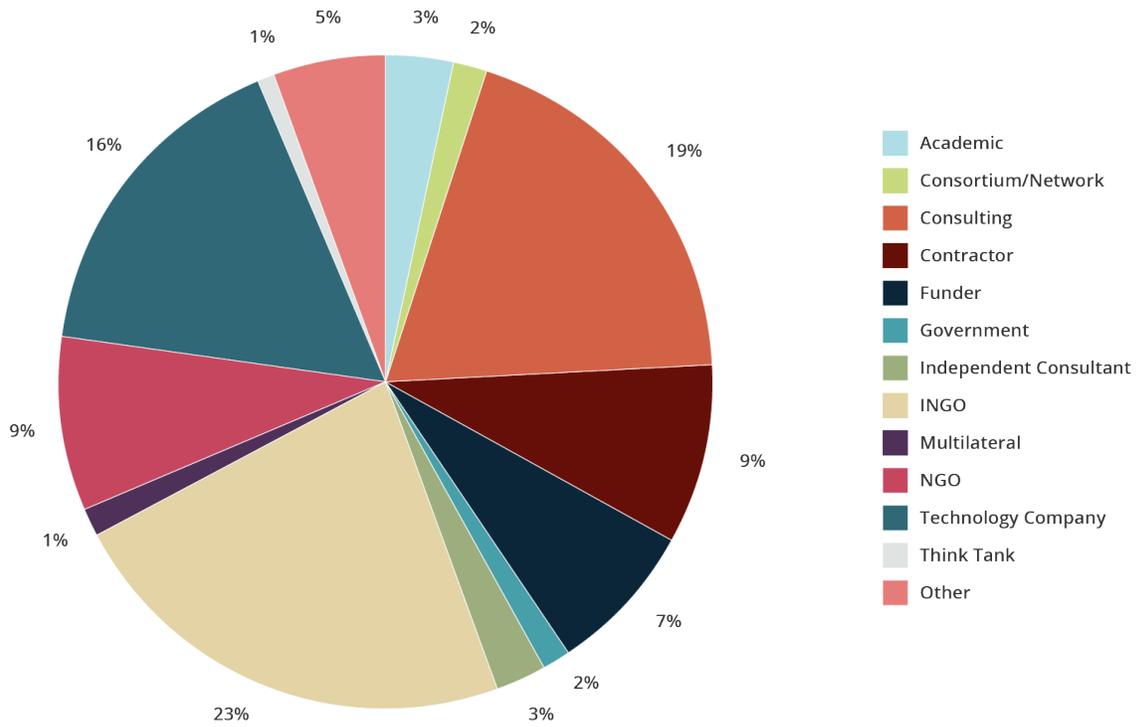
3. Time. Knowledge of MERL technologies and approaches, earliness or lateness of adoption of MERL technologies or approaches by the MERL Tech community and individuals within it, and rate of adoption in the wider development and humanitarian system.

4. The social system. The MERL Tech community, including the wider humanitarian and development sector; evaluators; technology developers; academics; data scientists and data analysts; the "responsible data" community; donors, funders, and investors; governments; and bilateral and multilateral institutions.

Figure 5 (on the following page) shows the MERL Tech social system.

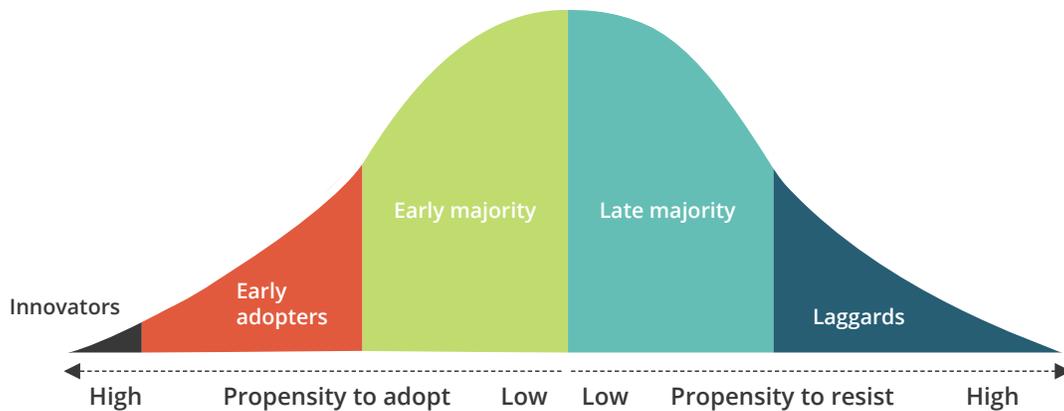
¹⁹ Everett Rogers (1962). *Diffusion of Innovations*. The Free Press. New York, NY.

Figure 5: The MERL Tech Social System



Rogers’ theory describes five types of individuals, each of whom reacts to innovation in specific ways: innovators, early adopters, early majority, late majority, and laggards. We can use this idea to explore different attitudes within the MERL Tech community (see Figure 6).

Figure 6: Different User Segments and Their Propensity to Adopt a Specific Innovation (based on Rogers’ theory).²⁰



²⁰ Les Robinson (2009). A Summary of Diffusion of Innovations. https://twut.nd.edu/PDF/Summary_Diffusion_Theory.pdf

The MERL Tech community generally comprises innovators and early adopters of new technologies and approaches for MERL. Within the community, however, adoption occurs at different rates, and all the user segments listed in Figure 5 are present. The presence of different user segments and propensities has generated dynamic discussions about both the possibilities and the risks of these new ways of doing MERL.

Each identified wave of MERL Tech seems to follow a fairly typical “diffusion of innovation” pathway,²¹ with innovators and early adopters piloting and testing new approaches and an early majority adopting some of these technologies and approaches, followed by a later majority and so-called “laggards” who resist certain tools and approaches.

Rogers describes laggards as those who “possess almost no opinion leadership” and are “isolates in social networks.” The MERL Tech space, in contrast with the wider field of M&E, is generally a community of early adopters. However, members of the MERL Tech space who hesitate to adopt certain MERL technologies are not necessarily timid about adopting innovations per se. Rather, they may push back against unquestioning adoption of technology and the “techno-utopia” that has characterized innovation in the technology space, and where popular slogans include “move fast and break things” and “don’t ask for permission, ask for forgiveness.” These attitudes may be present in the MERL Tech space, and many laggards among MERL Tech practitioners advocate for more thoughtful ethical reviews and stronger evidence that technology is improving MERL before moving forward. Laggards often remind the community at large of their important responsibility to avoid negative unintended consequences or harm to vulnerable groups. People might also be excited about one technology, yet skeptical of another, so static positioning of an individual in one of Rogers’ categories does not make sense.

This reaction from the MERL Tech community illustrates several critiques of Rogers’ theory. For one thing, the theory focuses on change at the individual level, whereas information technology involves a complex process of simultaneous change at individual, organizational, and sectoral levels. In the MERL Tech space, information technology also intersects with push and pull factors from donors and political pressures, and with wider culture and society. Additionally, Rogers’ theory considers adoption of innovation as a linear and binary process that classifies people as either adopters or non-adopters, with a bias toward positivity regarding adoption. This is framed as the “rational” or enlightened choice. In Rogers’ theory, technological change is seen as “a relatively simple, largely individual, dichotomous switching process, constituting a linear progression from old and inferior materials, tools and methods to new and superior ones.”²² But this is not always true.

Another key issue with diffusion of innovation theories is that technology has been treated generically, as “discrete, generic and mobile packages that are capable, in theory and principle, of being transferred smoothly from one setting to be adopted and implemented in another.”²³ Technologies are viewed as simple tools that can either be adopted or not adopted (for example, a woman in Peru decides either to boil water or not to boil water). This ignores various processes and influences (social, cognitive, epistemological, institutional, and cultural) that shape how technology is created, configured, and managed.^{24,25,26}

²¹ Rogers, op. cit.

²² Dominic Glover, James Sumberg, et al. (2019). “Rethinking technological change in smallholder agriculture.” *Outlook on Agriculture*. Vol 48(3) 169–180. Sage.

²³ Rogers, op. cit.

²⁴ Wiebe Bijker, Thomas Parke Hughes, and Trevor Pinch (1987). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge: MIT Press.

²⁵ Bruno Latour (2005), *Reassembling the Social: An Introduction to Actor Network Theory*. Oxford: Oxford University Press.

²⁶ Donald MacKenzie and Judy Wajcman (1999), *The Social Shaping of Technology*, 2nd ed. Buckingham: Open University Press.

Glover, et al. note that political economists have challenged some assumptions around adoption and diffusion by drawing attention to power relations that are expressed and reproduced through technology: “[Political economy] perspectives typically portray technologies as weapons in struggles for social and economic power and dominance. Big corporations, governments and capitalists are usually perceived to have the upper hand over ordinary citizens, poor and marginalized people and dispossessed minorities.”²⁷ Within the MERL Tech community, this type of discussion — and critique — has broadened since 2014 to address not only innovation but also the potential effects of innovation.

Glover, et al. also note that when “adoption” is the sole focus, the wider effects of technological change, whether positive or negative, might be overlooked. Applied to use of new technologies for MERL, an organization’s incorporation of a particular technology could be lauded as a success because “adoption” or “innovation” happened, despite considerable possible downsides (related, for example, to privacy, power, autonomy, and other elements) that are not being considered or measured.

Certain MERL Tech innovations have sparked discussion in the community about their potential for harm and unintended consequences that could put vulnerable or marginalized groups at risk — even while some of these technologies are adopted. In some cases, skeptics have been influential in pressing for slower adoption and improved ethical frameworks before technologies are implemented. Oxfam, for example, commissioned a study on the use of biometrics to track beneficiaries and suspended its own use until staff could review the evidence base to determine whether positive uses of biometrics outweigh the potential for harm to vulnerable populations.²⁸

Glover, et al. note that,²⁹ when adoption of innovation is used as the principal indicator of success or failure, there is a high risk of overlooking wider positive or negative ramifications, including unintended benefits, costs, and risks. Despite successful uptake of an innovation, considerable harm might have been done. The MERL Tech community overall has a tendency to reflect on this concern, contributing to a balance between innovators and early adopters and those who believe the field should proceed with caution.

“Certain MERL Tech innovations have sparked discussion in the community about their potential for harm and unintended consequences that could put vulnerable or marginalized groups at risk — even while some of these technologies are adopted.”

²⁷ Glover, op. cit.

²⁸ Oxfam and The Engine Room (2018). Biometrics in the Humanitarian Sector. <https://www.theengineroom.org/wp-content/uploads/2018/03/Engine-Room-Oxfam-Biometrics-Review.pdf>

²⁹ Glover, op. cit.

In the MERL Tech space, reasons for adopting one technology may be significantly different from reasons for adopting another. For example, factors that affect individual or organizational use of geospatial technologies might be completely different from those that affect use of social media analytics. Or perhaps the motivations for adopting a technology differ from one person, team, or organization to the next. Some may be interested primarily in adopting new technologies so they can monitor and evaluate more effectively, whereas others may see opportunities to improve branding or raise additional funding by “doing innovation.” Still others may include technologies as a way to trace aid under the banner of accountability, as a donor requirement. In fact, a 2017 paper found that the principal use of information generated by monitoring systems in many humanitarian agencies is to compile reports for donors.³⁰

Organizational change literature notes that many organizational change initiatives fail because of employee resistance to change, which is often caused because of poorly planned implementation of change initiatives. Leaders tend to think that they can impose change on employees whenever they themselves are ready to take action. However, employees may not have been prepared or engaged in the change process, and they are not ready for it. This often produces conflict.³¹ Behavior change theory posits that there is usually a reason why people do not adopt a “desired” behavior or understand the need to do so. The field considers that people have the power to change, and that they will do so when they are ready. Resistance to change might be because the benefits from the planned change do not seem great enough to compensate for the perceived downsides.

As the push for greater innovation among individuals, organizations, and the sector continues, it should be closely coupled with an understanding not only of the potential of new technologies but also negative effects, barriers, and reasons for non-adoption. Rather than being concerned about the potential for negative impact on themselves and their jobs, MERL Tech practitioners are more likely to think about the risks and harms that incorporation of new technologies could have on vulnerable individuals and groups and on wider society. In other words, resisters in the MERL Tech space might be resisting on behalf of others.

“As the push for greater innovation among individuals, organizations, and the sector continues, it should be closely coupled with an understanding not only of the potential of new technologies but also negative effects, barriers, and reasons for non-adoption.”

³⁰ Alexandra Warner (2017). What is monitoring in humanitarian action? Describing practice and identifying challenges. London: ALNAP/ODI. www.alnap.org/help-library/what-is-monitoring-in-humanitarian-action-describingpractice-and-identifying

³¹ Deloitte & Touche (1996). Executive survey of manufacturers.

Conclusions and Next Steps

As waves of new technologies and approaches continue to be introduced, it is critical to build the evidence base and understanding of what works, what does not, for whom, where, and why. We also need to be better oriented to designing with emerging approaches, determining which approach is indicated for a particular situation and when one approach is more appropriate than another, and identifying the short- and long-term resources needed to implement new approaches. It is important to continue to balance innovation with questions about ethics, privacy, bias, and justice.

Innovation itself should not be the goal for MERL Tech. Rather, as with other areas in which evaluators work, technology or emerging approaches to evaluation should be purposeful, chosen with clear goals in mind and a balanced assessment of potential consequences in terms of privacy, power, autonomy, and other factors that present potential harms.

Care should also be taken to ensure that the use of new technologies and new approaches does not further marginalize the people with whom we work, including individuals, groups, staff, partners, and other organizations. As we move to greater use of remote monitoring and big data and data science, we need to be cautious about interpreting data far from its source and excluding people from decisions that affect their own lives.

“It is important to continue to balance innovation with questions about ethics, privacy, bias, and justice.”

Going forward, the MERL Tech community should continue to invest in documenting, sharing, learning, training, and guidance³² to answer questions such as:

- **What do MERL Tech practitioners need to do to choose the right tools and approaches for their situation or context?**
- **How can issues of bias, data quality, and data gaps be overcome to improve rigor, validity, representativeness, and inclusion?**
- **How can different disciplines learn from one another to close gaps in knowledge, approaches, skills, and practices?**
- **What specific data privacy and safeguarding policies and practices are needed in the sector to reduce risk and enhance the safeguarding of vulnerable individuals and groups?**
- **How can the sector proceed cautiously so new approaches and methods are not rolled out before analysis of potential benefits and risks is conducted?**
- **How can the sector as a whole ensure that ethics and safeguarding are included in MERL design and implementation?**

Subsequent papers and MERL Tech convenings will tackle these outstanding questions and deepen knowledge sharing and learning around areas that are identified in the following chapters of this compendium.

³² Each sub-paper also provides specific recommendations for its particular topic area.

What's Next in this Compendium?

The following chapters discuss the three waves of MERL Tech. As the field of MERL Tech is emerging, we see the evidence base emerging as well. The earlier the wave, the more rigorous the evidence base. As MERL practitioners, however, we are not interested only in rigorous evidence. We also want to better understand what trends are emerging and where there is lived experience and lived practice. The next three chapters take different approaches based on this need.



Chapter One, What We Know About Traditional MERL Tech: Insights from a Scoping Review

by Zach Tilton, Michael Harnar, and Michele Behr, University of Western Michigan; Soham Banerji and Manon McGuigan, independent consultants; and Paul Perrin, Gretchen Bruening, John Gordley and Hannah Foster, University of Notre Dame; covers the technology and traditional MERL wave.

This paper aims to answer questions about how technology enables MERL Tech practitioners to do what we've always done, but better or differently. It addresses questions about the nature of the scholarly evidence-base for traditional MERL Tech and begins to describe what actually existing traditional MERL Tech looks like in practice. This is the earliest wave, and thus we find a more established scholarly evidence base. Subsequently, the team conducted a scoping review to identify evidence gaps and begin to synthesize results.

It is part aggregative—presenting summarized reports of the locations, sectors, technologies, and MERL activities that constitute the growing MERL Tech field, and part interpretive—drawing inferences from those high-level attributes and syntheses of collected study conclusions and recommendations that pertain to technologies, MERL activities, or the contexts where MERL Tech is deployed. While the review produced interesting findings, it is believed that the majority of lived experiences are not captured in the academic literature, and that an additional review should be conducted to capture learning documented and shared in grey literature, evaluation reports, blog posts, and less formal channels.

Chapter Two, Big Data to Data Science: Moving from “What” to “How” in the MERL Tech Space

by Kecia Bertermann, Luminate; Alexandra Robinson, Moonshot Global; Michael Bamberger, independent consultant; Grace Lyn Higdon, Institute of Development Studies; Linda Raftree, independent consultant and MERL Tech Conference organizer; explores the second wave of MERL Tech — big data.

A vast number of publications discuss big data. In general, however, there is less of an evidence base for the focused use of big data for MERL so, for this paper, the authors focus on learning from MERL practitioners. The authors review the types of sessions submitted and presented at MERL Tech conferences over the past five years in an effort to identify trends and advances. They drew also from key informant interviews with MERL practitioners to better understand how they are using new sources of data or using existing sources of data differently in MERL work. The paper identifies clear trends, as well as areas where more documentation and learning are needed.

Chapter Three, Emerging Technologies and Approaches in Monitoring, Evaluation, Research, and Learning for International Development Programs

by Kerry Bruce and Joris Vandelanotte, Clear Outcomes; and Valentine Gandhi, The Development CAFE and Social Impact; looks at the third wave: emerging technologies that have potential for MERL. This paper answers questions related to how technology enables us to do totally new, formerly unimaginable things in the MERL space. The authors identify new and innovative approaches that were enabled by technologies. They highlight potential positive uses of those tools for MERL, as well as their potential drawbacks. They also recommend areas where more work to trial and test new approaches is required and flag the need for considering validity, rigor, ethics, and privacy.

The evidence is maturing alongside the sector's maturing

The evidence base for all of these waves was light in 2014 when MERL Tech efforts began to take shape. The atmosphere was also quite different; the sector was in the throes of excitement over the possibilities of information and communication technologies in the development and humanitarian space.

Five years later, as the sector has matured, it has become more critical and informed in its approach to some technologies, and a great deal of learning has taken place. It is important that the learning and critical lenses remain as newer technologies and approaches to data emerge. We must learn from what we've done and not fall victim to re-inventing and re-learning every time new innovations enter the space. Rather, we need to apply and expand on what we know, use our precious time and resources to improve rather than re-create, and draw on our expertise as MERL practitioners to promote and implement more ethical, participatory, and sustainable approaches.

**“ What has been will be again,
What has been done will be
done again;**

/ Ecclesiastes 1:9

**“ No idea's original,
there's nothin' new under the sun
It's never what you do,
but how it's done.**

/ Nas