# Digital Solutions 2019 v1.2

## Unit 2 assessment instrument

### Project - digital solution

#### Unit objectives

This assessment instrument is used to determine student achievement of the following Unit objectives:

1. recognise and describe programming elements, data and useability principles, and data management processes

2. symbolise and explain information, ideas and data flow relationships within and between systems related to programming problems

3. analyse problems and information related to the selected technology context

4. determine solution requirements and prescribed and self-determined criteria of a programming problem

5. synthesise information and ideas to determine possible digital solutions

6. generate user interface and programmed components of the prototype digital solution

7. evaluate impacts, components and solutions against criteria to make refinements and justified recommendations

8. make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts.

*The assessment objectives used in the ISMG below have been contextualised to reflect these unit objectives.*

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| **Subject** | Digital Solutions | | |
| **Technique** | Project – digital solution | | |
| **Unit** | Unit 2: Application and data solutions | | |
| **Topics** | Topic 1: Data-driven problems and solution requirements  Topic 2: Data and programming techniques  Topic 3: Prototype data solutions | | |
| **Conditions** | | | |
| **Duration** | Up to 8 weeks | | |
| **Mode** | Multimodal | **Length** | * 8-10 A3 pages * 2-4 minute demonstration of the functionality of the user interface and coded components of the digital solution by video recording * 4-6 A4 pages of code with annotations |
| **Individual / group** | Individual | **Other** | * The reference list is not included in the page count. * Schools implement authentication strategies that reflect QCAA guidelines. |
| **Resources available** | * Computers * Internet * Stimulus (technical proposal) | | |
| **Context** | | | |
| Artbank is a unique Government visual arts support and access initiative. Artbank leases art from its collection to generate funds. It uses these funds to meet operating costs and invest in more artworks, which benefits local artists. Artbank has over 10,000 artworks in its collection. Its smallest collection is its glass artwork collection, which it has stopped collecting in recent years. | | | |
| **Task** | | | |
| Develop and generate the user interface and programmed components of a prototype for a new “glass artwork rating system” web application, that best addresses the requirements specified in the technical proposal (stimulus) provided.  You must document your progression through this task using the Digital Solutions problem-solving process (as specified in the QCAA Digital Solutions syllabus). Demonstrate the functionality of the components of the prototype web application in a video recording. | | | |
| **To complete this task, you must:** | | | |
| * **recognise and describe**   + programmed and user-interface components   + useability principles, including accessibility, effectiveness, safety, utility and learnability * **symbolise**   + the user and developer problem using mind maps and one or more of constructed sketches, annotated diagrams, images or screenshots   + algorithms communicated in pseudocode that demonstrate knowledge and understanding of programming features   + interrelationships between user experiences and data in the prototype web application * **explain**   + internal and external data components and data structures using appropriate symbols, code, data samples and screenshots from the prototype web application with annotations   + the prototype web application from a user-experience perspective communicated by way of a collection of annotated images of the user-interface components   + how programming elements and user-interface components connect, communicated in an annotated diagram   + the functionality, useability and efficiency of the coded components communicated through code comments and annotations on the 4–6 A4 pages * **analyse** the prototype web application problem and information to **identify**   + data inputs   + data and programmed components and their relationships to the structure of the prototype web application   + the prototype web application’s potential personal, social and economic impacts * **determine**   + solution requirements that include     - essential elements and features of the user interface based on useability principles     - data structures and linkage to interface and code   + prescribed and self-determined criteria * **synthesise** ideas and information about solutions for   + user interfaces   + data and programmed components of the prototype web application, e.g. annotated diagrams identifying and describing proposed components of the prototype web application   + data repositories   + programming to generate a prototype web application * **generate**   + sample code for the digital prototype on the 4–6 A4 pages, demonstrating     - selection     - iteration     - user input     - data output   + a prototype web application by combining the user interface, data and coded components * **evaluate** against criteria   + personal, social and economic impacts supported by a collection of data samples or representations   + accuracy and efficiency of the coded components supported by a collection of annotated code segments in tables, diagrams and written paragraphs identifying errors and actions to make refinements   + the prototype web application from a user-experience perspective supported by a collection of annotated images of the user-interface components * **make** refinements and justified recommendations for current and future improvements. | | | |
| **Stimulus** | | | |
| See technical proposal at end of document | | | |
| **Checkpoints** | | | |
| □ Term 3 Week 5: Submit exploration of solutions, identification of algorithms, user interface sketches and data flow diagram | | | |
| □ Term 3 Week 8: Complete draft submission | | | |
| □ Term 3 Week 10: Final submission | | | |

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| **Criterion** | **Marks allocated** | **Result** |
| **Retrieving and comprehending**  Assessment objectives 1, 2 | 8 |  |
| **Analysing**  Assessment objectives 3, 4 | 8 |  |
| **Synthesising and evaluating**  Assessment objectives 5, 6, 7 | 10 |  |
| **Communicating**  Assessment objective 8 | 4 |  |
| **Total** | 30 |  |
| **Authentication strategies** | | |
| * Students will provide documentation of their progress at indicated checkpoints. | | |
| * Students must acknowledge all sources. | | |
| * Students must submit a declaration of authenticity. | | |
| * The teacher will collect copies of the student response and monitor at key junctures. | | |
| * The teacher will conduct interviews or consultations with each student as they develop the response. | | |
| **Scaffolding** | | |
| Your response must include:   * A3 pages that   + demonstrate all phases of the problem-solving process   + communicate knowledge and understanding by way of annotated sketches, diagrams, images or screenshots * a video   + in mp4 file format   + no larger than 200 MB   + demonstrating the functionality of the user interface, data and coded components of the prototype digital solution * A4 pages of code with annotations explaining analysis, synthesis and evaluation decisions related to the code element or problem * referencing of sources following the school’s referencing style * written and visual features, as well as grammatically accurate language conventions, to communicate your decision-making * headings that organise and communicate the iterative phases of the problem-solving process in Digital Solutions. | | |

# Stimulus: Technical Proposal

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| **Identification** | |
|  | Web application developer for Australian Government, specifically Artbank. |
| **Contextual Information** | The Artbank artwork leasing (i.e. rental) site is seeking user feedback on its smallest collection, which is glass art works. Given the cost and difficulty with transporting and storing glass, Artbank may consider selling off their glass artworks in the future, if there is significant interest. |
| **Proposed Solution** | Develop a data-driven prototype “glass artwork rating system” for the glass artwork collection at Artbank. |
| **Potential System Interactions** | |  |  | | --- | --- | |  | Who: Proudlock  About: Professional art critic from overseas who looks for new and popular artworks abroad.  Needs:   * An authentic, credible, trustworthy, accurate and insightful rating system. | |  | Who: Francesca  About: Stained glass artist  Needs:   * A system that allows her to seek public recognition for her glass artworks and restorations. | |  | Who: Lorraine  About: Artbank collection curator who must curate in-demand collections depending on public interest.  Needs:   * A system that presents detailed data on interests and trends in collection artworks. | |
| **Specifications** | |
| **Prescribed functionality** | The base “glass artwork rating system” web application must be able to:   1. Import one of the raw glass artwork datasets below into a **database**. 2. Render the glass artworks data from the database to a webpage. 3. Allow the user to **like** or **dislike** an artwork that they see. 4. Keep a tally of each artworks’ likes or dislikes. |
| **Data** | The glass artwork raw dataset is available from a variety of sources:   |  |  | | --- | --- | | **SOURCE** | **URI** | | JSON | <https://digisoln.com/glassartworks.json> | | XML | <https://digisoln.com/glassartworks.xml> | | CSV | <https://digisoln.com/glassartworks.csv> | | API | <https://digisoln.com/glassartworks/>  e.g.: <https://digisoln.com/glassartworks/10806/artist> | | Python | <https://digisoln.com/skulpt/python/demo/glassartworks.py> |   You should consider the data requirements of your system and filter out unnecessary data from this dataset, as necessary:   |  |  | | --- | --- | | **FIELD** | **DESCRIPTION** | | artwork # | Used to uniquely identify a glass artwork. | | title | Title of artwork. | | artist | Name of artist. | | year | Year artwork was produced. | | short\_desc | Short sentence describing the artwork. | | sizing\_cm | Contains measurements of the artwork in *centimetres*. Measurements are split into:   * width * height * depth | | series | Lists of other artworks # that form part of a "set" alongside the existing glass artwork.  If this is empty, the artwork is a standalone piece. | | currently\_available | *True* if the artwork is not currently out on a rental. | | rental\_annual\_AUD | Cost of renting the standalone piece for 1 year.  If the artwork is part of a *series*, then this is the cost of renting all the pieces in the series (inclusive). | | long\_desc | May contain an extended explanation about the artwork or artist. | | img\_url | URL to JPEG photo image of the artwork. | |
| **Potential Functionality** | In addition to the *prescribed functionality*, the web application could be further improved in several ways:   * Improving the rating system beyond “like” and “dislike”:   + Ability to leave a more customised rating, such as categories (e.g., Value for money, ‘Wow’ factor, Rating out of 10, etc.).   + Ability to leave a review comment.   + Ability to sign a review with a verified account (authenticity). * Implementing a “make an offer to buy” system:   + Offers should be collated server-side, with the highest bid so far collated and displayed next to each artwork. * Artist sign-up:   + Artists could manage their collections, upload new artworks, and set artwork detail information. * Artbank management panel:   + Enable administrator back-end, that can:     - Manipulate data.     - Verify artist or critic accounts.     - Other helpful administrator tools. * Algorithms:   + Popularity (based on a ratio of number of hits to number of likes)   + Sort, search, or shuffle artworks displayed when browsing, or when rating or awarding artists, or choosing a ‘feature of the week’ artwork.   + Other statistical categories:     - potential profit from bids     - most active critics     - auto-moderate content (bots)     - user account preferences to suggest artworks.   + Site functionality – e.g., signing up, importing data to DB, form validation, etc.   Any functionality that can improve the UX of the application is encouraged. |
| **Interface** | * Responsive template provided – although the actual UX design for this application is left as a job for the developer. * Modifications to the template are welcome provided:   + Digital Solutions useability principles are the guiding principles   + Modifications should conform to W3C standards (a good tool is the Queensland Government [Consistent User Experience Standard](https://www.forgov.qld.gov.au/cue)) |

# Instrument-specific marking guide

Criterion: Retrieving and comprehending

### Assessment objectives

1. recognise and describe programming elements, user interface components and useability principles

2. symbolise and explain programming information and ideas, data structures and interrelationships between user experiences and data of the digital prototype

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| **The student work has the following characteristics:** | **Marks** |
| * accurate and discriminating recognition and discerning description of relevant programming elements, user-interface components and useability principles * adept symbolisation and discerning explanation of algorithms and relevant programming information and ideas, data structures and interrelationships between user experiences and data of the digital prototype. | 7-8 |
| * accurate recognition and effective description of relevant programming elements, user-interface components and useability principles * methodical symbolisation and effective explanation of algorithms and relevant programming information and ideas, data structures and interrelationships between user experiences and data of the digital prototype. | 5-6 |
| * appropriate recognition and description of some programming elements, user-interface components and useability principles * competent symbolisation and appropriate explanation of algorithms and some information and ideas, and interrelationships between user experiences and data of the digital prototype | 3-4 |
| * variable recognition and superficial description of programming elements, user-interface components or useability principles * variable symbolisation and superficial explanation of information, ideas or interrelationships. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

Criterion: Analysing

### Assessment objectives

1. analyse the problem and information related to the technical proposal for a low-fidelity prototype digital solution

2. determine user interface, data, programmed and solution requirements of the digital solution and prescribed and self-determined criteria

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| **The student work has the following characteristics:** | **Marks** |
| * insightful analysis of the problem and relevant contextual information to identify the essential elements and features of user interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution * astute determination of the user interface, data, programmed and solution requirements of the digital solution and essential prescribed and self-determined criteria. | 7-8 |
| * considered analysis of the problem and relevant contextual information to identify the relevant elements and features of user interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution * logical determination of the user interface, data, programmed and solution requirements of the digital solution and effective prescribed and self-determined criteria. | 5-6 |
| * appropriate analysis of the problem and contextual information to identify some elements and features of user interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution * reasonable determination of the user interface, data, programmed and solution requirements of the digital solution and some prescribed and self-determined criteria. | 3-4 |
| * superficial analysis of the problem or partial information to identify aspects of elements or features of the low-fidelity prototype digital solution * vague determination of some solution requirements of the digital solution and some criteria. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

Criterion: Synthesising and evaluating

### Assessment objectives

1. synthesise information and ideas to determine data elements, user interface and programmed components for a digital solution

2. generate user interfaces and programmed components of the digital solution

3. evaluate impacts, components and the digital solution against prescribed and self-determined criteria to make refinements and justified recommendations

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| **The student work has the following characteristics:** | **Marks** |
| * coherent and logical synthesis of relevant information and ideas to determine data elements, user interface and programmed components for a digital solution * purposeful generation of efficient user interface and programmed components of the digital solution * critical evaluation of impacts, user experience and coded components and the digital solution against essential prescribed and self-determined criteria to make discerning refinements and astute recommendations justified by data. | 9-10 |
| * logical synthesis of relevant information and ideas to determine data elements, user interface and programmed components for a digital solution * effective generation of user interface and programmed components of the digital solution * reasoned evaluation of impacts, user experience and coded components and the digital solution against effective prescribed and self-determined criteria to make effective refinements and considered recommendations justified by data. | 7-8 |
| * simple synthesis of information and ideas to determine data elements, user interface and programmed components for a digital solution * adequate generation of user interface and programmed components of the digital solution * feasible evaluation of impacts, user experience and coded components and the digital solution against some prescribed and self-determined criteria to make adequate refinements and fundamental recommendations justified by data. | 5-6 |
| * rudimentary synthesis of partial information or ideas to determine data elements, user interface or programmed components * partial generation of user interface and programmed components of the digital solution * superficial evaluation of impacts, user experience components or the solution against some criteria. | 3-4 |
| * unclear combination of information, ideas or solution components * identification of a change to an idea or a solution. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

Criterion: Communicating

### Assessment objectives

1. make decisions about and use mode-appropriate features, written language and conventions for a technical audience

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| **The student work has the following characteristics:** | **Marks** |
| * discerning decision-making about, and fluent use of   + written and visual features to communicate about a solution   + language for a technical audience   + grammatically accurate language structures   + referencing and project conventions. | 3-4 |
| * variable decision-making about, and inconsistent use of   + written and visual features   + suitable language   + grammar and language structures   + referencing or project conventions. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

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| **Marks** | **LOA** |
| **30** | **A+** |
| **29** |
| **28** | **A** |
| **27** |
| **26** | **A-** |
| **25** |
| **24** | **B+** |
| **23** |
| **22** | **B** |
| **21** |
| **20** | **B-** |
| **19** |
| **18** | **C+** |
| **17** |
| **16** | **C** |
| **15** |
| **14** | **C-** |
| **13** |

ISMG to LOA  
Note: Your grade will be awarded holistically. The “marks-to-grade” ratios shown below are a guide, and not to be taken as a determinant of final award:

|  |  |
| --- | --- |
| **Marks** | **LOA** |
| **12** | **D+** |
| **11** |
| **10** | **D** |
| **9** |
| **8** | **D-** |
| **7** |
| **6** | **E+** |
| **5** |
| **4** | **E** |
| **3** |
| **2** | **E-** |
| **1** |