GENERAL SYSTEM CHARACTERISTICS

11

Objective of Section:

Describe and define the concepts necessary to rate the General System Characteristics (GSC's) to determine the overall Value Adjustment Factor. The exercises at the end of the section help the student demonstrate that they have gained the basic knowledge required.

Definition:

The value adjustment factor (VAF) is based on 14 general system characteristics (GSC's) that rate the general functionality of the application being counted. Each characteristic has associated descriptions to determine the degrees of influence.

Rating:

The degrees of influence range on a scale of zero to five, from no influence to strong influence. Each characteristic is assigned the rating based upon detail descriptions provided by the IFPUG 4.1 Manual. They ratings are:

0 Not present, or no influence

1 Incidental influence

2 Moderate influence

3 Average influence

4 Significant influence

5 Strong influence throughout

Standard Documentation:

- General Specification Documents
- Interviews with the users

Rating GSC's early in the life cycle:

GSC's can be rated relative early in the software life cycle. In fact, if a user cannot answer these fourteen questions, then the entire project needs to be re-evaluated.

Tabulating:

Once all the 14 GSC's have been answered, they should be tabulated using the IFPUG Value Adjustment Equation (VAF) --

$$VAF = 0.65 + \left[\left(\sum_{i=1}^{14} Ci \right) / 100 \right]$$

where: Ci = degree of influence for each General System Characteristic
.i = is from 1 to 14 representing each GSC.
$\sum$ = is summation of all 14 GSC's.

Another way to understand the formula is VAF = (65 + TDI)/100, where TDI is the sum of the results from each question. A Microsoft Excel formula would be: =0.65+SUM(A1:A14)/100 ; assuming that the values for the characteristics were in cells A1 – A14.

GSC's at a Glance:

General System Characteristic		Brief Description
1.	Data communications	How many communication facilities are there to aid in the transfer or exchange of information with the application or system?
2.	Distributed data processing	How are distributed data and processing functions handled?
3.	Performance	Did the user require response time or throughput?
4.	Heavily used configuration	How heavily used is the current hardware platform where the application will be executed?
5.	Transaction rate	How frequently are transactions executed daily, weekly, monthly, etc.?
6.	On-Line data entry	What percentage of the information is entered On-Line?
7.	End-user efficiency	Was the application designed for end-user efficiency?
8.	On-Line update	How many ILF's are updated by On-Line transaction?
9.	Complex processing	Does the application have extensive logical or mathematical processing?
10.	Reusability	Was the application developed to meet one or many user's needs?
11.	Installation ease	How difficult is conversion and installation?
12.	Operational ease	How effective and/or automated are start-up, back up, and recovery procedures?
13.	Multiple sites	Was the application specifically designed, developed, and supported to be installed at multiple sites for multiple organizations?
14.	Facilitate change	Was the application specifically designed, developed, and supported to facilitate change?

Considerations for GUI Applications

GSC items such as Transaction Rates, End User Efficiency, On Line Update, and Reusability usually score higher for GUI applications than on traditional applications. On the other hand, Performance, Heavily used configuration, multiple sites, will score lower for GUI applications than traditional applications.

Detail GSC's:

1. Data Communications

The *data* and *control* information used in the application are sent or received over communication facilities. Terminals connected locally to the control unit are considered to use communication facilities. Protocol is a set of conventions, which permit the transfer, or exchange of information between two systems or devices. All data communication links require some type of protocol.

Score As	Descriptions to Determine Degree of Influence
0	Application is pure batch processing or a standalone PC.
1	Application is batch but has remote data entry *or* remote printing.
2	Application is batch but has remote data entry *and* remote printing.
3	Application includes online data collection or TP (teleprocessing) front end to a batch process or query system.
4	Application is more than a front-end, but supports only one type of TP communications protocol.
5	Application is more than a front-end, and supports more than one type of TP communications protocol.

Comments:

TCP/IP (Transmission Control Protocol/Internet Protocol). TCP/IP provides a common language for interoperation between networks that use a variety of local protocols (Ethernet, Netware, AppleTalk, DECnet and others) are examples of TP.

An application that allows query of application via a web based solution and local access would receive a value of 3.

An application that allows for the update of ILF's via the Internet and local update would receive a value of a 5.

2. Distributed Data Processing

Distributed data or processing functions are a characteristic of the application within the application boundary.

Score As	Descriptions To Determine Degree of Influence
0	Application does not aid the transfer of data or processing function between components of the system.
1	Application prepares data for end user processing on another component of the system such as PC spreadsheets and PC DBMS.
2	Data is prepared for transfer, then is transferred and processed on another component of the system (not for end-user processing).
3	Distributed processing and data transfer are online and in one direction only.
4	Distributed processing and data transfer are online and in both directions.
5	Processing functions are dynamically performed on the most appropriate component of the system.

Comments:

Copying files from a mainframe to a local PC or copy files from an Internet or intranet would receive a value of 2.

Reading via a client or via Internet or intranet would receive a value of 3.

Reading and updating via Internet or intranet would receive a value of 4.

Depending on available resources, the application processes either local, on server, on intranet or Internet application would receive a value of 5.

3. Performance

Application performance objectives, stated or approved by the user, *in either* response or throughput, influence (or will influence) the design, development, installation, and support of the application.

Score As	Descriptions To Determine Degree of Influence
0	No special performance requirements were stated by the user.
1	Performance and design requirements were stated and reviewed but no special actions were required.
2	Response time or throughput is critical during peak hours. No special design for CPU utilization was required. Processing deadline is for the next business day.
3	Response time or throughput is critical during all business hours. No special design for CPU utilization was required. Processing deadline requirements with interfacing systems are constraining.
4	In addition, stated user performance requirements are stringent enough to require performance analysis tasks in the design phase.
5	In addition, performance analysis tools were used in the design, development, and/or implementation phases to meet the stated user performance requirements.

Comments:
Again for a client/server or for internet/intranet application this remains the same.

4. Heavily Used Configuration

A heavily used operational configuration, requiring special design considerations, is a characteristic of the application. For example, the user wants to run the application on existing or committed equipment that will be heavily used

Score As	Descriptions To Determine Degree of Influence
0	No explicit or implicit operational restrictions are included.
1	Operational restrictions do exist, but are less restrictive than a typical application. No special effort is needed to meet the restrictions.
2	Some security or timing considerations are included.
3	Specific processor requirements for a specific piece of the application are included.
4	Stated operation restrictions require special constraints on the application in the central processor or a dedicated processor.
5	In addition, there are special constraints on the application in the distributed components of the system.

Comments
Does this application share hardware that is busy?. For example, an application that shares a server with 5 other applications would need to be optimized because it shares resources with 4 other applications.

5. Transaction Rate

The transaction rate is high and it influenced the design, development, installation, and support of the application

Score As	Descriptions To Determine Degree of Influence
0	No peak transaction period is anticipated.
1	Peak transaction period (e.g., monthly, quarterly, seasonally, annually) is anticipated.
2	Weekly peak transaction period is anticipated.
3	Daily peak transaction period is anticipated.
4	High transaction rate(s) stated by the user in the application requirements or service level agreements are high enough to require performance analysis tasks in the design phase.
5	High transaction rate(s) stated by the user in the application requirements or service level agreements are high enough to require performance analysis tasks and, in addition, require the use of performance analysis tools in the design, development, and/or installation phases.

6. Online Data Entry

Online data entry and control functions are provided in the application.

Score As	Descriptions To Determine Degree of Influence
0	All transactions are processed in batch mode.
1	1% to 7% of transactions are interactive data entry.
2	8% to 15% of transactions are interactive data entry.
3	16% to 23% of transactions are interactive data entry.
4	24% to 30% of transactions are interactive data entry.
5	More than 30% of transactions are interactive data entry.

7. End-User Efficiency

The online functions provided emphasize a design for end-user efficiency. The design includes:

- Navigational aids (for example, function keys, jumps, dynamically generated menus)
- Menus
- Online help and documents
- Automated cursor movement
- Scrolling
- Remote printing (via online transactions)
- Preassigned function keys
- Batch jobs submitted from online transactions
- Cursor selection of screen data
- Heavy use of reverse video, highlighting, colors underlining, and other indicators
- Hard copy user documentation of online transactions
- Mouse interface
- Pop-up windows.
- As few screens as possible to accomplish a business function
- Bilingual support (supports two languages; count as four items)
- Multilingual support (supports more than two languages; count as six items)

Score As	Descriptions To Determine Degree of Influence
0	None of the above.
1	One to three of the above.
2	Four to five of the above.
3	Six or more of the above, but there are no specific user requirements related to efficiency.
4	Six or more of the above, and stated requirements for end-user efficiency are strong enough to require design tasks for human factors to be included (for example, minimize key strokes, maximize defaults, use of templates).
5	Six or more of the above, and stated requirements for end-user efficiency are strong enough to require use of special tools and processes to demonstrate that the objectives have been achieved.

8. Online Update

The application provides online update for the internal logical files.

Score As	Descriptions To Determine Degree of Influence
0	None.
1	Online update of one to three control files is included. Volume of updating is low and recovery is easy.
2	Online update of four or more control files is included. Volume of updating is low and recovery easy.
3	Online update of major internal logical files is included.
4	In addition, protection against data lost is essential and has been specially designed and programmed in the system.
5	In addition, high volumes bring cost considerations into the recovery process. Highly automated recovery procedures with minimum operator intervention are included.

9. Complex Processing

Complex processing is a characteristic of the application. The following components are present.

- Sensitive control (for example, special audit processing) and/or application specific security processing
- Extensive logical processing
- Extensive mathematical processing
- Much exception processing resulting in incomplete transactions that must be processed again, for example, incomplete ATM transactions caused by TP interruption, missing data values, or failed edits
- Complex processing to handle multiple input/output possibilities, for example, multimedia, or device independence

Score As	Descriptions To Determine Degree of Influence
0	None of the above.
1	Any one of the above.
2	Any two of the above.
3	Any three of the above.
4	Any four of the above.
5	All five of the above.

10. Reusability

The application and the code in the application have been specifically designed, developed, and supported to be usable in *other* applications.

Score As	Descriptions To Determine Degree of Influence
0	No reusable code.
1	Reusable code is used within the application.
2	Less than 10% of the application considered more than one user's needs.
3	Ten percent (10%) or more of the application considered more than one user's needs.
4	The application was specifically packaged and/or documented to ease re-use, and the application is customized by the user at source code level.
5	The application was specifically packaged and/or documented to ease re-use, and the application is customized for use by means of user parameter maintenance.

11. Installation Ease

Conversion and installation ease are characteristics of the application. A conversion and installation plan and/or conversion tools were provided and tested during the system test phase.

Score As	Descriptions To Determine Degree of Influence
0	No special considerations were stated by the user, and no special setup is required for installation.
1	No special considerations were stated by the user *but* special setup is required for installation.
2	Conversion and installation requirements were stated by the user, and conversion and installation guides were provided and tested. The impact of conversion on the project is not considered to be important.
3	Conversion and installation requirements were stated by the user, and conversion and installation guides were provided and tested. The impact of conversion on the project is considered to be important.
4	In addition to 2 above, automated conversion and installation tools were provided and tested.
5	In addition to 3 above, automated conversion and installation tools were provided and tested.

12. Operational Ease

Operational ease is characteristic of the application. Effective start-up, back-up, and recovery procedures were provided and tested during the system test phase. The application minimizes the need for manual activities, such as tape mounts, paper handling, and direct on-location manual intervention.

Score As	Descriptions To Determine Degree of Influence
0	No special operational considerations other than the normal back-up procedures were stated by the user.
1 - 4	One, some, or all of the following items apply to the application. Select all that apply. Each item has a point value of one, except as noted otherwise.
	Effective start-up, back-up, and recovery processes were provided, but operator intervention is required.
	Effective start-up, back-up, and recovery processes were provided, but no operator intervention is required (count as two items).
	The application minimizes the need for tape mounts.
	The application minimizes the need for paper handling.
5	The application is designed for unattended operation. Unattended operation means *no operator intervention* is required to operate the system other than to start up or shut down the application. Automatic error recovery is a feature of the application.

13. Multiple Sites

The application has been specifically designed, developed, and supported to be installed at multiple sites for multiple organizations.

Score As	Descriptions To Determine Degree of Influence
0	User requirements do not require considering the needs of more than one user/installation site.
1	Needs of multiple sites were considered in the design, and the application is designed to operate only under identical hardware and software environments.
2	Needs of multiple sites were considered in the design, and the application is designed to operate only *under similar* hardware and/or software environments.
3	Needs of multiple sites were considered in the design, and the application is designed to operate *under different* hardware and/or software environments.
4	Documentation and support plan are provided and tested to support the application at multiple sites and the application is as described by 1 or 2.
5	Documentation and support plan are provided and tested to support the application at multiple sites and the application is as described by 3.

14. Facilitate Change

The application has been specifically designed, developed, and supported to facilitate change.

The following characteristics can apply for the application:

- Flexible query and report facility is provided that can handle simple requests; for example, *and/or* logic applied to only one internal logical file (count as one item).
- Flexible query and report facility is provided that can handle requests of average complexity, for example, *and/or* logic applied to more than one internal logical file (count as two items).
- Flexible query and report facility is provided that can handle complex requests, for example, *and/or* logic combinations on one or more internal logical files (count as three items).
- Business control data is kept in tables that are maintained by the user with online interactive processes, but changes take effect only on the next business day.
- Business control data is kept in tables that are maintained by the user with online interactive processes, and the changes take effect immediately (count as two items).

Score As	Descriptions To Determine Degree of Influence
0	None of the above.
1	Any one of the above.
2	Any two of the above.
3	Any three of the above.
4	Any four of the above.
5	All five of the above.

Skill Builder:

The following questions are used to help build on the concepts discussed in this section. They are designed to encourage thought and discussion.

1. What is the value adjustment factor if all of the general system characteristics scored a value of 5 (strong influence)?

2. What is the value adjustment factor if each of the general system characteristics has no influence (a score of 0)?

3. What is the origin of the .65 in the value adjustment factor calculation?

4. What is the possible (theoretical) range of the value adjustment factor?

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