Opening Gateways

A Practical Guide for Designing Electronic Records Access Programs

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Diagnostic forms included in the "Gateways" Appendix are available
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Introduction

Many people and organizations need government information: the researcher trying to understand trends in education, the local charity documenting the need for senior housing, an engineering firm preparing an environmental impact statement, a sixth-grader writing a term paper about the history of her town. Increasingly, the information they need or prefer is in electronic form.

Many different kinds of organizations provide access to government information—libraries, government archives, and all kinds of public agencies at every level of government. Universities and nonprofit organizations may also be repositories of government information. They, too, are making the transition to a largely electronic way of working.

The growing demand for information to be available in electronic form and for direct access to these electronic records is changing the design and management of records access programs. Programs are becoming increasingly focused on electronic records as the format desired by users. They are also shifting from staff-supported access models to direct-user access models, now made possible over the Web. Making a successful transition to this increasingly user- and usage-focused electronic model requires careful assessment of the users, uses, content, operation and cost of a desired program. This shift often requires program managers (content experts) to join traditional information access professionals in a new way of working.

Several practical tools are presented here to help these professionals create electronic records access programs that are effective, manageable and affordable. Each tool includes both a description and an example of the tool in action. Because access programs can involve digital data, images and documents of all kinds, we use the general term "information" to cover them all. This practical guide is designed to be used from the point of view of access providers. It can be used to develop new access programs or to revise existing ones.

We use a single hypothetical case example throughout the guide. It is a state government initiative to create a Web-based repository of information pertaining to the status of children. We call it the Children's Project Clearinghouse (CPC) and assign responsibility for it to the fictional State Commission on Human Services (CHS), a small policy and educational agency that provides research and information on social issues and trends to government officials and the public. Because the Commission will be the access provider for the Clearinghouse, all of the examples are prepared from CHS's point of view.

The Commission works with federal, state and nonprofit organizations to carry out this mission. These independent players will have an important role in the Clearinghouse. This is the Commission's first effort to make data and information more widely available by electronic means. Currently, the Commission sponsors or develops research and statistical reports. In the children's area, the main product is an annual compilation of statistics drawn from nearly 20 organizations and published in book form. To create the Clearinghouse, the Commission will have to adopt new policies and practices and learn more about data, meta data, technology, customer service and interorganizational management. If this first effort is successful, it may be expanded beyond children's issues to encompass other topics such as aging, education or community development.

General description of the tools

The Guide begins with a ***Preliminary Program Description*** that sets the stage for the analysis that follows. The ***Assessment Tool*** consists of several introductory questions and 15 program dimensions. Each dimension is a continuum of characteristics that range from less to more problematic or resource-intensive. Eight dimensions address information users, uses, suppliers or content. Seven additional dimensions consider aspects of the access program and its organizational context. The assessment provides a rough "big picture" of the considerations that an access provider must take into account in designing a new program or improving an existing one. This profile of characteristics tells an important story about the challenges an access provider will face.

Within the big picture and the story that underlies it, groups of dimensions tend to interact. The ***Diagnostic Tool*** helps planners understand how the situations they face on some dimensions affect or are affected by others. These interactions suggest alternative policies, management mechanisms and technologies that will help them build and operate a successful program.

The ***Program Design Tool*** takes the foregoing characteristics, interactions and alternatives into account and helps planners specify the main features of their program design. These include the key services to be offered, guiding policies, legal requirements, staff skills required, technologies to be employed, work flows and other elements that define the access program and shape its operation. This basic design can be presented in modest, moderate and elaborate terms.

The results of the program design effort lead to the identification and estimation of the various costs of implementing and operating the access program. The ***Cost Estimation Tool*** assists in this phase. It identifies the cost categories associated with the design and its implementation and ongoing operation. This tool also allows for the program to be specified at modest, moderate and elaborate levels. A comparison of the costs and expected performance at each level helps planners choose the right level of investment for achieving their goals.

Getting ready with a Preliminary Program Description

Whether creating a new program, or revising an existing one, planners should answer these questions as completely as possible as the first step:

- What is the purpose of the access program?
- What are the main information types to be provided?
- Who are the expected users?
- What uses will likely be made of the information?
- Who are the information suppliers and how do they collect their information?
- What laws, regulations or court decisions govern use of the information?
- How long is the information useful?
- How will technology be used?
- What staff skills are needed?
- What does past experience tell us?

The answers to these questions are the foundation for the program design effort. They describe the initial conditions for your program. As the design proceeds and specific choices are made, the answers may change to reflect new information.

The example on the next page shows how these questions would be answered by the State Commission on Human Services for the Children's Project Clearinghouse.

Example of a Preliminary Program Description for the Children's Project Clearinghouse (CPC)

- **What is the purpose of the access program?**
  The CPC project addresses the need for more rapid and timely access to data about the status of children in our state. The goal of CPC is to make existing program data available in a more timely and accessible way to state, local, nonprofit and individual users. There is a particular desire to expand both the kinds of data available and its usefulness for smaller jurisdictions and communities.

- **What are the main information types to be provided?**
  Statistical information about a variety of topics such as the number of low birth weight babies, children living in poverty, youngsters without medical insurance, high school dropouts, and teen pregnancies that occur in the state every year. Most of the information is available at the county level. Some is available for smaller geographic areas.

- **Who are the expected users?**
  State and local government program managers, program evaluators, nonprofit service providers, academic and nonprofit researchers, members of the public.

- **What uses will likely be made of the information?**
  Policy development, planning, budgeting, evaluation, grants, advocacy, research and accountability.

- **Who are the information suppliers and how do they collect their information?**
  The data in CPC comes from a variety of sources including 10 state agencies, three federal agencies and half a dozen professional research institutes. They collect the data in the course of operating their own programs. These programs include public education, family support and preservation, delinquency and drug prevention, mental health and chemical dependency treatment, juvenile justice, early childhood education and child care, services for the disabled, employment and training, health maintenance and wellness, and recreation and social development. These organizations periodically arrange this program information in database or spreadsheet format and submit it to the State Human Services Commission for use in an annual paper publication on trends in the status of children.

- **What laws, regulations or court decisions govern use of the information?**
  Information supplied to the Commission is statistical and publicly available without legal restrictions. The underlying sources are subject to a variety of restrictions mostly related to personal privacy.

- **How long is the information useful?**
  The data in CPC is most useful for the most recent three years; 3-10 years of data is useful for trend analysis.

- **How will technology be used?**
  CPC will be a publicly accessible, Web-based information repository and hopes to offer data analysis tools to allow searching, combining, comparisons, table generation and some limited GIS applications for users to manipulate data and generate reports.

- **What staff skills are needed?**
  Leadership and negotiation, data management, Web authoring and Web programming.

- **What does past experience tell us?**
  It is very difficult to get information from all contributing organizations on the same schedule. After initial submission, data gaps or errors may be corrected at the home organization, but these corrections are not always reported to the Commission. A lack of authority over contributing agencies results in a need to invest heavily in cooperative relationships. User-oriented descriptions of the information sources are currently inadequate or nonexistent.

Assessment Tool

The Assessment Tool uses two sets of dimensions. The first set pertains to the users, uses, suppliers and content of the records. The second set addresses the access program structure and organizational context. Each dimension can be thought of as a continuum ranging from low cost/low risk to high cost/high risk characteristics.

The users-uses-suppliers-content dimensions are:

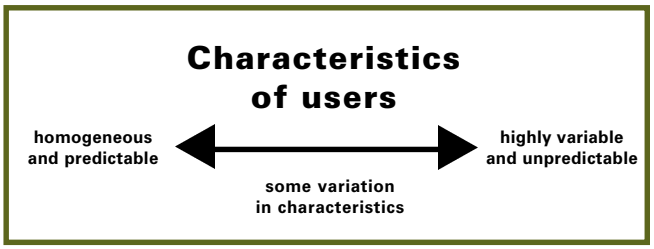
- Characteristics of users
- Predictability of uses
- Sensitivity of content
- Frame of reference needed to interpret and use content
- Status of meta data
- Uniformity of information sources
- Degree of integration among information sources
- Usefulness of content over time

The access program dimensions include:

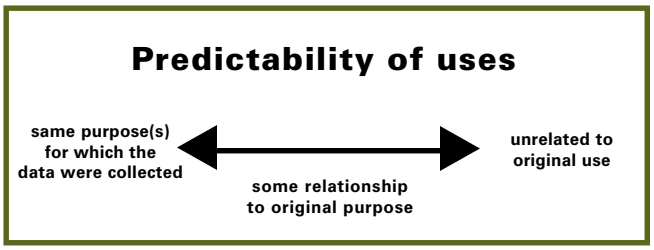
- Structure of relationships with information suppliers
- Structure of relationships with information users
- Involvement of access provider in original data collection
- Extent of data analysis or other manipulation conducted by the access provider
- Nature of data flows
- Suitability of existing technology
- Relationship of the access program to overall organizational mission

In this phase, each dimension is considered independently. The collection of independent ratings produces a profile of characteristics that must be taken into account in program design. (Later tools consider the relationships among the dimensions.) Each dimension is briefly described on the pages that follow.

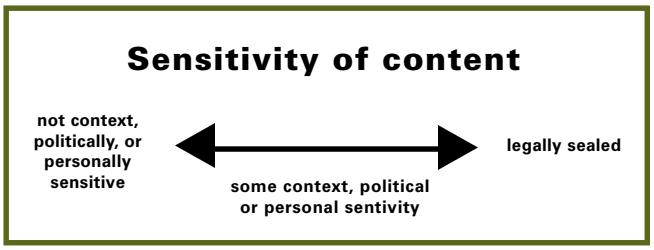
Dimensions related to users, uses, suppliers and content



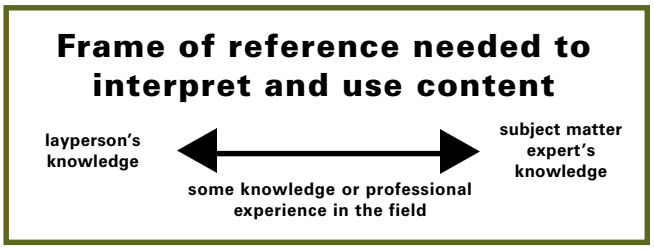
The first dimension deals with the degree to which user characteristics are consistent and predictable. User characteristics include ability to understand the data content, its limitations and the conditions under which it was collected; data-handling and analytical skills; technological capabilities and tools; and interests in the data content and what it can be used for. Registered or licensed users who provide information about themselves would fall on the left side of the continuum. Random members of the general public, whose characteristics vary most and are least predictable, serve as the anchor at the opposite extreme. The middle range accounts for users whose characteristics are more or less known or readily predicted. For example, even if they do not register, users of a repository devoted to organic chemistry are likely to be chemists, medical professionals, science teachers, science or medical students or people with similar interests or knowledge. A repository of popular music might attract users with a much greater variety of characteristics.



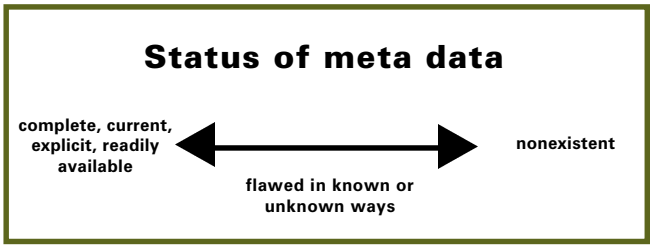
Electronic records and information may be applied to uses that are very close to or far removed from the uses for which they were created. The degree to which use can be predicted is therefore a key dimension to consider. At one end of the continuum are the uses for which the data were originally collected or the record was created. At the other end are uses that have no relationship to the original purpose for data collection. Various degrees of relationship to the original purpose lie at points in between. For example, real property records are created to document the history of ownership of land parcels. They are also used as the basis for local property taxes, a related use. The same records could be used to identify high-income neighborhoods for a marketing campaign, a use that is not at all like the original.



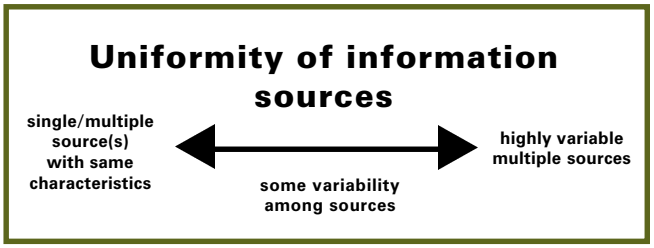
The subject matter or content of a record will have characteristics that allow it to be placed along a continuum that has, on the one extreme, factual content that is not controversial or subject to much interpretation and, on the other, content that is so sensitive that laws constrain its use. Between these two extremes lies information of varying sensitivity that must be handled by a range of appropriate policies or management tools. Low sensitivity content might be a daily record of air temperature and wind velocity. Sensitive content includes campaign contributions, divorce decrees or adoption records (which are generally sealed).



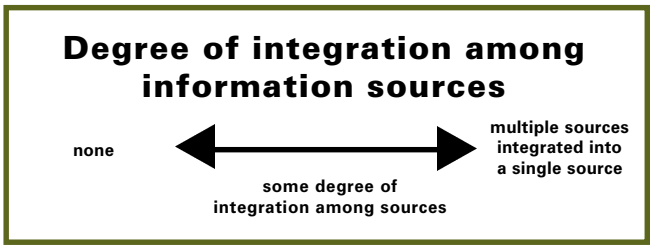
Information content can vary widely in its need for an expert frame of reference. At one end of the continuum lies information that is readily understandable by a lay person. At the other is information that cannot be used reliably without the knowledge and experience of a subject matter expert. In between is information of increasing nuance or complexity that requires increasing amounts of contextual knowledge in order to be used effectively. A lay person generally has the background knowledge to make good use of a library catalog, news stories or straightforward numerical data in tables or graphs. It takes more background and training to interpret research reports, complex statistical presentations or inferences, or highly technical information pertaining to various professions or scientific disciplines.



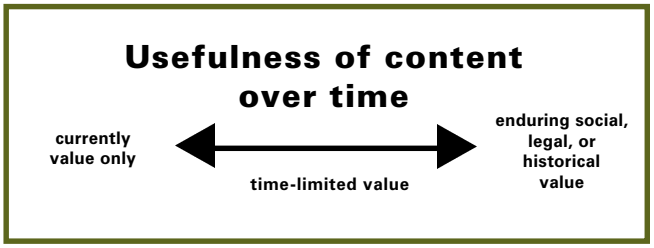
The method and quality of description constitutes the meta data dimension. Meta data, or information about the information in an access repository, can be characterized by its completeness, accuracy, explicitness, currency and availability to users. At one end of the continuum is meta data which has been made explicit, is current and complete, accurate and readily available to potential users of the data. At the other end of the continuum, meta data is nonexistent. At various points along the continuum, meta data is flawed or incomplete, with different levels of understanding about its shortcomings. For example, meta data may describe when the information was collected, how and by whom, but it may not provide definitions of key terms or explain how definitions changed from one year to the next.



This dimension refers to the uniformity of important aspects of the source records being made available for use. These characteristics include physical format, original purpose, method of data collection and the meaning of various data elements. At one end of the continuum are data or records that come from a single source or from multiple sources that are exactly alike in these characteristics. At the other end lay records that come from multiple sources with disparate characteristics. Income tax withholding instructions are collected by every employer in the country, but in a very uniform way, using a standard form, the W-4. By comparison, case records about social services to individual clients vary widely from one service agency to another.

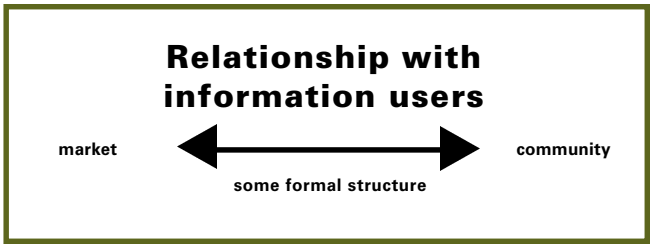


If the repository is composed of information from multiple sources, the degree of integration to be achieved among these sources is an important consideration. At one end of this dimension are repositories that maintain multiple sources as separate entities. This program lies at the high end of the continuum. The National Spatial Data Infrastructure collects or points to a virtual collection of many separate spatial data sets. At the other end are repositories in which information from multiple sources is integrated into a comprehensive single secondary source, such as a data warehouse. For example, New York's Bureau of Shelter Services is creating a data repository about homelessness that extracts, merges and organizes data from scores of government and nonprofit agencies.

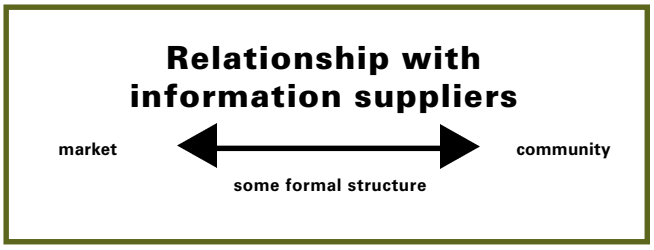


This dimension recognizes that the content of records can vary widely in pertinence and value over time. Some information has only current or short-lived usefulness; other information may be of enduring social, legal or historical import, and worthy of indefinite preservation. These are the two anchors of this time dimension. At points in between are records whose value to users diminishes over a medium-to long-term time interval. For instance, correctional institutions maintain various records essential to accomplish their work, including logs and prisoner case files. A log might document the rounds a prison guard makes on a daily basis, and these have value in the short term, proving that the guards fulfilled their responsibilities or providing a way to estimate when an unwitnessed activity (an escape, a fight, a suicide) took place. But shortly after the production of these records, their value decreases until it disappears. On the other hand, prisoner case files might have a good deal of continuing value. These document each prisoner, including dates of incarceration and release, age, ethnicity, offense, behavior in prison, medical condition, etc. The prison uses these records to track prisoners, and these records have value to the prison during the time of incarceration and for a short period after incarceration. However, these records also often have permanent value as a way to document prison conditions, ethnicity and other historical information over time.

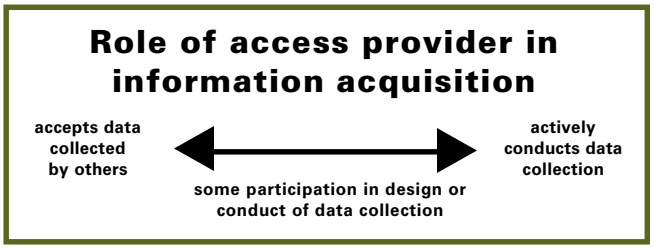
Dimensions related to organizational structure and context of the access program



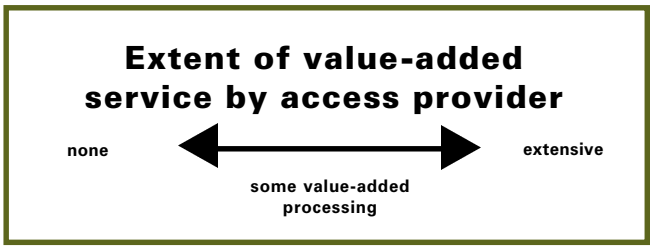
The structure of relationships between the access provider and information users could be described as varying from a simple *market* kind of mechanism, to a more *formal* rules-based arrangement, to a more *community*-like relationship. Market relationships are based on low transaction costs, mutual exchange, short-term involvement and little or no need for shared identity or values. Libraries operate under this model. Bureaucratic, legal or contractual relationships are based on formal agreements or policies, and characterized by longer-term involvement and higher costs to establish and maintain. Subscription services to online professional journals are typical. Community relationships are based on long-term familiarity and trust, with shared identity, values and mutual interests. The establishment and maintenance of these relationships is more costly than the others. More than one kind of relationship can exist with different user groups.



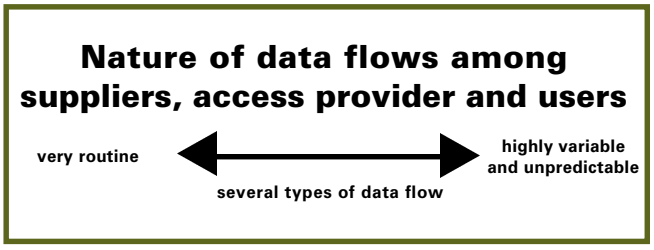
The same relationship structures that apply to users also apply to suppliers of information. They range from simple market transactions between access providers and information suppliers (such as information brokers who buy state vehicle registration files in order to serve the information needs of vehicle manufacturers) to formal arrangements (such as the information required of businesses by the US Securities and Exchange Commission) to complex community structures (like the CPC example we use in this guide). As with users, access providers can have one type of relationship with one set of data suppliers and a different one with others.



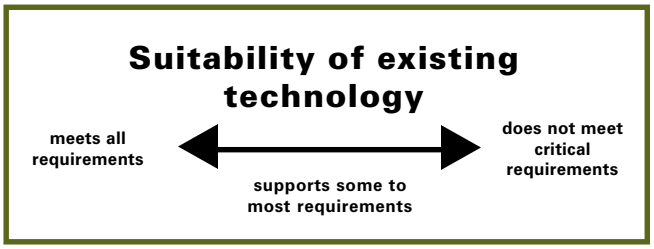
As an access provider, do you play a role in original data collection? At the low end, the information creation work of the suppliers is independent from the work of the access provider. Examples are data libraries that do no original data collection, but accept the information resources that are created or collected by others. The Inter-university Consortium for Political and Social Research (ICPSR), for example, specifies standards for acceptance of data sets, but is otherwise largely unconnected with the work of the data suppliers. Typically, government archives also fall at this end of the spectrum. At the high end, the access provider plays a significant role in data collection or creation. The Central Archive, an institute of the Cologne Association for Social Research at the University of Cologne, collaborates with the research community to design data collection methods and meta data requirements for new data sets. Some access providers, such as the National Center for Educational Statistics (NCES) and the U.S. Census Bureau, are the main or only data collection agent for their repositories. These programs would also be at the high end of this dimension.



This dimension captures the extent to which the access provider performs work that changes or adds value to the information supplied by others. At the high end of this dimension, the access provider transforms and analyzes the data in substantial ways (e.g., aggregation, constructing indicators, statistical analyses, data mining). As a result, what is available to users is significantly different from or enhanced beyond the original sources. The changes in the data may involve both format and content as well as ways of presentation. Analytical products such as reports or summaries may be made available to users. The U.S. Census Bureau, for example, provides not only basic census data, but many different subsets, analytical reports and analysis tools for users. At the low end of the dimension the provider does not transform or analyze the data in the repository, providing only access to the original data as received. In the middle would fall programs that conduct modest value-added activities such as providing a search capability or categorizing information according to theme or source. The New York GIS Clearinghouse is an example. It does not process the contributions of information suppliers, but provides several ways to search through the data, including by source, by theme, by coordinates and so on.



This dimension addresses the way in which information flows from the suppliers to the access program provider to the end users. At the high end, the flow of data into the repository and the demand for access to that data would be unpredictable and highly variable in timing, volume and other characteristics. A general government archive would be an example of mid-range variability of the dimension. For a highly routine case, both the nature and flow of the data into the repository would be consistent and predictable, as would be the demand for access by users. The Federal Deposit Insurance Corporation (FDIC) is an example of a highly routine program with regular, rigid requirements for submission of data by banks and routine reporting and access provisions for a large volume of users.



Electronic access programs necessarily rest on technology foundations. This dimension assesses the degree to which the access provider's existing technology can support the desired access program. On the left side fall programs which already have sufficient infrastructure and technical support to operate a program with the desired features. On the right side are situations in which existing technology does not meet even the most basic critical requirements. For example, an organization which does not have a Web service cannot offer a Web-based information repository to others without new resource investments. Security is an important factor here as well. Security technologies must be explored and understood to ensure that the appropriate technologies have been employed to provide the desired level of security.

This characteristic describes the degree to which the access program is central to the core business or mission of the provider organization. If the organization's primary purpose or mission is to provide access to information, it will have a low (or non-problematic) rating on this dimension. Archives and data libraries would be examples of such organizations. For the high end of the dimension, the access program would be considered a minor, unimportant or even unrelated part of the overall organizational mission. This program will have to compete with other, higher priority activities for attention and resources. Certain advocacy organizations would fall in the middle of this dimension. They may collect or acquire information and perform analysis primarily to advance the policy agenda of the organization, and only secondarily to provide data to other users. At the high end, would be programs that are transitory or of interest only to certain individuals, but are not germane to the organization as a whole or to its long-term strategies and goals.

How to use the Assessment Tool

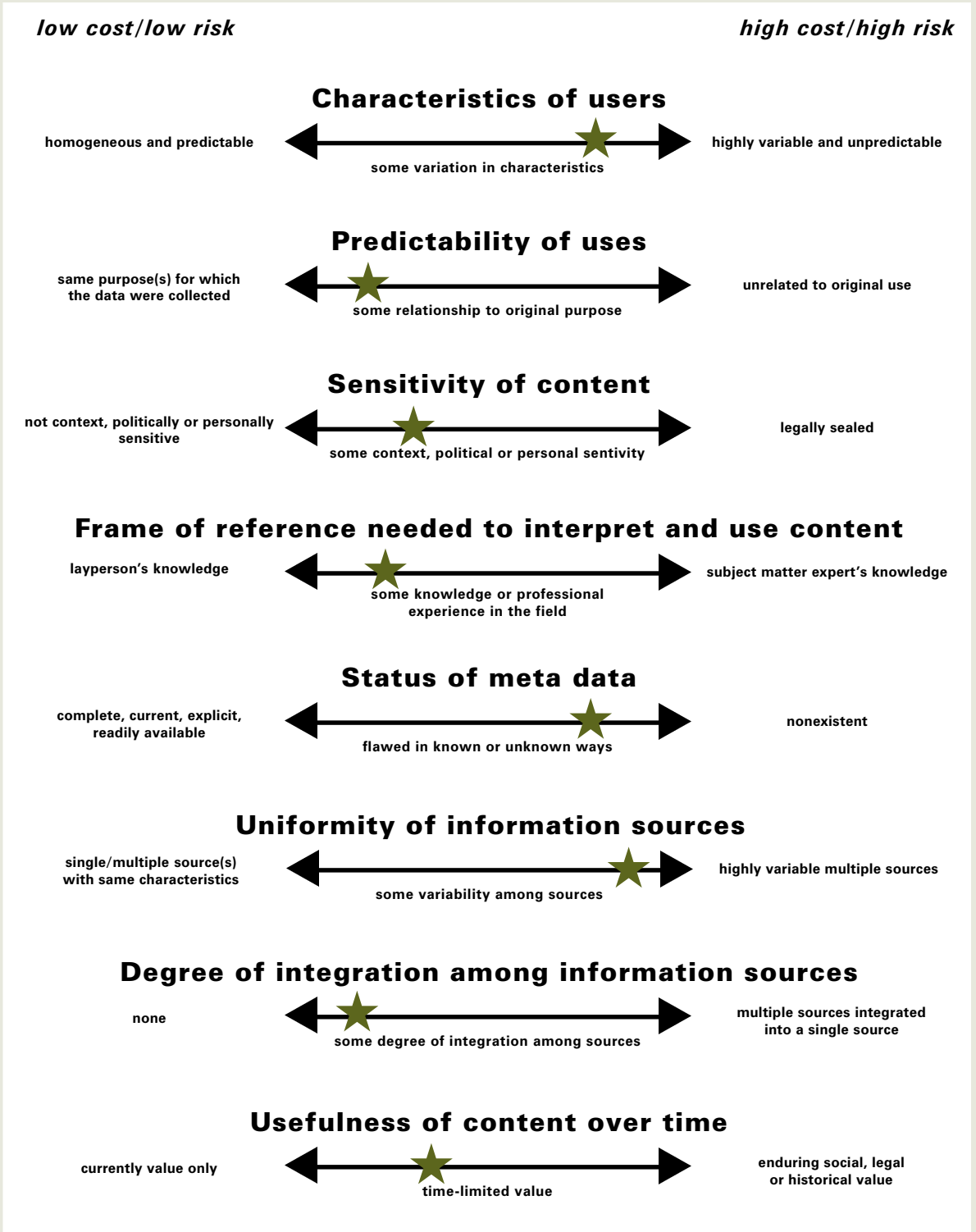
For each dimension, place a mark at the point on the continuum that approximates your situation. Occasionally, a single dimension warrants more than one mark. For example, the NYS Geographic Information System Cooperative has two different main groups of users. The first group comprises members of a GIS Information Sharing Cooperative who have signed formal agreements to participate in certain ways. This is a well-known, highly predictable group of users. The second group is made up of members of any organization or of the general public who are not members of the co-op. This group is much more variable and less predictable. Since there is a wide difference between these two main groups of users it is important to account for them both. In general, though, you should strive first for a single mark that captures the dominating characteristic for each dimension.

The tool can be used by a single planner and then reviewed by others, or it can be completed by a planning group led by a facilitator. In either case, it is important to explain (and agree on) the reasons for each mark. Since most people tend to underestimate the difficulties they will face in a project, err toward the conservative (i.e., right-hand) side whenever you are in doubt.

A quick glance through the completed profile will give you a rough idea of the challenge that lays before you. If most or all of the marks line up on the left, your job will face fewer difficulties than if the marks are scattered, or worse, align mostly on the problematic, resource-intensive right side.

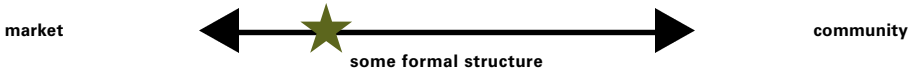
Our case example is shown on the following pages. It consists of a profile and a narrative description of the situation for each dimension, as related to the Children's Project Clearinghouse (CPC).

Example of the Assessment Tool applied to Children's Project Clearinghouse (CPC)

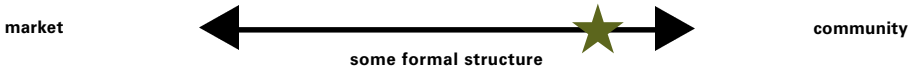


low cost/low risk *high cost/high risk*

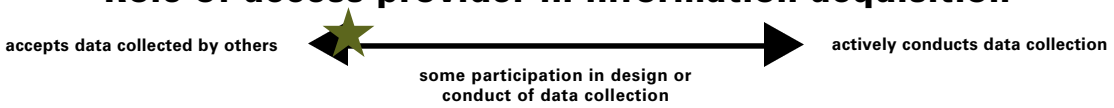
Relationship with information users



Relationship with information suppliers

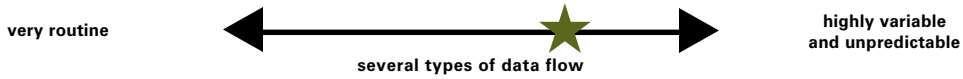


Role of access provider in information acquisition



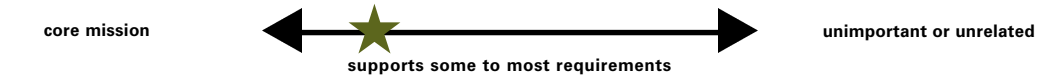
Extent of value-added service by access provider

Nature of data flows among suppliers, access provider and users



Suitability of existing technology

Relationship of access program to organizational mission



Narrative assessment of current CPC situation

Characteristics of users

CPC is intended to support the information needs of the segment of the health and human services community that focuses on programs and services for children. As such, the users are likely to be at least somewhat knowledgeable about the issues and programs relevant to that population. They will vary widely in their analytical and technological capabilities since the users will range from experts in large government agencies, universities and philanthropic institutions to part-time or volunteer workers in small local governments or nonprofit service organizations. Some general public use is expected but this is not likely to be a sizable group.

Predictability of uses

Interests in the use of CPC data will vary. Some will be interested in broad program or policy evaluation, others in winning grants for their localities, still others in comparing their communities' data to others. Some will use the information to inform advocacy efforts to criticize, change or enhance programs.

Sensitivity of content

The data to be incorporated in CPC is largely aggregate statistical information that does not reveal the identity of individuals or report small numbers that can be inferred to apply to a particular person or place. However, it will provide users the ability to integrate data from different sources. Consequently, user-generated analysis might reveal something that is politically or personally sensitive even though the individual source files do not. The fact that data is organized at a county level may raise some political sensitivity when jurisdictions begin to compare themselves to one another. Future plans for CPC include providing data at a community or neighborhood level. This level of detail may raise personal sensitivity in small communities where neighborhood and individual identification might be possible.

Frame of reference needed to interpret and use content

A lay person interested in the topics contained in CPC would be able to make effective use of most of the information in the repository. However, there is a fair amount of specialized terminology with which a lay user may be unfamiliar. In addition, users need to be familiar with simple statistics and be able to interpret tabular and graphical presentations of data.

Status of meta data

Traditionally, meta data has consisted of footnotes to tables provided by the various contributing organizations. The importance of meta data is becoming well-recognized and more information on the data collection methods, data descriptions and caveats to prevent misuse or miscorrelation are being prepared. These include such items as population source, agency source, data source, date compiled and any specific information that might assist in the analysis of the data.

Uniformity of information sources

CPC includes 50 data sets provided by 19 organizations. Each data set is created by the organization for its own purposes and then provided to CPC for secondary use. The data may have statewide coverage only, or may have county or smaller geographic breakdowns. Time periods may vary from one data set to another. Definitions and data categories may vary for the same data from one time period to another. All data sets are provided in electronic form, usually in database format, although some are in spreadsheet format.

Degree of integration among information sources

While the data sets housed in CPC will not be combined within the repository, the planned data analysis tools will allow users to combine information from different sources in order to complete their own integrated analyses.

Usefulness of content over time

The data sets housed in CPC have current value plus time-limited value for purposes of trend analysis. It is likely that users will be most concerned with the last three years of data for their current needs. Program evaluations are likely to need trend data for up to 10 years. CPC data duplicates or summarizes information held by the supplier agencies that may have longer term or enduring value. Therefore, the supplier agencies, not CPC, are responsible for managing access and long-term preservation.

Structure of relationships with information users

Although the information suppliers for CPC will also be data users, the Commission expects that the vast majority of users will be local governments and nonprofit service organizations with which the Commission has no official relationship. However, CHS is actively involved in "communities of practice" which include many of these organizations.

Structure of relationships with information suppliers

The Commission staff must maintain ongoing relationships with all 19 suppliers in order to acquire and maintain information for CPC. The Commission has no formal authority over these organizations so these relationships require constant attention. The Commission needs to offer encouragement and incentives to agencies so that they provide their information in usable form, with good user-oriented descriptions and in a timely way. The suppliers must also agree to maintain the integrity of the information in CPC as changes are made to their source data.

Involvement of access provider in original data collection

The Commission does not participate in, coordinate or influence the original data collection of any of the information sources in CPC.

Extent of value-added service by the access provider

The Commission will not process or transform the information contributed by suppliers in any substantial way, but it will need to conduct data quality checks, organize and index the information, and provide user analysis tools. The greatest value-added service, at least initially, will be expanded and readily available meta data.

Nature of data flows

Information flows into the Commission for CPC from 19 well-known sources. It is a relatively routine and well-understood process. Competing priorities facing information providers can lead to delays. Outflows from CPC will be user driven and episodic, but limited to a few routine Web-based mechanisms such as downloads, report generation and printing.

Suitability of existing technology

The Commission currently has neither the technology infrastructure, nor the technical staff skills to build or operate CPC. The clearinghouse is being prototyped by a consultant, but will need to be transferred to the Commission when it becomes operational. Financial, human and technical resources must be found to do this.

Relationship of the access program to overall organizational mission

CPC fits well with the Commission's overall mission to advise and educate policy-makers on important social trends. It carries out this mission chiefly by sponsoring and conducting research and issuing paper reports and statistical summaries. CPC is a natural extension of that effort, although it applies to only one of many human service areas of concern.

Diagnostic Tool

The Assessment Tool asked you to treat each dimension independently. In reality, of course, they interact. The Diagnostic Tool takes these interactions into account and helps you identify ways to set priorities, make trade-offs or create options that deal with them in a realistic way.

When the profile of characteristics indicates a problematic situation with one dimension, it is often possible to adjust others to compensate. The discussion below shows how different situations can be addressed by adopting policies or practices, setting limits or establishing certain requirements. These brief explanations of the interdependence among dimensions are not exhaustive, but they do illustrate key relationships and possible actions.

Users The more homogeneous and predictable the user population, the more focused the implementation of the program can be. Issues related to the sensitivity of the data may be more easily addressed when the user population is known and can be asked to agree to behave in certain ways. Your ability to predict the nature of use is also likely to be greater. Meta data can be developed to meet the known user community's needs rather than incurring the cost of developing meta data that is broad and detailed enough to serve an unidentifiable general population.

Uses When data collected for one purpose is used for a different purpose, there is potential for misuse or misunderstanding. The intended use, the nature and skill of the user and the status of meta data are therefore highly interdependent dimensions. Users must be made aware of the limitations of the data as well as its description. The more removed secondary users and uses are from the original purpose for data collection, the more they will need ready access to complete, accurate and timely meta data and perhaps some expert advice about data use.

Sensitivity of content Politically, personally and context sensitive content will have a strong impact on design and implementation. More sensitive content will require more stringent governance and access policies, regular review of their effectiveness and well-trained staff to handle the data appropriately. Sensitive content will also require the use of technical safeguards that ensure security and prevent improper access.

Needed frame of reference When an expert frame of reference is needed to interpret and use content, planners need to consider the capabilities of expected users and enhance the quality and usability of meta data and user support accordingly. They could also consider repackaging the content to make it more suitable for less expert users or provide some ready-made analysis for the most common uses or questions.

Meta data Meta data is a critically important dimension and the one over which you often have the most control. The quality, completeness and user-friendliness of meta data can be adjusted in many ways to account and compensate for variations in source data, the needed frame of reference for responsible use, or the unpredictability of users and the uses they have in mind. The more these characteristics tend toward the high or problematic end, the greater the importance of good meta data.

Uniformity and integration of sources These related dimensions have important implications for the design and operation of an access program. Consider these factors: Content from multiple sources or in multiple formats increases the overhead associated with managing relationships, handling the information and making it available for use. The larger the number of the sources, the larger the number of relationships that will need to be maintained with suppliers. The greater the variation among the sources, the more work needed to describe and maintain them. If the content from different sources will be integrated, the level of effort will rise as uniformity among sources diminishes.

The skill required to integrate multiple disparate data sources into a new information resource can be enormous. Integration demands a finely tuned understanding of the content and clear expectations about intended users and uses. Planners must also consider the frame of reference required to understand and interpret the integrated information and its sources and design user support services and meta data that are appropriate to the users and the information.

Usefulness over time If the content has enduring social, legal or historical value, meta data is critical to its long term and effective use. High quality and complete meta data that addresses context and frame of reference will help ensure that the content remains understandable to future users. A design for information of enduring value must also emphasize standards and make technology choices to ensure migration and preservation long into the future.

User and supplier relations If relationships are market-like, planners need to pay less attention to administrative activities which are much more important in formal arrangements that need rules, or contracts to guide them. Community relationships demand considerably more staff and leadership attention because they rely on long-term shared activities that build trust for joint efforts. These more labor-intensive relationships will require larger commitment of resources and must lie closer to the heart of the organization's mission than a program that will operate on a simple transaction basis.

Access provider involvement in data collection If the access provider plays no role in original data collection, it will be important to require information suppliers to include good meta data with their information sources. If the access provider participates in the original data collection strategy or work, the access program can benefit from staff who have a much deeper understanding of the information resources they are making available to users. However, the cost of the program is likely to rise to accommodate this additional role and the complex relationships with suppliers that it implies.

Data transformation and other value-added services Value-added services can compensate for inexperienced users, highly variable data sources and the need for an expert frame of reference. By providing indicators, normalized data, analytical reports and summaries, and user-oriented tools, instructions and support services, an access provider makes complex or voluminous data more consumable for more users. These services, however, add greatly to the cost of the access program and demand a broader range of staff skills and technical tools than in a program that does not provide these services.

How to use the Diagnostic Tool

This tool lists all 15 dimensions from the assessment profile.

First, put a check mark next to the dimensions over which you have the least influence. For example, some elements of your program may be required by law. Perhaps a long-standing agreement made at the leadership level of your organization limits your discretion to serve some users but not others. Certain data may be absolutely necessary to your program goals and so on. Since these cannot be changed, or can be influenced very little, they set the key constraints on your program.

Second, put a check mark next to those dimensions over which you have some influence. These are the factors that *can* be adjusted to compensate or account for the key constraints.

Third, refer to the assessment profile of your situation to see how these items were characterized. Use that characterization to describe the source and nature of the constraint or flexibility.

Finally, diagnose the situation using your descriptions of the constraints or flexibility of the dimensions. Document your diagnosis of the interdependencies and begin to identify options or alternatives and set priorities for program design. The description may provide the foundation and logic for necessary trade-offs among program elements. Refer to the discussion above to find ways to adjust some elements in order to deal with others and consider the additional interactions among dimensions that you may have discovered in the assessment.

In this diagnostic process, look particularly for patterns that can lead to serious problems (e.g., information that needs an expert's frame of reference, but users who are not experts; a requirement to integrate information from many sources, but no meta data about the sources). Here are some helpful things to remember:

- Meta data is often your most powerful compensating factor. Good quality meta data can help you deal well with several other dimensions including inexperienced users, data that comes from many different sources and data sources that must be integrated.
- Policies that define or restrict access, limit the kinds of data that will accepted, or require actions on the part of data suppliers to make their information more usable can all be helpful.
- Pay close attention to the place that your program plays in the larger mission of your organization. The more closely the goals and intensity of your program match the overall mission of your organization, the better. A mismatch here means you must fit your program to the likely level of support you will get from your leadership or you must develop a convincing business case that demonstrates why your program should get more attention.
- Value-added services can sometimes make complex data more useable and understandable for a wide audience of users, but they do cost time and money to produce and maintain.
- Compelling compliance for information providers to deliver timely, well documented and high quality data is a resource intensive process.

The case example that follows illustrates the use of the Diagnostic Tool.

Example of the Diagnostic Tool applied to the Children's Project Clearinghouse (CPC)

The Diagnostic Tool - Users, uses, suppliers and content dimensions

Users, uses, suppliers and content dimensions

Dimension	*Nature of dimension*		*Source and nature of constraint or flexibility*
	Key Constraint	*Adjustable*	
Characteristics of users	✓		Political leaders have committed to a clearinghouse available for wide public use.
Predictability of uses	✓		Can't predict all of the potential uses that the public may make of the data.
Sensitivity of content		✓	There is no expectation or commitment to provide data at the detail level, therefore, no individual data will be available.
Frame of reference needed to interpret and use content		✓	We can adjust the amount of information provided to the user about the data based on the level necessary to interpret and use the content.
Status of meta data		✓	Meta data is not consistent in availability and quality, but can be improved.
Uniformity of data/record sources	✓		The information is not uniform in content, time dimension, geographic dispersion or format.
Degree of integration among data/record sources		✓	Separate sources are grouped into categories but not integrated.
Usefulness of content over time		✓	We can work with users to ensure that CPC contains information of value to them and that those resources remain accessible and usable over time.

Diagnosis of dimension interdependencies

The very broad set of characteristics of users make it unlikely we can predict or prepare for all uses of the data. Therefore, the development of the site requires taking into account this potential broad range of uses and ensuring that users are provided with enough information to assist them in use questions. The main concern here is a lack of adequate meta data available to use as the foundation of the information provided to users. An important interdependence here is the lack of uniformity among data and sources. Many organizations will provide data to the clearinghouse. Each has its own priorities and procedures for data collection. The resources necessary to work with each to acquire the necessary meta data and to influence future data collection efforts will be considerable.

The data is linked conceptually to different topical areas. The data sets themselves are not physically or virtually integrated. Therefore, we have flexibility to expand and modify the data sets provided under each topical area. The effort associated with growth, in terms of technical work required to add additional data sets is more limited and predictable. The issue of meta data still exists for each data set, however.

Priorities	1. Acquiring sufficient meta data, or at least more meta data, to support the development of the necessary supporting materials for information users. 2. Developing an interface and set of functional capabilities that satisfy both casual or intermittent users as well as research-oriented high-frequency users.
Trade-offs	1. Commitment to providing access to large numbers of data sets versus a commitment to providing sufficient information to inform users. Due to the unpredictability of uses and users, more time will need to be invested in developing comprehensive support information to provide users with the necessary frame of reference to use the data. This will be directly affected by the available meta data. 2. Information to provide frame of reference versus additional data manipulation capability. We must decide what our commitment is to providing a frame of reference relative to each potential manipulation technique provided on this site. This will directly affect the amount of time the team can spend developing enhanced data manipulation capability given the level of effort required to ensure sufficient information for frame of reference.
New options	
Other	

The Diagnostic Tool - Organizational structure and context dimensions

Users, uses, suppliers and content dimensions

Dimension	*Nature of dimension*		*Source and nature of constraint or flexibility*
	Key Constraint	*Adjustable*	
Structure of relationships with information suppliers	✓		We have no formal authority over the information suppliers.
Structure of relationships with information users		✓	We have a good relationship with many users of our paper products. These relationships are based on Commission activities such as Statewide Human Services Planning Council. New relationships could be developed with new users who emerge as a result of the increased data accessibility.
Involvement of access provider in original data collection	✓		The Commission receives the data from the suppliers who do the original data collection for their own purposes, according to their own protocols.
Extent of value-added service by access provider		✓	There is no formal limit to the services that can be provided.
Nature of data flows	✓		We have no authority to compel suppliers to act in any particular way.
Suitability of existing technology for the envisioned access program		✓	We don't currently have the necessary technologies at the Commission to house and maintain the clearinghouse.
Relationship of the access program to overall mission		✓	Our CPC program goals are consistent with the overall mission of the organization.

Diagnosis of the dimension interdependencies

The nature of the relationships with the suppliers constrains the nature of the data flows. We can't control or complete well with the other priorities of the suppliers so we may have difficulty compiling complete and timely data. We have no formal authority so we must find ways to encourage suppliers to support the Clearinghouse (in terms of timely data sharing, improving meta data and potentially even considering the needs of the Clearinghouse users when designing data collection protocols) as a high priority task. Doing a good job at identifying and communicating the benefits that users are deriving from the site will help make the case here. We must invest in an approach to do this.

Giving stakeholders the opportunity to influence the future is critical to the success of the clearinghouse. It is also resource intensive. We will need to develop mechanisms to support this kind of consensual decision making and testing of stakeholder satisfaction. We have an existing network of relationships with potential users and providers. The Advisory Committee formed to identity user needs early in the project could be restructured to support the consensual decision-making desired. Other options include the creation of a Data Committee or an expanded role for the Statewide Human Services Planning Council.

A process for learning about user and provider needs and preferences must inform decisions about the extent of value-added services to add to the Clearinghouse. This process can provide the forum for establishing priorities for the Clearinghouse and how it is operated and expanded. It can also provide the forum for collecting benefit data and for communicating the value of the site.

CPC will demand a substantial amount of new resources, especially for technology. The Commission does not have the hardware or the necessary human resources to house and manage the site. Therefore, significant time and energy must be committed to establish partnerships and justify budget allocations. Contracting is also an option, but one which also requires new resources in terms of dollars to pay for these contracted services.

Priorities	1. Marketing the site as a new and critical information resource for those concerned with the state's children. 2. Developing a process for consensus-based decision-making regarding the operation and expansion of the Clearinghouse.
Trade-offs	Time for consensus-based decision-making process versus rapid decision-making.
New options	Partnering with other agencies to share the cost of the necessary infrastructure. Possibly forming an agency coalition to identify ways to share the technical and human resources necessary to provide such a program.
Other	

Program Design Tool

The Program Design Tool helps planners specify the main features of their program design. This tool helps you identify alternative designs that take the foregoing characteristics, interactions, constraints and flexibility into account. For example, in resource-poor situations or where a number of key constraints exist, you may want to invest slowly and carefully in just the key aspects of your desired program. In environments where privacy and confidentiality are paramount, you may want to begin the program with a modest design and expand it incrementally while building knowledge and confidence in security techniques and technologies.

Program designs can be developed at different levels of aspiration. Making the different levels explicit allows you to compare the costs relative to the benefits at each level. For example, if a moderate level of technical infrastructure will sufficiently meet your security requirements, then it makes no sense to push for an elaborate infrastructure to ensure security. On the other hand, if only an elaborate level of meta data will serve the needs of your users, you must find the resources to pay for it.

Any number of approaches to using this tool may make sense in your environment. A single individual can complete the tool and share it with a larger design team for refinement, or a formal facilitated design session could be used involving all participants at the same time. Regardless of the logistics, the most effective use of the Program Design Tool will result from a process of reviewing and refining the responses.

Levels of aspiration

Modest Program features and functionality at a modest level are the minimum investments worth making. A modest set of services would probably include relatively inexpensive features and limited information sources. Modest objectives would be consistent with a somewhat skeptical or inexperienced management team that is willing to “test the water” but not “take the plunge.”

Moderate At the moderate level, a plan for information access services might include additional features and a wider range of information sources. Delivery might be targeted at several distinctly different types of customers. Overall, this level would offer mid-range functionality with some economy-of-scale advantages built in by expanding beyond the modest level. The moderate level of aspiration, however, should not be viewed as an excessive commitment of resources to the initiative.

Elaborate Realistically, what is the most you could hope for? The highest level of aspiration could be a set of objectives that offers a wide range of services and/or technically sophisticated design goals, consistent with the resources potentially available to the program. Of course, one organization’s modest level of aspiration might be the elaborate version of service objectives for another agency. In detailing the elaborate level, be imaginative enough to be called “optimist” but not “dreamer.”

How to Use the Program Design Tool

The Program Design Tool has two parts. The first specifies the features and functionality of three levels of design complexity. The second identifies the benefits likely to be achieved by implementing each level. (The Cost Estimation Tool, which comes next, completes the picture by allowing you to compare these results on the basis of their costs.)

Part 1 — Specifying features and functionality

The first step requires you to be as explicit as possible about the features and functionality of the program you plan to deliver. Building directly on the results of the Assessment and Diagnostic Tools, you will answer 13 questions to produce modest, moderate and elaborate designs. As with the Assessment and Diagnostic Tools, the questions fall into two categories:

Users, uses, suppliers and content
Who are your customers?
What will customers be able to do?
What information sources will be included and what are their characteristics?
How extensively will the sources be integrated?
What meta data will be provided?
What security and confidentiality measures must be implemented?

Program structure and organizational context
How will customers get access to these services?
How will information be brought into the respository?
How will relationships with data providers be managed?
What involvement will you have in original data collection?
What value-added services will you provide to users?
What technologies are needed?
What activities will be outsourced?

It usually works best to answer all the questions for the modest design first. This gives you a complete baseline picture. You can then expand from that baseline by answering the questions for the moderate and elaborate versions. As with the other tools, one person can do a first draft followed by refinement from the entire team or a facilitated group effort can be used to both create and improve the design.

For each question be as direct and explicit as possible. For example, when answering, “Who are your customers?” try to include information on their important characteristics. Don’t stop with something as terse as “local officials” when you can add useful detail: “county, city and town officials responsible for the operation of service programs to children and families.” Use numbers whenever you can to help make later comparisons across the modest, moderate and elaborate levels. For example, try to estimate the size of each customer group, the frequency of data updates, or the number of customer service engagements to be handled.

Part 2 — Identifying likely benefits

The appropriateness of a particular program design rests on its ability to achieve desired performance benefits. When you have settled on the best design, you may want to consider the large body of literature and advice on performance measurement. You can make a solid start now, however, with this highly simplified approach which entails three general benefit categories: cheaper, faster and better.

Cheaper refers to all the ways that your services may save resources such as time or money. Remember that an initiative may not produce savings immediately, but only over the long term, sometimes by avoiding increased or perhaps new costs in the future. *Faster* refers to shortening processes, response times and waiting times. Providing information and services more quickly also can be considered as an increase in efficiency, even though no cost savings may accrue to the organization. *Better* refers to all the other ways in which performance may be improved beyond increasing the efficiencies of cost and speed. These improvements may be viewed as more "qualitative," though they can be measured, too.

You should not limit your thinking about performance improvements to your organization alone. The new services may make processes and outcomes cheaper, faster or better for users and suppliers as well. Keep all important stakeholders and constituencies in mind. The table at right shows a short list of variables to illustrate cheaper, faster and better performance, although it is far from an exhaustive set. Don't let this list constrain your own creativity.

Illustrative Benefits	
Cheaper	Reduce or avoid time spent on staff-supported information retrieval
	Reduce or avoid staff time spent on customer support
	Reduce current telephone, mailing, printing, travel, data acquisition, data distribution cost or other direct costs
	Reduce or redirect human resource costs through automation of manual tasks related to customer service, data acquisition
	Generate revenue that offsets costs
Faster	Reduce response time/waiting time for customers due to faster processing of inquiries and requests
	Streamline internal processes for information acquisition, processing, quality control
Better	More information available to users in electronic form
	More information available to users through self-directed electronic access
	Increase use of services (more people use services; same people use more services)
	Consolidate services: one-stop shopping, fewer steps in a process
	Add convenience through central location, more accessible locations
	Enhance quality: more useful, relevant or practical information or service
	Create innovative new services, new ways of using information
	Allow more frequent communication (with same people)
	Allow wider communication (to more people)
	Generate larger number of inquiries, requests, processing, transaction from new or existing customer
	Develop human resources through enhanced professional abilities, improved work skills
	Achieve additional visibility, positive media coverage, public relations advantages

To complete Part 2, list the cheaper, faster and better benefits that you can expect to achieve by implementing each level of program design. Again, be direct and explicit. Consider how you would measure these benefits or otherwise know they were achieved. Try not to rely on benefits whose existence cannot be verified in some practical way. This is another place to use whatever numbers you have to show the progression of benefit from modest to moderate to elaborate. Organizations who do this are often surprised that the incremental benefits of moving from one level to the next are much larger or much smaller than they expected.

An example from the CPC project illustrates the process of identifying program features and functionality at modest, moderate and elaborate levels of aspiration. Keep in mind that a final design may include a mixture of modest, moderate and elaborate aspirations for different questions. For example, a modestly defined set of customers may have access to an elaborate set of services.

Example of the Program Design Tool applied to the Children's Project Clearinghouse (CPC)

Program Design Tool, Part 1 – Features and functionality			
Features and functionalities	**Modest**	**Moderate**	**Elaborate**
Users, uses, suppliers and content			
Who are your customers?	State agencies, local governments, for profit and non profit service providers, the research community, the public.	Same	Same
What will customers be able to do?	The Clearinghouse will provide electronic access to the book via the Web. The site will provide a PDF version of the paper book.	Ad hoc query, links to other sites, display trends in multiple formats – tables, graphs.	Add: more advanced query capability, link current issues and hot topics, clickable county maps, download selected data in standard format.
What information sources will be included and what are their characteristics?	Data and meta data currently included in the book.	Add: more available data and meta data not previously included in the book due to space limitations.	Add: newly identified relevant data sets and associated meta data.
How extensively will the sources be integrated?	Sources will be integrated in the same way as in the book.	Data will be grouped according to category. Query capability will allow for comparison across data sets and across indicators areas.	Add: data sources will be integrated, to the extent possible, at the data base or element level allowing more extensive manipulation capability.
What meta data will be provided?	The meta data that is currently provided in book.	Additional meta data will be provided due to no space limitations. Suppliers will be encouraged to fill gaps in meta data.	Add: broad, systematic effort to improve meta data for all data sets and meta data development procedures for new data sources.
What security and confidentiality measures must be implemented?	None beyond the basic system securities necessary to ensure sound system management.	Same	Same
Program structure and organizational context			
How will customers get access to these services?	Over the Web	Same	Same
How will information be brought into the repository?	Commission loads PDF version of book to the Clearinghouse.	Suppliers provide physical databases to CHS to load into local database and forward for inclusion in staging database. Manual review of staging database prior to release.	Electronic submission of data sets from agencies directly to web staging database for automatic processing and inclusion on the Web.
How will relationships with data providers be managed?	Relationships will stay the same.	Need to encourage development of more comprehensive meta data. New roles for users and suppliers in governance.	Relationships may continue to change based on need to encourage the development of different or more extensive data sets.
What involvement will you have in original data collection?	None	Work with selected data suppliers to communicate need for comprehensive meta data.	Work systematically with suppliers about changes in data collection procedures to produce better data and meta data.
What value-added services will you provide to users?	Unlimited access to book. Previously only a limited number of books were printed and distributed.	Provide related links and resources plus basic user and provider support services.	Identify customized links and resources based on query, clickable maps, user support for enhanced data manipulation.
What technologies are needed?	Microcomputer, internet access, Web server, HTML authoring tools.	Add: multiuser database, forms technology, email.	Add: GIS
What activities will be outsourced?	None	Possibly hosting of site and technical development.	Add: technical maintenance and enhancement of the Clearinghouse.

Program Design Tool, Part 2 – Benefits			
	Modest	**Moderate**	**Elaborate**
Cheaper	For CHS, placing the PDF version of the book on the Clearinghouse will be more expensive than just printing the 5000 copies of the book.	For CHS, costs will increase with every new feature and functionality, new data set, new meta data requirements, etc. Supplier costs will increase with new meta data requirements. User costs will decrease due to better access.	Same for CHS. Supplier costs will increase due to new meta data requirements but decrease due to automated loading. User costs will decrease due to better access and tools.
Faster	Users will have access to the data faster than if they had to wait for the book to be printed and delivered.	Add: users will be able to conduct analyses faster than if they had to re-enter data from the book or get it from the source. Data analysis tools provided by the Clearing-house will eliminate the need to download data for use in separate tools. Data and data manipulation tools will be online and readily available for use.	Add: Users will have more timely access to the data as suppliers will load data directly to the Clearing-house upon its availability.
Better	Only 5,000 copies of the book are printed. Unless potential users receive one of the 5,000 copies or have access to one, the data, as compiled is unavailable to them. The Clearinghouse, gives many more users the opportunity to use the data.	Users will have the capability to use the data in new ways. Users will be able to query the data for different types of questions than the book supported. The available information and meta data will no longer be limited by the size of the book. More timely access to data. User will be provided with links to related resources.	Users will have ready access to both data and analysis tools to support decision making and planning. The use of a clearing-house model allows for CHS to adjust more readily to changes in the programs and services reported.

Cost Estimation Tool

Given the design and performance assessments that you made with the Program Design Tool, the last key question is what level of investment in a new program to recommend. Is the elaborate version the best level of investment or is it too expensive given the benefits it will deliver? What about a moderate or only a modest investment at first? It may be that the cost and performance assessments support taking no action at all. But how would you know?

The Cost Estimation Tool assists in this phase. It identifies the cost categories associated with the design, its implementation and ongoing operation. This tool allows for the costs of the program to be specified for modest, moderate and elaborate designs. A comparison of the costs at each level to the benefits you identified earlier helps you choose the right level of investment for achieving your goals.

People often tend to underestimate the cost of developing and delivering effective electronic records access programs. This may be due to the fact that there are so many different kinds of expenses that it is easy to forget some. Often planners have less than perfect information and so avoid costing out the parts that are not fully understood. We find that it is critical to identify explicitly as many of the costs as possible, even when you cannot be absolutely exact or certain about every amount. To make these estimations as straightforward as possible for the three levels of service you have described, we have constructed a model cost worksheet. The cost worksheet can be a useful tool for planning the evolution of your service. A worksheet should be completed to represent the costs for various levels of aspiration: modest, moderate and elaborate. In this way, you can assess explicitly what the start-up and ongoing costs might be for these three different versions. Sometimes it makes a great deal of sense to undertake substantial one-time investments in aiming for an elaborate level of service objectives from the very beginning. In other situations, enormous first-year costs can be daunting, so more modest investments may be more feasible. The point here is to be able to compare the costs of at least three alternative plans as thoroughly and explicitly as possible.

How to use the Cost Estimation Tool

Using the Cost Estimation Tool well depends on a complete program design worksheet. The elements shown on the Cost Estimation Tool represent the kinds of work to be done to create the program you specified with the Design Tool. The cost categories therefore do not link to specific design elements, but rather to the kinds of work that will need to be done to create the design. For each of the three levels of aspiration, review the cost worksheet to identify which cost categories (i.e., kinds of work) and which specific cost elements are relevant. Then enter your best estimate of the relevant costs in the cells of the worksheet. The cost categories on the worksheet are:

- Project leadership
- Project management
- Organizational readiness
- Access and tools for staff and other internal users
- Support services
- Access site development and maintenance
- Content development and maintenance
- Distribution
- Host of site infrastructure

In each category, the worksheet allows for "one-time" and "annual" costs. One-time costs are incurred during development and implementation only, while annual costs recur for as long as the service continues to be delivered.

Most categories also partition costs in a second way: costs for human resources and costs for other purposes. You are likely to find that the human resource costs dwarf other costs. In making your estimates, you should account for all the staff time necessary to plan, launch and operate the service. For example, if you plan to move to a new distribution mechanism that requires staff training, you should consider two costs in your estimates: the cost to buy, or develop and deliver the training program and the cost of staff time needed to attend the training classes.

Some of these activities may be done by in-house staff, others may be outsourced. When outsourcing, be sure to include staff costs for identifying potential vendors, selecting vendors and managing contracts. On the other hand, if you plan to do all activities in-house, but don't have appropriate staff skills, you should include costs for recruiting and hiring staff or for retraining existing staff.

The full Cost Estimation Tool which divides these categories into detailed subcategories is located in the Appendix. The example displays the summary information for our hypothetical CPC project.

Cost Categories

Project leadership Include in this category the necessary costs of creating the basic program philosophy, policy structure and governance framework. This could entail the active attention of a senior executive sponsor. You may also want to form an expert governing board or expand the responsibilities of an existing board.

Project management The costs of completing and executing the complete program design should be estimated in this section. Include the cost of an overall project manager, the staff work needed to flesh out the basic program design, and develop the protocols and procedures for project management (such as roles and responsibilities, regular reports and problem-solving techniques). This staff will also develop the implementation plan for the new program.

A variety of activities can support this process. Specific activities appropriate for planning and managing programs that are moving from traditional models to electronic models can be found in the CTG publication *Delivering Government Services on the World Wide Web: Recommended Practices for New York State*. More general suggestions may be found in CTG's *Making Smart IT Choices: A Handbook.* Both can be accessed by clicking on "Publications" on the CTG home page, www.ctg.albany.edu.

Organizational readiness This category includes the resources necessary to get the organization to the point where implementation of the program is feasible. It includes training, demonstration projects and other educational activities designed to help management and staff become more familiar with the new service models, techniques and technologies they will use. These will likely include process analysis, stakeholder and user analysis and change management.

Access and tools for staff, suppliers and users Your program will probably involve communicating over the Internet. Depending on the particulars of the project, it may be necessary for users to be able to browse the WWW, receive and respond to electronic mail, communicate with one another, and have access to specially developed internal Intranet applications. The users might be the public at large, agency staff, staff in other agencies and affiliated provider agencies, business partners or clients.

In order to be successful, it may be necessary to provide hardware, software, Internet access and training on both general software and on your particular service. For services aimed at the general public, user access is typically not subsidized by the project and general WWW competency is all that is required. For users within the agency or those who participate through an affiliates or subscription service, the cost of necessary components should be included when planning the project. You may have this infrastructure in place, or it might need to be developed further for a successful project. While this equipment might serve other purposes in addition to this specific project (such as general office automation and communication), if it is necessary for the success of the project, its cost must be considered. How much of the cost charged to the project varies depending on circumstances.

Any portion of this category may be outsourced, in which case you need to include the costs of research, procurement and contract management.

Support services Users and suppliers of the system will need training and help-desk support to make effective use of the resources. The sophistication and complexity of your service and the variability among users and suppliers will make big differences in your costs in this category. Again, depending on the type of relationship you have with users and suppliers, the support costs may be borne entirely by your organization or shared in some way with other parties.

The training and day-to-day support may be developed and provided in-house, or outsourced to a separate organization.

Access program development and maintenance Developing an electronic access program entails, at a minimum, converting information into a form that can be delivered to users by WWW servers. At present, this often requires specialized "mark-up" activities that require trained personnel and can be time-consuming. This is an area in which the support tools are rapidly changing and project plans need to be reassessed frequently to keep up with the current technology.

If the intended application involves two-way communication, using such technologies as electronic mail, fax-back services, fill-in forms that users can access via the WWW, specialized applications that link your internal databases, and other applications to the WWW front end or adaptive web pages, then the cost of developing and operating the service may be substantial. Staff may be needed on an ongoing basis to reply to e-mail and handle the additional work generated through the Web service. Developing the technical infrastructure may involve security planning, technical evaluation of alternatives, specialized programming, linking of search engines and databases to Web pages, and on-site hosting of the WWW site.

As the Tool shows, there are many different kinds of work in this category. In a large organization, these different functions may be carried out by separate staff members. In a smaller organization, one person may perform several of these functions.

Content development and maintenance Content development may involve in-house staff. It could be entirely handled by the data suppliers, or outsourced, or some combination of these methods. Under any of these methods, however, editorial control and quality standards should be the responsibility of the access provider.

This category includes a number of technology-oriented activities to create and manage databases, for example. It also entails a great deal of hands-on work to ensure data quality, consistency and timelines. This demands that staff develop good working relationships with data suppliers.

If your program design includes value-added services, this is the place to estimate their costs. These may involve data manipulation, integration, analysis, packaging and so on.

Promotion and distribution Once your program design is set and your information resources are prepared, you will need to let potential users and additional suppliers know about the service. This could include the preparation of brochures, educational publications, advertising in selected media outlets, presentations or other activities. You will also need to develop processes for handling requests and for preparing and distributing standard and customized products.

Host of site infrastructure To support a WWW-based service, a system containing a WWW server and space to store the information must be available, usually on a 24-hour-a-day, seven-days-a-week basis to support a Web site. Operating system and applications software are also needed. Advanced applications may require additional equipment and more expensive software to support e-mail access, process forms, link to databases, perform searches or generate customized HTML pages for individual users. Remember that advanced applications also demand advanced (and more costly) skills. These WWW hosting activities may be outsourced to a vendor, or may be implemented by connecting your organization's Web server to the Internet. While simple informational Web pages, forms and electronic mail can typically be outsourced, more advanced two-way applications often require development of a custom WWW server application and a dedicated host to provide that service.

Again, several roles and responsibilities are defined in the Tool. They are usually considered specialty areas and are generally carried out by professionals with different skills. A very small organization may combine some of these roles or outsource most of them for cost effectiveness.

Example of the Cost Estimation Tool applied to the Children's Project Clearinghouse (CPC)

Cost Estimation Worksheet (cost represented in dollars)						
	MODEST		MODERATE		ELABORATE	
	First Year		First Year		First Year	
		Annual		Annual		Annual
Project leadership	25,000	10,000	50,000	20,000	75,000	35,000
Project management	30,000	30,000	100,000	100,000	175,000	175,000
Organizational readiness **Annual costs will decline over time*	25,000	15,000	50,000	25,000	75,000	32,500
Access and tools for staff, suppliers and users	20,000	5,000	25,000	5,000	25,000	5,000
Support services	10,000	10,000	50,000	50,000	80,000	80,000
Access program development and maintenance	20,000	10,000	100,000	80,000	200,000	150,000
Content development and maintenance	20,000	20,000	125,000	50,000	200,000	735,000
Distribution and promotion	10,000	5,000	20,000	15,000	20,000	15,000
Host of site-infrastructure	50,000	40,000	50,000	40,000	75,000	50,000
INFRASTRUCTURE AND OTHER SUBTOTAL	52,500	36,250	142,500	96,250	231,250	154,375
HUMAN RESOURCES SUBTOTAL	157,500	108,750	427,500	288,750	693,750	463,125
GRAND TOTAL	210,000	145,000	570,000	385,000	925,000	617,500

Analysis of costs and benefits for the Children's Project Clearinghouse (CPC)

By comparing the costs of the various levels of implementation (shown in the Cost Estimation Tool) to their expected benefits (specified in the Program Design Tool), planners can begin to see where more or less spending makes sense.

In our CPC example, the modest level of implementation costs the least amount, but the figure is still substantial ($210,000 in the first year). What benefits would that amount of investment buy? According to the Program Design Tool, not much. The modest program design bears all the costs of a Web infrastructure, but produces only an electronic version of the old printed document. The Commission could accomplish the same thing for almost nothing by getting another agency which already has a relevant Web site to host the electronic document and by working with search engines and related sites to link to it. During the design discussions, the modest plan seemed to be "the least worth doing," but after the costs were estimated, that was clearly not the case. The least worth doing is actually this new idea of having someone else host an electronic version of the paper document. This very small step might be a good short term "design" because it would quickly deliver some benefits to users while a Web repository of the underlying data is prepared.

The elaborate program design includes many sophisticated and complex features including analysis tools for users, and an array of value-added services that CHS will need to develop. These features are expected to generate significant benefits. The cost of this plan is high, though—nearly a million dollars the first year. Moreover, the plan represents an enormous demand for skills and technologies which do not exist at all at the Commission today. Both the cost and the degree of change argue against this design, at least as the first step in implementation.

The moderate program design appears to make the investment in a Web repository worthwhile. It provides for ad hoc queries of the data sets that underlie the tables in the printed book and gives users the ability to compare data across different sources to answer their own questions. Improved data-loading techniques should streamline operations and maintenance. The initial cost comes close to half a million dollars, but the annual costs are a more affordable $385,000. It would give CHS a solid ability to use the Web first for children's issues, and over time for the other human service topics that fall within its mission. This seems to be the best choice to use as a foundation for a detailed system design and budget. During this detailing process, CHS is likely to uncover some additional costs, but it may also find ways to cut or get better value out its planned investment. The Program Design and Cost Estimation Tools are a start, not a substitute, for these essential next steps.

Conclusion

Electronic access programs have the potential to ensure that the electronic records maintained by government agencies and other organizations will be available and useable for the widest variety of contemporary and future uses. If designed well, these programs allow users to readily locate, use, analyze and compare relevant data to answer questions that are important to them. While such programs can make life simpler for information users, they are not easy or simple to design. If your organization is about to become an access provider or to revise an existing access program, these guidelines should help you deal with the complex work ahead.

- Start with a candid description of your planned program and its context
- Assess users, uses, content, supplier, structure and context dimensions
- Diagnose the interactions among these dimensions and the options they offer for action
- Design a program at several levels of aspiration
- Estimate the costs of these alternative designs
- Analyze the relative costs and benefits of different design configurations

Having taken these steps, you will be well-prepared to select the best program design for your situation, communicate it to stakeholders, develop detailed plans and budgets, and begin the difficult but rewarding work of implementation.

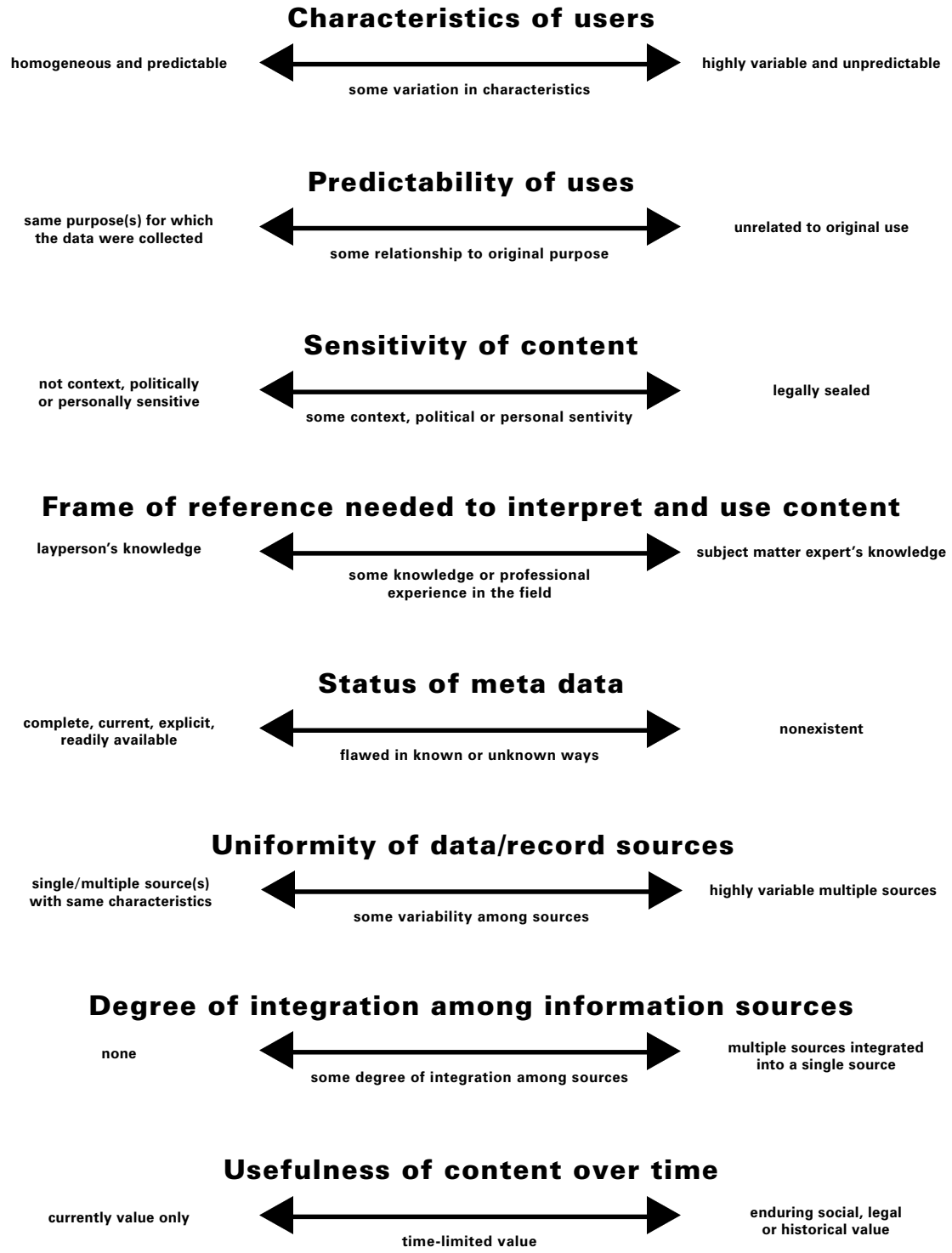
Appendices

1. **Assessment Tool**
2. **Diagnostic Tool**
3. **Program Design Tool**
4. **Cost Estimation Tool**

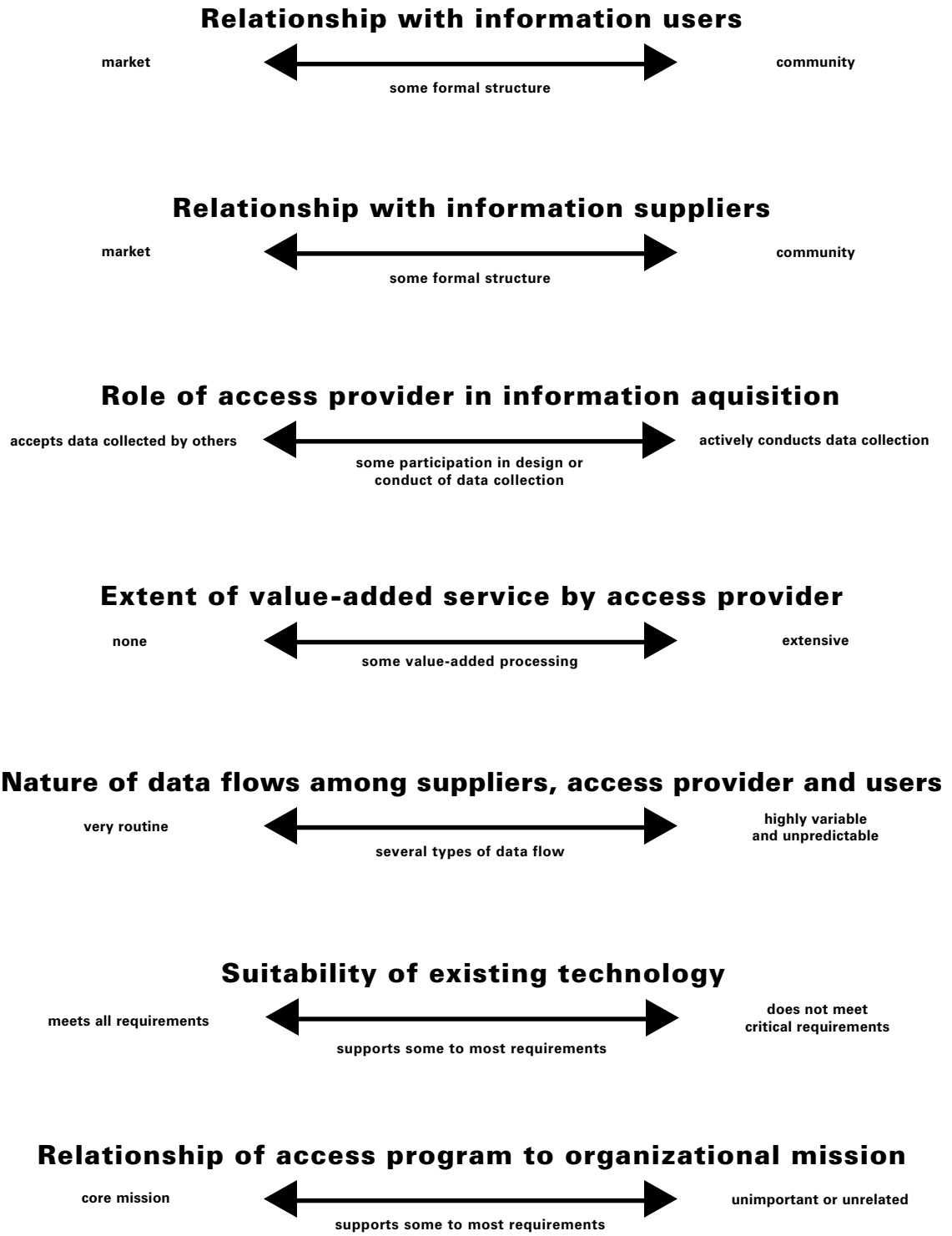
Tools available in a printable PDF format on CTG's Web site:
http://www.ctg.albany.edu/guides/gateways/appendix

Appendix 1. Assessment Tool

low cost/low risk *high cost/high risk*



low cost/low risk *high cost/high risk*



Appendix 2. Diagnostic Tool

The Diagnostic Tool - Users, uses, suppliers and content dimensions				
	Dimension	**Nature of dimension**		**Source and nature of constraint or flexibility**
		Key Constraint	***Adjustable***	
Users, uses, suppliers and content dimensions	Characteristics of users			
	Predictability of uses			
	Sensitivity of content			
	Frame of reference needed to interpret and use content			
	Status of meta data			
	Uniformity of data/record sources			
	Degree of integration among data/record sources			
	Usefulness of content over time			
Diagnosis of dimension interdependencies				
	Priorities			
	Trade-offs			
	New options			
	Other			

The Diagnostic Tool - Organizational structure and context dimensions				
	Dimension	**Nature of dimension**		**Source and nature of constraint or flexibility**
		Key Constraint	***Adjustable***	
Organizational structure and content dimensions	Structure of relationships with information suppliers			
	Structure of relationships with information users			
	Involvement of access provider in original data collection			
	Extent of value-added service by access provider			
	Nature of data flows			
	Suitability of existing technology			
	Relationship of access program to overall mission			
Diagnosis of dimension interdependencies				
	Priorities			
	Trade-offs			
	New options			
	Other			

Appendix 3. Program Design Tool

Program Design Tool, Part 1 - Features and functionality			
Features and functionalities	**Modest**	**Moderate**	**Elaborate**
Users, uses, suppliers and content			
Who are your customers?			
What will customers be able to do?			
What information sources will be included and what are their characteristics?			
How extensively will the sources be integrated?			
What meta data will be provided?			
What security and confidentiality measures must be implemented?			
Program structure and organizational context			
How will customers get access to these services?			
How will information be brought into the respository?			
How will relationships with data providers be managed?			
What involvement will you have in the original data collection?			
What value-added services will you provide to users?			
What technologies are needed?			
What activities will be outsourced?			
Program Design Tool, Part 2 - Benefits			
	Modest	**Moderate**	**Elaborate**
Cheaper			
Faster			
Better			

Appendix 4. Cost Estimation Tool

Cost Estimation Worksheet						
	MODEST		MODERATE		ELABORATE	
	First Year	Annual	First Year	Annual	First Year	Annual
Project Leadership						
Human Resources						
Develop program policy structure						
Full program design						
Project sponsorship activities						
Governance board						
Other						
Project Management						
Human Resources						
Overall project manager						
Develop program management procedures						
Develop program implementation plan						
Support Staff						
Other						
Organizational Readiness						
Training for technology awareness, process analysis and change management						
Other						
Human Resources						
Staff time in training						
Planning for process and policy changes						
Process and procedural changes - internal						
Process and procedural changes - external						
Other						
Access and Tools for Staff, Suppliers and Users						
Hardware for staff						
Software for staff						
Network access and software for users						
Network access and software for suppliers						
Other vender services						
Other						
Human Resources						
Start-up process for equipment procurement						
Establish and manage vendor and ISP contracts						
Other						
Support Services						
Contracted support services						
Other						
Human Resources						
Support services for suppliers						
Support services for users						

	MODEST		MODERATE		ELABORATE	
	First Year	Annual	First Year	Annual	First Year	Annual
Access Program Development and Maintenance						
Hardware for developers						
Software for developers						
Security infrastructure						
Network and internet access for developers						
Other vendor services						
Other						
Human Resources						
Start-up process for equipment procurement						
Establish and manage vendor contracts						
Develop and deliver of staff training						
Staff time in training						
Interface design and development						
Webmaster						
Editorial review						
Web site design and development						
Programming						
Database administration						
Other management support						
Other clerical support						
Other						
Content Development and Maintenance						
Hardware						
Software						
Network access for developers						
Other vender services						
Other						
Human Resources						
Start-up process for equipment procurement						
Relationship management with source organizations						
Data acquisition process management						
Data integration						
Data manipulation, enhancement, quality control						
Development and delivery of staff training						
Staff time in training						
Content review						
Programming						
Database administration						
Other management support						
Other clerical support						
Other						

	MODEST		MODERATE		ELABORATE	
	First Year	Annual	First Year	Annual	First Year	Annual
Distribution and Promotion						
Brochure, publication and advertising						
Postage and shipping						
Human Resources						
Request processing						
Host of Site-Infrastructure						
Hardware						
Software						
Network and internet access						
Other vendor services						
Other						
Human Resources						
Front-end research and technical evaluation						
Start-up process for equipment procurement						
Establish and manage vendor and ISP contracts						
Development and delivery of staff training						
Staff time in training						
Security infrastructure						
Network and systems administration						
Web server management						
Operations support						
Clerical support						
Other						
INFRASTRUCTURE AND OTHER SUBTOTAL						
HUMAN RESOURCES SUBTOTAL						
GRAND TOTAL						