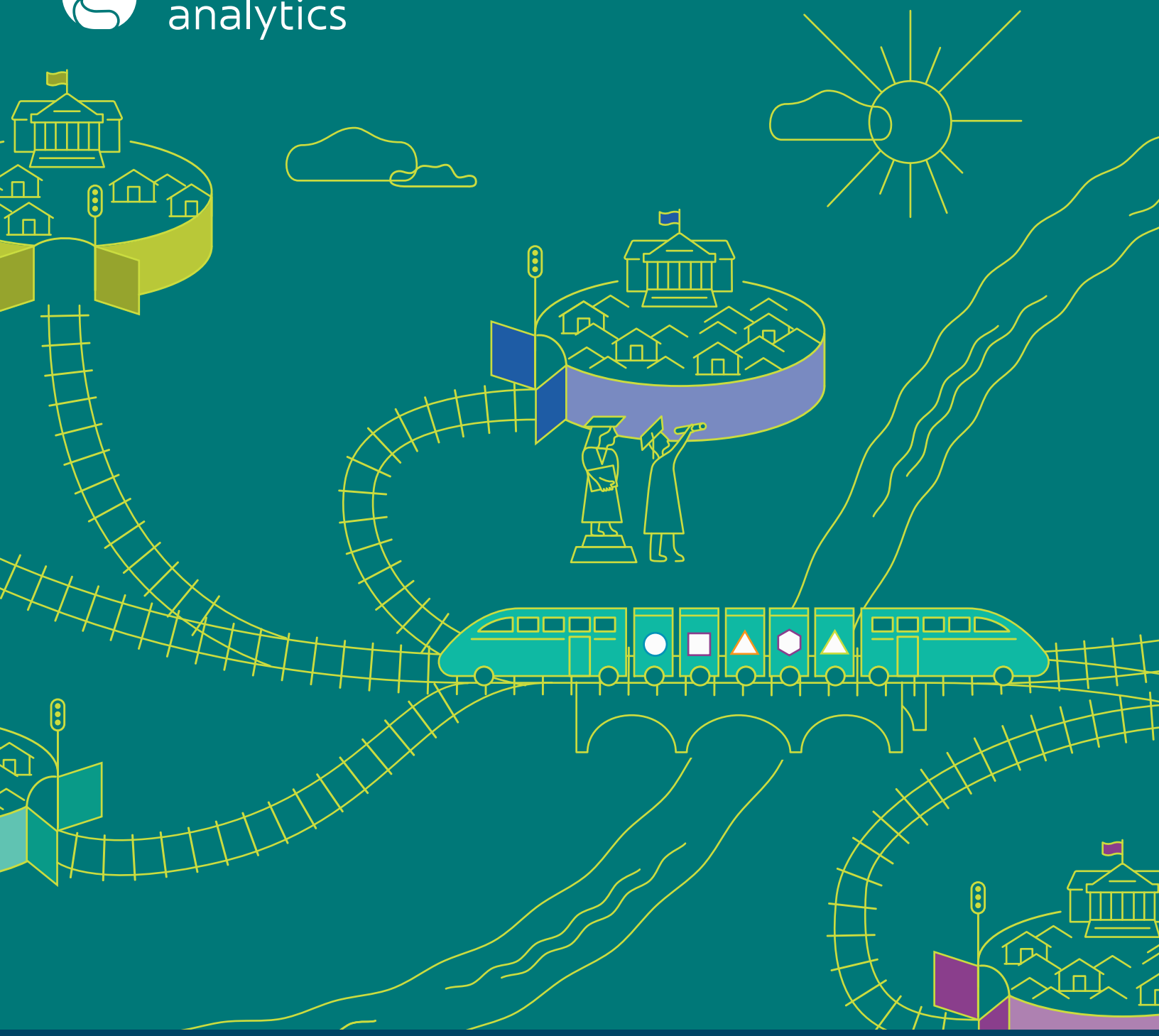
education analytics



How Ed-Fi Can Help You Make the Most of Your Data

This resource provides guidance for education agencies that are beginning to consider whether and how they might implement Ed-Fi to better manage their data. We define some terms and concepts, walk through the five key steps to get started with Ed-Fi, and include a list of resources where you can learn more.

Ed-Fi Explained

Ed-Fi is a set of technologies that use the **Ed-Fi Data Standard**, a set of rules that establish a unified structure for K-12 educational data. This standard is helpful for connecting and combining data from different educational data systems that otherwise would be difficult (if not impossible) to bring together. Districts and states use many different tools and platforms for storing and managing data, including student information systems, financial software, rostering tools, assessment platforms, behavior management systems, curricular materials, and more. Ed-Fi technology helps those different systems more seamlessly connect to each other and to other tools, which makes districts' and states' work with data less costly, less time consuming, and less prone to errors. Ed-Fi is a community-supported, open-source educational platform. It can be hosted on premises or on hosted sites, such as Amazon Web Services (AWS) or Microsoft Azure.

Terms to Know

Ed-Fi Alliance ↗

A non-profit organization, consisting of educators, technologists, and thought leaders, that acts as a resource and advocate for the Ed-Fi Data Standard

Ed-Fi Data Standard ↗

A set of rules that establish a unified structure and format for K–12 educational data

Ed-Fi Operational Data Store (ODS) ↗

Where data for Ed-Fi are captured and stored

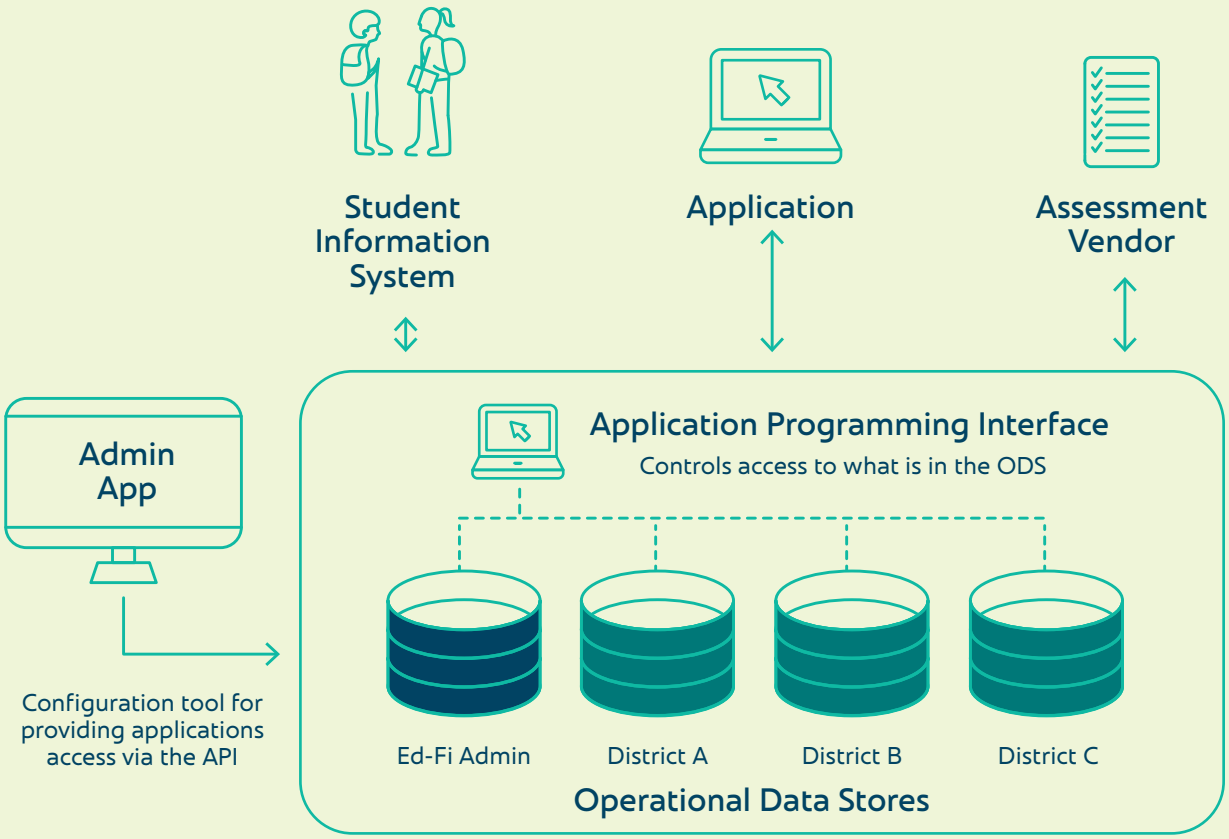
Ed-Fi Application Programming Interface (API) ↗

How users interact with the Ed-Fi ODS

Ed-Fi API/ODS Admin App ↗

The user interface (UI) that is used to manage and administer the ODS and the API.

EA's Approach to Ed-Fi Architecture



The Benefits of Ed-Fi

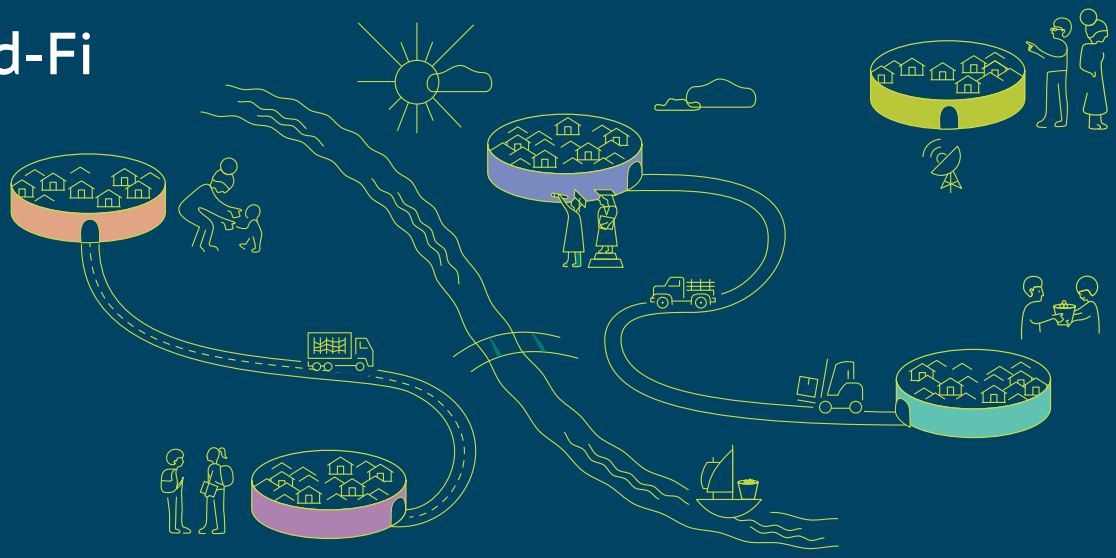
For far too long, the most pressing and interesting questions that educational stakeholders have could only be answered by collecting and merging information from disparate data sources. Due to the vastly different designs of these different sources, bringing this information together has been a manual, labor-intensive, and costly process.

Ed-Fi can provide immense benefits not only to the stakeholders wanting to use and learn from data, but to the broader education community. These benefits include improving data quality, enhancing interoperability between systems, building in granular data security, and enabling operational data for conducting statistical analysis and for creating analytics. By investing our time in and contributing to the Ed-Fi community, EA believes the future of analytics with educational data will become less expensive, more reliable, more efficient, and more securely accessible to a wider range of stakeholders.

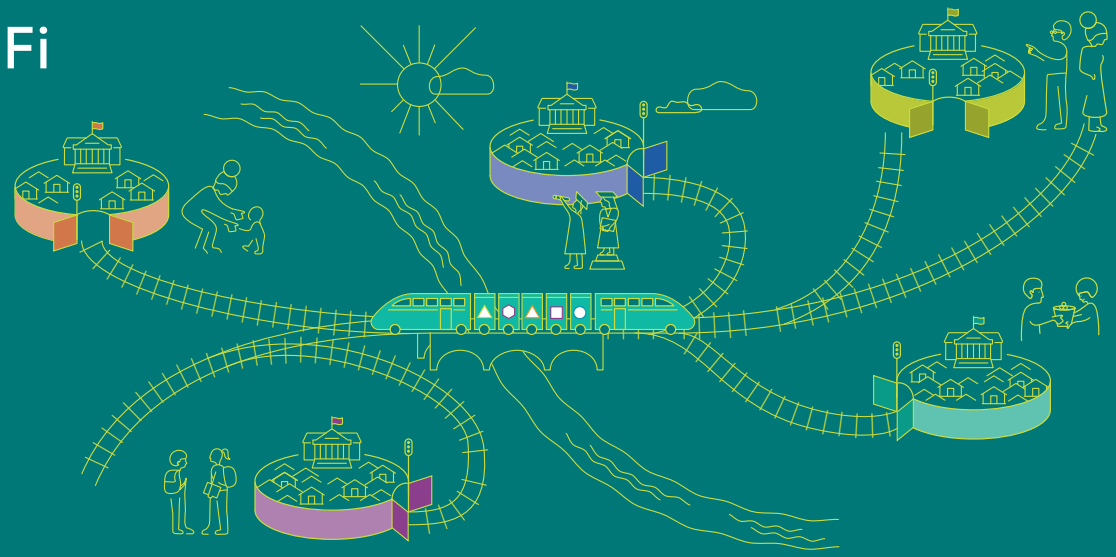
You can think of this sort of like a city's transportation system. So far, the only way to transport cars (data) has been to drive along all kinds of different roadways—highways, surface streets, dirt roads, bridges, and roundabouts. Each road has its own speed limit, differs in its capacity to handle traffic, and varies in terms of upkeep and repair. This has also been true for sharing educational data across systems; each time data needs to be shared from a district to a state, or from an assessment platform to a student information system, the connections among systems have to be built from scratch.

Ed-Fi has the potential to act like a high-speed rail system, where data can be almost automatically transported from one system to another, and shared securely and privately from one context (such as a K-12 school district) with another context needing those same data (such as a university needing transcript data or an employer needing high school diploma verification).

Before Ed-Fi



After Ed-Fi



Five Steps to Get Started with Ed-Fi

It may seem daunting as you first consider how to take the first step toward building an interoperable data system at your organization. EA has experience working with districts and states large and small in setting up Ed-Fi, and we can help guide you step by step through the process. Below are the five key steps to getting started with Ed-Fi in your state or district.

1 Layout the use cases for the data system.

There are many ways an Ed-Fi system can be set up. For instance, a state department of education wanting to streamline data collection for its compliance and monitoring requirements might decide to set up a centralized Ed-Fi ODS, to which each of its districts would connect individually for state reporting. On the other hand, a collaborative of districts wanting to pool resources and share best practices around data collection, analysis, and use might opt to each set up their own individual Ed-Fi ODS and creating interoperability among them. In other cases, a state may want to provide Ed-Fi as a service to its districts, thereby providing a blended model where each district has its own Ed-Fi ODS that can seamlessly connect to the state's ODS; this is the current model being stood up in the **state of South Carolina**.

There may be other use cases for different education agencies and stakeholders, and these use cases must drive the initial design and data governance decisions of the Ed-Fi system to be implemented. Furthermore, Ed-Fi can be customized via **Ed-Fi Extensions** to better meet the use cases of each stakeholder. The Ed-Fi Core domains include structures for many of the fundamental data types related to students, teachers, classrooms, and assessments. But if education agencies have a need for another kind of data—say, a place to store and access data related to school bus schedules—this can be added to the Ed-Fi ecosystem by creating an Extension. Though this can take time, energy, and collaboration, EA believes that developing an Extension in cooperation with the broader Ed-Fi community is imperative for benefitting the greater good, while ensuring Ed-Fi remains flexible and responsive to the needs of its users.

2 Take stock of the source data systems and how they interact.

Once you understand the use cases for the data system, you need to inventory the source systems that will be leveraged for those use cases. This is a key step. Each source system involved needs to be compliant with Ed-Fi Standards so that the data that comes from each of those systems can be translated for and stored in the Ed-Fi ODS. At times, you may not know exactly which source system a piece of data originates from; you may interact with data in one system, but those data have already been extracted from a different source (and possibly transformed). For example, your Student Information System (SIS) may use a plugin that allows it to pull in and display gradebook data; it may even be possible to export those gradebook data into a .csv file. However, the gradebook data originate from a different source, and it is that original source (not the SIS, which is an interim system) that must be compliant with Ed-Fi Standards. Taking inventory of each of these source systems, for all the data relevant for the use cases you specified, is important for building a functional Ed-Fi implementation.

3 Consider data governance principles and implications.

One of the biggest challenges is navigating data governance—in other words, who "owns" a given piece of data, like a student ID or a student's demographic information? What happens if source systems disagree with one another? These issues are both big, philosophical ones that require a broad theoretical perspective, and small, technical ones that require expertise in data and technology. Building a system that works for stakeholders at every level of the system—from students and parents to district administrators and state-level staff—means weighing and balancing tradeoffs. Data governance issues also do not get solved at the outset, but rather require an ongoing commitment to asking these questions:

4 Decide which technology stack to use.

The technology stack (or "tech stack") refers to the tools, services, frameworks, and programming languages that are used. In other words, it's the full data ecosystem for implementing Ed-Fi.

There are many factors that go into deciding on a tech stack. To facilitate this decision-making process, we recommend consulting with a partner (like EA) that has deep experience with Ed-Fi implementation, given that it takes time to obtain buy-in from all stakeholders. Below, we list some of the considerations and tradeoffs that accompany each of these options. We hope this is a useful starting point for education agencies that are at the beginning stages of their Ed-Fi implementation.

In-House

CONSIDERATIONS
A common approach that many LEAs take

Possible to hire a contractor to do this

BENEFITS
Completely customized to the local use case

CHALLENGES
Can be very difficult to implement; requires a great degree of technical skill

Can be very costly and requires investment of resources

Cloud-Based

CONSIDERATIONS
Implemented by a service on a cloud provider

Also requires coordination from an in-house technical expert

BENEFITS
Fast and relatively easy to stand up

Reduced maintenance vs. in-house option

More reliable than in-house option

Capitalizes on advances in tech fields, so system stays current

CHALLENGES
Different technical skills needed vs. in-house option (i.e., cloud architects and developers)

Needs deep in-house expertise to make it work

Managed Platform Provider

CONSIDERATIONS
Also a cloud-based solution

EA's **StartingBlocks** service is one example

BENEFITS
Outsources the technical expertise needed

Can include management or enrichment tools not available in the base Ed-Fi stack

Likely least expensive total cost of ownership

CHALLENGES
Less flexibility to adjust Ed-Fi extensions

May have limited access to raw databases

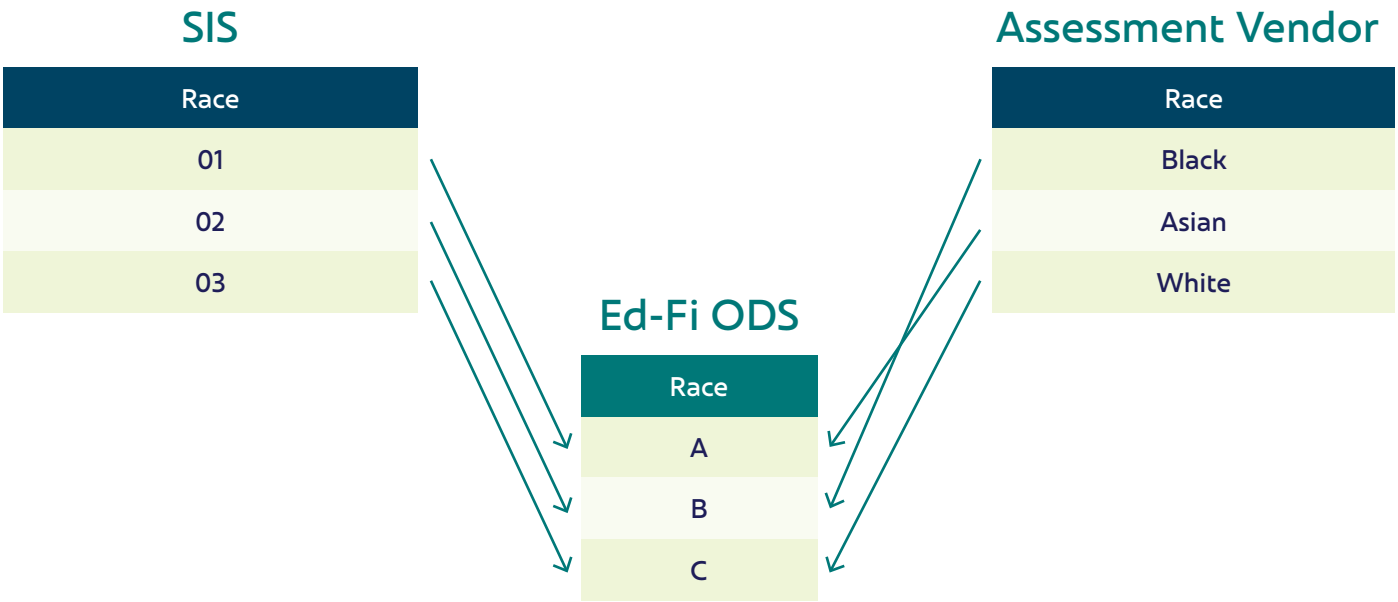
Vendor management and quality variance requires careful procurement

5 Map your data systems.

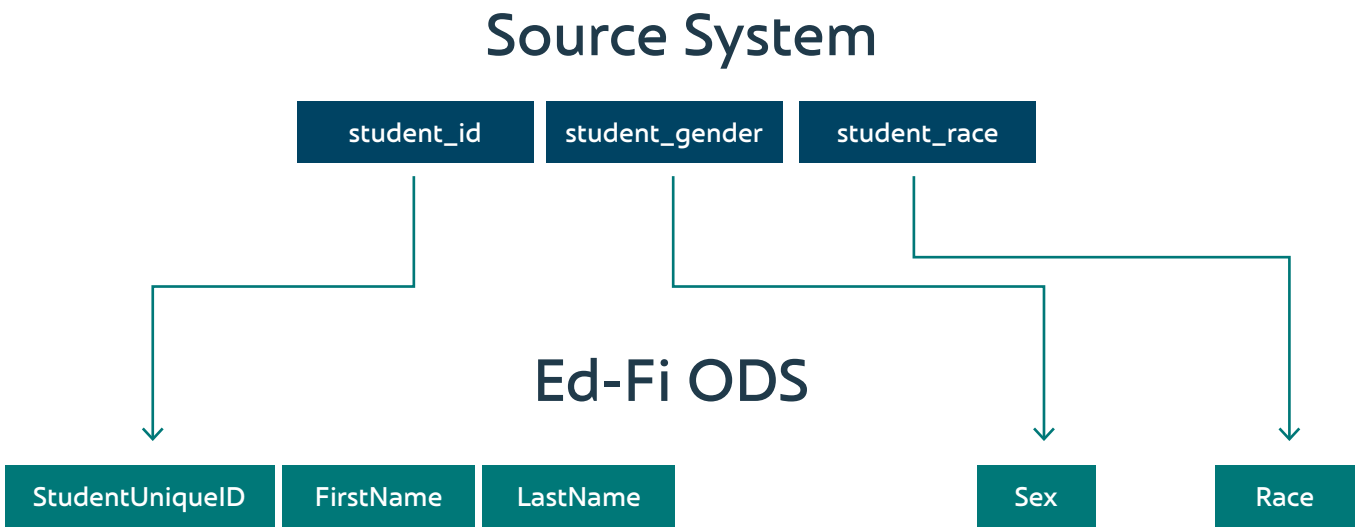
The final step is when interoperability actually "happens:" through a data mapping process. There are two types of data mapping: descriptor mapping and system mapping. The education agency that is implementing Ed-Fi is only responsible for descriptor mapping. Vendors are responsible for system mapping.

To understand why mapping is needed, remember that any system that you source data from (like a SIS or assessment platform) must interact with the Ed-Fi ODS through the Ed-Fi API. This means that each of these source systems need to "map" directly onto the structure of the Ed-Fi ODS. Below, we provide details on the two types of mapping that need to happen.

DESCRIPTOR MAPPING is the responsibility of the education agency implementing Ed-Fi, and it's the key step to creating interoperability among source systems. Descriptor mapping is when you decide how to translate the codes used in all your source systems to the codes used in the Ed-Fi ODS. For example, student's race/ethnicity may be stored as a value from 1 to 5 in one source system, and as text strings in another source system. You will need to decide what values the "race/ethnicity" variable can take in the ODS system, and then map the codes from each different source system onto the ODS codes. This is not simply a technical question, but a significant data governance question; it will require collaboration among and buy-in from your stakeholders to agree to what these "source of truth" codes will end up being.



SYSTEM MAPPING is the responsibility of each vendor that provides a source data system (like a SIS). The vendor has figured out where all of the data in that system "live" in the Ed-Fi ODS. There may be different locations in the ODS for different pieces of information from each source system; a student's ID needs to be stored in one place, and a student's race and sex each need to be stored in other places.



Adjusting and Improving Your Ed-Fi System

Once the education agency has completed these five steps, what comes next may surprise you: some degree of failure. This is simply inevitable and expected in the world of software development, but it's not something that always gets discussed explicitly when it comes to setting up an interoperable educational data system. These first five steps will get your agency to the point of being able to try it out and see where it fails. Then, you can iterate on those errors to remedy them over time.

In addition to inevitable system errors that emerge, there are context and policy changes that will likely require you to revisit some decisions you made in those five steps. For example, courses tend to evolve frequently over time, including course descriptions, titles, and relevant variable names; this would mean that your descriptor mapping would need to be revisited on a regular basis. Another example might be that a new group of stakeholders emerges that has a need for access to interoperable data that you hadn't considered previously; in this case, you would need to go back to Step 1 to define this added use case of the system, which in turn may require an additional source data system, added data governance, further descriptor mapping, or possibly a change to the technology stack you want to use.

Once you have stood up your initial Ed-Fi system and source systems have begun publishing data to the ODS, there is a host of things you can do with Ed-Fi as you iterate through system improvements, such as:

- Standing up an Ed-Fi application almost instantly (an example of this type of application is EA's **Rally Analytics Platform**)
- Launching a dashboard that reports analytics using data in real time
- Using your existing operational data for state reporting purposes (which would save an LEA time and resources)
- Creating longitudinal data stores that draw information from different sources with a high degree of accuracy

All of this and more is possible with Ed-Fi, and although the journey to this end point can seem long and arduous, there are many resources and organizations available to help you along the way.

More Information About Ed-Fi

Learn about how to get started on your Ed-Fi implementation journey with EA's Ed-Fi services, called StartingBlocks, **here**.

Read a case study detailing how we established an Ed-Fi implementation in South Carolina **here**.

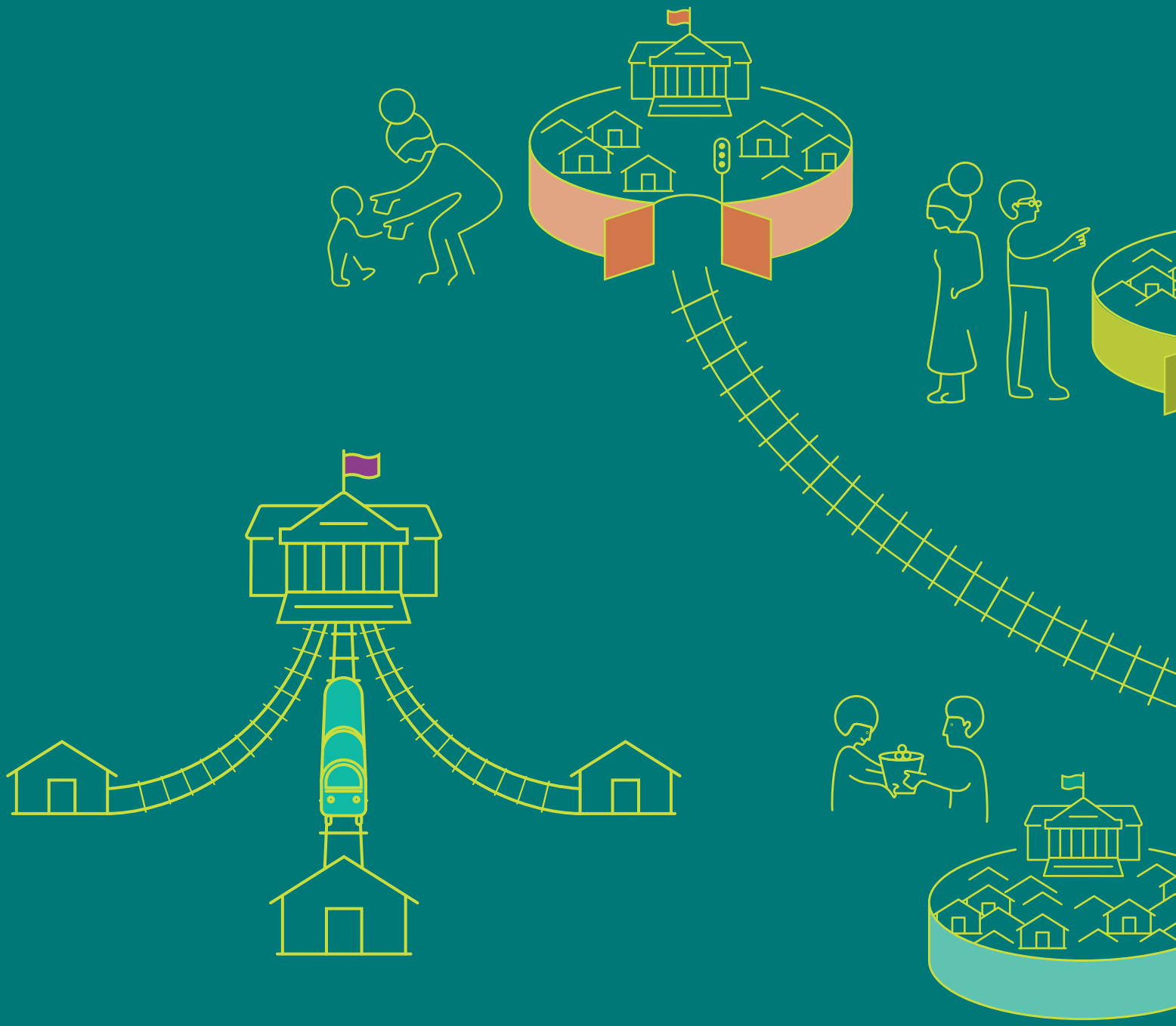
Explore our Rally Analytics Platform, a teacher- and administrator-facing tool enabled by Ed-Fi technology, **here**.

Visit the Ed-Fi Alliance **here**.

To get in touch with us, please visit **edanalytics.org/contact.**

About EA

As a mission-driven non-profit, we use data and analytics to improve outcomes for students and the education system. Education Analytics conducts research and develops rigorous analytics that support actionable solutions and drive continuous improvement in American education. We help our partners make better decisions on policies and programs that lead to success for all students.



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