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HOW TO BUILD INTEGRATED ED-FI INFRASTRUCTURE TO SUPPORT STATE AND LOCAL USE CASES

A Roadmap for State Education Agencies

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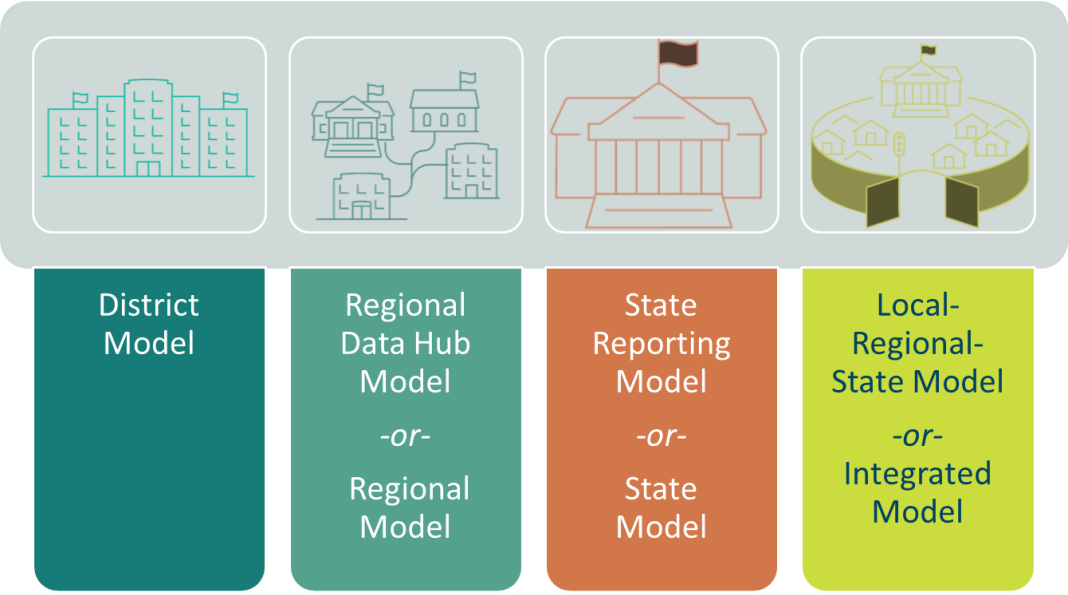
INTRODUCTION

States across the U.S. are asking the same question: *How do we make it easier on ourselves and our districts to collect and use data for the things we need and want to accomplish?* In pursuit of an answer, many state education agencies (SEAs) have begun the process of building out data infrastructure that leverages interoperability. In many cases, the interoperable technology of choice is Ed-Fi, and there are multiple models a state could choose to set up Ed-Fi infrastructure across the state:



The **district model** refers to Ed-Fi implementation within a single (typically large) district. The **regional data hub model** (or "regional model") refers to implementation among a consortium of districts, typically located in the same state; the **Michigan Data Hub** and **INSite** in Indiana are examples of this model. The **state reporting model** (or the "state model") refers to statewide implementation focused primarily on enabling and streamlining mandated state reporting across the state, such as in **Wisconsin**, **Arizona**, **Nebraska**, and **New Mexico**. Finally, the **local-regional-state model** (or "integrated model") brings together local, regional, and state education agencies, such as the partnership in South Carolina between the **South Carolina Department of Education** and **District Data Governance Group**. In the integrated model, an Operational Data Store (ODS) is stood up for the SEA, and an ODS is stood up for each local education agency (LEA). This is designed to enable *both* state use cases (e.g., state reporting, policy research) and local use cases (e.g., operational data use, data analysis); regionally based **education service agencies** often provide key support to the LEAs and the SEA in the realms of governance, infrastructure, and service.

You can find more information outlining these different models, or implementation patterns, as part of the **Ed-Fi Alliance's Ed Fi Academy**.

Why Consider an Integrated Model?

Recently, states working to build an integrated model have started demonstrating this model can create far more incentive and buy-in across all stakeholders (relative to the other models), resulting in faster, more accurate, and more sustainable infrastructure builds. The district and regional models, while they can be impactful for the districts involved, have been extremely limited so far in their abilities to scale or enable coordinated, collaborative expansion of Ed-Fi. Most LEAs are not funded sufficiently well enough to infuse interoperable data into all of their operations, due to the high costs of integration. Vendors in these cases are not incentivized to bear those integration costs and to support data standards at the local level.

On the other hand, the state model has shown the ability to implement Ed-Fi at scale, with more robust funding streams and more incentive for vendors to support state-wide data standardization—but there's been minimal evidence to date that this scaled infrastructure is being used and valued by educators in school and district settings.

The integrated model positions the SEA to drive scale *and* impact of Ed-Fi. Some of the benefits of this model are that it:

1. Allows the state to simplify and automate their required reporting
2. Avoids yet another compliance activity for LEAs by providing them with a *service* that enables their own operational use of data
3. Saves money, time, and resources overall at both the SEA and LEA levels
4. Facilitates collaboration between the SEA and LEAs
5. Improved accuracy and usability in data quality checks for state reporting and other purposes.
6. Easily supports additional use cases at various levels of data granularity (e.g., for research, for policy)
7. Streamlines integration of various apps used by districts
8. Scales up to new data needs
9. Integrates assessment data
10. Standardizes collecting and validating data

There are, of course, several **challenges** that emerge when pursuing this model, which we discuss in **the next section** (along with the key questions to ask to anticipate those challenges). Then, the sections that follow outline a roadmap with five phases (Phase 1 – Phase 5):

- **Phase 1** is when the SEA needs to consider five critical decisions to be made *before* any technical work or project planning even begins—hence, why we label it Phase 1. Dedicating time and energy during Phase 1 will ensure you avoid complications later, are well positioned to cultivate stakeholder support, and anticipate as many risks as possible in advance, all of which will help you set your implementation up for success. The length needed for Phase 1 depends on the complexity of the systems in your state; the more

departments and bureaus that need to coalesce towards a unified strategy, the more time this will take.

- **Phase 2** is the planning phase, when the SEA will engage with stakeholders, design the ODS systems, and make their roll-out plans.
- **Phase 3** is the pilot phase, when participating LEAs will begin implementing Ed-Fi and testing out the initial design of the implementation. This crucial year allows you to uncover problems, assign ownership of those problems, design solutions to those problems, and prepare for wider roll out.
- **Phase 4** is the parallel phase, when the SEA is validating whether Ed-Fi is replicating the existing file-based state reporting process. At the same time, any local data services for LEAs and ESAs are now in production, so they are able to start using interoperable data for their prioritized uses. During this time, all agencies (LEAs, ESAs, and SEA) are learning how to navigate the new workflow, and the SEA is helping alleviate the added pressure felt from two parallel reporting approaches.
- **Phase 5**, discussed in the conclusion, is the production phase, when Ed-Fi is the sole approach for state reporting and local services can continue to populate on top of the ODSs.

The details shared in these phases can serve as a high-level, big-picture guide for states that are interested in setting up their Ed-Fi infrastructure as part of an integrated model. It is not meant to be prescriptive, but rather meant to help lay out all of the elements involved in the process in an organized way, based on our experience to date helping states with this process. Please refer to the **prescriptive SEA Playbook published by the Ed-Fi Alliance** for state leadership to guide the SEA team on what is involved in adopting Ed-Fi.

This roadmap is designed for states that have not yet started on their Ed-Fi implementation journey, *as well as* those that may be somewhere along the path of these phases. Although this document positions the SEA as a key driver for each phase of implementation, there may very well be other agencies (such as LEAs and regional Educational Service Agencies) that are playing a significant role in driving the work forward, bringing stakeholders together, and developing processes to enable smooth implementation. Even if the state is not initiating the Ed-Fi rollout, the policies and legislative actions of the SEA influence and even drive how LEAs and service agencies both use and interpret data.

Although we present these phases sequentially, there are ways to expedite the process when needed (e.g., due to legislative or contractual constraints). There are tradeoffs to working these phases concurrently vs. sequentially, such as the risk of not seeing downstream implications of some decisions until later than desired, but an experienced partner who has supported states in establishing integrated infrastructure can help diagnose the tradeoffs in the context of your state. Some SEAs may be well positioned to move through these phases more quickly, and others may want to invest more time in one place or another depending on their context.

In our experience to date, a successful implementation of integrated Ed-Fi infrastructure takes 2 ½ years at a minimum: ½ a year for mapping and policy alignment, 1 year for pilot, and 1 year for parallel. More commonly, a timeline of 3+ years is more realistic, but our hope is that as more states and more vendors become more familiar with and expert in the technology, this timeline can continue to shorten.

> *An experienced partner who has supported states in establishing integrated infrastructure can help diagnose the tradeoffs in the context of your state.*

PHASE 1: PRE-PLANNING

The challenges that any set of stakeholders within a state must grapple with when designing and building an integrated model can be framed as **key decision points** that need to be made *before* embarking on such a roadmap. In other words, before any technical work or concrete project planning begins, the SEA must engage in deep conceptual thinking to set the implementation up for success. These are the decisions that need to be made as part of Phase 1:

1. **Consider the sequence of how to build the infrastructure**. Will you build the state ODS, then add in local ODSs? Will you build the local ODSs, and build the state ODS? Or will you build both the state and local ODSs at the same time? Work with a **trusted Ed-Fi implementation partner** to help you navigate the tradeoffs to each of these approaches. If you are in a position where you've already embarked down one of these paths, one of these partner organizations can help you customize the guidance in this roadmap to match your circumstances. If you haven't yet chosen a sequence, an implementation partner can work with you to understand the context in your state (including the vendor landscape, LEA use case needs, SEA priorities, and political considerations) to advise on the most likely path to success. We've seen evidence of success with all three of these approaches—so while there is no one right answer for all, there may be an optimal answer for your case.
2. **Decide on ownership of the infrastructure.** Your decision about the sequence of the infrastructure build will constrain and help inform the policy-driven decision about who owns said infrastructure (i.e., who oversees it and is responsible for maintaining it over time). This also has implications for data governance (see #4). Options include: The LEAs own their ODSs, and the state owns the state ODS; a consortium of LEAs or an Education Service Agency (ESA) owns the district ODSs, and the state owns the state ODS; the state owns both the state and LEA ODSs; or some LEAs own their ODS, other LEAs only connect

their SIS to the state ODS, and the state owns the state ODS. Deciding on the sequence and ownership of the infrastructure can be made in parallel, but likely will need to consult different groups (technically-focused for the sequence and policy-focused for the ownership).

3. **Design the state ODS and local ODSs to align to both state and local use cases.** Detail the key requirements of the state ODS that preserve the potential for local use, even if local ODSs will come later in the sequence. Decide on key requirements of the local ODSs, beyond simply SIS connections. Engaging LEAs and service agencies to gather local use cases and approaches to data will help guide the choices made at this stage. Often there is a great deal of alignment in SEA and LEA approaches to data, but the LEA need for data is often wider than the SEA needs. An example of this is discipline data, where an LEA may need detailed data about the incident and the resulting actions, but the state may only want a summary count of the types of incidents. Engagement at this stage shows all parties that there is a shared ownership of the approaches to data, rather than just a prescription from the SEA. Resources like previous MSP engagements, existing local and service agency implementations, and Ed-Fi certifications can provide a starting point for enumerating state and local needs. One practical benefit of this engagement is that the SEA may find that a vendor who is already Ed-Fi certified (or intends to be certified) has much of the necessary code to start the process efficiently. Ignoring the local needs or truncating the requirements of a particular Ed-Fi resource may result in more development cycles in the future and longer vendor delivery timelines.
4. **Design a coordinated management model**. Both the SEA and LEAs will need to be involved in coordinating their respective needs, in order to streamline the interactions with vendors. In our experience, leveraging a third party to interface between the SEA and the LEAs and develop this coordinated management has been the most promising approach. For example, South Carolina established the **District Data Governance Group** (DDGG) and Texas has established the **Texas Education Exchange** (housed within an ESA) for this purpose.
5. **Establish a plan for smooth vendor management.** Even before a state ODS is stood up, it's crucial to be up front with vendors about the need to prioritize using best practices (according to the Ed-Fi community), rather than taking short cuts that create short-term gains while locking states into exclusively relying on that vendor long-term. This means the state ought to commit vendors to using core Ed-Fi, provide thought leadership to the vendor community in their state to direct how the infrastructure build will unfold, ensure vendors understand the benefit to them to ensure joint optimal outcomes, and provide technical assistance during implementation to non-SIS vendors (e.g., assessment vendors, survey platforms) who are less integrated into Ed-Fi than SIS vendors tend to be.

You do not need to navigate these decisions alone; there is a robust Ed-Fi community to lean on and learn from so that you do not need to re-discover for yourself the challenges experienced by those who are already on this path. Discovering those unknowns along the way on your own can be more frustrating (and costly) than finding a trusted partner who knows

where those sticking points are. You may want to conduct a cost-benefit analysis to understand the tradeoffs between contracting with an implementation partner and staffing the work fully in-house.

That being said, we recommend that any state embarking on their Ed-Fi journey find trusted partners with experience in establishing an integrated interoperable infrastructure who can help guide them through each of these decisions given the unique context of their state.

PHASE 2: PLANNING

In Phase 2 of the project, the SEA begins to engage with key stakeholders—including LEAs, vendors, partners, legislators, and others—to plan the Ed-Fi pilot itself (which begins in Phase 3). During the planning phase, it is all about the **design of API/ODS systems** that need to be built in ways that enable the desired use cases for both the SEA and LEAs. In this phase, we lay out three main steps that the state needs to initiate during planning, prior to the pilot:

1. Model reconciliation
    a. Mapping
    b. Determine seed data
    c. Design & deploy extensions
2. Design a roll out plan for the SEA, LEAs, and vendors
3. Architecture & deployment

Below, we detail each of these steps to walk through the key decisions needing to be made, the main challenges to work through or avoid, and the lessons we've learned from doing this work in states across the country.

Step 2.1: Model Reconciliation

Model reconciliation refers to the process of reconciling (or unifying) the state's data model with the Ed-Fi data model. There are **three components** of the model reconciliation process:

(a) **Data model mapping**: Converting your state's data model to the Ed-Fi model of data
(b) **Determining seed data**: Identifying the fundamental data elements that will populate the ODSs
(c) **Designing & deploying extensions**: Deciding what extension (if any) are needed for your data model and how to design those extensions

We summarize each of these three components of model reconciliation below.

STEP 2.1A: DATA MODEL MAPPING

The first step in the model reconciliation process is *mapping* your state's current data model onto the Ed-Fi model of data, with the goal of fitting your state's data model into the Ed-Fi

model. To do this "fitting," the SEA needs to go through each element of the state data and make logical connections to Ed-Fi data elements (which may or may not be like one another).

Note that **data model mapping** is a distinct process from **descriptor mapping**, where you will map descriptors from your state data model (e.g., the categories that can populate a `race` variable, or the values that can populate a `gender` variable). Think of a **data model** like a globe of the world: it organizes the full picture of the world in one format and standardizes how things are represented on the globe. In turn, think of **descriptors** as the legend on that globe: it specifies what specific colors or symbols mean and what's "allowed" to be on that globe. You can learn more about the details of descriptors from the Ed-Fi alliance **here**.

As you engage in the model reconciliation process, there are **three types** of mapping, listed in the order of *most* to *least* desirable:

1. **1:1 mapping**: When both the data model *and* the descriptors exactly overlap between the state data model and the Ed-Fi data model
2. **Close mapping**: When either (1) the data model matches but the descriptors don't match, or (2) the data model doesn't match but the descriptors do match. In either case, you create a logical map between the differences, which are closely aligned but not exact.
3. **Extensions**: When neither the data model nor the descriptors match (which is a model mapping problem), therefore requiring the creation of an *extension*

Data model mapping is a precursor to getting any of your vendors up and running, as it is the process by which you will establish the ground rules of Ed-Fi in the context of your state. It's also a precursor to being able to discuss *local* use cases and *local* data models because many local data needs are derived from the state or federal definition (e.g., special education, disability status); this means that engaging in the model reconciliation process results in significant coverage of what any local data model must first include.

There are **two major goals** to keep in mind during the mapping process when integrated Ed-Fi infrastructure:

1. Enable *controlled granularity* to support local use
2. Be prepared to modify your own organization's practice because of model reconciliation

We briefly explain each of these goals in turn.

Enable controlled granularity to support local use.

You do *not* want to modify the Ed-Fi model in a way that excludes local use, such as by customizing the API or customizing your data model so that a district is not able to land additional data beyond what you, as the state, are defining. Let's take *discipline* data as an example: You want to do your state-to-Ed-Fi mapping so that your state's disciplinary definitions are a *subset* of the entirety of discipline types that exist in the data system. This means you should allow other discipline incidents—beyond just the ones the state is counting or validating—to land in the data model.

In other words, you do not want to *force* LEAs to roll up all their discipline codes to the state's discipline codes; instead, you want LEAs to have flexibility to be able to roll up the codes to the state codes for some purposes, and to use their local discipline codes for other purposes, depending on the use and the context. Note that this principle is also in line with the current Ed-Fi guidance on *descriptors* (a type of seed data, which is described more in **step 2.1b**).

The concept of *controlled granularity* refers to the idea of having as much granularity as needed for LEAs to get value from the ODS *and* for the SEA to meet their legislative requirements. This does not mean all values should be preserved at their most granular level, as that would become unnecessarily unwieldy. It's important to embrace flexibility and not accidentally remove it, which is a nuanced balance to strike.

Be prepared to modify your own organization's practice because of model reconciliation.

Model reconciliation is *not* simply a process of creating 1:1 mapping between the state and Ed-Fi fields (though that is a vital component of it). For state education agencies, it's also about how to adapt state data practices to enable the model reconciliation moving forward. This may mean, for instance, identifying which fields in an existing collection no one is using, and then deciding whether to stop collecting that field after consulting legislative mandates, liaising with other bureaus or departments that uses that data collection, etc.

A common example of this is aggregate attendance values, which most states collect. The logic in the mapping for how to do this aggregation depends on the number of SIS vendors in the state; more SIS vendors means more logic sets for how to compute the aggregation from local data. When you begin the move to Ed-Fi, this allows for granular attendance, so it makes the most sense to receive granular data from the LEAs and then centralize aggregation at the state level—which means the state now needs to take on this aggregation step, whereas before, aggregation was "baked into" what the SIS vendors delivered to the state.

This has some implications that are crucial to consider during Phase 2 (and not later). For example, once the granular attendance data are in the ODS, the state must shift from simply verifying a single attendance number per district to now calculating that number themselves. Consequently, the state may have new business processes to add, existing business processes to amend, or old business processes to remove—and the SEA must be open to all these possibilities as an outcome of the model reconciliation process.

STEP 2.1B: DETERMINE SEED DATA

After you've completed data model mapping, the next step in model reconciliation is to determine your ***seed data***—those data elements that will fundamentally populate the ODSs. A key assumption for how we are laying out how this would be done is that we are starting at the state level and from the state context. This means we're assuming that the state has authority over certain data elements, such as school information, school codes, student IDs, staff IDs,

and so on. The state will be making decisions about how much of those data you pre-fill into any ODS will operating in the state (either state ODS or local ODS)—in other words, you're defining your **baseline data elements**.

Without baseline data elements, LEAs and the SEA could have vastly different opinions about what should populate the ODS. For instance, the LEAs and SEA need to agree about which value is used for a state identifier. This means entering into a mutual agreement or a contract of sorts about these elements.

There are four main categories of seed data:

1. **Education organization information**, such as school name, school ID, district ID, etc.
2. **Descriptors**, such as race categories, discipline actions, languages, countries, counties, student mobility codes, etc.
3. **Courses**, or meta-course data that enables course categorization at the state level, such as whether the course is credit bearing, course content area, AP flag, honors flag, etc.
4. **Programs**, such as special education, English learner, 504 plans, food services, etc.

Choosing which data to pre-seed allows the state to make crucial decisions ahead of time, such as what "counts" as a single school within the data system and ensures there is alignment between the SEA and the LEAs.

A common mistake to avoid is using seed data as a replacement for a **master data management process**. You do *not* want your ODS to serve as the original source of truth for the data inside of it. Although it should *align* to the sources of truth, every seed data element should originate from another database or data system that serves as the authoritative source for that element. The ODS is designed to enable o*perational storage* of data; it is not meant to be an *authoritative source* of a data element.

Consider the example of school IDs. The ODS should store the school IDs that are currently in operation. When a new school is created, it must be created in *another* system (not in the ODS). That system should go through some sort of authorization step (to ensure that new school ID is valid, accurate, etc.), and once the school ID data are authorized, then they would land in the ODS as part of the seed data for the upcoming school year. The ODS should not be the original source of truth for the school IDs, but rather you want the seed data in the ODS to be downstream of some other validated business process.

STEP 2.1C: DESIGN AND DEPLOY EXTENSIONS

While you are establishing your seed data, you'll also begin to determine what extensions you need for your data model, and how to design those extensions. These two processes (Step 2.1b and Step 2.1c) occur in parallel, and occasionally, one side can inform the other (i.e., extensions can determine new seed data that needs to be added, and seed data can inform which extensions are needed).

As a rule, extensions should be limited to only those data elements that are unique within your state's context. Given that rule, there are **two categories of extensions:**

1. Data elements that will *always* only ever be for your state
2. Data elements that do not yet exist, but other states are likely to adopt

The first category means anything esoteric or specific that is mandated by your state's legislature. For example, in some states, there's a requirement to collect information about restraints used. Although there may be several different states that collect this general type of data, the format and granularity of those data vary greatly from state to state (e.g., some states collect this in the form of a code, whereas others collect this as a narrative). In these cases, an extension is necessary because it enables the SEA to meet its own mandated reporting requirements.

The second category is common when there is an emergent data type, perhaps because the federal government has adopted it. For example, during COVID, the federal government mandated the **collection of digital equity data**, and they were quite prescriptive about what data elements needed to be collected (e.g., internet performance, device access, etc.). This translates well to a shared data model addition, given the shared need across states to collect these data. Any time there are overlapping needs with other states for a new federally mandated construct, an extension should be constructed in collaboration with other SEA partners, and then put forward as a new addition to the data model.

This is why it is so important to work with a collection of trusted and well-informed partners who can help drive this effort. This group should ideally include partners who have experience with state Ed-Fi data models, as well as the **Ed-Fi Alliance**—not only so that you get appropriate guidance on what should be a shared extension versus unique to your SEA, but also to help you tap into the community and network needed to collaborate on a shared extension.

Step 2.2: Design Roll Out Plans for the SEA, LEAs, and Vendors

Once your model reconciliation, seed data, and extensions are sorted out, you can begin planning your Ed-Fi roll out. This means considering the needs of and strategies for gaining stakeholder awareness and buy-in within your own SEA, among the LEAs, and among your vendors. We discuss each of these three groups below.

STEP 2.2A: SEA ROLL OUT PLAN

When planning how to roll out Ed-Fi within the SEA itself, there are three main steps to consider.

First, begin by informing and collaborating with your non-technology users and stakeholders—namely, anyone who is not part of the state Ed-Fi team. You need to engage with them so that they understand what the transition to Ed-Fi means for them. For instance, if you are changing

what data you collect, you absolutely need others at the table to understand how their downstream processes will necessarily change.

Second, you'll begin to implement the changes to your business practices that you identified in **Step 2.1a**, during the data model mapping process. Recall that our **second major goal** of mapping is to "be prepared to modify your own practice at the SEA as a result of model reconciliation." When planning your SEA roll out, this is when those identified changes become reality.

Third, you need to identify if any existing **validation frameworks** need to be modified. Taking our earlier example of aggregate attendance values, the SEA would need to consider how to shift from validating a single data point of aggregated attendance from each LEA to now validating the granular data you receive and then need to use to calculate the aggregate attendance rate. Note that the validation needed depends on your state's legislative requirements. For instance, if the attendance *rate* must be validated, then the SEA will need to first calculate and then validate that aggregate attendance rate computed from the granular data. If, on the other hand, the legislature specifies that an attendance *count of* days in sessions must be validated, then that would require a different validation framework. Other stakeholders within your SEA must be part of (and be on board with) any new or amended validation frameworks.

Finally, you must decide how to augment your labor force to make Phase 2 (and beyond) happen. Rather than taking on the entire burden within the SEA labor force, the SEA will need to partner with another organization that *already* serves this purpose of facilitating collaboration and change management with districts. In many cases, this may be partnering with one or more educational service agencies (ESAs), as in Michigan and Texas. In some cases, a state may need to establish a new third-party entity for sustained collaboration, like the District Data Governance Group in South Carolina. In yet other cases, another organization (such as Education Analytics) may be the best option to augment the SEA's labor force and get implementation off the ground. Which partnering organization you choose will depend on the local context of your state, as well as which points of deployment you need help with (e.g., just on the front end, during planning? Or throughout the entire planning, implementation, and maintenance of the deployment?)

Regardless of the specific choice of *which* organization to partner with, we highly recommend **establishing a statewide collaborative housed in some type of hub** to cultivate the value of local use of a statewide Ed-Fi implementation. The table below includes three examples from different states that have used this approach:

State	Collaborative Hub
Michigan	**Michigan Data Hub** (MiDataHub) housed at Kalamazoo Regional Educational Service Agency (RESA)

South Carolina	**District Data Governance Group** (DDGG) incubated at Richland School District Two, and moving to a separately incorporated nonprofit
Texas	**Texas Education Exchange** housed at the Region 4 Education Service Center (ESC) as part of larger collaborative of ESCs across the state

In each of these examples, the state has resourced and participated in the setup of a hub at a school district or a regional educational service entity. The rationale for these choices has included:

- Creating some structural distance between the state and the hub
- Keeping the hub inside the government orbit
- Ease of grantmaking and/or contracting
- Building trust with districts

In many states, the most straightforward hub strategy would be for the SEA to work with a regional Educational Service Agency (ESA). The ideal ESA would meet the following criteria:

- Positive reputation in the state, particularly among technology leaders in the state
- Previous success in state-ESA collaboration
- Previous experience and infrastructure for entering IT-related service contracts with LEAs
- Previous experience and infrastructure for entering into data privacy agreements with LEAs
- Entrepreneurial leadership

Alternative hosts for the hub beyond an ESA include a school district or a separate non-profit. If the SEA wants to go the route of starting a new nonprofit or organization, this would need to begin during Phase 1 (see Phase 1, decision point #3 and #4) when considering infrastructure ownership and joint data governance.

Regardless of the home base, the hub needs modest yet adequate staffing levels and a partnership with a managed service provider of Ed-Fi that has deep experience in this type of integrated implementation. Staffing can be as light as one to two dedicated FTE, with the managed service provider partner providing most of the pilot's capacity.

Financial resources from the SEA for the hub should focus on supporting the following:

- Staffing the hub
- Funding a managed service provider to:
    1. configure, host, and onboard LEAs to Ed-Fi, and
    2. provide tooling to move data required for state reporting from the local ODSs to the state system
- Funding a "proof of life" or "early win" use of the data for local purposes
- Developing a "Train the trainers" model to build capacity for Ed-Fi onboarding throughout the state (e.g., through all the ESAs)
- Implementing the "Train the trainers model"

STEP 2.2B: LEA ROLL OUT PLAN

As you begin planning how you will roll out Ed-Fi to your districts, there are six key suggestions we have, each listed and detailed below.

1. Start small

Your first LEAs should be a select group that you know are (a) highly communicative and (b) willing to share their local practices that are involved in fulfilling the current state data requirements. You do not need or want many LEAs to participate at this stage—emphasize engagement quality over quantity.

2. Consider the right "sample" of LEAs

You don't want to only include LEAs that are like one another in your pilot. You want to ensure you have adequate coverage of several types of LEAs. The criteria you use will depend on the unique context of your state, and what the distinguishing factors are among LEAs. Some criteria to consider may include:

- LEA size (large, medium, small)
- LEA capacity (high, moderate, low)
- Urbanicity (urban, suburban, rural)
- Locality (North, South, East, West, central)
- Poverty levels (high, moderate, low concentrations of students in poverty)
- Student information system (if your LEAs use a range of student information systems, aim to maximize representation of those systems in the pilot)

Your goal is to surface edge cases at *this* stage, so you aren't surprised by them later. This means that you may end up (or are likely to end up) going back to **step 2.1** (model reconciliation) to make modifications based on your LEA roll out.

3. Select your participating LEAs

Make sure you include targets for and incentives for LEAs to participate in the pilot. Incentives might include financial resources, though they can also be the opportunity to get a head start on the new approach to state reporting and/or access to tools that are seen as prospectively valuable at no cost to the LEA during the pilot.

4. Learn LEA practices and processes for state data

Once you identify which LEAs will participate, you will need to spend time with them to dig into their current practices for how they collect, process, and report state data. This includes both technological processes, like what software or tools they use, along with non-technological processes, like what validation steps take place or how discrepancies are addressed.

Note that states should be fully prepared to surface potentially surprising local practices when it comes to state reporting, such as arduous manual processes that state-level staff assumed

were automated and routine. We encourage states to have a non-judgmental, fact-gathering perspective when learning about current local practices.

In addition to learning their processes, you also need to ask each LEA to carefully explain their staffing approach for creating state data. Who are the personnel who have a role (either large or small) in the state data process? How much of their time is spent each week, semester, and school year on the state data processes? What kinds of technical and non-technical skillsets are needed among these staff? What does training or onboarding for these staff look like, and how much time does it take?

Understanding the LEAs' current capacity and staffing approaches for generating state data (even without Ed-Fi) is crucial for when you are planning Phase 3, because it teaches you how many different people (and who) you will need to interface with during the pilot in each LEA. You should know the names and titles of everyone who needs to be involved in the project at each of the LEAs.

5. Consider what LEA support looks like

You will need to provide differentiated support for the participating LEAs. The transition to Ed-Fi is truly a sea change in how LEAs do this work. It is not just a simple next step—it's more like a leap of faith. SEA staff need to be prepared to train people to make this leap, including upskilling or reskilling LEA staff, providing training materials, establishing a schedule and cadence for hands-on support, or working sessions, or creating professional learning communities for LEAs to share best practices.

Some of this load can be shared by vendors (e.g., SIS vendors) in your state. Some vendors do take a good portion of this work on as part of their scope, so it can be extremely helpful to ask about this during the Phase 2 planning process. Even if some vendors do participate or contribute to supporting LEAs, the SEA still does bear some responsibility to support their LEAs in the transition, and regardless, the SEA's leadership in communicating clearly and transparently about what LEAs can expect will be invaluable.

6. Solicit feedback on step 2.1 from the LEAs

The last crucial step of the LEA rollout is to get their input, feedback, and buy-in for **steps 2.1a**, **2.1b**, and **2.1c**. You will need the LEAs to examine the state data model and review your data model data mapping to verify that the decisions you made will align to their practice—or if not, what kinds of modifications would be needed that still enable robust state-to-Ed-Fi data mapping.

For example, LEAs differ in how they make decisions about offering services to students and even within LEAs, there may be a range of options for delivering student services. Some students may be in a separate school designed to meet their needs. Other students may be in a self-contained classroom in a school, whereas others receive pull-out or push-in services. The data model needs to be able to accommodate all these different physical environments where

students are learning. To achieve this, SEA staff need to not only understand all those possibilities, but also relay that information to the vendors who will need to ensure that their products will align to all those different options.

STEP 2.2C: VENDOR ROLL OUT PLAN

The vendors who are part of your Ed-Fi implementation do not *just* refer to SIS vendors. Although SIS vendors do play a key role in Ed-Fi implementation and roll out, we use the term *vendors* to be inclusive of any provider of a source data system that will integrate with Ed-Fi.

There are three main aspects to consider when rolling out Ed-Fi with your vendors:

1. Communicate early and specify a timeline
2. Assess vendor technical capacity for Ed-Fi
3. Collaborate with vendors on mapping

Communicate early and specify a timeline

Primarily, the SEA should initiate contact with SIS vendors as early as possible to communicate the timeline for rolling out Ed-Fi; specifically, communicating in what school year Ed-Fi will be required and will be the exclusive state reporting delivery method. Establishing with vendors early on what the timeline is for your state-specific Ed-Fi integration will ensure they activate the right next steps on their end to get the ball rolling.

For context, most vendors build into their baseline licensing cost to districts state reporting compliance support. In most cases, the vendors will consider a shift to Ed-Fi as part of this base compliance support to *districts*. However, there will be a different team on the vendor side who will support the full statewide integration of Ed-Fi; this means that if a district were to inform a vendor that they are gearing up for an Ed-Fi transition, that would be handled by the existing vendor support team. On the other hand, if the state informs the vendor about the statewide reporting transition, this will bring in a different team that has access to additional resources and expertise needed to make the shift to Ed-Fi across the state. This means you want official communication to the vendors to come from the SEA, not the LEA, early in the process—so that you get access to those additional resources.

Assess vendor technical capacity for Ed-Fi

Most SIS vendors will be familiar and have experience with statewide Ed-Fi integrations. This may not be true for all other vendors, such as assessment platforms, HR systems, IEP systems, etc. Because you may need to provide additional technical support to some vendors with less experience with Ed-Fi (as we noted in **#5 of Phase 1**), you'll need to determine which vendors have previous Ed-Fi experience of any kind, which have experience with state-level deployment of Ed-Fi, and which vendors are already working with the LEAs participating in your pilot.

Once you gauge the level of technical assistance needed, you can create a plan for how to onboard the vendors who need more hands-on support, and how to leverage those vendors with more Ed-Fi experience to take on more of the collaborative work.

Collaborate with vendors on mapping

All your vendors (regardless of their prior Ed-Fi experience and capacity) must be part of the mapping process. It's crucial that they weigh in on how your mapping will translate into systemic changes that need to be made in their source systems. For each of your source data systems (e.g., your SIS, your HR system, your finance system, your IEP system, etc.), there are many changes that the vendors themselves would need to own and implement on their end. These could include adding new fields or changing fields to a different data type (e.g., from Boolean to date format). In turn, once these source data system changes are made to accommodate the mapping, this feeds back into your LEA roll out plan; you'll need to again interface with your LEAs now to understand how much work will be needed on the district side to implement these changes.

Establish expectations with SIS vendors for supporting extensions

As more vendors become familiar with Ed-Fi and more integrated into the Ed-Fi community, it is important to help norm on the expectations with your SIS vendor(s) to support the unique context of your state. In fact, one of the benefits to an integrated infrastructure model is that you can streamline and simplify many processes, discussions, and features across the LEAs in your state. An important example of this is the creation of a **state profile** that includes not only the full Ed-Fi core certification requirements, but also any state extensions needed. Although this is not currently standard practice in the field, discussing this expectation with your SIS vendor as part of your roll-out plan can help drastically avoid downstream iteration that can slow down implementation. Note that this step in the process is complex and may involve many competing incentives across stakeholders that requires thoughtful negotiation. Contact the Ed-Fi Alliance if you are interested in learning more about how to successfully navigate these discussions.

Step 2.3: Determine Architecture and Deployment Strategy

You will need to make a choice about how you are going to host your Ed-Fi architecture. There are **three main options**:

1. Host in-house or **on premises** ("on prem")
2. Use **cloud-based** hosting
3. Use a **managed platform provider**

Below, we summarize some of the considerations, benefits, and challenges of each of these options.

Hosting Option	Consideration	Benefits	Challenges
On Premises	• A common approach LEAs may take • Possible to hire a contractor to do this	• Completely customized to local use case	• Can be exceedingly difficult to implement • Requires a great degree of technical skill • Can be very costly and resource-intensive
Cloud-Based	• Implemented by a cloud provider • Need to decide which cloud platform to use • Requires coordination from an in-house technical expert	• Fast and easy to stand up • Reduced maintenance compared to in-house • More reliable than in-house • Capitalizes on advances in tech fields, so system stays current	• Will constrain some of the choices on how to deploy • Will lock you into some decisions once cloud provider is decided • Different tech skills needed vs. in-house • Needs deep in-house expertise to make work
Managed Platform Provider	• Also a cloud-based solution • EA's StartingBlocks service is one example	• Least expensive total cost of ownership • Will provide you with one overall cost • Outsources the technical expertise needed • Can include management or enrichment tools not available in base Ed-Fi stack	• Will obscure some of the costs you might have • Less flexibility to adjust Ed-Fi extensions • May have limited access to raw databases • Vendor management and quality variance requires careful procurement

Below, we detail some of the factors you should consider when making the decisions among these options for your implementation:

1. What are the **overall platform hosting** costs?
2. What are the **licensing costs** for the various components, including database, containers, and/or operating systems?
3. What features are available for **scaling up** and **scaling out**?
    - By *scaling up*, we mean adding more resources like memory and CPU to increase the computing capacity of your infrastructure.
    - By *scaling out*, we mean adding more servers or services/containers to spread out the computing workload over several parallel resources.
4. For your deployment, decide how the data will be promoted *out* of the architecture.
    - The Ed-Fi ecosystem could be completely **closed**, which means data come in and data exit out *only* via the Ed-Fi API
    - On the other hand, you may want to be able to **push data out** by directly interfacing with the database, which would imply different costs and different architecture decisions
    - You might want to push data out from the database because it's more *efficient* for your Extract Transform Load (ETL) workflow, but we encourage you to think of the API not just as a *transport layer* but also as a *structure* that you would use as part of your data systems
5. Decide if your overarching architecture will be built around a *single database* model (Shared Instance, Year Specific) or a *multiple database model* (District Specific).
    - **Single Database**: This deployment mode reduces the number of databases you must maintain, but it also creates one failure point. With this approach, you must have a robust backup and failover strategy to account for the fact that you've centralized all the data.
    - **Multiple Databases**: This mode results in multiple databases for a single school year, and it allows for *segmented* database performance; however, it increases the complexity of validation and reporting of data.
    - **Hybrid Model**: Implement multiple databases to collect District data then publish that data to a single State database. This introduces complexity when considering IDs for students and districts but allows for segmenting of risks and performance.
    - This decision must consider data management practices, backup strategies, and risk evaluation. Each model also has implications for the URL setup of the API, so the decision will need to be communicated to all clients who interact with the API.

Phase 2 Summary

The three main steps of Phase 2 include:

- Step 2.1: Model reconciliation, including (a) data model mapping, (b) determining seed data, and (c) designing & deploying extensions
- Step 2.2: Designing roll out plans for (a) the SEA, (b) the LEAs, and (c) vendors
- Step 2.3: Determining your architecture and deployment strategy

These planning steps are key to enabling Phase 3, your pilot phase, where you'll test out both state reporting and designing the local ODSs. The next section provides a roadmap for this pilot.

PHASE 3: PILOT

The pilot phase is a crucial time when the SEA will begin to align and build trust with all parties involved in Ed-Fi. A main goal for your pilot phase is much more than just having a trial run before larger-scale implementation; in addition, it's your tool for how you will pressure test the assumptions, processes, and systems you designed in Phase 2—and amend those Phase 2 decisions *before* they are already in action at scale.

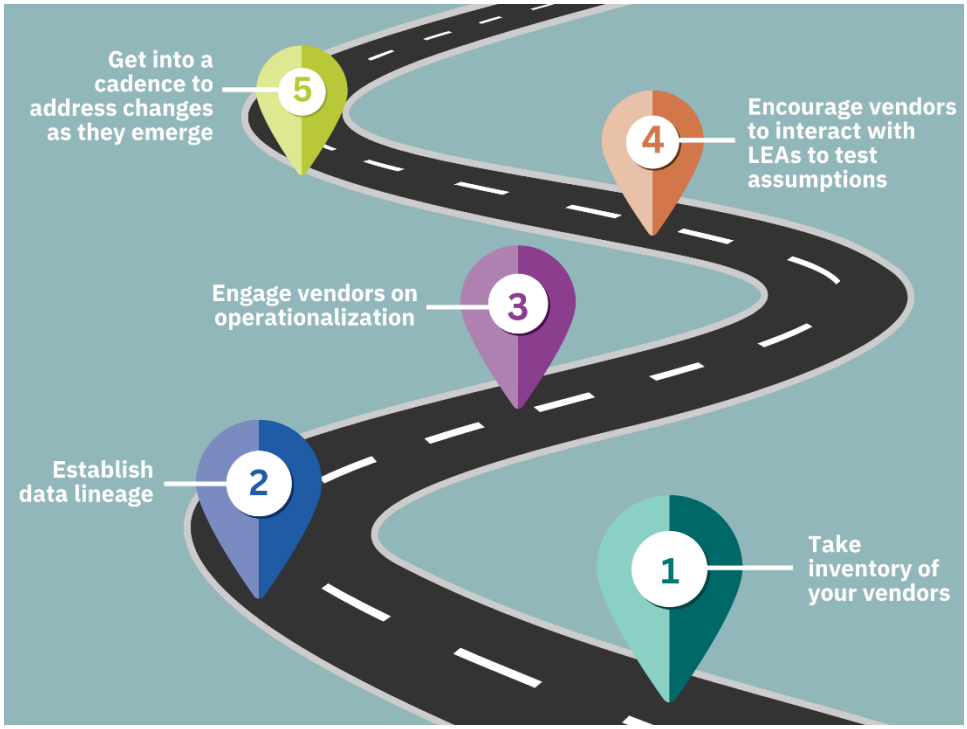
During the pilot phase, you will inevitably encounter many problems or obstacles on a variety of fronts. Your task is, for each one of those problems, to identify which of the parties involved in the Ed-Fi deployment—the SEA, the districts, the support agencies, the vendors—are responsible for resolving that issue. You are building a *framework* of responsibility by doing in-depth testing and small scale roll out during the pilot phase. You absolutely do not want to wait to figure out *how* to resolve those problems until people are sending real data. By the time you get to Phase 4 (the parallel phase), you want your stakeholders to already have trust in place and that they know how to reconcile the errors that will emerge.

As an encouraging forewarning, know that everything will feel "wishy-washy" or up in the air throughout the pilot phase until you get to the end of Phase 3. That is normal and expected. It doesn't *necessarily* indicate things are off-track if it's unclear how all the pieces will come together while the pilot is underway. Your focus should be that by the *end* of Phase 3, and as you enter Phase 3, you will have clear decisions about what role each party plays, so you can solidify those plans during Phase 4 (the parallel phase) *before* you transition to Ed-Fi-only reporting (after the parallel phase).

In the sections below, we summarize four main steps to tackle during your pilot phase: Implementing your vendor support, implementing your district support, implementing your state reporting design, and optionally designing your local ODS pilot.

Step 3.1: Vendor Support

There are five major aspects to implementing your vendor support, illustrated in the graphic below and detailed in the sections that follow.



STEP 3.1A: TAKE INVENTORY OF YOUR VENDORS

Your first step is to take stock of and inventory how many distinct types of vendors you'll have populating the ODS, as well as **who the vendors are**. This will include your vendors for Student Information Systems (SIS), HR systems, finance systems, assessment platforms, IEP or special education platforms, and more. You will have to talk directly to your LEAs to learn which vendors they are using for each of these various sources, except for those vendors that are centralized via a statewide contract. Once you have your inventory of vendors, you'll want to identify which ones have no experience with Ed-Fi, to assess the level of capacity they have and the degree of training you may need to provide to onboard them (see **step 2.2c**).

STEP 3.1B: ESTABLISH DATA LINEAGE

You'll need to revisit the data model mapping you completed in **step 2.1a** and establish your **data lineage**. This means identifying which data elements are within the jurisdiction of the vendors identified in **step 3.1a**, and specifying the order of data transfer.

For example, your IEP vendor may need to submit just a portion of the IEP data, whereas your SIS vendor may need to send the rest of those data needed. You need to establish which vendor is responsible for doing the minimum viable data push and who goes first. In other words, does the SIS vendor need to push student IDs first, and then the IEP vendor pushes the remaining IEP data? How will the data flow from each vendor to complete the data record you need?

Another example is staff data, because your staff *roles* may live in one data system, but staff *salaries* may come from a different source system. If your staff demographic data are updated in your HR system first, do you want to wait for that to be updated *before* it is reflected in the SIS? Or do you want the data to flow directly *without* going into a secondary system?

You will need to make this jurisdiction and order determination for every resource in your data model for which there can be multiple sources of granular data. Think of the SEA as playing the role of a **traffic cop**. It's not enough to just establish the rules of the road and place signs to direct traffic—you will need the state to be actively playing a role in telling one vendor when they can push data, and when it's the next vendor's turn to go. Otherwise, leaving the vendors to navigate a roundabout on their own can more likely lead to accidents on the road.

STEP 3.1C: START ENGAGING VENDORS ON OPERATIONALIZATION

Once you have your vendor inventory and a sense of your data lineage, you'll want to start engaging with these vendors to determine what it will take to *operationalize* all the conceptual decisions you've made and plans you've designed. At a minimum, you'll need to identify how your **timelines** will work for each of your vendor's workflow, including building in:

- Development work
- Quality assurance (QA) and testing
- Deployment to each LEA

For instance, some vendors roll out updates every month, whereas others may have a twice-a-year schedule. The SEA will need to understand these different timelines and adjust its own delivery timeline to accommodate the schedules, given that this will dictate how quickly a new feature will "reach" the customer (i.e., the LEAs' users).

STEP 3.1D: ENCOURAGE VENDORS TO INTERACT WITH LEAS TO TEST ASSUMPTIONS

In our experience, it can be common for vendors to assume how users are using their product. They may (and often do) find that once they deploy their code, actual use in practice can differ quite dramatically from what it was designed for. The SEA can and should encourage each of your vendors to interface directly with the LEAs in your state to test out their assumptions when designing their code.

As one example, your vendors all have state-specific fields where LEAs can store data. Those state-specific fields may or may not duplicate data that are already in a core field that the vendor offers currently. What can happen in practice is that some districts might use the state-specific field exclusively, whereas other districts might use the core field exclusively (and yet other districts may use both). The districts would then remedy or reconcile the data as needed later in the process, when they push the data "out." Your vendor might assume that all districts are using the state-specific field, and your role is to ask them to take additional steps to verify, whether that's pulling usage statistics or talking directly to LEA users to figure out who is using the field as intended, who is doing a lot of data transformations downstream, and what kinds of data transformation are taking place.

This is a win-win, because it's a terrific opportunity for vendors to understand their customers better, and it also helps you prevent them from deploying code that won't work right for your LEAs. The reality is that we see that happen a lot, where a vendor will undergo a huge development cycle, and once it gets in the hands of the LEAs, the data aren't there—or aren't flowing in the way you're expecting. Making the vendors explicitly aware of your expectations that they, too, are talking to and interacting with your LEAs will help avoid this kind of hiccup.

STEP 3.1E: GET INTO A CADENCE TO ADDRESS CHANGES AS THEY EMERGE

There are always going to be unforeseen circumstances or complications. As the COVID pandemic unfortunately demonstrated, we never know what will cause us to need to coordinate among many different parties and agencies to pivot quickly on the ground. The pandemic also illuminated the kinds of changes that could be implemented more quickly and painlessly when data pipelines are already in place.

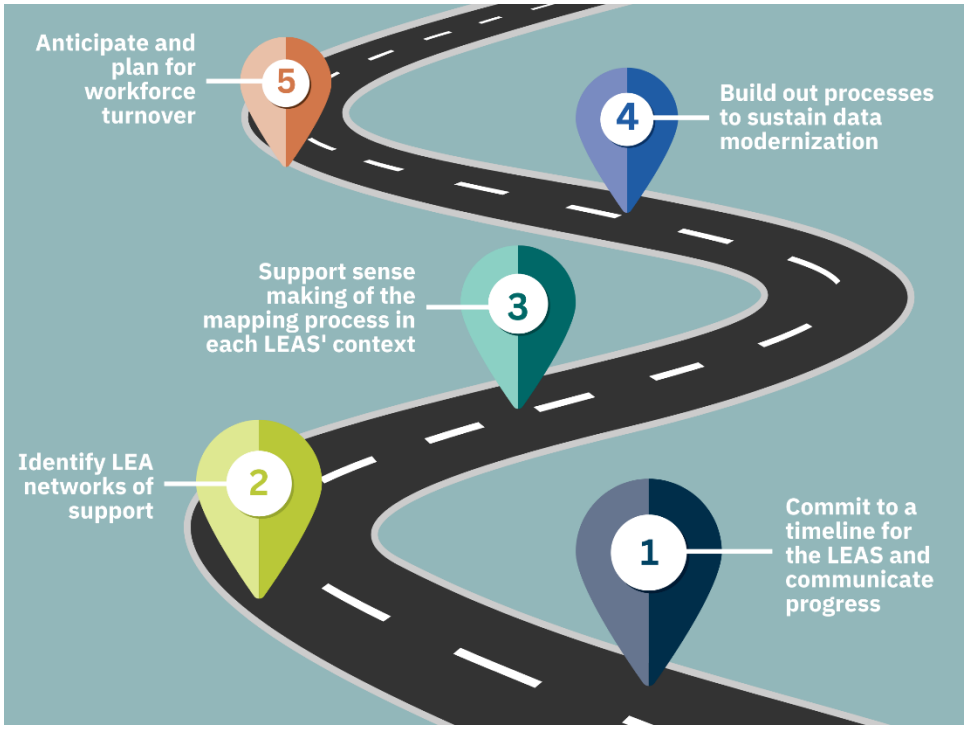
We recommend that you get into the rhythm of making regular, timely assessments of the needs of your data pipelines. It doesn't *have* to be the case that getting something into a vendor's hands and then getting it into Ed-Fi takes a full month, if you have regular touchpoints with those vendors on a set cadence. Regular touchpoints are crucial given how bidirectional these projects are and the feedback loop that's needed for success. It's not just the state who needs to share information with the vendor, but the vendor sharing back with the state—to say, you're asking us to collect this type of data, but it's impossible because there's no data element there. Getting that bidirectional information flow will enable you to anticipate pivots more efficiently and effectively, to cement the content of information that comes up in meetings, and to be nimbler in handling any changes that emerge.

A note about vendors' market decisions.

Inevitably, one or more of your vendors will make a market decision that impacts your implementation. For instance, a new vendor may choose to enter a new state, or they may opt to leave a state completely. If either of these major market changes happen among your vendor landscape, we recommend establishing a check-in with that vendor. If a vendor is entering your state for the first time, this allows you to advise on what kinds of questions they should be asking and what sorts of development tasks they should queue up in their pipeline. If a vendor is leaving your state, it enables you to establish how to support your districts in the hand-off to another vendor. As the state, you can decide whether you wish to allocate resources to directly assist with that, but even if not, knowing the transition is coming in case things happen outside of your control will get you one step closer to success.

Step 3.2: District Support

There are five main components to support your LEAs during this phase, illustrated in the graphic below and detailed in the sections that follow:



STEP 3.2A: COMMIT TO A TIMELINE FOR THE LEAS AND COMMUNICATE PROGRESS

Your LEAs need to know when they are going to have to pull staff capacity and resources in multiple directions to enable the transition to Ed-Fi. They all should be transitioning within a

specific and known time frame. There needs to be communication to *all levels* within each LEA—not just the reporting personnel. District administrative and functional staff must be aware of when they will need to reprioritize their efforts.

Importantly, whenever new milestones are established, you need a predictable mechanism for communicating that to districts in a timely manner. The timeline established with LEAs must be a living document updated continually as a source of truth. All LEAs should be able to quickly assess what is on pace or on track as planned, and where pivots or shifts are happening. This timeline must be more granular than simply "what we're working towards this year" and "what we're working towards next year."

An Ed-Fi implementation partner (such as a **managed service provider**, or MSP) can—and should—play a supportive role in helping all education agencies involved manage the support needed to implement Ed-Fi at this scale. Not only can a MSP provide that direct support to LEAs in a state, but they also can help SEAs (along with other service agencies) build capacity to provide the needed support to LEAs and vendors on a longer-term basis.

Consider the use of project management software and cloud-based collaboration tools to make sure everyone stays up-to-date and on the same page about the current timeline for implementation of each phase. Some tools Education Analytics have used with success include Monday.com, Jira, and Smartsheet.

STEP 3.2B: IDENTIFY LEA NETWORKS OF SUPPORT

Regardless of the level of service and support you provide at the SEA level, LEAs inherently have their own organic networks of support that they rely on to support change management and evolution in district practices. It's worth your effort to go to the LEAs and work to identify the various support mechanisms that undergird state reporting in its *current* form. Questions that can guide you as you seek to identify these mechanisms include:

Learning how you can tap into and leverage these formal and informal support networks will ensure that the transition is as comfortable as possible for the LEAs. Rather than formal training, many of these support networks offer coping mechanisms, collaborative problem solving, crowdsourced information, or tools to alleviate stress. Given that the Ed-Fi journey results in systemic **culture shift** for the LEAs, getting in at the ground level of these authentic, community-based communication networks will allow you to populate key elements of the culture shift *at the level where it will happen*. Even if the timeline itself must be top-down by design, you want to engage stakeholders from the bottom-up.

Though it's possible the SEA may not be able to directly fund this stakeholder engagement, at a minimum, the SEA should be prepared to support it via soft measures. This could look like providing webinars, sending personnel to support on-site training, and other measures to which you are committing time, rather than dollars, to support the work.

STEP 3.2C: SUPPORT SENSE MAKING OF THE MAPPING PROCESS IN EACH LEAS' CONTEXT

Think back to Step 1 of Phase 2, the model reconciliation process, where you conducted the data model mapping, determined seed data, and designed extensions to your data model. Now is the time where you bring the early planning work into "the real world." This is your opportunity to repackage that data model mapping for the users who are generating the granular data—but who remain the furthest away from the ultimate use of those data for state reporting.

Specifically, staff within your LEAs need to see a list of rules enforced on their data. They need to understand the "why" for how the transformations imposed on their data will enable key uses of those data. By helping LEA staff feel like they are part of the process, it signals that you understand that their current comfort level with existing workflows is being fundamentally challenged. You should aim to show LEAs what the transition will look like—not just by breaking it down on paper via a mapping document, but also via engaging with LEA staff directly to help them understand what that map means to them in terms of their day-to-day workflow.

Collaborating on this step of sense making with vendors will ensure you don't deliver inaccurate information. Some of your district engagements will be modified based on the user experience a vendor provides them. You want the vendors to be on hand to explain their own systems, rather than the SEA explaining how this will work across all vendors involved. This further helps underscore that the Ed-Fi implementation is a joint venture among the state, the LEAs, and the vendors.

One note to ensure this joint venture framing is successful: You'll want to establish with the vendors *and* the LEAs what the boundaries are for district support. Making sure all parties are on the same page of what is included versus what is out of scope will avoid frustrating miscommunication or disappointment down the road.

STEP 3.2D: BUILD OUT PROCESSES TO SUSTAIN DATA MODERNIZATION

Providing support to your LEAs for their Ed-Fi implementation—especially (but not only) as it relates to their state reporting efforts—never ends. It's an ongoing, continual process that is part of the shift to Ed-Fi. It represents a sea change in how LEAs need to be supported in this process. Part of the integrated model trade-off is that in exchange for more local control, some of the complexity involved in state reporting shifts from the state to the LEAs. This shift is a forever burden. Given the SEA is going to save some FTE time by reducing the complexity needing to be managed at the state level, plan to convert that to offset some of the new challenges the LEAs are experiencing.

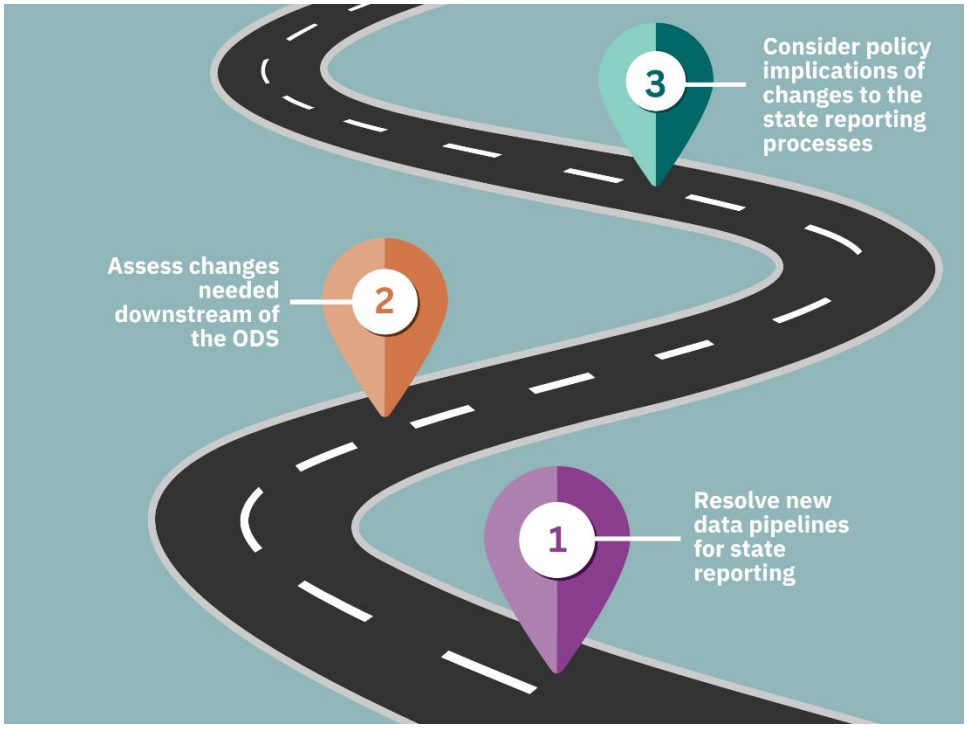
Rather than thinking of this as a short-term workgroup, conceive of these efforts as an ongoing **data modernization** effort, where you will be building new norms, expectations, processes, and systems for establishing and maintaining these technologies over time. Data modernization is part of a broader digital transformation movement, which represents a new way of working rather than a one-time blip.

STEP 3.2E: ANTICIPATE AND PLAN FOR WORKFORCE TURNOVER

The LEA staff who are part of the initial planning process and roll out will not always be there. You should expect some repetition of the steps above each new school year as staffing rotates and evolves. Consider sustainable, long-lasting tools to help you maintain knowledge management over time, including thorough documentation, reusable training modules, recorded webinars or Q&A sessions, and change logs.

Step 3.3: State Reporting Design

There are three key steps when tackling your state reporting design, illustrated in the graphic below and detailed in the sections that follow:



STEP 3.3A: RESOLVE NEW DATA PIPELINES FOR STATE REPORTING

As a state considers how to design the state reporting system to run off Ed-Fi, you'll need to keep in mind that the data are going to be shaped differently, due to the data model mapping process performed in Step 2.1a. You will need to reorganize the pathways for how data leave the collection system (that is, the ODS) and enter any of the downstream data sources that exist. For example, when shifting to collecting more granular data than you used to before Ed-Fi, you'll have a new part of your data pipeline that introduces aggregate calculations—that previously were not necessary.

As another (more detailed) example of how your data pathways for state reporting will change with Ed-Fi, consider how Ed-Fi introduces some new data elements (or metadata) that enrich data points you used to collect. Whereas they were previously one-dimensional, Ed-Fi may have more complicated associations with those data: Some data points may enter the system in a more verbose or detailed way. For instance, for programs like Food Services, instead of a simple variable that can take on the value of `Free Lunch`, `Reduced Lunch`, or `Both`, in Ed-Fi, you get more dimensions on that data element, including things like:

- Begin date of status change
- End date of status change
- Attribution of status (i.e., did the FRL status come from a program, the district, or the state?)

Simply, there is more content in the data given the way Ed-Fi defines things. The state then must decide what to do with that content.

In some cases, you may have opted in Step 2.1a: Data Model Mapping to ignore or "throw out" some of these additional data elements. At this point, you may now realize that there are some uses for those additional pieces, which will lead you to return to Step 2.1 and revisit your data model mapping. It is often not obvious or uncontroversial what kinds of decisions to make here, which means you will need to get into the messiness of the data model and resolve the new data pipelines that feed into the state reporting.

STEP 3.3B: ASSESS CHANGES NEEDED DOWNSTREAM OF THE ODS

In addition to the data pipelines to revisit in Step 3.3a, the differences to the data model that result merge from the data model mapping process (Step 2.1a) need to be accommodated downstream of the ODS. Much like you're asking vendors to decide how to handle the increased granularity, you'll need to choose whether to collapse the data, or to keep the level of granularity in the source data, or to progressively collapse it as you get closer and closer to the end state of the data (that is, a data warehouse, a longitudinal data store, or whatever you will ultimately *do* with the data from your LEAs). What are the logical transformations that you need to add to accommodate the new data model?

STEP 3.3C: CONSIDER POLICY IMPLICATIONS OF CHANGES TO STATE REPORTING PROCESSES

Beyond the technological aspects of the state reporting process that will change, there is a great deal to consider on the policy front. There are many downstream considerations for how to accommodate the many policy implications that arise while ensuring that changes don't need to be made to Ed-Fi itself. Thankfully, there are many SEAs that have been doing this work for more than a decade, who have expertise and knowledge to share with states who are just embarking on this journey. Below, we highlight the long-standing work in two such states to help share what they've learned when it comes to policy implications of changes to the state reporting process: Michigan and Wisconsin.

Case Studies

The **Wisconsin Department of Public Instruction** (DPI) is nine years into their Ed-Fi implementation, and the **Michigan Data Hub** (MiDataHub) is nearly 10 years into their implementation. What have these two states learned in the last decade of doing this work?

State Reporting Policy Implications
When transitioning to Ed-Fi for state reporting, DPI shared several downstream policy implications to consider, including:

- Understand that data are constantly changing
- Determine what data to report and how to handle changes in datasets that are not static (such as those related to special education and IEPs)
- Establish a snapshotting process, or push data on a specific date, for all new state reporting processes
- Interpret and make rules for data usage that are in line with your specific state laws and programs
- Continue to refine your reporting processes and addressing edge cases

Implementation
For DPI, they used training and consistent communication, such as in-person conferences, virtual learning, training modules, and monthly meetings with users and vendors. DPI emphasizes the importance of providing digestible information and meeting users at their level of understanding.

In Michigan, districts opted in to using the data hub, with minor resistance to date. The Michigan Data Hub emphasizes the importance **of connecting the disparate, disconnected data systems that districts use**. Key to this work are the concepts of **local control and data ownership**, along with policy work related to data privacy, data governance, and data analytics. The Michigan Data Hub provides a path for state reporting, generating the same XML file that all districts must send to the Center for Educational Performance and Information (CEPI) for pupil accounting and other purposes. CEPI is preparing for a potential transition to an API for state reporting in a CEDS/Ed-Fi aligned manner as modeled by MiDataHub but does not have a timeline yet.

Benefits
Some of the most salient benefits Michigan's migration to Ed-Fi enabled include their ability to:

- Establish an Ed-Fi powered ecosystem to connect data systems between the state, regional, and district levels
- Meet data-driven objectives that were previously too challenging, time-consuming, or costly
- Facilitate the integration of assessment data
- Improve data quality checks
- Improve the accuracy and usability of the data for state reporting and other purposes
- Provide equity in data capacity in districts across the state

The Michigan Data Hub is now better positioned to support districts in their data-driven initiatives and is working towards expanding its network of champions and users, including charter schools.

Challenges
Michigan did share some challenges in their implementation, including:

- Resistance from vendors and districts; some vendors were reluctant to upgrade their systems
- Some districts expressed concerns about data sharing and security
- Legislative language that includes the use of MiDataHub is sometimes burdensome when it is written in a way that conflicts with the way MiDataHub operates

To overcome these challenges, the Michigan Data Hub focused on providing value to districts, engaging with vendors, and conducting outreach through road shows, conferences, webinars, and training programs. They've also established a more solid line of communication to state legislators to facilitate rapid response to new or updated legislation related to educational data.

Lessons Learned
Lessons learned from **DPI's** migration to Ed-Fi include:

- Embrace fidelity to the core implementation and adjust to the standard descriptors (only extending where necessary)
- Understand the security model; it may be necessary to customize the security setup to ensure data integrity and avoid conflicts between vendors
- Collaborate with other SEAs and LEAs in the Ed-Fi community, since they provide valuable insights and guidance
- Patience, starting small, and effective communication were identified as essential factors for a successful implementation

Lessons learned from **MiDataHub's** adoption of Ed-Fi include:

- Establish a win-win relationship with vendor partners who will provide and/or consume data
- The Ed-Fi ODS and API provide the infrastructure for collaboration on a statewide scale, including state, regional, district, vendor, and research partners
- Consider opportunities to save time and money by streamlining existing processes
- Configuring data systems to populate the Ed-Fi ODS takes time and effort on the part of districts, so ensure that they find value from their use of the ecosystem

Summary
Overall, the transition to Ed-Fi has brought about significant improvements in data management, data integration, and collaboration among districts and stakeholders. Both DPI and the MiDataHub emphasized the need to communicate consistently with vendors and partners about data sharing and security, provide ongoing training opportunities, and continue to show the value of the Ed-Fi system.

Step 3.4: (Optional) Local ODS Design and Pilot

Designing and piloting the local district ODS is optional during the pilot phase —but, when possible, we highly recommend it as a concurrent step in phase 3. It's the strongest design for your pilot, as it places the local ODS on the critical path for state reporting, which creates a forcing function for shared governance and shared success. Since your goal *should* be to support local use, then you ought to collect similar information for your local ODS pilot as you do in your state reporting pilot—so that you can amend the data model mapping and other decisions you made during phase 2 to properly accommodate local use cases.

A local ODS pilot also communicates to the vendor community that the state stands behind the need to support both state reporting and local use. For the purposes of this section, we will assume that the local ODS serves as the first stop for data—meaning, data will move from source systems into a local ODS for each participating LEA. Select data will then make its way into the state collection and reporting infrastructure.

3.4A: ENABLE "PROOF OF LIFE" USES OF THE DATA FOR LOCAL PURPOSES

While an Ed-Fi ODS has uses in and of itself (e.g., sourcing data for state reporting), having a small number of "proof of life" uses of Ed-Fi helps motivate local use. Given the breadth of data points collected via API, surfacing this data back to districts via visualizations or through other data access layers provides immediate utility for districts using the same infrastructure. Data transfer from districts to vendors also becomes possible at a state-wide scale and may allow for districts to leverage services like rostering and records transfer between districts. ODS hosts should also provide visibility into the ODS to enable districts' evaluation of the quantity and quality of the data flowing through the system.

3.4B: DEVELOP & IMPLEMENT A "TRAIN THE TRAINERS" MODEL

Building data system capacity within districts and sustaining that capacity requires a large workforce that cannot be housed within a single education organization. Ed-Fi implementations have leveraged various organization types to train, develop, and deploy resources. These organization types include Education Service Centers, Universities, County Office of Education, and non-profit organizations. State staff can share knowledge with the workforce at these organizations, and the staff at the organizations can use their existing networks of support to propagate that information throughout the schools the regularly interact with and provide services to.

3.4C: PLAN FOR SCALE

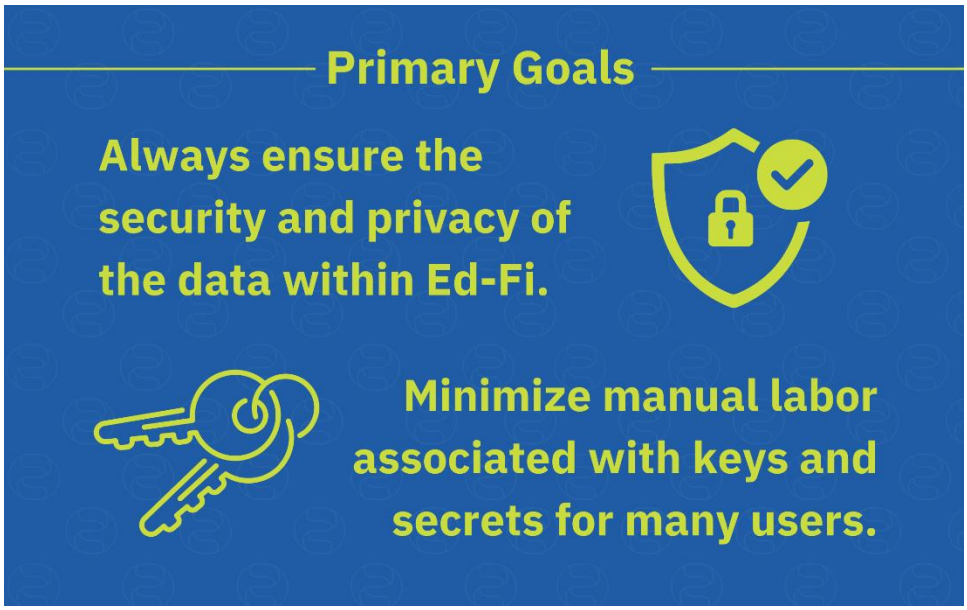
Once LEAs have been engaged and a strategy for training and persistence has been developed, the next step is to examine one's infrastructure and determine how it will need to scale to

accommodate any additional use cases beyond the primary SEA use case. This scaling may be in the form of additional cloud or on-prem resources being added to the environments in which LEAs would be leveraging the API. Another option may be to engage with a service agency listed above to provide a parallel infrastructure that accepts LEA data and then promotes the subset required for state reporting to the SEA infrastructure.

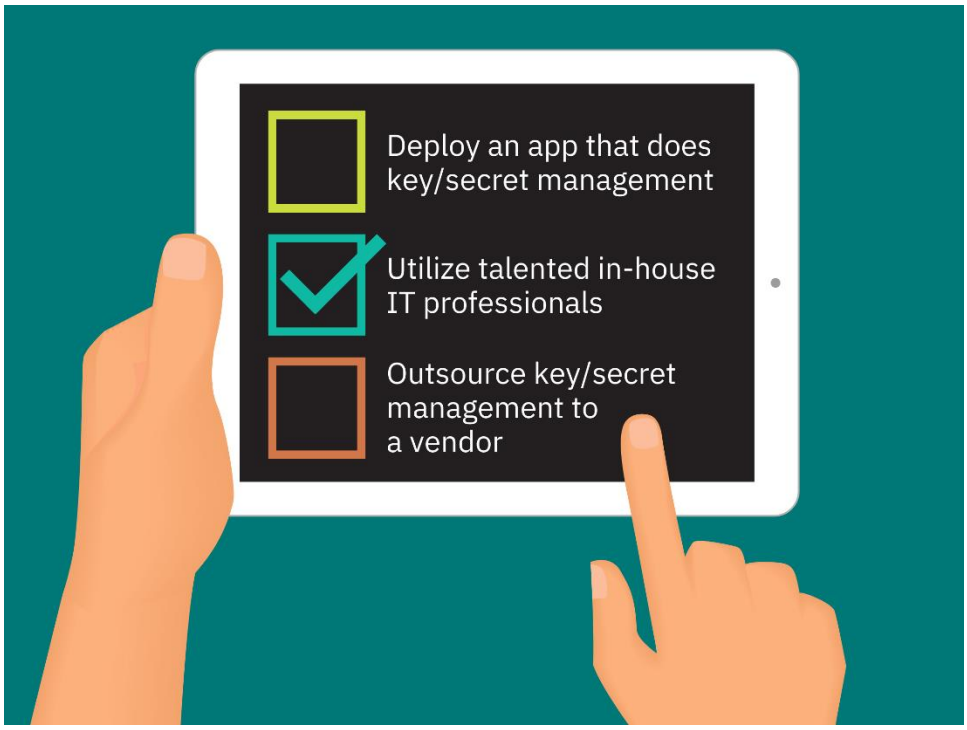
Step 3.5: Key/Secret Management

Keys and secrets (also called *credentials*) are the equivalent of a username and password to have access to the Ed-Fi system. All LEA staff members and all SEA staff members who need to touch or interact with the data in the Ed-Fi system need their own unique access, to ensure they have access to *only* those data for which they have permission.

There is a great deal of thought and planning that needs to go into the process of administering keys and secrets. Your number one goal should *always* be to ensure the security and privacy of the data within Ed-Fi. Another top goal will be to minimize the manual labor associated with administering keys and secrets for many users. Credentials will change from year to year, so you will need a strong process in place to distribute updated credentials at regular intervals. You also need your process to accommodate if or when things go wrong, such as if credentials are leaked or otherwise compromised.



There are several active measures you can implement to help you handle both anticipated logistics challenges and unanticipated/emergency events. For instance, you could opt to deploy an app that does key/secret management. You may also have talented in-house IT professionals who can handle this work manually. You could also choose to outsource this effort to a vendor.



Regardless of the path you choose, you need to think not *only* about the logistics of distributing credentials, but *also* how you will clearly and consistently communicate to users the vital importance of keys/secrets. Users should treat their credentials the same as they would treat a critical piece of student data. It's not just a password—it is more equivalent to a bank account number *and* a pin.

One additional component to plan for is your **resource-level permissions**. Returning to our "SEA as a traffic cop" analogy from earlier, there will need to be **claimsets** created that represent the "rules of the road" for how you enforce how data enter the ODS. These claimsets are not a strategy in and of itself—rather, these rules for data population have been derived elsewhere, and the claimsets enforce those rules. An example of this is a situation where staff data—like salaries and FTE percentages—may live in the HR data system, whereas the staff and section relationships live in the Student Information System. In this situation, the SEA must provide clear instructions for how data need to be sequenced into the ODS from these separate systems, *each* of which will have their own credentials and claimset. Although the structure of the API provides some guidance here, most districts will need to be guided in applying those rules to their current business practices.

Phase 3 Summary

In the process of piloting your statewide Ed-Fi infrastructure, there are several key steps to follow, including engaging vendors, communicating with LEAs, establishing your data pipeline, and planning for future scalability.

The main steps of Phase 3 include:

- Step 3.1: Vendor Engagement, including taking an inventory of vendors, identifying the data elements within the jurisdiction of each vendor, specifying the order of data transfer, and engaging vendors on how to design their timelines to operationalize the workflow.
- Step 3.2: LEA Communication and Support, including committing to a timeline with LEAs, regularly communicating progress with LEAs, identifying LEA networks of support, supporting the data mapping process for each LEA, building processes to standardize data modernization, and planning for workforce turnover.
- Step 3.3: Data Pipeline and Reporting, including resolving new data pipelines for state reporting, assessing changes needed downstream of the data organizational system, and revisiting the data model mapping as necessary.
- Step 3.4: (*Optional*) Local ODS Design and Pilot, including identifying "proof of life" uses of the data for local purposes, developing and implementing a "train the trainers" model, and engaging ESAs or other partners (like universities or non-profits) to support scalability.
- Step 3.5: Key/Secret Management, either by deploying an app, working with in-house IT, or outsourcing to a vendor.

By following these steps during the pilot phase, you will be well positioned for Phase 4, your parallel phase, when every LEA in your state will use Ed-Fi to report their data *and* still send data to the state via prior processes. The next section provides a roadmap for this parallel phase.

PHASE 4: PARALLEL PHASE

Phase 4 is often referred to as your "parallel phase" or "parallel year," as this is when every LEA in your state will use Ed-Fi to report their data to the state *and,* in parallel, still send data to the state via your prior process. Doing so enables you to do a side-by-side comparison of the outcomes of reporting using Ed-Fi with the outcomes of reporting via business as usual. This crucial step takes place before transitioning exclusively to Ed-Fi for state reporting ensures that you're identifying and finalizing as many details as possible in advance of your Ed-Fi-only year. This is the year where you are fully out of the theoretical realm (i.e., no longer revisiting or re-engaging with the decisions you made during Phase 2) and settling on the actual processes that each responsible party must do for the long term.

Setting Expectations Early and Often

We can't emphasize enough how important it is to **communicate to all stakeholders early and often that most people in the ecosystem are going to be doing *double* the work during the parallel year.** It may seem obvious from the use of the term "parallel year" alone, but we have seen repeatedly that many people do not fully internalize the implications of doing their business-as-usual state reporting process *on top of* this brand-new Ed-Fi-based reporting

process. This is not only true for the staff who are sending data in (i.e., the LEA and school staff) but *also* for the staff who are receiving the data on the SEA side—and then providing feedback to those who submit.

Too often, we see people on both the LEA and SEA side assume they can "phone it in" when submitting data either:

- the old, file-based way (since the old way is going away next year anyway!), or
- the new, Ed-Fi way (since this is just practice for the real year anyway!)

Either of these assumptions would be detrimental to your implementation. Your goal is for you to obtain **equal levels of detail and fidelity** with both approaches, so that you can accurately probe, evaluate, and validate which approach in your parallel phase is yielding more accurate results. To do this appropriately, you must have both approaches treated as if they are real.

This analysis of the shape *and* the content of the data means significant labor on the part of the SEA (and potentially the collaborative hub mentioned in **Step 2.2a**). You do not want to discount the double work required of SEA staff during the parallel phase. Also keep in mind the inherent challenges with incentivizing staff at all levels to deprioritize elements of their job that currently matter for funding levels; their natural (and rightful) inclination is to make sure the data from schools returns the right funding back to those schools. They have no incentive to deprioritize this, as it's full of risk for the state—and if staff believe their existing processes are adequately working for that purpose, they may want to treat the Ed-Fi based approach with fidelity is a "nice to have" rather than a "need to have."

Unfortunately, there is no real way to avoid this duplicate effort (unless your state legislature enacted a law permitting the SEA to skip an entire year of reporting— and not feasible or advisable). Instead, consider mechanisms or strategies to help alleviate pressure on the system and its stakeholders, which we describe next.

Alleviating Pressure on Stakeholders

Think of your parallel phase as a **stress test**. There are innumerable stressors being places on LEAs, the SEA, the vendors, and the technology itself that is being established. This is the phase when everyone in the system figures out where the stressors are going to be (both now and in the future) and how to manage those stressors.

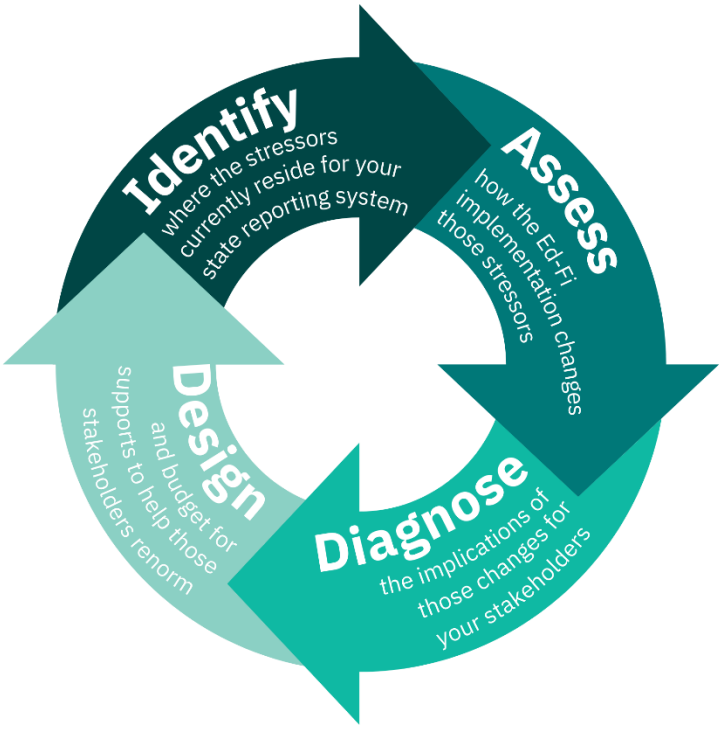
Your goal as the SEA should be to make accommodations for the added pressure on the system. You won't be set up well to do a transition of this magnitude when all stakeholders are at their maximum capacity for extended periods of time.

So what can you do to set up your parallel phase for success? Consider how the SEA can provide appropriate supports and engaging with your state legislature as two key tactics for your parallel phase.

PROVIDE APPROPRIATE SUPPORTS

As the SEA, you need to consider what the appropriate supports are that you can provide to your LEAs—and just as importantly, how you can resource those supports. Here is a step-by-step illustration of how you might arrive at diagnosing appropriate supports in your context:

1. **Identify where the stressors currently reside in your state reporting system**. For instance, are the LEAs currently most burdened by generating CSV files, submitting them to the state, receiving those files, making corrections, and then pushing it back to the state?
2. **Assess how the Ed-Fi implementation changes those stressors.** For example, Ed-Fi implementation may move the generation of the CSV to much earlier in the process, within the source system itself.
3. **Diagnose the implications of those changes for your stakeholders.** For example, do your LEA staff need a different set of technical skills than before? Do your vendors need to provide your LEAs with something new? Are vendors going to need to push out updates on a different cadence?
4. **Design and budget for supports to help those stakeholders renorm.** For instance, are there partner agencies in the state you could help with the renorming process, such as an ESA or a research center in a university? Is there a third party who can serve as an effective intermediary between the LEA technical implementation staff and the state policy staff? What will it cost to work with these other agencies?



We recommend considering all the ways that partner agencies and intermediaries can support the parallel phase transition. A "middle layer" between the LEA staff generating the data and the SEA staff receiving the data will be needed to absorb the added stress and pressure felt by

the LEAs who are submitting the data. You don't want the SEA technical teams to need to both absorb that stress *and* try to convert it into actionable information for the technical teams to take. LEA staff need to have a reliable resource they can go to with specific questions—and this shouldn't be the SEA technical teams who are deploying Ed-Fi, as they shouldn't be expected to have the policy or contextual knowledge to effectively respond to those questions. This resource could be within the SEA or a third party, such as a non-profit with experience implementing statewide Ed-Fi.

ENGAGING YOUR LEGISLATURE

The second tactic to consider for alleviating some stress during the parallel year is to engage your state legislature. Your goal should be to work with the legislature to *remove* a stressor that is normally present during this timeline to compensate for the additional stress introduced by parallel reporting.

Your state legislature has the potential to be a key release valve for your LEAs in this process. For instance, the New Mexico Public Education Department (NMPED) worked with the NM state legislature to defer all their *new* legislative collections to the second production year (i.e., 2 years *after* the parallel year). This means the state is not going to add any new data points or data collections during the phase when LEAs and the SEA are duplicating their reporting efforts and during their first full Ed-Fi year. Instead, any new data points or collections would come after the parallel year and first production year validation, giving LEAs and NMPED staff time to acclimate to Ed-Fi *without* incurring additional reporting burden.

This type of strategy—working with your state legislature to identify opportunities to reduce reporting burden during the transition—is a win for everyone involved. We don't mean to imply it's easy or automatic; SEA staff will need to make the case to the legislature that this is beneficial for everyone. Some talking points to consider sharing include:

- True validation must only include the same data points that were collected in the prior year. In other words, trying to validate new data points in one year with the new and old approaches is not going to truly validate the new approach.
- From May to August every year is a high-pressure time for LEAs, when they must act upon the last legislative session before the new school year begins. This short turnaround time (even *without* the transition to Ed-Fi and the addition of new technology).

Helping the legislature understand the value of a two-year timeline for new changes should ideally be the norm for these kinds of large-scale data infrastructure transitions.

The Importance of a True Parallel Year

In some cases, we have seen states want to engage in the parallel comparison earlier in the Ed-Fi implementation process (e.g., perhaps during Phase 3/the pilot phase). A benefit to this is that it can help garner buy-in with LEAs (and ESAs) that Ed-Fi is a viable alternative to file-

based reporting. The significant downside to this is that there is already a significant amount of effort involved for the LEAs engaged in the pilot itself, without doing the side-by-side comparison that comes during the parallel phase. Trying to both pilot and compare the results of the old and new methods will put an enormous amount of pressure on the participating LEAs. As a result, **we strongly encourage SEAs to have at least one data collection cycle that is strictly focused on piloting with LEAs, and another data collection cycle that is strictly focused on a side-by-side comparison/validation.**

The reason for this recommendation is that it's very difficult (if not impossible) to understand *how* to make the changes we outline in this roadmap document until you start seeing the data come into your Ed-Fi system. The pilot phase turns the theoretical into the tangible, and it allows the SEA to first course correct before testing the validity of their Ed-Fi implementation (parallel phase), before schools, LEAs, and the SEA are relying solely on Ed-Fi (production phase).

Phase 4 Summary

Your parallel phase is a key step in your overall Ed-Fi implementation, where several critical things will happen:

- This is when you move out of the theoretical realm and into the implementation realm
- The parallel phase serves as a stress test
- The SEA will be conducting a side-by-side comparison (i.e., validation) of its business-as-usual state reporting approach against the new Ed-Fi state reporting approach
- Every LEA and the SEA will be duplicating their state reporting efforts this year
- Both approaches need to be treated with the highest fidelity possible
- All stakeholders will be working to identify and finalize as many details as possible in advance of the production (i.e., Ed-Fi only) year

As a result of these factors, we recommend that you approach your parallel phase with these goals in mind:

- Alleviate pressure on the system for SEA and LEA staff (and other stakeholders)
- Provide appropriate, resourced supports to LEAs
- Engage your legislature to creatively problem solve around creating a release valve for LEAs during the parallel phase
- Preserve at least one data collection cycle focused only on piloting (what we call Phase 3) and the next cycle on validation (what we call Phase 4)

CONCLUSION

This document is designed to layout a comprehensive roadmap for SEAs to follow as they begin their journey towards statewide implementation of interoperable technology that can support, serve, and benefit local use of data.

We start by outlining five key decision points in Phase 1 that you need to make *before* any technical work even begins. Dedicating time and energy during Phase 1 will ensure you avoid headaches later, are well positioned to build buy-in with your critical stakeholders and anticipate as many risks as possible in advance.

We then describe your planning phase (Phase 2). This is when you start to engage with your key stakeholders to plan the Ed-Fi pilot. Your planning phase is focused on designing your ODS systems to enable desired use cases for the SEA and LEAs alike. The three main steps of Phase 2 include model reconciliation, designing a roll-out plan for the SEA, the LEAs, and vendors, and designing your architecture and deployment strategy.

Phase 3, your pilot phase, is when you start to align to and build trust with all the stakeholders involved in your Ed-Fi implementation. More than just a trial run, this is your tool to pressure test everything you designed in your planning phase. It's expected and necessary to encounter a wide range of obstacles and challenges, and your goal will be to identify who in the ecosystem is responsible for resolving each issue that arises during the pilot. Communicating this goal to and setting expectations for pilot participants will be crucial to helping you build trust with these stakeholders. By the end of your pilot phase, you want to arrive at clear decisions about what role each stakeholder plays. Then, your parallel phase is when you solidify those decisions.

In your parallel phase, your goal is to validate the new Ed-Fi approach to state reporting for all the LEAs in your state. This is a key step to building trust and buy-in at all levels of the data ecosystem. Critically, you'll need to focus on setting expectations with SEA staff, LEAs, vendors, and partners that this year will involve double the work while you do both file-based and Ed-Fi state reporting. Ensuring fidelity for both reporting approaches is crucial for your validation to work. Identifying supports that can help alleviate any pressure the LEAs are feeling in this phase and working with your state legislature to creatively design a release valve for some of that pressure will be key strategies to reducing friction and tension during this transition.

Where To Go from Here: Phase 5 (Production)

Once you have made it through your parallel phase, you are going to be in Phase 5: Production. This is when your Ed-Fi based state reporting systems are up and running, and when your LEAs can begin to focus on leveraging their local ODS for their own operational uses.

We acknowledge that this document may make it seem like a nearly insurmountable task, but on the contrary, it's meant to lay out all the specific intricacies needed to implement an infrastructure transformation of this magnitude in your state. Diving into these details now will help you anticipate (and ideally, avoid some) major challenges.

This document leverages all the lessons Education Analytics has learned in our past and current work with partners across the country to stand up Ed-Fi infrastructure at the state and local levels. And we aren't the only partner in the field with this kind of expertise. Tap into the broader Ed-Fi community! There is a huge number of partners with deep knowledge and experience of how to do this well.

Selecting a Partner

Although there are many vendors poised to support you with your implementation, it's important to find the *right* partner for your context. In our experience, here are **four questions** to ask an organization you wish to partner with (*before* you enter a contracted relationship):

1. How would you (the vendor) design this project in ways that consider all the spheres of influence laid out in this roadmap document?
2. Where do you anticipate stakeholders may come into conflict or stressor points during this project?
3. Does your project plan include: (a) specific steps (b) with timelines and (c) interaction points among all the different stakeholders (including the SEA, LEAs, ESAs, vendors, legislature, and partnering agencies)?
4. Do the interaction points included in #3c include interaction *across* those different agencies as well as *within* different segments of each agency?

Education Analytics wishes to be a resource and thought partner to SEA CIOs and their offices as they embark on this journey.

If we can offer assistance in helping you navigate this document or provide further information to you, please ***get in touch****.*