Feature

The Ethics of Designing Digital Infrastructure

By Lucy Bernholz & Lyndon Ormond-Parker

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→ Nonprofits face a new era of making considered choices about their digital infrastructure to ensure that it aligns with their mission. The decisions that nonprofit executives and boards will make promise to transform the sector.

The Ethics of Designing Digital Infrastructure

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Illustration by James Minchall
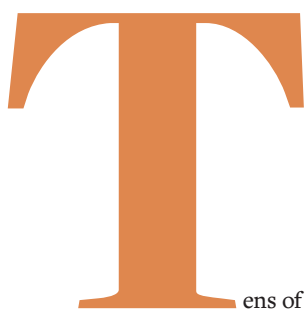
Tens of thousands of years ago, communities in northern Australia began developing systems for managing information to help them survive in a harsh environment. They designed these systems to delegate roles and responsibilities to different people with different skills, often delineated by age and gender. They shared knowledge about where to find certain foodstuffs and water supplies, how to distinguish medicinal plants from poisonous ones, and where territorial borders were drawn. They depended mostly on oral and visual practices to store and transmit critical information. They managed this valuable resource for the benefit of all and thrived for millennia.

Prior to colonization, approximately 400 languages were spoken on the Australian continent, and the northern region was one of the most linguistically diverse. But colonial rule threatened this rich cultural heritage by imposing legal, educational, and religious demands that were backed by forced migration and bans on linguistic and cultural practices. In the face of this threat, indigenous communities were forced to adopt strategies to protect themselves and their traditions.

Four hundred miles southwest of Darwin, on Australia's north central tip, lies Wadeye, a town of about 3,000 people. The majority of its residents are Aboriginal people from more than 20 clans, culturally rich, young, and economically disadvantaged. The predominant language spoken is Murrinh-patha.

Since the 1970s, the local community has been taking steps to record their language and customs. They made audiovisual recordings of linguistic traditions as well as of songs, dances, and examples of other traditional practices. They captured this knowledge on VHS tapes and mini-DVDs, which they stored at Wadeye's Kanamkek-Yile Ngala Museum.[1] Then, in 2010, local Wadeye leaders joined with representatives from national heritage organizations and colleagues from the University of Melbourne to develop a digital version of the museum's linguistic and cultural recordings.

Digitization afforded protection from loss of fragile VHS tapes, the opportunity to store backup copies offsite in preservation-quality facilities, and the ability to continue offering regular local access to the information. Over several years, Wadeye community elders, local museum and cultural staff, and scholars from across the country created a digital audiovisual archive, established a narrowcast television system in Wadeye, and piloted a local area network. The research team designed these systems to fit both the community's information-management practices and the extreme challenges of distance and cost.

The community and research team made digital copies of the analogue archive and used a local computer server to facilitate access. They developed a computer-based filing system that transferred the community's traditional rules about access into the digital system. They developed and coded all of the materials with a metadata schema that enabled the system to find and serve only that information to which a user was allowed access, based on his or her age and identity. In order to align with these knowledge practices and keep the costs down, the team configured low-cost delivery systems using the Raspberry Pi system of open-source hardware. They used Linux to enable access to the digital collection on nondigital televisions. The system was designed to take advantage of existing community infrastructure, including the television in the community center.

The Raspberry Pi hardware could be connected to this shared television with the same basic cables used to attach a DVR. The elders then tested the system, checking that the access rules were clearly embedded in the digital system.

In order for the local Aboriginal community to make their shared history and culture accessible for everyone, a digital TV broadcast system was established in late 2016. WadeyeTV broadcasts current and past events, such as football matches, ceremonies, stories of traditional songs, dance, oral histories, and health-promotion messages in Murrinh-patha.

In this way, the people of Wadeye have built and continue to develop digital systems that literally encode their values. They have pursued an inexpensive, sustainable way to protect their information, secure it from damage, and make it available for regular use. The infrastructure they developed aligns with their values about information, fits within their limited budget, and can be maintained by the existing staff.

Such a well-aligned digital infrastructure should be the aspiration of all nonprofits, everywhere. Nonprofits today are dependent on digital software and hardware. Just as they manage their financial, physical, and human resources, so must they align their digital technology with their values to achieve their mission.

TODAY'S DIGITAL DEPENDENCIES

In the 1960s, motivated by surging attention to civil rights, entrenched poverty, and antiwar sentiments, foundations, nonprofits, and churches began to align their investment portfolios with their programmatic missions. Through decades of innovation and iteration, from divestment efforts to the creation of the impact-investment movement, a field of financial practice emerged that sought to better align investments and values. There are many ways to seek mission alignment, ranging from omitting certain types of stock holdings, such as those in tobacco or firearms, to active portfolio management to invest in mission-related enterprises. Not all foundations or nonprofits align their investment portfolios with their missions, but many do. It's a common enough practice that those organizations that don't screen their investments in any way related to their missions are likely to have at least considered doing so. In other words, over several decades, what was fringe practice became common, with many options for levels of participation.

It's time to follow this same pattern by aligning organizational missions with digital infrastructure and data practices. Just as nonprofits and foundations depend on their financial resources to power their organizations, so do they depend on digital resources. These assets are less familiar than money, but no less important. The systems to manage digital resources can be built in ways that align with an organization's mission but should not be assumed to do so. The preset defaults built into software may be out of sync with an organization's values. The key for all nonprofit organizations is to be able to assess—and redress— any such technological compromises.

Aligning technology with mission requires understanding the organization's complete tech stack—the layers of infrastructure, including hardware, software, and organizational practices and policies, that undergird our everyday use of digital technology. The stack includes the organization's choice of computer storage (cloud or onsite); software and hardware choices; and processes for collecting, storing, using, sharing, and destroying digital information, from

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emails to board dockets. It necessitates decisions about software, hardware, external vendors, and the organization's data governance practices. Aligning the technology and digital practices with organizational purpose is as important as managing and governing your analog resource—time, money, and human capital—toward mission.

Digital resources are more varied than financial contributions, they come from a wider variety of constituents (including beneficiaries), and they are often exchanged over platforms and software that put third-party interests between donors and recipients. Digital data are also subject to an ever-shifting mosaic of legal demands, depending on whether they represent children, medical, educational, consumer, or financial information. Commercial firms and public agencies trying to govern digital data also must attend to the ways that networked binary code differs from financial or human resources. But the balancing act for organizations in civil society—which seek to use privately donated resources for public benefit—raises a suite of additional challenges.

When we envision the nonprofit or philanthropic organization of the 21st century, we can assume it will be using donated resources—financial, human, and digital—to achieve its public purpose. For financial and human resources, we have models of good practice, from internal financial checks to external auditors, as well as legal guidelines, including nondiscrimination laws and human resource managers.

But when it comes to managing and governing digital data, we are just now creating these practices. Nonprofit organizations are beginning to realize that using digital data well requires more than just the right software. It also demands personnel training, organizational policies, and board liabilities.

All organizations using digital data now need to consider how their dependence on this resource changes their technological, managerial, and governance practices. Civil society organizations are further challenged because these dependencies adhere the entire (theoretically independent) sector to governments and commercial actors in ways not yet fully acknowledged. Digital ties between nonprofits and governments are persistent and pervasive. They include nonprofit dependence on public data sources for program work and advocacy, an unintended consequence of open data, open government, and transparency initiatives. More broadly, government surveillance of the Internet and wireless spectrum means that all digital communication, including that of civil society organizations, is swept into state-monitored systems, effectively eliminating even notional independence or privacy. The same dynamic is at play for nonprofits and foundations using commercial software, cloud storage, or platform services in their default modes. Practically speaking, civil society, as a space free from government or commercial monitoring, doesn't exist in networked digital space. This is a challenge not just to the resilience of individual organizations, but also to the existence of both civil society and the democratic systems that depend on it.

Individual nonprofits and foundations now run on digital data—from emails to home addresses, performance measurements to

programmatic information on vulnerable people, evaluation data to donor information. While some domains are ahead of others, we are generally at the early stages of designing practices and policies for managing and governing digital data safely, ethically, and effectively for public benefit. Creating an appropriate tech stack for mission-driven organizations requires aligning software defaults, operating practices, organizational governance, and public reporting and oversight expectations.

A QUESTION OF GOVERNANCE

While there are technological advances that hold promise for civil society, the challenges we currently face are primarily questions of governance. They are shaped by internal challenges of resource stewardship and external challenges created by the political economy of civil society. They involve decisions about and tactics for protecting and stewarding digital resources in line with a nonprofit's particular mission. The external challenges arise because the vast majority of software and digital infrastructure used by nonprofits and foundations are commercial products and government-surveilled systems. The nonprofit sector has largely had to compromise its values to fit the default offerings of these digital tools. Only occasionally has civil society been able to leverage any collective power to develop and maintain digital tools that align with its values. Even then, the sector's reliance on commercial and public digital infrastructure shades the sector's cherished sense of independence.

The managerial and governance challenges of digital data are distinct from the programmatic or analytic challenges of using data for performance measurement or evaluative purposes. Unlike these narrower applications, the organizational implications of digital data are all-encompassing. They extend from board policies to front-line staff training, require regular updating, and are most effectively supported as perennial budget items. In an ideal situation, the operational questions will be answered in ways that facilitate these performative tasks. But in the real world, the desire to collect and use data often pushes the operational challenges to the fore.

Nonprofits can distinguish themselves from their commercial or public sector counterparts by how they apply their digital resources toward mission. To do so well requires a deeper understanding of how digital systems work; a new set of skills for staff, volunteers, and board members; and new measures of success. For nonprofits to succeed today, they need to be able to align all of their resources—financial, human, and digital—with their mission. From board chair to software, successful nonprofits will be those that maximize the potential of these complementary resources while maintaining the trust of those they serve.

Nonprofits are digitally dependent. Whether they exist as a large corporation with hundreds of staff people or as a group of local volunteers meeting in kitchens, they are likely to rely—at the very least—on a set of mobile phone numbers to get their work done. Building up from that minimum—the use of email, laptops, networked printers, social media platforms, hosted servers or cloud storage—today's nonprofit organizations rely on digital services and infrastructure. Aligning digital resources with mission is as important as is aligning the funding you receive, the office locations you choose, and the skills you select for when you hire staff, manage volunteers, or select board members.

Aligning digital resources requires a similar set of considerations. The task is harder, however, for several reasons. First, we're still not used to doing it. Even though nonprofits have been digitally dependent since they got their first email addresses, they still struggle to incorporate real technological expertise. Second, digital systems are opaque—you don't see the wireless spectrum, and most of us prefer not to have to understand how our routers and servers work or even where the data on our mobile phones is stored. Third, a lot of very cool software is available for free—a price point that is universally attractive, especially for financially strapped organizations. Access to online document-sharing tools, cloud storage, and social media networks can be had with what at first appears to be no associated line item on the expense side of the budget.

But the most important reason for misalignment is that most of us—in our lives at work and at home—don't realize the types of tradeoffs that software and hardware demand of us. Cost has been the primary criterion for choosing software and hardware products. Functionality, access, configurability, support, maintenance charges—these considerations also factor in. But for decades, only a minority of organizations and civil-society activists have paid much attention to the ways in which their choices of digital resources might or might not reflect their values and their mission.

DIGITAL CHOICES

In many ways, the movement to align financial investments with mission has been more straightforward than similar efforts to align digital practices. While there are many decisions to be made about financial resources, a robust service sector of professional managers and advisors is ready and willing to help. Financial decisions and activities can be overseen by a finite number of people in any organization, on clear schedules, and with assigned checks and balances. There are also clear regulatory requirements and compliance mechanisms.

Aligning digital practices is more complicated for a few reasons. First, digital data and systems are used by everyone in an organization, or at least everyone with an email address. The practices and policies that an organization wishes to follow must be communicated to, understood by, and practiced by everyone. Second, digital resources are still poorly understood, especially as compared with money. Third, digital data are almost never static; they exist on what is often referred to as the "data life cycle," and decisions need to be made for each stage of this cycle. Fourth, digital practice involves at least three separate but related sets of activities and choices:

- information technology decisions about hardware, networks, and software;
- data management for specific purposes such as programming, evaluation, fundraising, or communications; and
- data governance as a board responsibility, strategic asset, and source of liability.

While it would be most efficient and cohesive to have the last area—data governance for strategy and liability purposes—attended to first, most organizations find themselves either focused on IT decisions or addressing data management issues in an ad hoc way. Recognizing this, a more useful place to start is with the data life cycle—a frame that can be used to consider decisions about IT (both

software and hardware) as well as specific departmental goals and legal obligations for certain kinds of data. There are many versions of the data life cycle, each providing various levels of complexity. For our purposes, a simplified five-stage process will suffice. These stages are collection, analysis, storage, sharing, and destruction.

Once organizations recognize digital data as a "living" resource, they can inventory it, apply their existing decision-making processes to develop new policies, and budget for the kinds of training or systems changes needed to manage digital resources responsibly.

The most important thing to learn from looking at your organization's data through the lens of a life cycle is that data governance is *everyone's* business. Simply plotting email along this life cycle reveals that these data are created and used by everyone; are stored on several different devices at any point in time; and require organizational policies and ongoing training to control how they are shared, accessed, and destroyed.

It's also important to think about the multiple, interoperable layers of digital technology that support your organization's work. To align your tech stack with your organization's mission is to identify the points of intersection between software and hardware and your organization's values. If your organization is working with vulnerable people, for example, you will want to make sure that the software, hardware, and external vendors you use can protect that information and allow access to it in ways that align with your governing board's responsibilities. Because most nonprofits won't be in a position to negotiate over shared Internet infrastructure, it's worthwhile to consider only those layers of the tech stack over which a typical organization can exert some control.[2] (See "Layers of the Nonprofit Tech Stack" above.)

Every organization depends on these layers and has varying degrees of choice at each stage. At the top layer—where content and applications meet board governance—organizations have a lot of control. As you move down the tech stack to the bottom layers of networking protocols and Internet providers, the number of choices available to consumers decreases. In many parts of the world, the choices of telecommunications carriers for broadband are limited. Organizations with technically advanced staff have more options at every level of the stack, as they can customize their applications; use open-source products; and take advantage of smaller, niche vendors that provide alternatives to the major infrastructure providers.

It should also be noted that many organizations rely on software as a service, and they store their materials on offsite servers, commonly called "the cloud." These choices blend together different layers,

Layers of the Nonprofit Tech Stack
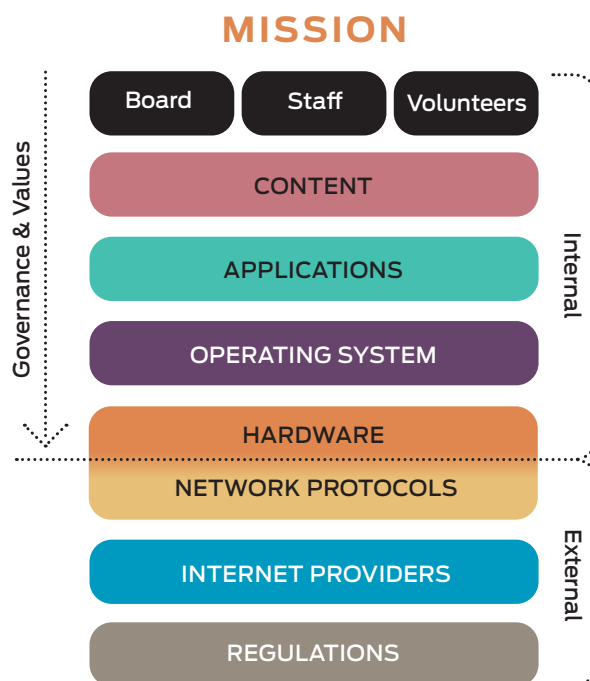
basically bundling applications with hardware, for example. They are the digital equivalent of managing your organization within the software and hardware boundaries offered by the vendors, most often Amazon, Microsoft, Google, or Salesforce.

Because cost and accessibility are important parameters, nonprofits may find that the choices available to them aren't ideal. For example, an organization might prefer not to use commercially provided free-storage options because it doesn't want its information to become the property of the corporate provider. However, it also doesn't have the resources to build, maintain, and protect its own systems for remote access. In this case, the alignment challenge will require an organization to use less-than-preferred technology and train their staff to be careful about the kinds of information that is stored there. This mix of human behavior and technological solution will be common throughout the alignment process.

NONPROFIT VALUES FOR DIGITAL DATA

The nonprofit sector in the United States alone includes more than one million organizations with missions that are wide-ranging and often at odds with one another. Because of this, there is no one-size-fits-all approach to aligning technology with organizational mission. However, it is possible to identify common values that hold for the nonprofit sector across its multitude of missions by focusing on its overall function and purpose. In contrast with for-profit corporations, nonprofits exist to ensure that a diversity of public-benefiting efforts, which are not served by the larger market or public sector, can flourish. The tactics designed into the form to ensure the public benefit include limiting the possibility of individual profit, self-governance, and accountability for activities.

If we define civil society as the voluntary pursuit of public benefit using private resources, we can identify four common values for all organizations in this sector. Their voluntary nature requires a commitment to consent and permission. The dependence on private resources demands attention to the rights of individuals—the need to secure the resources and recognize individuals' control over their data as well as their associational and expressive rights. The public-benefit purpose suggests that data use be mission-specific (as distinct from a potential revenue source). And the pluralistic nature of the sector reinforces the opportunity to engage multiple voices—including those of the people represented in the data—in governing the resource. This generates four common principles for digital data use: public benefit, voluntary (or permission-based), private rights, and pluralism.

First, prioritizing public benefit when making choices around data use enables an organization to ask itself whether the risks of

having certain kinds of data are worth it. Are there types of data being collected that don't serve the public purpose of the organization, and can that be minimized? This focus on public benefit might inspire reconsideration of board structure or decision making. Some groups, such as Emerson College's Engagement Lab, have developed new advisory structures so that the people represented in the data have some say over how the organization uses it. They do this through a combination of new advisory boards and memoranda of understanding between participants outlining their different roles.

The voluntary nature of the sector also provides a filter for technology practices. Nonprofits rely on time and money from volunteers and donors and have developed practices to invite that participation and respect its limits. These same approaches can be applied to the collection of digital data and its use. Respecting the rights of individuals to contribute their information, asking to use it, and being clear and honest about how it is used not only is in line with how the sector treats other resources but also readies nonprofits to meet emerging data regulations, especially those coming from the European Union.[3]

Respecting the private nature of digital data as a resource is a step in this same direction. Nonprofits that treat digital data on people as a contribution from private individuals can make decisions about data security and sharing grounded in a commitment to protect that privacy and the digital resource. Not surprisingly, given the challenges of maintaining high-grade technological security, these efforts often take the form of minimizing data collection in the first place.

Finally, the range of digital infrastructures—from fully open source to custom-made systems—mirrors the pluralistic aspirations of the nonprofit sector. Just as there is a breadth of missions, there is a breadth of systems. The sector is home to software and hardware developers and communities that build alternatives to ready-made commercial offerings. People experimenting with mesh networks, building encryption tools, and creating apps for deliberative decision making often organize themselves as nonprofits or situate themselves as part of civil society. This pluralism of structure and technological infrastructure is key to the long-term vitality of nonprofits and civil society. Consolidation of nonprofit activity on any single software or hardware system may be in the best interests of the platform provider, but it won't serve the sector well.

Aligning organizational technology with mission is the first step in building a civil society that can thrive in the digital age. Beyond the level of any single organization is the need to recognize the sector-level intersections between digital policy and civil society.[4] The laws and regulations that shape our digital systems are of critical importance for civil society to continue, because these are the very rules that today define our associational rights.

A TRANSFORMATIVE MOMENT

Much of the debate to date about aligning technology with values has been framed as choosing between open-source software or hardware and their ready-made, proprietary counterparts. Framing this as an either/or, the debate is both oversimplified and misleading. Open-source software components, which are maintained by many people and made available for use, adaptation, and reuse, sit at the core of the software that powers most Internet servers. Many commercial offerings depend on open-source components and standards. The idea of these as distinct alternatives is inaccurate.[5]

That said, many organizations are attracted to an idealized image of open source, which promises transparency and reusability, and presents an opportunity to avoid being locked in to the products, services, and long-term contracts of commercial proprietary options.

However, configuring, supporting, updating, and protecting a system built on open-source software requires a level of technological know-how that is often not available to, or affordable by, nonprofit organizations. The external ecosystem of software coders that maintains open-source tools is a critical factor, and one that is outside the sphere of influence of any single organization. An organization that depends on open-source tools is dependent on this ecosystem to keep maintaining and upgrading the tools. That ecosystem, as Sean McDonald of FrontlineSMS has noted, is fragmented and difficult, if not impossible, to corral over time.[6] For most nonprofits with limited technology budgets, the need to be able to find reliable support for their software and hardware without having dedicated expertise on staff is going to rule out depending on open-source tools.

Even more important than where your organization sits on the spectrum between open source and off the shelf is the recognition that the range of choices for digitally aligning your organization and its mission go far beyond this single choice. The true test of mission-aligned digital organizations is how well governance, software, hardware, and staff skills work in concert to further social purpose.

We find ourselves in a transformative moment. Nonprofits and associations of all kinds are now focusing attention on making correct choices about digital security, data privacy, permission, and consent practices, and trying to find ways to better align their work with their tools. This mainstreaming of ethical concern about the tech stack points to a wholesale reinvention of nonprofit organizations. It will lead to new organizational forms, reminiscent of those we know today but purpose-built to align and dedicate both digital and analog resources to achieve their mission. ∎

RESOURCES

Once you realize that you need to develop organizational practices and policies to manage digital data, where can you turn? The Responsible Data Forum is an online community dedicated to generating resources for using digital data in the social sector. And Digital Impact hosts a free online tool kit filled with templates for different organizational policies, as well as worksheets and checklists for managing your organization's data.

NOTES

1   Information in this article about Wadeye, the museum, and the digitization efforts comes from L. Ormond-Parker, M. Langton, M. S. Huebner, J. Coleman, C. Pearson, R. Slogget, R. Nordlinger, K. Smith, and K. Clarke, "When Magnets Collide: Digital Preservation and Access of At-Risk Audiovisual Archives in a Remote Aboriginal Community," Melbourne Networked Society Institute, University of Melbourne, Research Paper 1-2016, 2015.

2   Note there are alternative systems, such as mesh networks and personal cloud servers, that technologically sophisticated organizations and individuals can access. These levels are indicated in the chart on page 44 by way of choices about operators, rather than in terms of protocols and standards, in order to be relevant to the greatest number of readers.

3   The European Union General Data Protection Regulation, adopted in 2016 and taking effect in May 2018, subjects nonprofits to a broad set of data regulations.

4   Zara Rahman, "Ties That Bind: Organisational Security for Civil Society," prepared by The Engine Room for the Ford Foundation, March 2018.

5   Nadia Eghbal, "Roads and Bridges: The Unseen Labor Behind Our Digital Infrastructure," the Ford Foundation, July 14, 2016.

6   Sean McDonald, "Frontline and the Missing Middle Mile," Opensource.com, March 18, 2015.