Digital Solutions 2019 v1.2

IA3: Sample assessment instrument

Project — folio (25%)

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

This assessment instrument has been designed to be completed over a duration of six weeks.

Student name

Student number

Teacher

Issued

Due date

Marking summary

Criterion	Marks allocated	Provisional marks
Retrieving and comprehending	6	
Analysing	7	
Synthesising and evaluating	8	
Communicating	4	
Overall	**25**	

QCAA

Queensland Curriculum
& Assessment Authority

Queensland
Government

For all Queensland schools

220286

Conditions

Technique	Project — folio
Unit	Unit 4: Digital impacts
Topic/s	Topic 1: Digital methods for exchanging data
	Topic 2: Complex digital data exchange problems and solution requirements
	Topic 3: Prototype digital data exchanges
Duration	—
Mode/length	Source code with annotations:

Mode/length continued:

Source code with annotations:

- Written: 2–4 A4 pages

Documentation:

- Multimodal: 8–10 A3 pages

Demonstration of the functionality of the digital solution by video recording:

- Multimodal: 1–2 minutes

Individual/group	Individual
Other	Title and contents pages, reference list and appendixes are not included in the page count.
	Students may use class time and their own time to develop a response.
Resources	Computers, internet, stimulus (technical proposal)

Context

We live in a connected world that is increasingly embracing technologies that enable real-time data to be collected and exchanged across interconnected devices and systems. Understanding and developing methods of securing data exchange between computer systems is extremely important for privacy.

Federal, state and local government departments across Australia are adopting open data policies and increasingly provide access to, and encourage use of, open (publicly accessible) datasets. Open datasets, wearable technology, telemetry, smart homes, augmented and virtual reality, and sensors are being used across a variety of sectors to continuously monitor and track data and human activity.

Governments encourage use of open datasets through competitions known as GovHacks, which involve developing innovative solutions that solve problems and create better outcomes for local communities. Small teams are formed and given access to thousands of open datasets, which they then 'mash' together to create web, mobile or augmented reality applications, as well as 3D printed visualisations. Each team creates a project page, proof of concept and a video explaining how the government data can be used.

Brisbane City Council, for example, has an open data portal that is accessible to the public, which contains data on people of all ages.

Task

Read the technical proposal (stimulus material) and then present a proof of concept for a new web application for young people.

The new web application must provide:

- young people with a platform to connect with friends and acquaintances

- information about available community support services.

Document use of the Digital Solutions problem-solving process in responding to the problem and generate a component of the data exchange solution. The technical proposal provides further details about requirements for the new web application.

To complete this task, you must:

Part 1: Research and investigation

- recognise and describe of key elements of
    - a data exchange application
    - components of data exchange systems
    - data security processes
- symbolise using mind maps and one or more of constructed sketches, annotated diagrams, images or screenshots, and explain
    - data interface, data structures and data specifications
    - digital methods of exchanging data
- analyse the data exchange problem to identify
    - the data structures, including data input and output requirements
    - data exchange methods

- determine data exchange system requirements
- evaluate against prescribed and self-determined criteria the most suitable process for exporting and importing data between the two digital systems

Part 2: Data exchange solution

- symbolise using mind maps and one or more of constructed sketches, annotated diagrams, images or screenshots, and explain
  - data flow relationships within and between systems
  - programming features and ideas using annotated code segments
  - algorithms communicated in pseudocode
- determine prescribed and self-determined criteria
- synthesise data, algorithm and coded component ideas to generate components of a data exchange solution that simulates the exchange of data between two digital systems; the solution will receive data in one format and programmatically transform it into another format for sharing/displaying
- evaluate the
  - accuracy of code after testing to identify errors and actions to make improvements
  - digital data exchange solution against prescribed and self-determined criteria
  - functionality, useability and efficiency of the components of the digital solution
- make refinements and justified recommendations for current and future improvements

Part 3: Impacts

- recognise and describe key elements of
  - risks associated with storing and accessing data
  - digital security strategies, including authentication and encryption strategies
- analyse a data security problem to identify risks to
  - the system
  - data security and privacy
- determine a security strategy for data
- evaluate against prescribed and self-determined criteria the impact of data transmission on personal, social and economic needs
- recommend an appropriate strategy to increase data security.

Stimulus

See the attached technical proposal.

Checkpoints

☐ Term 2 Week 3: Submission of data requirements, identification of algorithms and some code and user interface

☐ Term 2 Week 6: Complete draft submission

☐ Term 2 Week 8: Final submission

Authentication strategies

- Students will provide documentation of their progress at indicated checkpoints.

- The teacher will collect and annotate one draft.

- Students must acknowledge all sources.

- Students must submit a declaration of authenticity.

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.

Instrument-specific marking guide (IA3): Project — folio (25%)

Criterion: Retrieving and comprehending

Assessment objectives

1. recognise and describe key elements of an application, components of data exchange systems, and data security processes

2. symbolise and explain data interface, structures and specifications; data flow relationships within and between systems; and digital methods of exchanging data

The student work has the following characteristics:	Marks
• accurate and discriminating recognition and discerning description of key elements of an application, components of data exchange systems, and data security processes • adept symbolisation and discerning explanation of data interface, structures and specifications; data flow relationships within and between systems; and digital methods of exchanging data.	5–6
• appropriate recognition and description of key elements of an application, components of data exchange systems, and data security processes • competent symbolisation and appropriate explanation of data interface, structures and specifications; data flow relationships within and between systems; and digital methods of exchanging data.	3–4
• variable recognition and superficial description of elements of an application, components of data exchange systems, or data security processes • variable symbolisation and superficial explanation of aspects of data interface, data flow relationships or digital methods of exchanging data.	1–2
• does not satisfy any of the descriptors above.	0

Criterion: Analysing

Assessment objectives

3. analyse a data exchange problem and information related to data security

4. determine data exchange system requirements, a security strategy for data, and prescribed and self-determined criteria

The student work has the following characteristics:	Marks
• insightful analysis of the data exchange problem and relevant information related to data security to identify the data structures, data exchange methods, risks to data and code components • astute determination of data exchange requirements, security strategy for data, code for the data conversion program and essential prescribed and self-determined criteria.	6–7
• considered analysis of the data exchange problem and relevant information related to data security to identify the data structures, data exchange methods, risks to data and code components • logical determination of data exchange requirements, security strategy for data, code for the data conversion program and effective prescribed and self-determined criteria.	4–5
• appropriate analysis of the data exchange problem and information related to data security to identify the data structures, data exchange methods, risks to data and code components • reasonable determination of data exchange requirements, security strategy for data or code for the data conversion program and some criteria.	2–3
• makes statements about aspects of the data exchange problem, data structures, data exchange methods, risks to data or code components • vague determination of some data exchange requirements, security strategy for data and some criteria.	1
• does not satisfy any of the descriptors above.	0

Criterion: Synthesising and evaluating

Assessment objectives

5. synthesise information and ideas to determine selected data, algorithms and coded components of data exchange solutions

6. generate components of the data exchange solution

7. evaluate impacts, coded components and a data exchange solution against prescribed and self-determined criteria to make refinements and justified recommendations

The student work has the following characteristics:	Marks
• coherent and logical synthesis of relevant information and ideas to determine selected data, algorithms and coded components of data exchange solutions • purposeful generation of efficient components of the data exchange solution • critical evaluation of impacts, coded components and a data exchange solution against essential prescribed and self-determined criteria to make discerning refinements of code and astute recommendations justified by data.	7–8
• logical synthesis of relevant information and ideas to determine data, algorithms and coded components of data exchange solutions • effective generation of components of a data exchange solution • reasoned evaluation of impacts, coded components and the digital data exchange solution against effective criteria to make effective refinements of code and considered recommendations justified by data.	5–6
• simple synthesis of information or ideas to determine data, algorithms and coded components of data exchange solutions • adequate generation of components of the data exchange solution • feasible evaluation of impacts, coded components and a digital data exchange solution against some criteria to make adequate refinements of code and fundamental recommendations justified by data.	3–4
• unclear combinations of information or ideas to determine data, algorithms or coded components of data exchange solutions • superficial evaluation of impacts, or the digital data exchange solution, against criteria.	1–2
• does not satisfy any of the descriptors above.	0

Criterion: Communicating

Assessment objectives

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

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 investigation conventions.	2–3
- variable decision-making about, and inconsistent use of - written and visual features - suitable language - grammar and language structures - referencing or investigation conventions.	1
does not satisfy any of the descriptors above.	0

Stimulus

Technical proposal

Identification

Governments have developed strategies aimed at encouraging young people to achieve their potential. The vision of Brisbane City Council's Youth Strategy is for 'a city where young people are healthy, valued, resilient and confident young citizens who actively contribute to a better Brisbane'. A proof of concept is required to demonstrate the planning and data transfer functionality of a new web application for young people.

A new web application for Brisbane young people will allow them to:

- connect with friends

- use API datasets (upcoming fireworks displays and Brisbane CityCycles bicycle hire scheme)

- take a geotagged photo, upload it and share it with friends

- incorporate a mood tracker facility enabling the user to indicate their current mood through icons and text (the information will be stored for later use).

The proof of concept involves:

- developing a low-fidelity prototype of the web application for young people

- generating the data exchange component that simulates exchange of data between two digital systems (data server and web application). The solution will receive data in one format and programmatically transform it into another format for sharing and displaying

- evaluating impacts and making recommendations for improving data security during transfer

- developing a video to demonstrate data transfer functionality.

Interactions

Proto-personas have been developed for potential users of the web application (see Figure 1).

Figure 1: User profiles for the new web application

Jake

- has finished school, but has deferred university for one year in order to start his own business
- likes to cycle and does a lot of volunteer work
- through his volunteer work, he has discovered that a lot of young people are not aware of the support services available to them

Jordan and Dani

- university students
- interested in the arts, cultural events, markets and keeping in touch with their friends
- use public transport and CityCycles extensively

Quyen

- 21 years old
- from Vietnam and is a visitor to Brisbane
- on a very tight budget, interested in finding free events to go to in Brisbane

Component specifications

Data

The new web application must:

- incorporate dynamic event data

    - provide dynamic data feeds of up-to-date events and resource information

    - use publicly available web API datasets from

        - upcoming fireworks displays
          www.data.qld.gov.au/dataset/fireworks

        - Brisbane CityCycle — Station locations — API
          www.data.brisbane.qld.gov.au/data/dataset/citycycle

    - enable users to view information.

The JavaScript client must:

- connect to each API dataset

- receive data in one format and programmatically transform it into another format and display the data

- display the contents of each dataset on the same webpage

- include relevant headings for each column of data
- display only the following data for the Upcoming fireworks displays API
  - public event types
  - each event's date, time, address, suburb and postcode
  - contents of the Upcoming fireworks displays dataset
- display only the following data for the Brisbane CityCycles API
  - dynamic dataset
  - each bicycle's location, latitude and longitude
  - number of bicycles available (when there are 20 or more)
  - Brisbane CityCycles dataset.

Note: You will need to obtain a personal API access key to access the Brisbane CityCycles dataset.

User interface/experience

The new web application must:

- be accessible on personal computers and mobile devices, though different web browsers
- provide a user customisable list of links to support websites, using the Youth apps and tools dataset, www.data.qld.gov.au/dataset/youth-apps-and-tools
- allow the user to take a geotagged photo, upload it and share it with friends
- incorporate a mood tracker facility enabling the user to indicate their current mood through icons and text (the information will be stored for later use)
- feature a responsive web interface.

Code

The new web application must include:

- an algorithm to retrieve and display the data from each API
- code to retrieve data from the API
- code accuracy
  - data is to be displayed on the same webpage
  - the JavaScript client needs to
    - use the two stated datasets
    - connect to each dataset
    - display only the stated data
    - include column headings for the data
- efficient code.

References

- *Australian Government — Office of the Australian Information Commissioner*, 'Australian Privacy Principles guidelines: *Privacy Act 1988*', www.oaic.gov.au/agencies-and-organisations/app-guidelines

- *Australian Government — Office of the Australian Information Commissioner*, 'Australian Privacy Principles', www.oaic.gov.au/privacy-law/privacy-act/australian-privacy-principles

- *Australian Government — Data.gov.au*, www.data.gov.au

- *Brisbane City Council 2013*, 'Delivering a Youth-Friendly City: Youth Strategy 2014–2019', www.brisbane.qld.gov.au/community-safety/community-support/young-people/youth-programs/youth-strategy-2014-2019-delivering-youth-friendly-city

- *Pixabay* (Jake image), www.pixabay.com/en/portrait-advertisement-814633

- *Pixabay* (Jordan and Dani image), cdn.pixabay.com/photo/2018/03/28/04/31/women-3268222__340.jpg

- *Pexels* (Quyen image), www.pexels.com/photo/woman-in-white-v-neck-shirt-in-selective-focus-photography-157023

- *Queensland Government, Natural Resources, Mines and Energy*, 'Upcoming fireworks displays', www.data.qld.gov.au/dataset/fireworks

- *Queensland Government, Natural Resources, Mines and Energy*, 'Brisbane CityCycle — station locations — API', www.data.brisbane.qld.gov.au/data/dataset/citycycle

- *Queensland Government, Child Safety, Youth and Women*, 'Youth apps and tools dataset', www.data.qld.gov.au/dataset/youth-apps-and-tools