Information Processing and Technology (2010)
Sample work program

December 2010
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Compiled by the Queensland Studies Authority

December 2010

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A work program is the school’s plan of how the course will be delivered and assessed, based on the school’s interpretation of the syllabus. The school’s work program must meet syllabus requirements, and indicate that there will be sufficient scope and depth of student learning to reflect the general objectives and meet the exit criteria and standards.

This sample demonstrates one approach, and should be used as a guide only to help teachers plan and develop school work programs.
# 1.0 Course Organisation and Assessment Plan (Year A/B)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Syllabus Topics</th>
<th>Time (Hours)</th>
<th>Assessment Technique/Item</th>
<th>Topics Assessed</th>
<th>Conditions</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester One</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algorithmic Design Concepts</td>
<td>• Algorithms (A) • Software programming (SP) • Social and ethical issues (SEI)</td>
<td>27½ Core: 23 Add: 4½</td>
<td>Extended response Review</td>
<td>SP SEI</td>
<td>• Formative  • 600–1000 words  • 3 weeks  • Draft required</td>
<td>KA AS EC</td>
</tr>
<tr>
<td>Software Design</td>
<td>• Algorithms • Software programming • Social and ethical issues • Human - computer interaction (HCI)</td>
<td>27½ Core: 24 Add: 3½</td>
<td>Extended response Folio</td>
<td>A SP HCI</td>
<td>• Formative  • 5 weeks  • Series of practical exercises  • Exercises to range from implementing algorithms to the design and development of solutions to problems</td>
<td>KA AS EC</td>
</tr>
<tr>
<td><strong>Semester Two</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Software Development</td>
<td>• Algorithms • Software programming • Human - computer interaction</td>
<td>43 Core: 38 Add: 5</td>
<td>Product Major project</td>
<td>A SP HCI</td>
<td>• Formative  • 8 weeks  • Group based  • Use of software development cycle  • Written explanation 800 – 1000 words</td>
<td>KA AS EC</td>
</tr>
<tr>
<td>Knowledge Based Systems</td>
<td>• Intelligent systems (IS) • Human - computer interaction (HCI)</td>
<td>12 Core: 2 Add: 10</td>
<td>Product Minor project</td>
<td>IS HCI</td>
<td>• Formative  • 3 weeks  • Individual work  • Written explanation 800 words</td>
<td>KA AS EC</td>
</tr>
<tr>
<td>Unit</td>
<td>Syllabus Topics</td>
<td>Time (Hours)</td>
<td>Assessment Technique/Item</td>
<td>Topics Assessed</td>
<td>Conditions</td>
<td>Dimensions</td>
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<td>---------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Information Systems Design  | • Relational information systems (RIS)  
• Structured Query Language (SQL)  
• Social and ethical Issues      | 27½          | Extended response          | RIS             | Summative  
800 – 1200 words  
3 weeks  
Draft required                                                  | KA AS EC    |
|                             |                                                                                  | Core: 25     | Essay                      | SEI             |                                                                          |            |
|                             |                                                                                  | Add: 2½      |                            |                 |                                                                          |            |
|                             | Querying Information Systems                                                    | 27½          | Extended response          | SQL             | Summative  
3 weeks  
Series of practical exercises based on querying of online relational databases  
Exercises to be combination of SQL and QBE.                                    | KA AS EC    |
|                             | • Structured Query Language  
• Relational information systems  
• Human - computer interaction   | Core: 22½     | Folio                      | RIS             |                                                                          |            |
|                             |                                                                                  | Add: 5       |                            |                 |                                                                          |            |
|                             | Semester Three                                                                 |              |                            |                 |                                                                          |            |
| Information Systems Design  | • Structured Query Language  
• Relational information systems  
• Human - computer interaction   | 27½          | Product                    | SQL             | Summative  
6 weeks  
Individual work  
Written explanation 1000 – 1500 words  
Use of information system development cycle                                   | KA AS EC    |
|                             |                                                                                  | Core: 22½     | Major project              | RIS             |                                                                          |            |
|                             |                                                                                  | Add: 5       |                            | HCI             |                                                                          |            |
|                             | Semester Four                                                                   |              | Supervised written         | RIS             | Summative  
90 minutes  
No notes allowed                                                               | KA AS EC    |
|                             | Information Systems Design and Web Development                                | 27½          | Short Response              | SQL             |                                                                          |            |
|                             | • Relational Information Systems  
• Computer Systems (CS)                                                       | Core: 9½     | Product                    | CS              | Summative  
3 weeks  
Individual work  
Written explanation 1000 words                                                   | KA AS EC    |
|                             |                                                                                  | Add: 18      | Minor Project              | RIS             |                                                                          |            |
| Time Allocations             | Core topics: 166½ hours  
Additional material: 53½ hours                                                   | Total: 220 hours |                            |                 | KEY: KA – Knowledge and application; AS - Analysis and synthesis;  
EC – Evaluation and communication                                                  |            |
|                             |                                                                                  |              |                            |                 |                                                                          |            |

**Dimensions**

- **KA**: Knowledge and application
- **AS**: Analysis and synthesis
- **EC**: Evaluation and communication
<table>
<thead>
<tr>
<th>Semester One</th>
<th>Unit</th>
<th>Syllabus Topics</th>
<th>Time (Hours)</th>
<th>Assessment Technique/Item</th>
<th>Topics Assessed</th>
<th>Conditions</th>
<th>Dimensions</th>
</tr>
</thead>
</table>
| Information Systems Design | • Relational information systems (RIS)  
• Structured Query Language (SQL)  
• Social and ethical issues (SEI) | 27½  
Core: 25  
Add: 2½ | Extended response Review | RIS  
SEI | • Formative  
• 600 – 1000 words  
• 3 weeks  
• Draft required | KA  
AS  
EC |
| Querying Information Systems | • Structured Query Language  
• Relational information systems  
• Human - computer interaction (HCI) | 27½  
Core: 22½  
Add: 5 | Extended response Folio | SQL  
RIS | • Formative  
• 3 weeks  
• Series of practical exercises based on querying of online relational databases  
• Exercises to be a combination of SQL and QBE. | KA  
AS  
EC |
| Information Systems Development | • Structured Query Language  
• Relational information systems  
• Human - computer Interaction | 43  
Core: 38  
Add: 5 | Product Major project | SQL  
RIS  
HCI | • Formative  
• 6 weeks  
• Group Work  
• Use of information system development cycle | KA  
AS  
EC |
| Knowledge Based Systems | • Intelligent Systems (IS)  
• Human Computer Interaction | 12  
Core: 2  
Add: 10 | Product Minor project | IS  
HCl | • Formative  
• 3 weeks  
• Individual work  
• Written explanation 800 words | KA  
AS  
EC |
<table>
<thead>
<tr>
<th>Semester Three</th>
<th>Unit</th>
<th>Syllabus Topics</th>
<th>Time (Hours)</th>
<th>Assessment Technique/Item</th>
<th>Topics Assessed</th>
<th>Conditions</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Algorithmic Design</td>
<td>• Algorithms (A)</td>
<td>27½</td>
<td>Extended response</td>
<td>SP</td>
<td>• Summative</td>
<td>KA</td>
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<tr>
<td></td>
<td>Concepts</td>
<td>• Software programming (SP)</td>
<td>Core: 23 Add: 4½</td>
<td>Essay</td>
<td>SEI</td>
<td>• 800 – 1200 words</td>
<td>AS</td>
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<tr>
<td></td>
<td></td>
<td>• Social and ethical issues</td>
<td></td>
<td></td>
<td></td>
<td>• 3 weeks</td>
<td>EC</td>
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<td></td>
<td></td>
<td>• Draft required</td>
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<tr>
<td></td>
<td>Software Design</td>
<td>• Algorithms</td>
<td>27½</td>
<td>Extended response</td>
<td>A</td>
<td>• Summative</td>
<td>KA</td>
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<td></td>
<td>• Software programming</td>
<td>Core: 24 Add: 3½</td>
<td>Folio</td>
<td>SP</td>
<td>• 5 weeks</td>
<td>AS</td>
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<tr>
<td></td>
<td></td>
<td>• Social and ethical issues</td>
<td></td>
<td></td>
<td>HCI</td>
<td>• Series of practical exercises</td>
<td>EC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Human - computer interaction</td>
<td></td>
<td></td>
<td></td>
<td>• Exercises to range from implementing algorithms to the design and</td>
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<tr>
<td></td>
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<td></td>
<td>development of solutions to problems</td>
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<tr>
<td></td>
<td>Software Development</td>
<td>• Algorithms</td>
<td>27½</td>
<td>Product</td>
<td>A</td>
<td>• Summative</td>
<td>KA</td>
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<tr>
<td></td>
<td></td>
<td>• Software programming</td>
<td>Core: 22½ Add: 5</td>
<td>Major project</td>
<td>SP</td>
<td>• 6 weeks</td>
<td>AS</td>
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<td></td>
<td>• Human - computer interaction</td>
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<td>HCI</td>
<td>• Individual</td>
<td>EC</td>
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<tr>
<td></td>
<td></td>
<td>• Use of software development cycle</td>
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<td></td>
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<td>Supervised written</td>
<td>A</td>
<td>• Summative</td>
<td>KA</td>
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<td></td>
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<td></td>
<td></td>
<td>Short Response</td>
<td>SP</td>
<td>• 90 minutes</td>
<td>AS</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• No notes allowed</td>
<td>EC</td>
</tr>
<tr>
<td></td>
<td>Software Design and Web</td>
<td>• Computer Systems (CS)</td>
<td>27½</td>
<td>Product</td>
<td>CS</td>
<td>• Summative</td>
<td>KA</td>
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<tr>
<td></td>
<td>Development</td>
<td>• Software programming</td>
<td>Core: 9½ Add: 18</td>
<td>Minor Project</td>
<td>SP</td>
<td>• 3 weeks</td>
<td>AS</td>
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<td></td>
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<td>• Individual work</td>
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<td>EC</td>
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<tr>
<td></td>
<td>Time Allocations</td>
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<td></td>
<td>KEY: KA – Knowledge and application; AS - Analysis and synthesis;</td>
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<td></td>
<td></td>
<td>EC – Evaluation and communication</td>
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</tr>
</tbody>
</table>

**Total:** 220 hours
2.0 Outlines of Intended Student Learning

SAMPLE UNIT 1: Information Systems Design

<table>
<thead>
<tr>
<th>Core topics:</th>
<th>Structured Query Language</th>
<th>Additional material:</th>
<th>Structured Query Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time allocation:</td>
<td>Relational Information Systems</td>
<td>Time allocation:</td>
<td>2½ hours</td>
</tr>
<tr>
<td>25 hours</td>
<td>Social and Ethical Issues</td>
<td>2½ hours</td>
<td></td>
</tr>
</tbody>
</table>

Unit description

This unit introduces students to a formal model for describing the architecture of information systems and presents methods for developing these systems. Within the unit, social and ethical issues related to, for example, security, privacy and identity theft will be integrated. Students will also be introduced to a formal query language Structured Query Language (SQL), for the manipulation of data within a database.

Dimensions of the General Objectives assessed within this unit:

1. Knowledge and application (KA)
2. Analysis and synthesis (AS)
3. Evaluation and communication (EC).

Topic: Structured Query Language

Core:

- Terminology such as retrieval, insertion, deletion, update and modification
- Data definition concepts including:
  - table and column names
  - column data types
  - defining tables
  - populating a table with data.
- Data manipulation using SQL including:
  - analysing requests for information in order to recognise one or more types of query required
  - retrieval from one or more columns in one table
  - retrieval from one or more columns based on some selection criteria
  - sorting data based on one or more columns
  - use of logical, arithmetic and relational operators to build the relevant selection criteria
  - predefined functions such as maximum, minimum, average and number of elements in a column
  - inserting, updating and deleting of queries.
Additional material:
• Query by example (QBE)

**Topic: Relational information systems**

**Core:**
• Data, information, knowledge and wisdom, and the differences between the terms as they apply to information systems.
• External, logical, conceptual and physical views of information systems
• Classification systems for different types of information systems
• Steps of the information system development cycle for the production of an information system, i.e. identification, conceptualisation, formalisation, implementation, testing, evaluation, documentation and specification documentation.
• Maintaining security and privacy in information systems

**Topic: Social and ethical issues**

**Core:**
• Appropriate terminology for discussing social, ethical, legal and moral issues
• Issues associated with the physical and logical security of computer systems e.g. data protection, backup systems, data integrity
• Hacking
• Privacy
• Unauthorised access
• Identity theft
• Storing and displaying sensitive information e.g. pictures of indigenous people

**Learning Experiences**
• Retrieving information from an existing database through ad hoc queries and the production of formal reports.
• Creating a database, setting field properties, inserting, modifying or deleting data.
• Identifying and using online database resources
• Presenting situations or problems to help students discriminate between facts and opinions

**Assessment Technique / Item**

**Year 11 - Extended Response** (Review)
• Formative
• 600 – 1000 words
• 3 weeks
• Draft required
• Review of literature on database security issues
Year 12 - Extended Response (Essay)

- Summative
- 800 – 1200 words
- 3 weeks
- Draft required
- Argumentative essay based upon issues of privacy with regard to databases

SAMPLE UNIT 2: Software Design

<table>
<thead>
<tr>
<th>Core topics:</th>
<th>Algorithms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time allocation:</td>
<td>24 hours</td>
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<tr>
<td>Software Programming</td>
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</tr>
<tr>
<td>Social and Ethical Issues</td>
<td></td>
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<tr>
<td>Human Computer Interaction</td>
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</table>

<table>
<thead>
<tr>
<th>Additional material:</th>
<th>Algorithms</th>
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<tbody>
<tr>
<td>Time allocation:</td>
<td>Software programming</td>
</tr>
<tr>
<td>3½ hours</td>
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</tbody>
</table>

Unit description:
This unit involves the study of the development of software. Students will gain experience and skills in the design, development and evaluation of computer programs that solve practical problems. The steps in the software development cycle will be used to solve these problems.

Dimensions of the General Objectives assessed within this unit:
1. Knowledge and application
2. Analysis and synthesis
3. Evaluation and communication

Topic: Algorithms
Core:
- General principles of algorithm development such as top-down design and modularity
- Basic elements of algorithms
  - assignment
  - procedure call
  - skip
- Standard algorithm control structures:
  - sequence
  - selection
  - iteration
Additional material:
• Search techniques

Topic: Software Programming

Core:
• Procedural design and implementation
• Use of a 3rd generation programming language
• Implementation of sequence, selection and iteration in a 3GL
• Implementation of modularity in a 3GL and passing of values to and from modules
• Metrics and protocols of testing, e.g. alpha- and beta- testing
• Common data types including:
  – real numbers
  – integer numbers
  – character strings
• Common data structures including:
  – variables
  – arrays
  – text files

Additional material:
• Static Structures including:
  – user-defined types
  – objects

Topic: Social and ethical issues

Core:
• Software piracy/cracking – the responsibilities of software developers and retailers as well as users and purchasers
• Copyright / intellectual property, commercial licensing, open-source, freeware/shareware
• Monopolies and the nature of competition in the software industry
• Malicious code e.g. viruses, trojans and worms
• Phishing

Human – computer interaction

Core:
• Role of affordances and metaphors in the design of interfaces
• Approach to interfaces from the perspectives of different individuals, e.g. users, designers, programmers, hardware engineers.
• Fundamental importance of user-centred design for building new interfaces.
- Principles of user-centred design:
  - design errors such as clutter, embellishment and interference
  - usability
  - accessibility i.e. accommodating for special needs including legal aspects and standards, verification of standards
  - use of style guide

### Learning Experiences

- Use of algorithm and code libraries
- Analysis of a problem and selection of the most appropriate algorithm for solution
- Solving a variety of problems
- Developing algorithmic solutions to simple problems given varying amounts of guidance.
- Solving a variety of problems using 3GL
- Observing, analysing, modifying, testing, evaluating and/or documenting existing solutions.
- Developing partial or complete solutions to problems.
- Presenting situations or problems to help students discriminate between facts and opinions
- Justifying design choices they have made in interfaces they have developed

### Assessment Technique / Item

#### Year 11 – Extended Response (Folio)

- Formative
- 5 weeks
- Series of practical exercises
- Exercises range from implementing given algorithms to the design and development of solutions to problems
- Open book / notes allowed
- Help menus available

#### Year 12 – Extended Response (Folio)

- Summative
- 5 weeks
- Series of practical exercises
- Exercises range from implementing given algorithms to the design and development of solutions to problems.
- Open book / notes allowed
- Help menus available
# 3.0 Student Profile (Year A/B)

<table>
<thead>
<tr>
<th>Item</th>
<th>Assessment</th>
<th>Topics</th>
<th>Unit</th>
<th>F/S</th>
<th>K &amp; A</th>
<th>A &amp; S</th>
<th>E &amp; C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Extended response Review</td>
<td>SP, SEI</td>
<td>Algorithmic Design Concepts</td>
<td>F</td>
<td>F</td>
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</tr>
<tr>
<td>2</td>
<td>Extended response Folio</td>
<td>A, SP, HCI</td>
<td>Software Design</td>
<td>F</td>
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</tr>
<tr>
<td>3</td>
<td>Product Major Project</td>
<td>A, SP, HCI</td>
<td>Software Development</td>
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<tr>
<td>4</td>
<td>Supervised written Short response</td>
<td>A, SP</td>
<td>Software Development</td>
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<tr>
<td>5</td>
<td>Product Minor Project</td>
<td>IS, HCI</td>
<td>Knowledge Based Systems</td>
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## Standards - Monitoring

### Interim Level of Achievement - Monitoring

<table>
<thead>
<tr>
<th>Item</th>
<th>Assessment</th>
<th>Topics</th>
<th>Unit</th>
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<th>K &amp; A</th>
<th>A &amp; S</th>
<th>E &amp; C</th>
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<tbody>
<tr>
<td>6</td>
<td>Extended response Essay</td>
<td>RIS, SEI</td>
<td>Querying Information Systems</td>
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<tr>
<td>7</td>
<td>Extended response Folio</td>
<td>SQL, RIS</td>
<td>Information Systems Design</td>
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</table>

## Standards - Verification

### Proposed Level of Achievement - Verification

<table>
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<tr>
<th>Item</th>
<th>Assessment</th>
<th>Topics</th>
<th>Unit</th>
<th>F/S</th>
<th>K &amp; A</th>
<th>A &amp; S</th>
<th>E &amp; C</th>
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<tr>
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<td>Product Major Project</td>
<td>SQL, RIS, HCI</td>
<td>Information Systems Development</td>
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<td>9</td>
<td>Supervised written Short Response</td>
<td>SQL, RIS</td>
<td>Information Systems Development</td>
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</tr>
</tbody>
</table>

## Exit Standards

### Exit Level of Achievement

**KEY:** F – Formative; S – Summative; K&A – Knowledge and application; A&S - Analysis and synthesis; E&C – Evaluation and communication
3.0 Student Profile (Year B/A)

<table>
<thead>
<tr>
<th>Item</th>
<th>Assessment</th>
<th>Topics</th>
<th>Unit</th>
<th>F/S</th>
<th>K &amp; A</th>
<th>A &amp; S</th>
<th>E &amp; C</th>
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<td>1</td>
<td>Extended response</td>
<td>RIS, SEI</td>
<td>Querying Information Systems</td>
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<td></td>
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<tr>
<td>3</td>
<td>Product Major project</td>
<td>SQL, RIS, HCI</td>
<td>Information Systems Development</td>
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Standards - Monitoring

Interim Level of Achievement - Monitoring

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Standards - Verification

Proposed Level of Achievement - Verification

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Exit Standards

Exit Level of Achievement

KEY: F– Formative; S –Summative; K&A – Knowledge and application; A&S - Analysis and synthesis; E&C – Evaluation and communication;