

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

(A new generation, enhanced and comprehensive software  
size measurement methodology)

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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

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2. SCCQI Introduction
3. SCCQI Software Size Counts
4. SCCQI Software Estimations
5. SCCQI Software Key Software Indicators
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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## Software Size Measurement

- Very important activity in software development lifecycle
- Determination of software size based on the functional specifications
- Measurement of the size should be comprehensive based on all the software constituents (components):
  - functionality
  - error handling
  - messages
  - user interfaces
  - logical data model
- Proper translation of measured size to effort should be possible
- Should indicate the quality aspects of specifications and software, if possible

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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Introduction

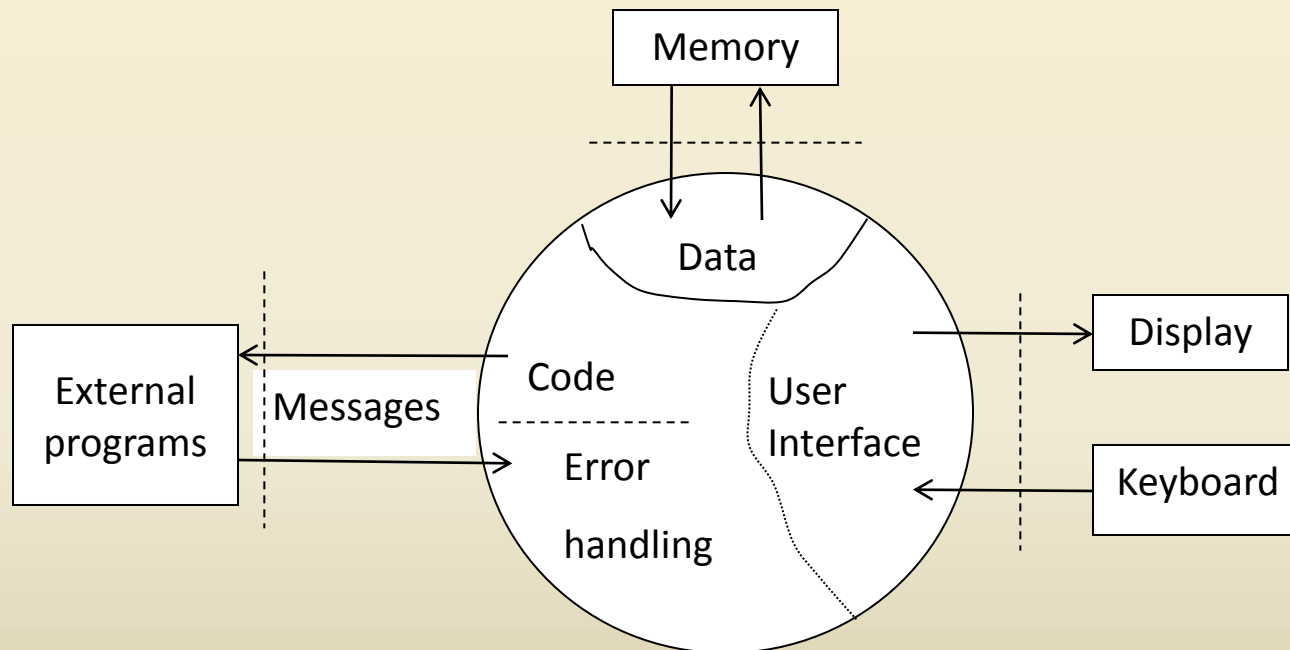
Current available methodologies:

- IFPUG
- COSMIC
- UCP (Capgemini)
- others

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Introduction

Software size determination model – main software constituents to be considered:



# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Introduction

Measurements in the current available methodologies:

- Use very limited software measurability criteria
- Example, COSMIC method uses only 4 criteria:
  - Memory read
  - Memory write
  - Entry from input devices and external programs
  - Exit from output devices and external programs

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Introduction

Measurements in the current available methodologies (continued):

- Software measurability criteria not considered for:
  - size and complexity of data
  - size, type and complexity of all the functionality
  - error handling
  - number, size and complexity of user interfaces (screens)
  - quantity, size and complexity of message exchanges
  - others



# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Introduction

Measurements in SCCQI:

- 26 expansive software measurability criteria considered for counting the function points
- all the main constituents of software functional description considered:
  - data
  - functionality
  - user interfaces
  - message exchange
- result 26 raw counts

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Introduction

Measurements in SCCQI (continued):

- 26 raw counts used for calculating:
  - 6 software size counts
  - 4 software estimations about the software size and effort
  - 21 Key Software Indicators (KSI) of which
    - 12 Software Structural Indicators (SSI)
    - 9 Software Operational Indicators (SOI)

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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Software Size Counts

26 relevant and essential measuring criteria for 26 raw counts considering:

- the size and complexity of data
- size, type and complexity of all the functionality
- error handling
- number, size and complexity of user interfaces
- quantity, size and complexity of message exchanges
- apparent deficiencies in the functional specifications of
  - data model
  - functionalities
  - user interfaces
  - messages

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Software Size Counts

Raw counts used to calculate 6 software size counts:

1. Data Count: indicates the data size and complexity, based on 3 raw counts obtained from the counting of classes, their attributes and their fields defined in the logical data model of the functional specifications
2. Functionality Count: indicates the functionality size and complexity, based on 13 raw counts obtained by considering all the operations of the software:
  - Processing operations
  - Memory transactions
  - Input/output device interactions
  - Communications with external programs
  - Error handling

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Software Size Counts

Raw counts used to calculate 6 software size counts (continued):

3. User Interface Count: indicates the user interface size and complexity, based on 4 raw counts obtained from the counting of user interfaces (screens), their size and navigation links interconnecting the user interfaces (screens)
4. Message Count: indicates the message size and complexity, base on 2 raw counts obtained from the counting of the messages and their fields
5. Total Software Count: indicates the total software size and complexity  
The sum of:
  - Data Count
  - Functionality Count
  - User Interface Count
  - Message Count

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Software Size Counts

Raw counts used to calculate 6 software size counts (continued):

6. Requirements Deficiency Count: apparently deficient items for the counts of

- data
- functionality
- user interface
- message

based on 4 raw counts for the deficiencies in the above 4 items

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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Software Estimations

Raw counts used for 4 software estimations about software size and effort:

- Software logical size:
  - a complex function of data, functionality, user interface and message counts
  - approximate software logical size (in number of logical lines)
- Design effort:
  - a function of the software logic size
  - needed for preparing the technical specification document and coding
- Testing effort
  - a function of the design effort
  - needed for preparing the test specification document and testing

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Software Estimations

Raw counts used for 4 software estimations about software size and effort (contd.):

- Total effort:
  - sum of the design effort and testing effort
  - needed for
    - preparing the technical specifications document
    - coding
    - preparing the test specification document
    - testing

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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

Conspicuous overview of :

- the most important software characteristics
  - structural – static proportion
  - operational – dynamic run-time

Raw counts used for calculating:

- 21 KSIs indicated as Low, Medium, High or Very High:
  - 12 Software Structural Indicators
  - 9 Software Operational Indicators

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Structural Indicators (SSI):

- Point of view of static content of the software
- Help to assess the structure of the software about
  - data
  - functionality
  - error handling
  - deficiencies

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Structural Indicators (SSI):

1. Data complexity and size: based on the data count – the bigger the data count, the more complex and the bigger the size of data in the software
2. Functionality complexity and size: based on the functionality count – the bigger the functionality count, the more complex and bigger the functionality in the software
3. Memory transaction proportion: static proportion of the memory transaction (read/write) functionality in the total software
4. Computational content proportion: static proportion of the computational part in the total software

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Structural Indicators (SSI):

5. Logical operation content proportion: static proportion of the logical operation (AND, OR, etc.) part in the total software
6. Decision content proportion: static proportion of the decisional operations part in the total software
7. Repeat content proportion: static proportion of the repeat operations part in the total software
8. Action content proportion: static proportion of the different actions performance in the total software

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Structural Indicators (SSI):

9. User interface proportion: static proportion of the user interface related part in the total software
10. External communication proportion: static proportion of the message communication part in the total software
11. Error handling proportion: static proportion of the error handling capability in the total software
12. Requirements deficiency grade: static proportion of the apparent deficient part in data, functionality, user interfaces and messages



# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Operational Indicators (SOI):

- Indicate the dynamic properties of the software at run-time
- Help in assessing the intensity of
  - data flows to/from memory
  - data flows to external devices/programs
  - computations
  - logical operations
  - other software operations

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Operational Indicators (SOI):

1. Memory traffic level: level of memory traffic in the entire functionality at run-time
2. Computational level: level of computations in the entire functionality at run-time
3. Logical operations level: level of logical operations in the entire functionality at run-time
4. Decision Execution level: level of decision executions in the entire functionality at run-time

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

### Software Operational Indicators (SOI):

5. Repeat Execution level: level of repeat execution in the entire functionality at run-time
6. Action execution level: level of actions performed in the entire functionality at run-time
7. User interaction level: level of user interactions in the entire functionality at run-time
8. External communication level: level of message exchange with external environment in the entire functionality at run-time

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## SCCQI Key Software Indicators (KSI's)

Software Operational Indicators (SOI):

9. Error handling capability: level of error handling execution in the entire functionality at run-time

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## Example

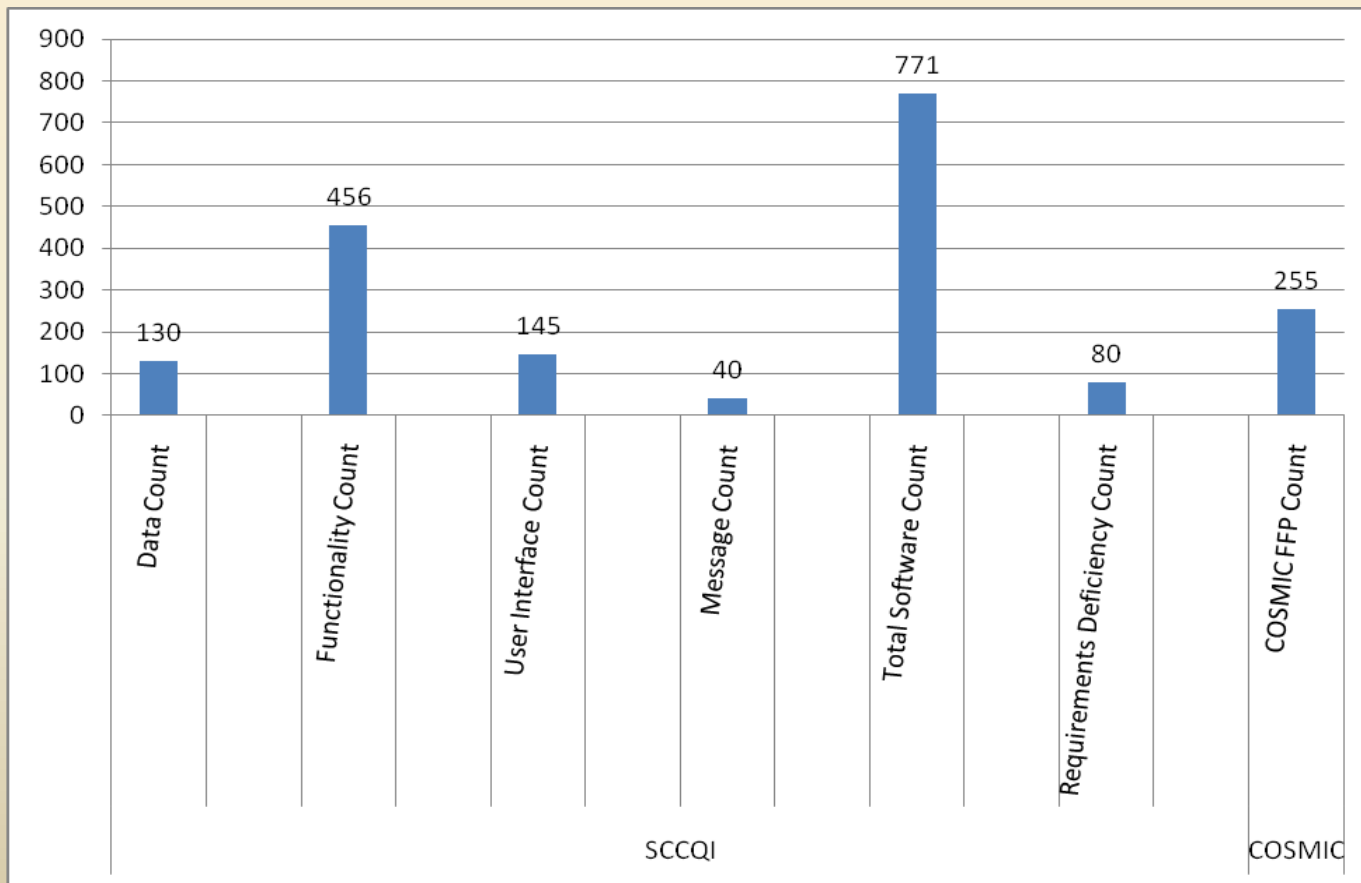
SCCQI: Software Size Counts and Software Estimations about the Software Size and Effort

Software Size Count:		Software Estimations - Software Size and Effort:		COSMIC count	
Data Count	130				
Functionality Count	456			COSMIC count	255
User Interface Count	145	Software Logical Size	2797		
Message Count	40	Design Effort (tech spec+coding) person days	38		
Total Software Count	771	Testing Effort (test spec+testing) person days	46		
Requirements Deficiency Count	80	Total Effort (design+testing) person days	84	Total COSMIC Count	255

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## Example

Graph of Software Size Counts - SCCQI vs. COSMIC



# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## Example

### SCCQI KSI's

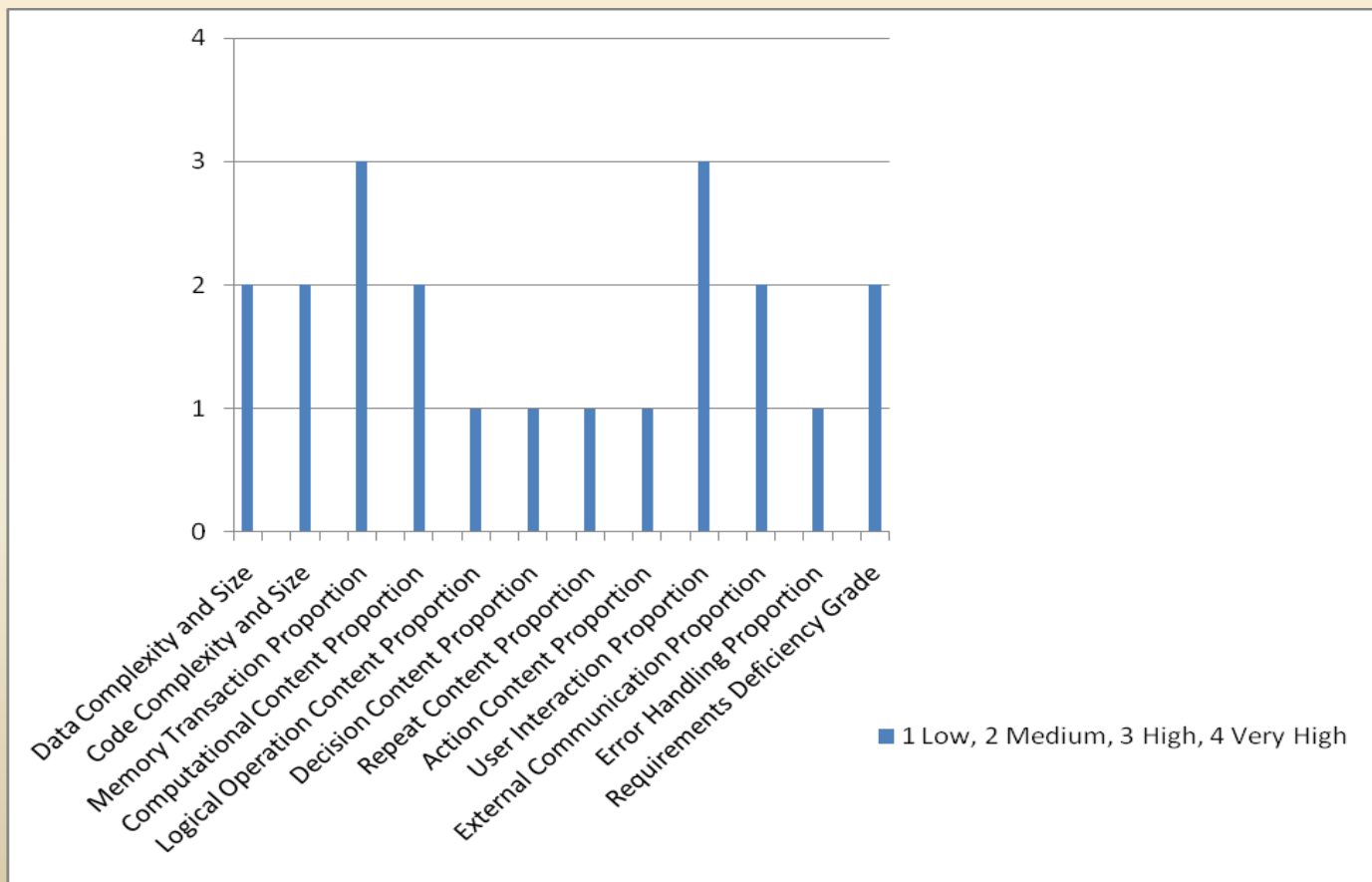
Software Structural Indicators (static structure):	Level:	Software Operational Indicators (dynamic run-time):	Level:
Data Complexity and Size	Medium		
Functionality Complexity and Size	Medium		
Memory Transaction Proportion	High		
Computational Content Proportion	Medium	Memory Traffic Level	Medium
Logical Operation Content Proportion	Low	Computational Level	Medium
Decision Content Proportion	Low	Logical Operations Level	Medium
Repeat Content Proportion	Low	Decision Execution Level	Low
Action Content Proportion	Low	Repeat Execution Level	Low
User Interaction Proportion	High	Action Execution Level	Medium
External Communication Proportion	Medium	User interaction Level	High
Error Handling Proportion	Low	External Communication Level	Medium
Requirements Deficiency Grade	Medium	Error Handling Capability	Medium



# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## Example

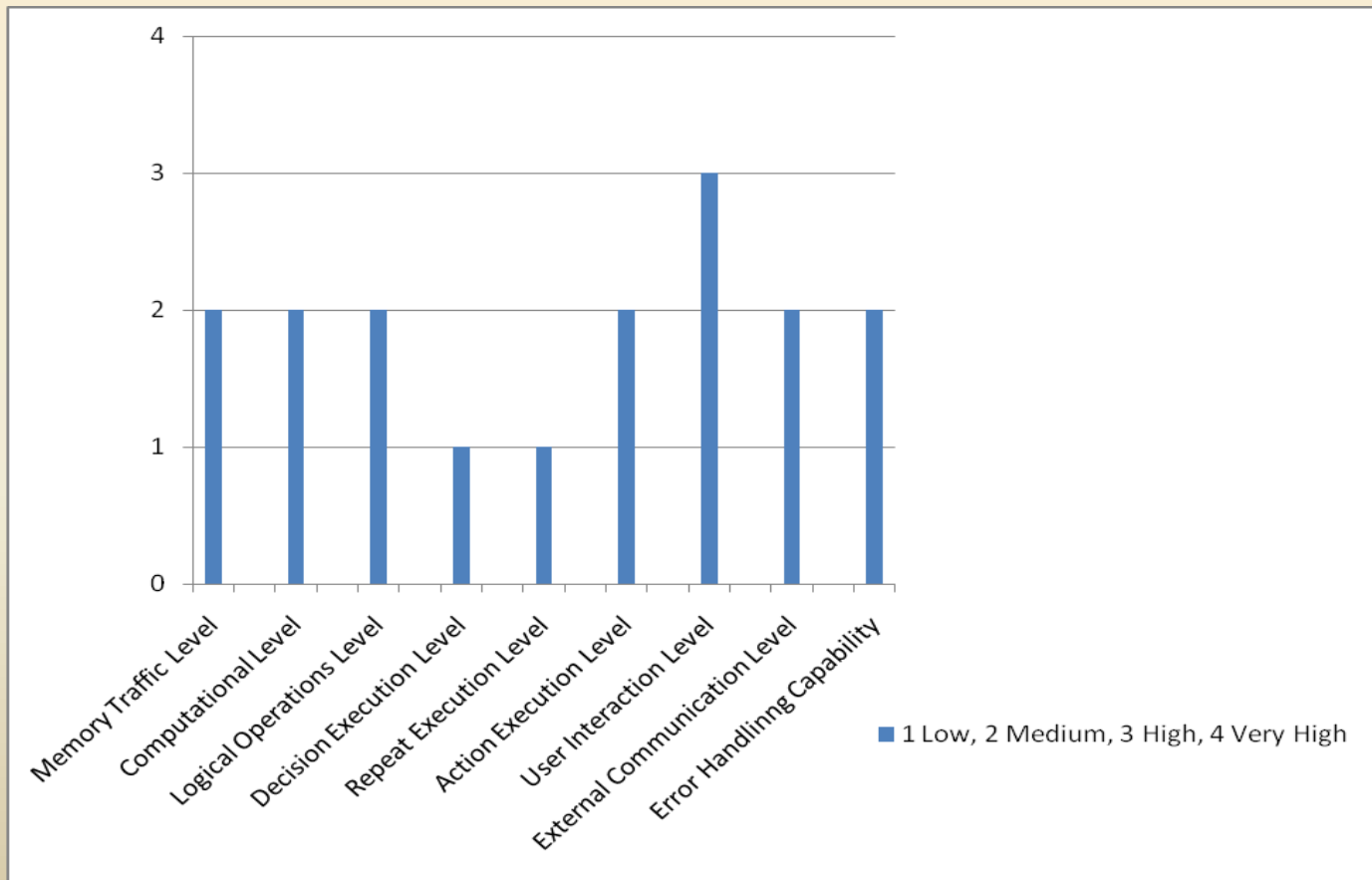
Graph of KSI's - Software Structural Indicators



# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

## Example

Graph of KSI's - Software Operational Indicators



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## Conclusion

Many useful features and significant advantages in the SCCQI methodology:

- Function counts covers all the important constituents of software in counting
- Very elaborate and comprehensive considering 26 relevant essential software measurability criteria
- Realistic effort estimates for precise project planning regarding project management
- Vital Key Software Indicators regarding quality management for
  - assessing structural and operational characteristics of software
  - judging the quality of the functional specifications regarding the error handling and deficiencies in data, functionality, user interfaces and messages

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# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

Questions/Answers

# Software Comprehensive Count with Quality Indicators (SCCQI) for Software Size Measurement

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