NRS Data Flow and Planning Workbook

NATIONAL REPORTING SYSTEM for Adult Education

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Introduction

Data items for NRS accountability are entered at different times during each student's period of participation, and are subject to different business rules and varying challenges to ensure completeness, timeliness, and accuracy.

Although conceptually simple, efforts to ensure data quality for accountability, reporting, and program improvement often get complicated by real-world realities. Not all students have complete identifying information or want to provide it. Agencies use different definitions for similar data elements. Demands on staff members' time prevent timely entry of system data. Even organizational data-sharing rules can affect how data are acquired and used.

To develop a data system that addresses these rules, system designers and developers must have a clear picture of how they function, which ones require technology to support their application, and technical challenges that may need to be addressed. Documentation that highlights where data enter the system, their source, and manner of validation make developing technologies much easier.

To address organizational data sharing and governance issues, state staff must understand which data need to be acquired from external sources, and which of their organization's information resources are to be shared with other agencies. Without documentation, remembering, communicating, and addressing the range of issues related to interagency data sharing become too difficult. For example, inconsistencies in cross-agency data definitions can lead to reporting inaccuracies. Improperly shared data, or improperly data cleansing, can lead to inconsistencies and even data breaches. To ensure that data are entered and exceptions are handled properly, even data entry staff benefit from knowing the source of the data and understanding their appropriate values.

By considering the abstract notion of data quality in the light of its more concrete parts—accuracy, timeliness, and completeness—you may find solutions to your greatest data challenges more easily. Mapping data flow will help you to consider the strengths and challenges of existing data management systems and processes, and identify ways to promote improvements in the timeliness, completeness, and accuracy of program data.

Overview of the Workbook and Tools

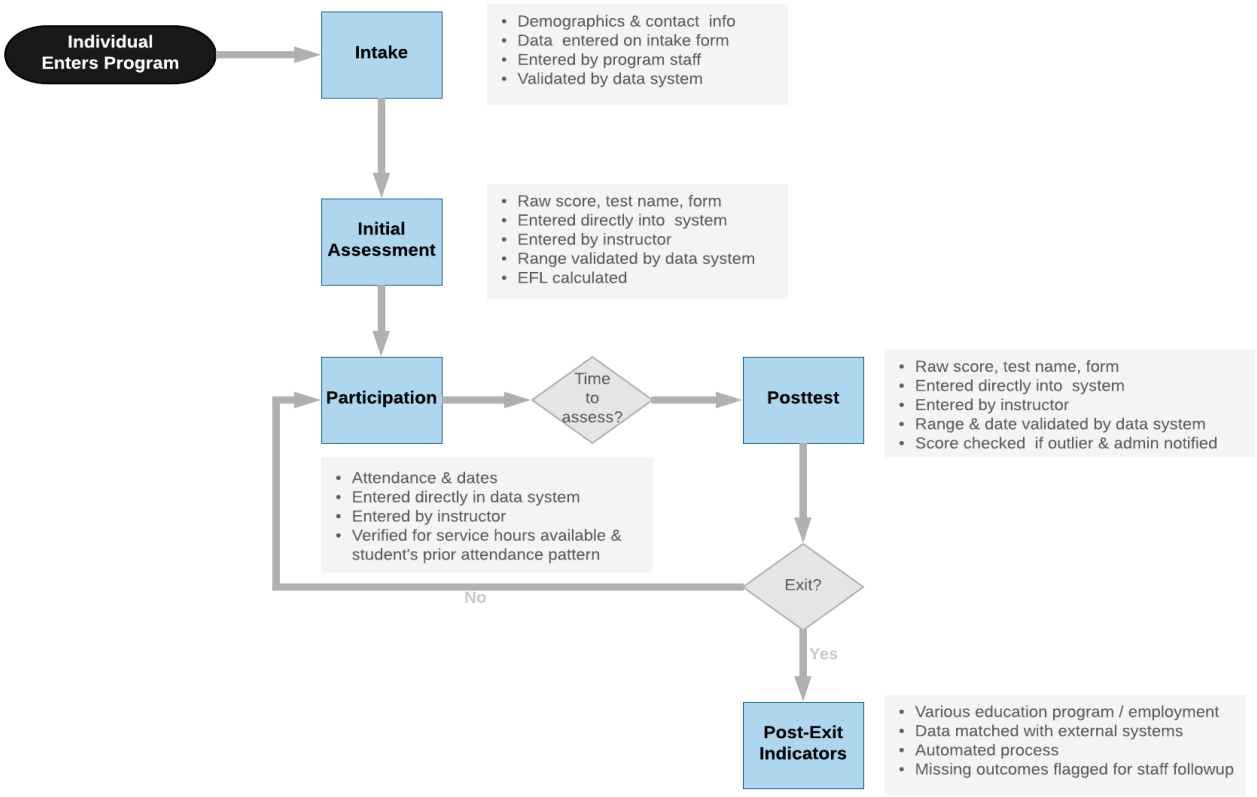
To support your team's effort to build a new data system, document and communicate your needs and challenges for obtaining and using data, or, helping your thinking through those challenges, consider creating your own graphical flowchart. This guide will help you through the process, using a workbook to enable you to fill in key details about your organization's data flow. The workbook includes information about creating flowcharts and an accompanying data management workbook to guide you through a detailed look at the data you collect and manage. It uses a general model of the data collection process from intake until student exit to help you understand data flow in your state or adult education program. We also offer an example of a way to illustrate graphically your data flow using readily available charting software. Appendix A provides a list of several tools for creating flowcharts. Appendix B illustrates the operational steps we followed to create the flowcharts in this workbook, using a free online tool.

Documenting Your Own Data Flow

Data flows can be represented graphically to provide a quick view of critical acquisition points, and to gain greater understanding about how information is used within a data system. A project to map your state's data flow can help you identify potential data quality and completeness challenges, or to communicate particular data-related needs with data system developers or agency partners.

As you think about a project to map your data flow, consider the kinds of information and presentation that might help you communicate the types of data you need and how data are used. One way is to annotate a system flowchart with information required at each step as a student progresses through an adult education program. Using this approach, state staff and other professionals can identify and understand immediately the collection chokepoints, potential data entry timeliness issues, and places where interagency collaboration will be necessary.

The following diagram illustrates a general way a student might interact with an adult education program, along with the data collected at each point along the way.



The boxes in this example represent the process a student goes through while attending an adult education program. The blue boxes represent activities including intake, assessment, class participation, and postexit indicators. The gray diamonds represent conditions that drive the student's participation and determine which blue box activity comes next. Gray arrows mark the movement

from step to step in the process. The black ovals document the data management considerations at each step of the process, for example, how related data are collected, how data are acquired, who obtains the data, and how data are checked. You also may include brief notes that characterize a data collection challenge or even link to additional documentation.

From this bird's eye view, all points of data entry/collection are easier to see and to zero-in on those having particular challenges. From here, we can drill down into the workings of each blue box, documenting and exploring the process by which data are collected and managed.

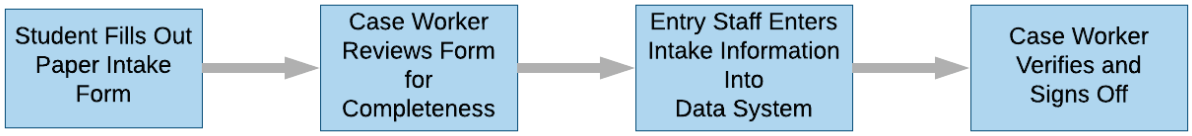
Intake

Focusing on the flowchart's *Intake* box, examine key aspects of data entry and management during intake. Much of the data you will collect from a student occurs at intake or within the first few weeks after the student becomes a participant. Data collected at intake includes identifying and contact information and demographics, such as age, gender, race, ethnicity, and barriers to employment.

When developing your data flow, mentally walk through the intake process. Determine the following:

1. Staff member in charge of intake collects basic demographic information.
2. Staff member compiles and enters notes for completing the intake form.
3. Form is sent to clerical staff for review, and to the teachers.

You may then create a more detailed data flowchart to document the data acquisition and management process, and identify potential problems, such as data entry bottlenecks, and potential solutions. Here is a simple example to illustrate how your intake data flowchart might look:



Initial Assessment

At intake or soon thereafter, you will assess students for placement in an educational functioning level (EFL). During the assessment process, consider what data are collected and how. To help visualize how the process works, you can create a simple flowchart, as shown above.

If data must be entered on paper, then transferred to a data system, your flowchart might include a process box for each step. Consider substeps for each box, and any implications in how the process is carried out for data accuracy and timeliness of reporting. Process-related as well as operational factors, may affect the efficiency of the process. For example, whether teachers have easy access to forms and other resources for administering tests. Does the process require busy individuals, such as teachers, to carryout manual tasks? Are there ways to collect and manage assessment information that lessen the burden and require less time?

Participation: Attendance, Progress Assessment, and Updates

As a student participates in classes, program staff may enter attendance and or update information collected at intake. To help visualize the details of this process, a flowchart may include elements to show the kinds of paperwork required, how attendance is taken, the process for using forms or online tools, and where the data are stored. Creating the diagram offers opportunities to visualize data management processes and identify methods you might use to streamline them. Document your process for what happens if a lapse occurs and the data are not collected on schedule.

Postexit: Performance Indicators

Modeling your process to collect data on outcomes may be more involved than other flowcharting efforts because of the variety of education and employment outcomes that programs need to track. Continue by creating flowcharts that are more detailed and model how programs collect the postexit performance indicators required by the *Workforce Opportunity and Investment Act* (WIOA). These indicators include second and fourth quarter employment, earnings in the second postexit quarter, and credential attainment, as well as entry into postsecondary and secondary credential attainment for the measurable skill gains (MSG) indicator. Programs will collect these measures through a survey or the state may collect them through data matching. A box on your flowchart represents each step in the data collection and management process.

The sources and the kinds of documentation needed and collected to record these indicators will shape your indicators flowchart. Determine how you ensure appropriate follow-up is conducted—whether directly with the student or with another organization to determine completion of a postsecondary credential, employment, and so on. Your flowchart can provide greater understanding of such a process and help provide insights for simplifying it.

Many factors can affect the collection and management of data. Consider process factors, where and how data may be acquired, availability of sufficient staff, legal factors or agency rules, timing, security, personal privacy needs, and so on. Also, consider the staff involved in collecting data and who has access to data. Identify staff who are responsible for data collection and the process and staff involved in data verification through error checks, after data are entered into the state data system. A process also should be in place for correcting errors and adding missing data elements to the system.

An overview flowchart and a series of more detailed process-related flowcharts to document more detailed data management practices can aid understanding of the overall process, and its most important components. When complete, your flowchart provides a tool for understanding how your process (and that of local programs) may affect the timeliness, accuracy, and usefulness of the data you manage. You can use the data flow workbook to understand your data management challenges and solutions in greater detail.

The pages in this workbook help you to think through which data to collect, manage, and share as individuals interact with adult education programs in your state. To report accurately on the impact of programs, data may be entered manually or acquired from external sources.

Final Thoughts

With a solid understanding of your data needs, and challenges you face to meet them, you can understand better the features that your data system needs, the procedures you develop for handling

student information, and the relationships you must develop with other agencies and external organizations with whom you work.

As a *living* tool, the flowchart and workbook provide the basis for conversations among state staff and others, not just to document but discuss challenges and solutions as you think through a new data system's needs. Your entries need not be final until you are finished conceptualizing the system. Consider revising them with input from all stakeholders. Follow up, by transforming conceptual solutions into concrete specifications for use by your IT department, development team, or data system vendor.

Where flowcharts provide a visual overview of your data acquisition and management process, as our example shows, other tools can provide greater detail for addressing data-related challenges. Our data flow workbook will help you think through the kinds of data to be acquired at each stage of a participant's interaction with their local program, identify key challenges and generate ideas for addressing them. Each page addresses a different data collection step in the student participation lifecycle, as documented in the flowchart presented above.

Enter on each page, the kinds of data needed, how they will be acquired, challenges you anticipate, and solutions you identify. To help you get started on each page, we provide a few examples related to each type of data, challenges, and solutions. Use this tool to identify data acquisition and management approaches appropriate for your state.

For most challenges, tried-and-true solutions will be sufficient, but also consider how your state might differ from others and which challenges might require some additional thought. Because common or best practices constantly evolve, you will benefit by considering which technology trends may be driving new and better solutions. For example, data systems now can be interconnected easily, making data matches much easier. Pervasive handheld devices, like smart phones are also data collection devices. Might there be a way to use them to improve collection of attendance data, for example?

With a picture of a student's journey and NRS requirements at the forefront, you are ready to consider the challenges of collecting and maintaining accurate, timely, and complete data in a step-by-step way. Work through each page to identify data-related challenges and generate solutions for your state's particular needs.

Intake

During the intake process, adult education participants provide information about their prior education experience, demographics, contact information, and so on. In the spaces below, complete a listing of specific data items that you have identified with your team, and include how they are acquired and verified for accuracy and key challenges to address and solutions for addressing them.

Data Acquired

What data are required at intake?

Example: Individual identification (SSN), and demographic (ethnicity, DOB, gender) information.

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Collection Method

How are the data acquired, stored, and managed?
Example: Manually entered into data system, data matched, etc.

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_____

Verified for Accuracy

Describe the main aspects of your process to ensure accuracy of the data collected as part of the process described above. Example: Data system checks all critical items for accuracy; data entry staff review and correct entry errors. Case worker reviews and approves entries.

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Error Correction

How are corrections made if an error occurs? Who makes the corrections? Are particular kinds of errors common?

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Data Acquisition and Quality Challenges

Identify key challenges. For example: Not all students have an SSN, must coordinate student information with other agencies for consistency, coordinate management of information for the same student enrolled in multiple programs or multiple periods of participation.

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Solutions to Maintain Completeness, Accuracy, and Timeliness

Enter bullet point descriptions of solutions to data quality and acquisition challenges. For example: Data entry range checks for demographic information, shared/unified databases, etc.

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Initial Assessment

Following intake, program participants take a pretest to determine placement. In the spaces below, complete a listing of assessment data items to be collected that you have identified with your team, and include how they are acquired and key challenges to address and solutions for addressing them.

Data Acquired

What data are collected by program staff or acquired through data matching when students are assessed? For example: Assessment Date, Type, Score, EFL.

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Collection Method

How are the data acquired, stored, and managed?
Example: Manually entered into data system, data matched, etc.

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Verified for Accuracy

Describe the main aspects of your process to ensure accuracy of the data collected as part of the process described above. Example: Data system checks all critical items for accuracy; data entry staff review and correct entry errors. Case worker reviews and approves entries.

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Error Correction

How are corrections made if an error occurs? Who makes the corrections? Are particular kinds of errors common?

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Data Acquisition and Quality Challenges

Identify key challenges in the spaces below. For example: Prevent use of same test form, ensure consistent use of assessments, ensure appropriate timing of assessments.

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Solutions to Maintain Completeness, Accuracy, and Timeliness

Enter bullet point descriptions of solutions to data quality and acquisition challenges. For example: Data entry checks for consistency (same assessment for pretest and posttest), prevent entry of test scores before required posttest is permitted.

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Participation

A student's level of participation in the program is measured in contact hours. To measure program effectiveness, student enrollment information and contact hours must be recorded regularly and accurately. In the spaces below, complete a listing of attendance-related data items that you have identified with your team, and include how they are acquired and key challenges to address and solutions for addressing them.

Data Acquired

What participant attendance data are collected by program staff or acquired through data matching?

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Collection Method

How are the data acquired, stored, and managed?
Example: Manually entered into data system, data matched, etc.

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_____

Verified for Accuracy

Describe the main aspects of your process to ensure accuracy of the data collected as part of the process described above. Example: Data system checks all critical items for accuracy; data entry staff review and correct entry errors. Case worker reviews and approves entries.

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Error Correction

How are corrections made if an error occurs? Who makes the corrections? Are particular kinds of errors common?

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Data Acquisition and Quality Challenges

Identify key challenges in the spaces below. For example: Difficult to maintain compliance with need to enter data quickly; process by which instructor enters attendance data manually is inefficient and error prone.

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Solutions to Maintain Completeness, Accuracy, and Timeliness

Enter bullet point descriptions of solutions to data quality and acquisition challenges. For example: Smart phone app that automatically marks student attendance eliminates need for manual entry; data checks to prevent entering more than available number of contact hours.

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Postexit Indicators

Consistent with WIOA requirements, postsecondary education and employment status outcomes information is collected for participants. This information may come from a variety of sources and may be managed in different ways. In the spaces below, complete a listing of employment and academic data items relevant to your state that you have identified with your team, and include how they are acquired and key challenges to address and solutions for addressing them.

Employment Outcomes

States collect employment status, quarterly earnings, and other data on the WIOA employment performance indicators after participants exit the program. In the spaces below, enter the full list of employment-related data items that you have identified with your team, and include how they are acquired and key challenges to address and solutions for addressing them.

Data Acquired

What employment data are collected by program staff or acquired through data matching?

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Collection Method

How are the data acquired, stored, and managed?
Example: Manually entered into data system, data matched, etc.

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_____

Verified for Accuracy

Describe the main aspects of your process to ensure accuracy of the data collected as part of the process described above. Example: Data system checks all critical items for accuracy; data entry staff review and correct entry errors. Case worker reviews and approves entries.

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Error Correction

How are corrections made if an error occurs? Who makes the corrections? Are particular kinds of errors common?

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Data Acquisition and Quality Challenges

Identify key challenges in the spaces below. For example: Systems for entering employment status data in different agencies may use incompatible designs or data formats; data privacy policies may prevent sharing of employment data cross-agency, and so on.

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Solutions to Maintain Completeness, Accuracy, and Timeliness

Enter bullet point descriptions of solutions to data quality and acquisition challenges. For example: Enter information about obtaining needed data sharing MOUs, or establishment of cross-agency workgroups to manage or negotiate consistent data definitions and update timelines, and so on.

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Credential Attainment and Entry into Postsecondary Education

States collect information about measurable skill gains and credentials related to WIOA performance indicators. In the spaces below, enter the full list of data items that you have identified with your team, and include how they are acquired and key challenges to address and solutions for addressing them.

Data Acquired

What measurable skill gains and credential data are collected by program staff or acquired through data matching?

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Collection Method

How are the data acquired, stored, and managed?
Example: Manually entered into data system, data matched, etc.

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_____

Verified for Accuracy

Describe the main aspects of your process to ensure accuracy of the data collected as part of the process described above. Example: Data system checks all critical items for accuracy; data entry staff review and correct entry errors. Case worker reviews and approves entries.

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Error Correction

How are corrections made if an error occurs? Who makes the corrections? Are particular kinds of errors common?

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Data Acquisition and Quality Challenges

Identify key challenges in the spaces below. For example: The need to obtain student credential information or certificates from a wide variety of colleges and other institutions; data privacy and handling consideration; and so on.

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Solutions to Maintain Completeness, Accuracy, and Timeliness

Enter bullet point descriptions of solutions to data quality and acquisition challenges. For example: Enter information about needed data-sharing MOUs, or mix of electronic and manual systems needed to obtain certification and program completion information.

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Appendix A—
Creating a Flowchart

To document basic data collection points, outline procedures, and identify factors that affect collection of timely and accurate data in your state, you can use a flowchart as illustrated above. Several tools are available for creating flowcharts, both online and that you can download to your desktop. To build our sample data flowchart in this workbook, we chose Lucid Chart because it is easy to use and free. Learning to use it did not take long, and creating our data flowchart was a straightforward task.

Other useful flow-charting tools include free online options and those familiar to systems analysts—such as Microsoft Visio, and basic office presentation tools like PowerPoint. Here is a list of some options, with links for more information:

1. Lucid Chart—https://www.lucidchart.com
2. Draw IO—https://www.draw.io
3. Smart Draw—https://www.smartdraw.com
4. Microsoft Visio—https://products.office.com/en-us/visio/flowchart-software

These are not the only options but are some of the most well-known. An online search will enable you to identify additional choices.

Appendix B—
Creating Your Own Flowchart

The flowchart that appears earlier in this document was created with a free tool, called Lucid Chart. Like other options, it was easy to use and delivered a visually appealing result. Here are the basic steps we followed to create a flowchart using this tool:

Set Up Your Lucid Chart Account

1. Visit https://www.lucidchart.com/
2. Scroll down to the bottom of the page, then click *start diagramming online.*
3. At the bottom of the registration page, click the link that says *start free account.*
4. Register using the directions provided.

Create Your Data Flowchart

1. Log in to the account you have created.
2. Click on the "create blank document" link.

3. A blank grid will appear on the right-hand side of your screen, and a palate of symbols will appear on the left. You are ready to create your diagram.
4. Drag symbols from the palate on to your grid. To create a cohesive layout, consider starting with the rectangles, each of which will represent a step in the service-delivery process. After dropping in a rectangle, use your keyboard to type the name of the process step.

   Click the paint bucket button at the top of your screen to change the background color, if you wish. You also can change the typeface and other attributes of the box.

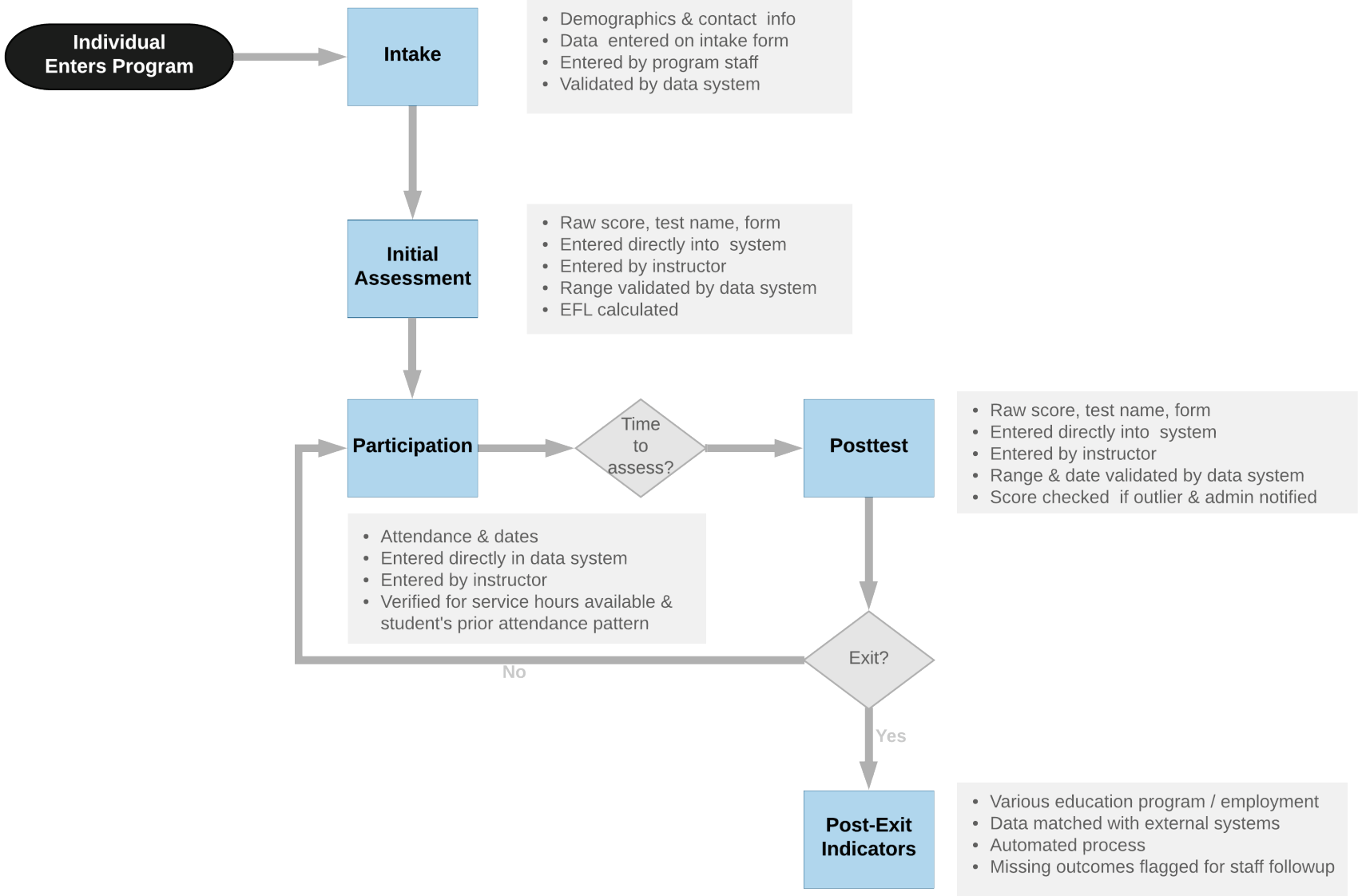
   To create additional boxes with the same appearance, copy and paste the one you created originally, then change the text inside. Position the process rectangles with enough space to add additional shapes.

   When done, you should have a page of rectangles representing steps that a student goes through, and diamonds indicating decision points.

5. Next, connect the process rectangles and diamonds using arrows to show how a student progresses through a program. To do this, drag an arrow shape from the palate. Drag the ends of the arrow to the sides of another shape to make a connection. As you did with the shapes, you can change the width and color of your arrows using the control buttons at the top of the page.
6. Finally, add information about data collection at each point in the process. In the example above, this is shown in the black ovals. As the flowchart is intended to provide a high-level view, you might include only the basics for each process box. Consider including the types of data collected or used and the source of the data. Are data collected manually, transferred from another data system, or automatically collected some other way?

Appendix C—
Flowchart Example

To provide you with additional insight into what flowcharts are, and how you might use them, we created an additional example. This one focuses more deeply on the program intake process, and the data collected, retrieved from other sources, and used as a student enrolls in a program. In a real-world scenario, this flowchart might be part of a collection of related charts, each providing detailed information about how data are collected and used in a program. See if you can identify potential data-related challenges by reviewing the chart.


Individual Enters Program
Intake
• Demographics & contact info
• Data entered on intake form
• Entered by program staff
• Validated by data system
Initial Assessment
• Raw score, test name, form
• Entered directly into system
• Entered by instructor
• Range validated by data system
• EFL calculated
Participation
Time to assess?
Posttest
• Raw score, test name, form
• Entered directly into system
• Entered by instructor
• Range & date validated by data system
• Score checked if outlier & admin notified
• Attendance & dates
• Entered directly in data system
• Entered by instructor
• Verified for service hours available & student's prior attendance pattern
Exit?
No
Yes
Post-Exit Indicators
• Various education program / employment
• Data matched with external systems
• Automated process
• Missing outcomes flagged for staff followup