COMMONWEALTH OF PENNSYLVANIA
HEALTH & HUMAN SERVICES IT DELIVERY CENTER

INFORMATION TECHNOLOGY STANDARD

Name of Standard: **Cognos Reporting Development**	Number: **STD-EKMS004**
Domain: **Knowledge Management**	Category: **Data Warehouse/Business Intelligence**
Date Issued: **12/21/2007**	Issued by Direction Of: Shane Roadcap
Date Revised: **8/20/2019**	**Shane Roadcap, Chief Solution Management**

Abstract:

The purpose of this Standard is to establish enterprise-wide standards and guidance for the development of Cognos BI (business intelligence) applications for the Department of Human Services (DHS) that will reside on the production Cognos BI web reporting site. Cognos BI provides a variety of reporting, analysis, dashboard, and scorecard capabilities to provide the right amount of detail to the report consumer. Analytical, historical, and trend analysis reporting should be implemented using this toolset.

General:

This standard applies to all Health and Human Services IT Delivery Center Cognos developers, both Commonwealth and contractor. This standard applies best practices and enforces a common interface across the reporting applications implemented on the Cognos BI platform.

Standard:

URLs/Links

Cognos Connection / Cognos Portal provides the capability to provide links to documents or other websites within its folders. Links must adhere to the following standards:

1. Links to non-Commonwealth websites are not permitted.
2. Documents provided as links should be in PDF format.

Report Development

Report Design

Reports that will be deployed to production must adhere to the following standards:

1. The default report format should be PDF. This requirement may be waived for reports that will never be printed, are part of a dashboard or interactive reporting application, or where user specified reformatting or exporting is required.
2. Report permissions should be set and inherited from the folder in which they are placed.
3. The following prompt page formats should be used.
    a. The report title must be included centered at the top of the prompt page.
    b. The current date must be displayed right justified at the top of the prompt page.
    c. Remove Back and Next buttons if there are not multiple prompt pages in the report.
    d. Every prompt page should include Cancel and Finish buttons left justified at the bottom of the prompt page.
    e. For date prompts, set the Select UI property to Edit Box.
    f. All list prompts must be sorted.
    g. For single selection list prompts, use the Value Prompt object with the Select UI property set to Drop Down List.
    h. For multi-selection list prompts, use the Value Prompt object with the Select UI property set to List Box.
4. The following report page formats should be used.
    a. The report title must be included centered at the top of the report page.
    b. The current date must be displayed right justified at the top of the report page.
    c. If the report includes prompts, the values selected must be displayed on the report page.
    d. Page numbers with the label “Page” should be included centered within the report footer.
5. Queries utilized by the report must be developed using a Cognos Framework Manager package. Type-in SQL query subjects are prohibited.
6. All queries that result from each report must be reviewed from a performance standpoint and evaluated for tuning opportunities prior to deployment.
7. Reports that utilize images must acquire those images using the relative path of ...\images. Images should be standardized, and reuse is encouraged.

Report Documentation

Report Description

<Report Description>

Lists/Crosstabs/Visualizations

<Report Object Name>

<Report Object Description>

Granularity

<Granularity of Report Object>

Totals/Metrics/Counts/Aggregations

Total Name	Total Description
<Aggregate Name>	<Aggregate Description>
<Aggregate Name>	<Aggregate Description>

Data Items

Data Item Name	Data Item Description
<Data Item Name>	<Data Item Description>
<Data Item Name>	<Data Item Description>

Filters & Business Logic

<Filter Description>

<Filter Description>

Data Anomalies

<Data Anomaly Description>
<Data Anomaly Description>

Prompts

Prompt Name	Type	Required Y/N?	Multi-Select Y/N?	Description
<Prompt Name>	<Prompt Type>	(Yes|No)	(Yes|No)	<Prompt Description>
<Prompt Name>	<Prompt Type>	(Yes|No)	(Yes|No)	<Prompt Description>

Drill-Through Reports

Drill Through Report Name	Drill Through Report Description
<Drill-Through Report Name>	<Drill-Through Report Description>
<Drill-Through Report Name>	<Drill-Through Report Description>

Stakeholders

Stakeholder Name	Stakeholder Role	Additional Information
<Stakeholder Name>	<Stakeholder Department - Stakeholder Title>	<Stakeholder Description>
<Stakeholder Name>	<Stakeholder Department - Stakeholder Title>	<Stakeholder Description>

Change History

Date	Request TFS Reference Number/Knowledge Management Request Number	Description
<Change Date>	<TFS Reference Number>	<Change Description>
<Change Date>	<TFS Reference Number>	<Change Description>

A picture of EKMS's Report Documentation Template

Each report developed in Cognos Report Studio must include a page that documents its design and the business logic behind its design. To facilitate the creation of this documentation, the Enterprise Knowledge Management Section has produced a template that provides the basic layout for a documentation page (see above). The documentation page must include the following information:

Report Description

This description should include 1-3 paragraphs that provide a brief overview of the business need of the report, and how the report and its design meet that need.

Lists/Crosstabs/Visualizations

This section is to be repeated for all major lists, crosstabs, or visualizations (charts and graphs) that appear on the report's pages. In EKMS's documentation template, the table objects that must be copied and pasted to add a new iteration of this section can be found between two < HTML Item > tags. Each sub-section contains the following information about the report object that it documents:

- **Report Object Name:** The value of the "Miscellaneous > Name" property associated with the list, crosstab, visualization, or other object that appears on the report pages.

  When naming report objects, avoid using abbreviations or acronyms, as these create barriers to understanding what a given report object's function is.

- **Report Object Description:** A brief paragraph describing the function of the report object within the context of the report.

- **Granularity:** This section should include a brief paragraph describing how the data in the report object is grouped.

  - When the report object is a list object, this section should describe what each row in the list represents.

  - When the report object is a crosstab object, this section should describe which dimensional attributes the crosstab is broken down by, and which axes those dimensional attributes appear on.

  - When the report object is a visualization, this section should describe the meanings of the trendlines, bars, pie segments, graph axes, or other chart components that might appear in the object.

- **Totals/Metrics/Counts/Aggregations:** This section should include a breakdown of the meanings of the numbers that appear in any column that contains a total or aggregate value (sum, average, etc).

  - **Total Name:** A plain-English name that gives the reader an idea of what the aggregated value is; avoid using abbreviations or acronyms when possible.

  - **Total Description:** A paragraph that elaborates on what the value in the aggregated column is and how it is calculated. Also, include the context in which the aggregated value is computed (what dimensional attributes it was computed over).

- **Data Items:** This section should contain a description of each element visible in the report object that is based on a data item from a query. This description should include:

    - **Data Item Name:** A plain-English name that describes the business meaning of a data item that serves as the source for a report object component.

    - **Data Item Description:** A paragraph that elaborates on the business meaning of the data item and the values that it contains, as well as how the data item is used in the context of the report object that makes use of it.

- **Filters:** This section should include a brief description of each of the logical constraints imposed on the query that serves as the data source for the report object.

  Avoid simply re-stating the filter syntax. For example, if the filter's syntax is "[Eligibility].[Account Details].[Benefit Classification] In ('ABC','XYZ')", writing something like "The benefit classification must be either 'ABC' or 'XYZ'" in this section does not provide much meaningful information to report consumers and designers. In this instance, the business meaning behind this filter is that it is targeting accounts that fall under the Temporary Assistance for Needy Families (TANF) benefit classification. Therefore, including this business-level information is more helpful than simply re-iterating what code comparisons the database is doing

- **Data Anomalies:** This section should include a brief paragraph describing any anomalies that may undermine the correctness of the figures shown in the report object or in the query that serves as its source. It may also be advisable to include information on data issues that, while not erroneous, may confound the likely assumptions of report users who are not intimately familiar with the data.

Prompts

This section should contain a description of all the parameters used to filter the report results, and the report objects that provide the interface to modify the values of those parameters. Please note that if two prompts set the value of a single parameter, only a single entry is needed to document them in this section. The purpose of the information in this section is to provide business-side users with a high-level description of how the report's results can be filtered; a detailed breakdown of how this functionality is implemented is not necessary.

- **Prompt Name:** The value of the "Miscellaneous > Name" property of the prompt object in question, or the name of the parameter whose value the prompt sets if the prompt object has no value for its "Miscellaneous > Name" property.

  Avoid the use of acronyms and abbreviations when determining the prompt names; these create barriers to conveying the business meaning of the prompts to report consumers and designers.

- **Prompt Type**: The type of the prompt in question. This information can be found by clicking the prompt object and reading the text that appears as the top of the "Properties" pane.

- **Required Y/N?:** This table cell should contain the value of a prompt object's "General > Required" property, which determines whether or not the report executor must enter a value into the prompt object before the report can be run; this value will be either "Yes" or "No".

- **Multi-Select Y/N?**: This table cell should contain the value of the prompt object's "General > Multi-Select" property, which determines whether or not the report executor will be allowed to select multiple values for the prompt; this value will be either "Yes" or "No".

- **Description:** This table cell should contain additional information about the prompt, such as what its purpose in the report's business context is, what data item it filters, what rules it imposes on the values it accepts if the prompt allows free-form input, and what rules it uses to determine what values are available for selection if the prompt is one that allows the selection of values from a list.

Drill-Through Reports

- **Drill Through Report Name:** This table cell should contain the name of the drill-through report in question.

- **Drill Through Report Description:** This table cell should contain a brief description of what information the drill through report provides, and which report elements offer the option to run the drill through report.

Stakeholders

- **Stakeholder Name:** This table cell should include the full name of the stakeholder in question. A stakeholder in the context of this section is someone from the program office that either serves as the subject matter expert informing the design of the report, or an individual who is involved in the day-to-day operations and decisions that go into producing the EDW data that the report is based on.

- **Stakeholder Role:** This table cell should include the program office in which the stakeholder works, and his or her position title.

- **Additional Information:** This table cell should include any additional information that might assist the report consumer or designer in determining the role of the stakeholder within the stakeholder's department, as well as what the stakeholder's role is within the context of designing and modifying the report.

Change History

- **Date:** The calendar date on which the change in question was made. Use the format MM-DD-YYYY.

- **Request TFS Reference Number/Knowledge Management Request Number:** The number in Team Foundation Server (TFS) under which the Knowledge Management Request or Task that prompted the construction/modification of the report is logged.

- **Description:** A description of what changes were made on the date and under the TFS object referenced in the "Date" and "Request TFS Reference Number/Knowledge Management Request Number" columns (respectively).

Active Report Development

Active reports that will be deployed to production or distributed with production data must adhere to the following standards:

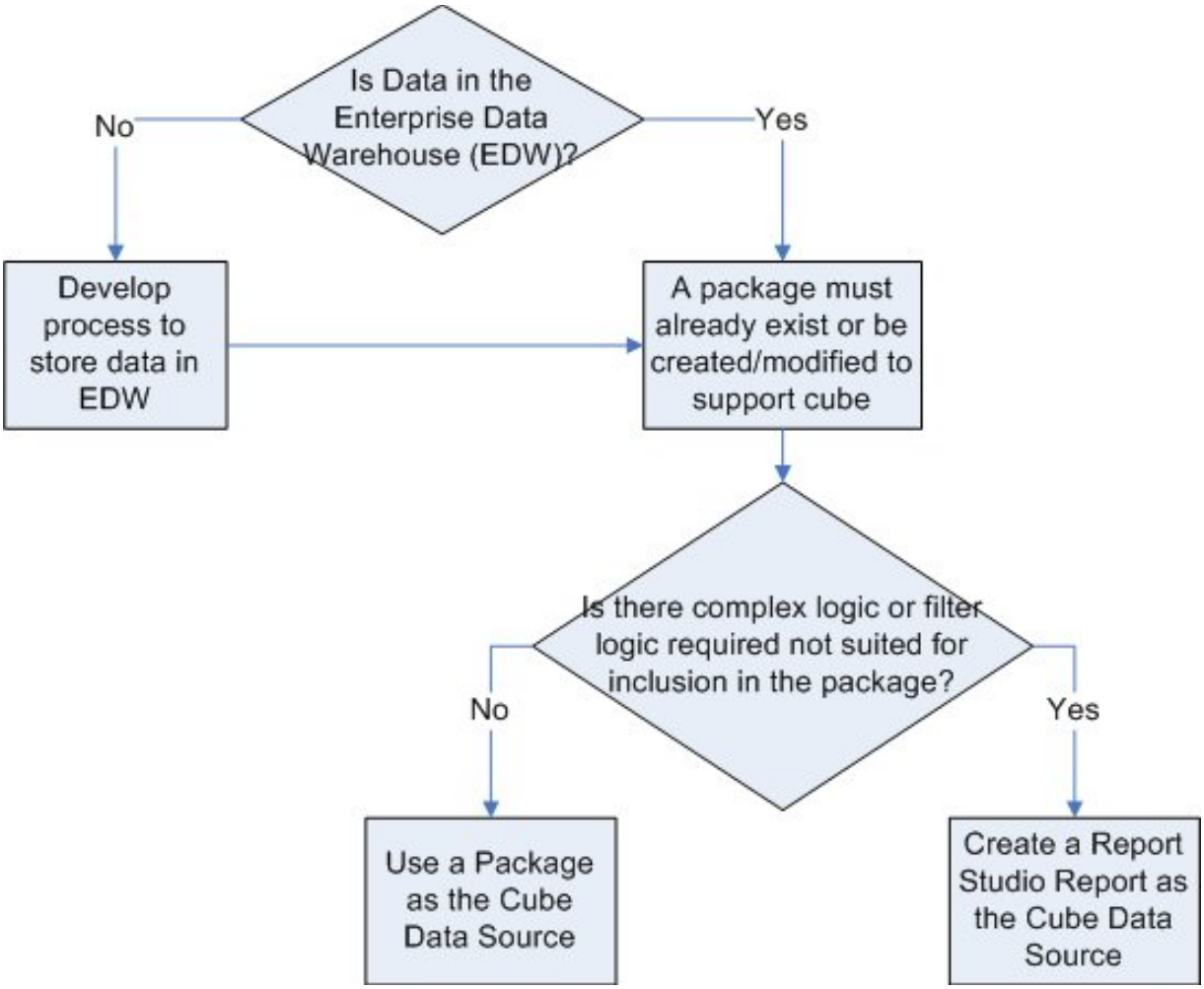
1. The acceptable file size is for an IBM Cognos Active Report is no larger than 10 MB. If users are looking for a high level dashboard for a quick overview while on the go, then smaller reports that load faster would be best.
2. **Keep Decks Simple -** Decks should only contain data that is unique to a card. Any common styling or static content should be placed outside of the deck in order to avoid it being unnecessarily

duplicated. The end result will appear the same to the end user, but the output file size will be reduced if the styling is placed outside the deck because the styling is only included once in the output file.

3. The target platform for the active report should be determined prior to development and the report should be written to take this into account to optimize the end user experience.
4. No PII, HIPAA, or other sensitive data is allowed in Active Reports or their underlying MHT files as it is not always obvious such data is present in the underlying MHT files. This must be evaluated during the Active Report development and prior to deployment.
5. Active reports should always be mocked up prior to any development. Such mockups should show the various objects in the report as well as their controls/interactivity and various state changes. These mockups must be reviewed by EKMS prior to any report development beginning.
6. Prior to the Active Report being made available for end-user UAT, the functioning report must undergo a review by EKMS. Sufficient time should be allowed in the development timeline for changes required by EKMS to be made.

Cube Development

All data used to generate cubes must exist in the Data Warehouse and be accessible through a Framework Manager package as described in the diagram below.


Is Data in the Enterprise Data Warehouse (EDW)?
No
Yes
Develop process to store data in EDW
A package must already exist or be created/modified to support cube
Is there complex logic or filter logic required not suited for inclusion in the package?
No
Yes
Use a Package as the Cube Data Source
Create a Report Studio Report as the Cube Data Source

Develop process to store data in EDW – See Data Warehouse Standards under the Data Warehouse portion of the Knowledge Management domain.

Use a Package as the cube data source – See Cognos Model/Package Development under the Business Intelligence portion of the Knowledge Management domain.

Create a Report Studio Report as the cube data source. – See Report Development portion of this standard for details.

Cube Summary/Support Tables

When it is necessary to create new database tables to support a cube's star-schema grouping the following standards apply.

1. When new subject areas are added to the Data Warehouse, any requirements for cubes associated with those subject areas should be considered. If this consideration is given in the requirements phase of a project there will be minimal need to create new tables/star-schema groupings in the Data Warehouse after the fact.

2. All cubes should be based around star-schema (snowflake) groupings with a central fact table surrounded by one of more dimension tables. This star-schema should be optimized to support cube builds. (This is in contrast to a more normalized relational model as would be found in a transactional system).

3. The measures of a cube should be sourced from fields in the central fact table of the star-schema grouping. (Measures should not be derived from the dimension tables of the star-schema grouping).

Naming Conventions for Cube Summary/Support Tables

Database tables and fields created to support cubes should follow BIS Data Domain standards.

Location of Cube Summary/Support Tables

1. Summary tables created to support cube building should be owned by the 'cube' user and placed in the 'cube' schema of the EDWT environment.

2. If cube drill-through reports access tables not already in the EDWP environment those tables should receive database approval and exist in the EDWP environment. (This is in contrast to drill-through reports that access tables already existing in the production EDWP environment.) Provisions will need to be made to update these tables on a regular basis as required by the cube build schedule

Cube Summary/Support Table Permissions

1. The 'cube' user should be granted SELECT privilege on tables created to support cubes.

2. The 'impromptu' user should be granted SELECT privilege on tables created to support cubes if those tables will be accessed through a Report Studio report.

Transformer Data-Sources

The following guidelines should be used when determining the data-source to source cubes from:

Data Source	Guideline
Framework Manager Package	• When a Framework Manager package is useable without the need for a Report Studio report (see below).
Report Studio Report	• When one or more of the following is required: 1. The model query subject describing the cube(s) needs to be filtered in a way that cannot be performed in the package. (E.g. only a limited subset or range of the data found in the model query subject is used by the cube.) 2. The model query subject describing the cube requires complex logic that cannot be implemented as part of a package. (In this situation justification must be provided why it is better to implement this logic in the report rather than in the Framework Manager package or the ETL/SQL process used to populate the cube's central fact table.)
File based format (fixed-length, delimited, CSV, etc.)	These will be addressed on a case-by-case basis and must be reviewed by EKMS.
Impromptu IQD Files	New cubes may not use IQD files as data-sources for a cube. All new additions, or major modification to existing cubes and Transformer Models, must abide by this standard.
Access Query or Excel Query	These should not be used as data sources for a cube.
Hard-Coded SQL	Hard coded SQL (in a Report Studio report or not) should not be used as a data source for a cube.

Data-Source Permissions

1. Cognos packages and reports used as data-sources by cubes should only be accessible to the 'cognos' user within Cognos Connection / Cognos Portal.

2. Packages and reports used exclusively for cube builds should not be visible to general users within Cognos Connection / Cognos Portal.

3. Cognos Transformer should use the 'Cognos' login when modeling/building cubes which use a Cognos package or report as their data-source.

Framework Manager Models and Packages

1. Consult the Framework Manager modeling standards document for details on Framework Manager models used as data-sources.

2. Packages used as data-sources should be placed within the "Cube Packages" folder under the "Public Folders > *Program Area*" folder within Cognos Connection / Cognos Portal.

Report Studio Reports

1. Report Studio reports used as cube data sources should, within Cognos Connection / Cognos Portal, be placed within the package they are derived from.

2. Report Studio reports used as a data source should be named "*Cube Name* Cube" where "*Cube Name*" is the business name of the cube as defined by the user. If multiple cubes will be derived from the same Report Studio report, then an appropriately descriptive name should be chosen and "Cubes" substituted for "Cube." Example: LIHEAP Payments Cube, LIHEAP Recipient Cubes.

3. Report Studio reports used for a drill through should be named "*Cube Business Name: Descriptive* Details" where "*Cube Business Name*" is the business name of the cube as defined by the user and "*Descriptive*" describes the measure being drilled down on. Example: LIHEAP Payments: Payment Amount Details, LIHEAP Cases: Recipient Details.

Transformer Model Standards

1. All Transformer models utilized by production cubes must be provided to BIS as part of a BI deployment release so they can be included in the DHS Transformer Model Library

2. If multiple, similar, cubes will be derived from the same data-source, it is preferable to have those cubes utilize the same Transformer model rather than having a separate, identical, model for each cube.

3. Transformer models should be named "*Cube Name* Model" where "*Cube Name*" is the business name of the cube as defined by the user. If multiple cubes will be derived from the same Transformer model then an appropriately descriptive name should be used. Example: LIHEAP Payments Model, LIHEAP Cubes Model.

4. Cubes will be named: "*Business Name* Cube", where "*Business Name"* is the business name as agreed upon or supplied by the end user. Example: LIHEAP Payments Cube.

5. The name and the file name of the Cube, as specified in its properties within the Transformer model, must match the title of the Cube as it will appear within Cognos Connection / Cognos Portal including proper capitalization and punctuation.

6. The names of all dimensions within a cube should be approved by the end-user and descriptive of the dimension being provided. Acronyms and abbreviations should not be used. Example: "Category of Assistance," "County," "Recipient Date of Birth."

7. Measure names should be in the format "*Measure Type Measure Name*" where "*Measure Type*" corresponds to the type of measure being given (total, count, distinct count, etc.) and "*Measure Name*" is the business item being measured. "*Measure Name*" should be approved by the end-user and acronyms and abbreviations

should be spelled out. Example: “Total Assistance Amount,” “Distinct Count of Recipients,” “Total Applications Processed.”

8. **No more than twelve dimensions and ten measures should be used in a single cube.** Limited exceptions may be granted with proper business justification and approval from EKMS. Any exceptions will require a build demonstration of the prospective cube. This demonstration must include the following items:

    a. The cube must be built using the maximum projected data size and range it would encounter in the production environment. The time it takes to perform this build will be evaluated to ensure that the cube can be built in a timely fashion.

    b. Access to the data used in the build test must be provided to EKMS.

    c. Access to the completed cube (built as described above) must be provided to EKMS. This will allow EKMS to test the response-time of the cube from a user-perspective.

9. **If a dimension contains more than 200 category items, that dimension must be broken down into hierarchical levels.**

10. **No non-time dimension can be made on a set of data with more than 1,000 items, regardless of how many levels compose its hierarchy**.

11. **No non-time hierarchical dimension should ever contain more than five levels in its hierarchy**.

12. Data within a cube level should not be presented randomly. It should be sorted alphabetically, numerically, or in some other logical fashion that meets the business requirements.

13. Any measure or dimension in a cube which contains an empty or NULL value should have an appropriate default value set for that field.

14. **All queries that result from each cube must be reviewed from a performance standpoint and evaluated for tuning opportunities prior to deployment.**

Naming Conventions:

- All OLAP cubes must follow the naming conventions defined below.
- *Italicized* text indicates a variable name. Normal text indicates a literal.

Naming Conventions			
Object	**Naming Convention**	**Examples**	**Notes**
Cube Dimension Names	*Dimension Name*	Categories of Assistance Counties	Dimension names should be approved by the end-user. Acronyms and abbreviations should not be used. See the rules for naming dimensions above.
Cube Measure Names	*Type of Measure Measure Name*	Distinct Count of Recipients	The Measure Name should be approved by the end user. Acronyms and abbreviations should not be used. See the rules for naming measures above.
Cube Name	*Business Name* Cube	LIHEAP Payments Cube	The Cube Name should be approved by the end user.

Data Sources			Reference Data Source Standard.
Database Table Field Names		CAT_CODE	Field names should follow BIS Data Domain standards
Database Table Names		T_ADR_DIM	Table names should follow BIS Data Domain standards
Package Names	*Business Name* OLAP Package	Expedited Medical Encounters OLAP Package	Business Name should be approved by the end user.
Report Names for Reports Used as Data Sources	*Cube Business Name* Cube *Cube Descriptor* Cubes	LIHEAP Payments Cube LIHEAP Recipients Cubes	The Cube Name should be approved by the end user. See the rules for naming cubes above.
Report Names for Drill Through Reports	*Cube Business Name: Descriptive* Details	LIHEAP Payments: Payment Amount Details LIHEAP Cases: Recipient Details.	"Descriptive" should describe the measure being drilled down on.
Transformer Model Names	*Cube Name* Model	LIHEAP Payments Model LIHEAP Cubes Model	The Cube Name should be approved by the end user. See the rules for naming Transformer models above.

Object Description

The description is a property available under each folder and object within Cognos Connection / Cognos Portal. A description is required for every production folder and object. The description property must be set in the development staging area prior to submitting a request to deploy objects to staging and production.

Descriptions must adhere to the following standards:

Folders

Name folders within the Public Folders tab for the specific project or program area. Acronyms should be avoided. Folder descriptions should describe the specific project or program area. Subfolders should provide a logical grouping under the specific project or program area and the description should explain that grouping.

Application (Cube/Report/Link/Job)

The description should include a brief definition of the application and any special considerations. Any acronyms used in the object name must be spelled out here. The following sample description has both:

> MR Consumer Eligibility Determination
>
> The Mental Retardation (MR) Consumer Eligibility Determination Cube allows for the analysis of the Number of Active MR Consumers who an eligibility length of time can be calculated for. These consumers must have an MR Date of Registration and a Notification of Eligibility Date (date that the Eligibility Notification Document was printed) in order to be considered in this cube. In addition, only consumers with an Eligibility Begin Date and an Active record status are considered in this cube.

Additional description standards by application type:

1. Cube – Include as Title Text for each new cube: “Latest cube update: <var>MDC file date</var>”.
2. Report – If the report is a prompt report, include [Prompt Report] at the beginning of the description.
3. Link – If accessible only within the DHS network, include [Available to Intranet Users Only] at the beginning of the description.
4. PDF Document Link – Include [PDF Document] at the beginning of the description.

Review for Compliance

All Cognos reports and cubes that will reside on the production DHS Cognos BI web reporting site must be available for a compliance review by BIS staff prior to the start of user acceptance testing phase or 3 weeks prior to implementation, whichever is earlier, for each development/enhancement project. Applications that fail this standard will not be deployed into production.

Exemptions from this Standard:

Any request for an exemption to this standard must be made to and approved by Data Warehouse in the Solution Management Division in the Health and Human Service Information Technology Delivery Center (HHS IT DC).

Refresh Schedule:

All standards and referenced documentation identified in this standard will be subject to review and possible revision annually or upon request by the HHS Information Technology Delivery Center Domain Leads.

Standard Revision Log:

Change Date	Version	Change Description	Author and Organization
12/21/2007	1.0	Initial Creation	Larry Leitzel, EKMS
07/22/2008	1.1	Added language to allow review against standard	Larry Leitzel, EKMS

10/20/2008	1.2	Updated requirements for OLAP cubes that fail to meet standard	Larry Leitzel, EKMS
03/02/2010	2.0	Major revision to incorporate standards for Cognos 8 BI cube development.	Bryan Porter, EKMS
11/30/2013	2.1	Update report development standards and define data source naming conventions.	Larry Leitzel, EKMS
02/18/2016	2.2	Replaced DPW and Public Welfare with DHS and Human Services. Updated links to Data Warehouse Standards and Cognos Model/Package Development.	Joe Sweigard, EKMS
08/02/2018	2.3	Conformed names to those used by Cognos Analytics.	Larry Leitzel, EKMS
11/02/2018	3.0	Addition of “Report Documentation” section and its sub-sections. Application of styles to headers and paragraphs; addition of section breaks between sections.	Chris Allan, EKMS
11/19/2018	3.1	Removed “Appendix A”; moved screenshot of documentation template from Appendix A into the “Report Documentation” section. Changed verbiage of “Lists/Crosstabs/Visualizations” section to further emphasize the fact that this section needs to be repeated for each report object and that the table objects in EKMS’s template that need to be repeated are between HTML Item tags.	Chris Allan, EKMS
08/20/2019	3.2	Update Organization	Larry Leitzel, EKMS