# **Digital Solutions subject report**

2021 cohort February 2022





ISBN

Electronic version: 978-1-74378-193-7

© 🗊 © State of Queensland (QCAA) 2022

Licence: https://creativecommons.org/licenses/by/4.0 | Copyright notice: www.qcaa.qld.edu.au/copyright — lists the full terms and conditions, which specify certain exceptions to the licence. | Attribution: '© State of Queensland (QCAA) 2022' — please include the link to our copyright notice.

Other copyright material in this publication is listed below.

1. Student responses in this report are excluded from the CC BY 4.0 licence.

Queensland Curriculum & Assessment Authority PO Box 307 Spring Hill QLD 4004 Australia 154 Melbourne Street, South Brisbane

Phone: (07) 3864 0299 Email: office@qcaa.qld.edu.au Website: www.qcaa.qld.edu.au

# Contents

Introduction	1
Audience and use	1
Report preparation	1
Subject data summary	2
Subject completion	2
Units 1 and 2 results	2
Units 3 and 4 internal assessment (IA) results	2
IA1 marks	3
IA2 marks	4
IA3 marks	5
External assessment (EA) marks	6
Final subject results	7
Final marks for IA and EA	7
Grade boundaries	7
Distribution of standards	7
Internal assessment	8
Endorsement	8
Confirmation	8
Internal assessment 1 (IA1)	10
Investigation — technical proposal (20%)	10
Assessment design	
Assessment decisions	12
Internal assessment 2 (IA2)	19
Project — digital solution (30%)	
Assessment design	
Assessment decisions	21
Internal assessment 3 (IA3)	28
Project — folio (25%)	
Assessment design	
Assessment decisions	
External assessment	36
Combination response — Examination (25%)	
Assessment design	
Assessment decisions	

# Introduction

Despite the challenges brought about by the COVID-19 pandemic, Queensland's education community can look back on 2021 with satisfaction at having implemented the first full assessment cycle in the new Queensland Certificate of Education (QCE) system. That meant delivering three internal assessments and one external assessment in each General subject.

This report analyses that cycle — from endorsing summative internal assessment instruments to confirming internal assessment marks, and designing and marking external assessment. It also gives readers information about:

- applying syllabus objectives in the design and marking of internal and external assessments
- patterns of student achievement.

The report promotes continuous improvement by:

- identifying effective practices in the design and marking of valid, accessible and reliable assessments
- recommending where and how to enhance the design and marking of valid, accessible and reliable assessment instruments
- providing examples of best practice where relevant, possible and appropriate.

# Audience and use

This report should be read by school leaders, subject leaders and teachers to:

- inform teaching and learning and assessment preparation
- assist in assessment design practice
- assist in making assessment decisions
- · help prepare students for external assessment.

The report is publicly available to promote transparency and accountability. Students, parents, community members and other education stakeholders can learn about the assessment practices and outcomes for General subjects (including alternative sequences (AS) and Senior External Examination (SEE) subjects, where relevant) and General (Extension) subjects.

# **Report preparation**

The report includes analyses of data and other information from endorsement, confirmation and external assessment processes. It also includes advice from the chief confirmer, chief endorser and chief marker, developed in consultation with and support from QCAA subject matter experts.



# **Subject completion**

The following data includes students who completed the General subject.

**Note:** All data is correct as at 17 December 2021. Where percentages are provided, these are rounded to two decimal places and, therefore, may not add up to 100%.

Number of schools that offered the subject: 187.

Completion of units	Unit 1	Unit 2	Units 3 and 4
Number of students completed	2313	2115	1721

# Units 1 and 2 results

Number of students	Satisfactory	Unsatisfactory
Unit 1	2065	248
Unit 2	1872	243

# Units 3 and 4 internal assessment (IA) results



Total marks for IA

# IA1 marks



IA1 Criterion: Retrieving and comprehending



#### IA1 Criterion: Synthesising and evaluating



#### IA1 Criterion: Analysing



#### IA1 Criterion: Communicating



# IA2 marks



#### IA2 Criterion: Retrieving and comprehending



#### IA2 Criterion: Synthesising and evaluating



**IA2 Criterion: Analysing** 





#### **IA2 Criterion: Communicating**

Digital Solutions subject report 2021 cohort

## IA3 marks



IA3 Criterion: Retrieving and comprehending



#### IA3 Criterion: Synthesising and evaluating



**IA3 Criterion: Analysing** 







# External assessment (EA) marks

# **Final subject results**

# Final marks for IA and EA



## **Grade boundaries**

The grade boundaries are determined using a process to compare results on a numeric scale to the reporting standards.

Standard	Α	В	С	D	E
Marks achieved	100–83	82–67	66–44	43–19	18–0

# **Distribution of standards**

The number of students who achieved each standard across the state is as follows.

Standard	Α	В	С	D	E
Number of students	384	523	665	142	7



The following information and advice pertain to the assessment design and assessment decisions for each IA in Units 3 and 4. These instruments have undergone quality assurance processes informed by the attributes of quality assessment (validity, accessibility and reliability).

### Endorsement

Endorsement is the quality assurance process based on the attributes of validity and accessibility. These attributes are categorised further as priorities for assessment, and each priority can be further broken down into assessment practices.

Data presented in the Assessment design section identifies the reasons why IA instruments were not endorsed at Application 1, by the priority for assessments. An IA may have been identified more than once for a priority for assessment, e.g. it may have demonstrated a misalignment to both the subject matter and the assessment objective/s.

Refer to the quality assurance tools for detailed information about the assessment practices for each assessment instrument.

Number of instruments submitted	IA1	IA2	IA3
Total number of instruments	184	184	175
Percentage endorsed in Application 1	28%	45%	28%

#### Percentage of instruments endorsed in Application 1

### Confirmation

Confirmation is the quality assurance process based on the attribute of reliability. The QCAA uses provisional criterion marks determined by teachers to identify the samples of student responses that schools are required to submit for confirmation.

Confirmation samples are representative of the school's decisions about the quality of student work in relation to the ISMG and are used to make decisions about the cohort's results. If further information is required about the school's application of the ISMG to finalise a confirmation decision, the QCAA requests additional samples.

Schools may request a review where an individual student's confirmed result is different from the school's provisional mark in one or more criteria and the school considers this result to be an anomaly or exception.

The following table includes the percentage agreement between the provisional marks and confirmed marks by assessment instrument. The Assessment decisions section of this report for each assessment instrument identifies the agreement trends between provisional and confirmed marks by criterion.

IA	Number of schools	Number of samples requested	Number of additional samples requested	Percentage agreement with provisional marks
1	174	921	128	68.97%
2	174	892	113	65.52%
3	174	909	106	72.99%

Number of samples reviewed and percentage agreement



# Internal assessment 1 (IA1)

# Investigation — technical proposal (20%)

The IA1 Investigation — technical proposal assessment requires students to research a specific problem through collection, analysis and synthesis of information. A technical proposal uses research or investigative practices to assess a range of cognitions in a particular context. Research or investigative practices include locating and using information beyond students' own knowledge and the data they have been given.

Students must adhere to research conventions, including citations, reference lists or bibliographies. This assessment occurs over an extended and defined period of time. Students may use class time and their own time to develop a proposal and identify a low-fidelity prototype digital solution.

### Assessment design

#### Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Validity priority	Number of times priority was identified in decisions*
Alignment	31
Authentication	3
Authenticity	42
Item construction	18
Scope and scale	92

Reasons for non-endorsement by priority of assessment

\*Each priority might contain up to four assessment practices.

Total number of submissions: 184.

#### **Effective practices**

Validity priorities were effectively demonstrated in assessment instruments that:

- included a complete list of assessable evidence from the summative internal assessment specifications for IA1 as defined by the syllabus (section 4.6.1)
- defined a range of appropriate authentication strategies from the suggestions provided in the endorsement application.

#### **Practices to strengthen**

It is recommended that assessment instruments:

.

- identify a single specific technology context from the list of technology contexts outlined in the Unit 3 description section of the syllabus (section 4.1)
- · limit the scope and scale of stimulus datasets that students are required to analyse and describe by providing students with direct links to datasets or including specific search terms for a data portal which may require excessive time and effort to find appropriate datasets.

#### Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of as	ssessment
---	-----------

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	1
Language	8
Layout	10
Transparency	4

\*Each priority might contain up to four assessment practices.

Total number of submissions: 184.

#### **Effective practices**

Accessibility priorities were effectively demonstrated in assessment instruments that:

- used clear and concise task instructions in the language of the syllabus with minimal distractors, e.g. providing additional information that does not contribute to the task
- described contexts accessible to students that did not place students in professional roles outside the scope of their knowledge and experience.

#### **Practices to strengthen**

It is recommended that assessment instruments:

- use correct spelling and grammar, especially when using technical terms or when a misspelt word gives a different meaning to the intended instruction, e.g. 'usher' instead of 'user'
- reflect the same list hierarchy for assessable evidence; misaligned bullet points were common and can reduce clarity, change the meaning or emphasis of list items.

# Assessment decisions

### Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Retrieving and comprehending	81.61	17.24	1.15	0%
2	Analysing	78.16	20.69	1.15	0%
3	Synthesising and evaluating	75.86	22.99	1.15	0%
4	Communicating	93.1	5.17	1.15	0.57%

Agreement trends between provisional and confirmed marks

#### **Effective practices**

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- evidence was matched to the appropriate quality for individual elements of evaluation characteristics including impacts, components, and prescribed and self-determined criteria to make refinements and justified recommendations
- matching qualities in the student responses with the Communicating criterion across the performance levels.

#### Samples of effective practices

The following is an excerpt from a response that illustrates the characteristics for the criteria at the performance level indicated. The excerpt may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

This student response excerpt has been included:

• to demonstrate accurate and discriminating recognition and discerning description of data sources, programming elements, user interface components and useability principles.

Retrieving and comprehending (4–5 marks)	Excerpt 1	
	HOME PAGE USEABILITY PRINCIPLES	
	Utility         The starting address is automatically populated based on the location determined by either IP or GPS location.         The drop-down menu will under the map will display the travel time and the number of hazards on an alternative route that the user may wish to select. Alternatively, the auto-select button will choose a route that has the most optimal balance between safety and travel time.         The hamburger menu on the mobile interface will slide from the left and overlay the screen the user is currently on; the behind screen will slightly darken so the focus is on the menu.	
	Effectiveness The application will effectively be able to process any Australian address and overlay the map with appropriate and accurate crash hotspots.	
	Accessibility <ul> <li>Across all interfaces clear contrast and appropriate font size will be used so all users can read and view the information (Mobile and Desktop).</li> </ul>	
	<ul> <li>Safety</li> <li>If the user does not correctly enter all details an error message will appear disallowing the user to continue.</li> <li>When the user is typing an address, suggestions will display under the input box to decrease the chance of spelling</li> </ul>	
	mistakes that may cause an application error.  Learnability  Information is displayed from left to right and is intuitive and easy to understand for all types of users, including those	
	who are non-technical.	
	HUME PAGE (TABLET)	-
	(at of Arms)	
	Slightly more compact screen layout, though, same aspect ratio is site desktop sketch and hence the same	
	layout was used Passible Routes Safety Tips	
	V Hazanh ## Tennel Time ## 1.	
	Auto-Select Least Hazard Roade 2.	

		Cras	h_Overview		
Crash_Ref_Num	Longitude	Latitude	Fatality_count	Nature_ID	Lighting_Conds
1	152.9604851	-26.6850522	0	1	1
2	153.0382625	-27.55077584	0	2	2
3	153.1163416	-27.54515319	0	1	1
2366	152.95988	-27.59929387	0	2	3
2367	153.3876325	-28.00069332	0	3	1
7159	152.9900066	-27.48805518	0	1	4
7160	153.1804154	-27.46326543	0	8	1
12129	153.1110176	-27.22271075	0	1	1
12130	153.0932473	-26.65403458	0	1	2
16880	152.9524005	-27.08176767	0	1	1
16881	153.1291595	-27.69531282	0	2	1
21783	153.0936701	-26.57426261	0	4	2
21784	153.0932271	-26.65672735	0	2	1
25465	153.229142	-27.48922619	0	5	1
25466	153.4278547	-28.03460502	0	6	1
28186	152.9772933	-26.73210329	0	5	1
28187	150.449377	-23.457487	0	2	2
30840	152.968434	-27.345446	0	1	1
30841	153.2022317	-27.70496629	0	2	4
33203	153.135103	-27.78300986	1	6	3
33204	151.258623	-24.009208	0	7	3

Crash_Ref_Num	Longitude	Latitude	Fatality_count	Nature_ID	Lighting_Conds
1	152.9604851	-26.6850522	0	1	1
2	153.0382625	-27.55077584	0	2	2
3	153.1163416	-27.54515319	0	1	1
2366	152.95988	-27.59929387	0	2	3
2367	153.3876325	-28.00069332	0	3	1
7159	152.9900066	-27.48805518	0	1	4
7160	153.1804154	-27.46326543	0	8	1
12129	153.1110176	-27.22271075	0	1	1
12130	153.0932473	-26.65403458	0	1	2
16880	152.9524005	-27.08176767	0	1	1
16881	153.1291595	-27.69531282	0	2	1
21783	153.0936701	-26.57426261	0	4	2
21784	153.0932271	-26.65672735	0	2	1
25465	153.229142	-27.48922619	0	5	1
25466	153.4278547	-28.03460502	0	6	1
28186	152.9772933	-26.73210329	0	5	1
28187	150.449377	-23.457487	0	2	2
30840	152.968434	-27.345446	0	1	1
30841	153.2022317	-27.70496629	0	2	4
33203	153.135103	-27.78300986	1	6	3
33204	151 258623	-24 009208	0	7	3

Crash_Type					
Nature_ID	Nature				
1	Angle				
2	Hit object				
3	Hit animal				
4	Hit parked vehicle				
5	Fall from vehicle				
6	Hit pedestrian				
7	Overturned				
8	Rear-end				

Lightening Conditions					
Lightening_ID	Туре				
1	Daylight				
2	Darkenss - lightened				
3	Darkeness - not lightened				
4	Dawn/dusk				

**Example:** The postcode depends on the suburb before the primary key of the 'Location' table, thus, was separated into a new table called 'Suburbs', the primary key being the suburb name.



This student response excerpt has been included:

• to demonstrate insightful analysis of the problem and relevant contextual information to identify the relevant elements and features of user interface, data and programming components and their relationships to the structure of the identified problem.



This student response excerpt has been included:

• to demonstrate critical evaluation of impacts, components, and a low-fidelity prototype against prescribed and self-determined criteria to make refinements and justified recommendations



#### Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG in this IA, it is recommended that:

- schools examine the Retrieving and comprehending criterion 4-5 performance level descriptors to ensure consistency of the match with evidence in student responses including
  - symbolisation of algorithms with pseudocode for procedural code that processes data for insertion into a database or manipulates or displays retrieved data, and user interaction, data validation and data presentation (section 4.4)
- schools examine the Synthesising and evaluating criterion 3–4 performance level descriptors to ensure consistency of the match with evidence in student responses including
  - that the qualities in the student response match the characteristics in the marking guide for each characteristic, e.g. synthesis of relevant information and ideas to determine data elements may be demonstrated at a higher performance level than syntheses to determine user interface or algorithm components
- schools examine the Communicating criterion performance level descriptors to ensure consistency of the match with evidence in students responses including
  - sufficient information about variations to responses to ensure accuracy of reviews, e.g. if the video component does not include spoken features to communicate information and ideas, this should be accurately reflected with ISMG annotations.



# Project — digital solution (30%)

The IA2 Project — digital solution assessment focuses on the problem-solving process in Digital Solutions that requires the application of a range of cognitive, technical and creative skills and theoretical understandings. The response is a coherent work that documents the iterative process undertaken to develop a solution to a technical proposal. It may include written paragraphs and annotations, diagrams, sketches, drawings, and components of a prototype digital solution.

This assessment occurs over an extended and defined period of time. Students may use class time and their own time to develop a response.

Assessment design

#### Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Validity priority	Number of times priority was identified in decisions*
Alignment	57
Authentication	3
Authenticity	22
Item construction	22
Scope and scale	39

Reasons for non-endorsement by priority of assessment

\*Each priority might contain up to four assessment practices.

Total number of submissions: 184.

#### **Effective practices**

Validity priorities were effectively demonstrated in assessment instruments that:

• included a technical proposal stimulus attachment with headings and content aligned with syllabus specifications (section 4.6.2), e.g. a PDF document with the title 'Technical Proposal' and sub-sections for identification, interactions, and component specifications.

#### **Practices to strengthen**

It is recommended that assessment instruments:

• reference an external data source to provide students an opportunity to 'explain internal and external data components' as specified in the syllabus (section 4.6.2)

- require students to explore, develop, generate, and evaluate a prototype digital solution of an appropriate scope and scale for the instrument conditions using knowledge and skills aligned to the subject matter of Unit 3
- identify the same technology context for IA1 and IA2, since Unit 3 requires students to create prototype digital solutions for 'one of the technology contexts' as specified in the syllabus (section 4.1)
- not repeat information in various sections of the task, e.g. including instructions about the referencing style in the Scaffolding section when it is already listed under Authentication strategies.

#### Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	2
Language	13
Layout	11
Transparency	4

Reasons for non-endorsement by priority of assessment

\*Each priority might contain up to four assessment practices.

Total number of submissions: 184.

#### **Effective practices**

Accessibility priorities were effectively demonstrated in assessment instruments that:

described personas or target audiences in the technical proposal that were free of bias,
 e.g. described personas that are not outside the scope of student knowledge and experience.

#### **Practices to strengthen**

It is recommended that assessment instruments:

- avoid the use of jargon and colloquial language in task descriptions and technical proposals
- describe all actions related to the task in the 'To complete this task you must ...' section of the instrument; there should be no new instructions in the scaffolding.

# Assessment decisions

### Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Retrieving and comprehending	76.44%	22.99%	0.57%	0%
2	Analysing	78.74%	18.97%	1.15%	1.15%
3	Synthesising and evaluating	72.99%	16.09%	1.72%	9.2%
4	Communicating	91.38%	6.32%	2.3%	0%

Agreement trends between provisional and confirmed marks

#### **Effective practices**

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- evidence was matched to the appropriate quality for generation of user interfaces and programmed components, taking into consideration the functionality demonstrated in the video component
- evidence was matched to the appropriate quality for individual elements of evaluation characteristics, including impacts, components, and prescribed and self-determined criteria to make refinements and justified recommendations.

#### Samples of effective practices

The following is an excerpt from a response that illustrates the characteristics for the criterion at the performance level indicated. The sample may provide evidence of more than one criterion. The characteristics highlighted may not be the only time the characteristics have occurred throughout the response.

This excerpt has been included:

• to demonstrate a purposeful generation of efficient user interface and programmed components of the digital solution.

evaluating (9–10 marks)	MyAdmin	Steame DFC Mars & Bill Adverse dans (2013) France (M. Aversenert & Biller Have Bennes: ∭ Structure: ☐ SOL: 4, Search: ∯ Instri: ∰ Eggert: ∰ Report: № Operations: 10: Tracking	×
(Pac	ent tables)	uns defeted (Overy took 0.0012 sec)	
	Anatoria Protokow Protokow Posława Pos	Activity         Type         Caliform         Andrews, Natl         Drive         Comp         Draw         Dr	ି ଭିଗାରିକୁ (Son ) (୧୦)   (Son SOL   (Son SOC Con   (Solon)
Ex ww ass	cerpt 1 c /w.qcaa.o	pontent (video, 3 min) Id.edu.au/curriculum- /portal/media/snr_digital_solutions_21_subj_rpt_ia	

This excerpt has been included:

• to demonstrate 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.

Retrieving and comprehending	Excerpt 2
(7–8 marks)	The calculation results function is essential in
	displaying accurate results to all users. This
	algorithm is purposed with adding the greatest of
	two scores from a competition add them together
	and diaplay all searces in descending order to all
	and display all scores in descending order to all
	users. This algorithm is responsible for displaying
	accurate scoring results to generic users (parent and
	student), administration users and organisation
	users.
	BEGIN
	INPUT team
	INPUT result1
	INPUT result2
	INPUT result3
	IE result = 0 < AND > 101
	II Tesult = 0 < RWD > 101 INPUT result = r1
	ELSE:
	IF result =! 0< AND >101
	Print "Result 1 must be
	ENDIF
	ENDIF
	IF result2 = $0 < AND > 101$
	INPUT result $1 = r^2$
	ELSE: IF regult = $1.0 < AND > 101$
	Print "Result 2 must be
	between 1 and 100"
	ENDIF
	END IF
	IF result3 = $0 < AND > 101$ INDUIT result1 = $x^2$
	ELSE:
	IF result =! 0< AND >101
	Print "Result 3 must be
	between 1 and 100"
	ENDIF
	IF r1 AND r2 AND r3 == TRUE
	CALCULATE $r1+r2+r3 = r$
	THEN $r/3 = result$
	PRINT result
	END



Memb	ers						Resul	ts			
MemberID	name	Dateofbirth	Grade	gender	Media	astatus	CompID	TeamID	Round	Type	Score
8	Cherlize Myer	39814	Year	Female	YES		1	1	1	Interview	34.5
5	David Brown	39296	Year	Male	NO		1	1	2	Performance	38.0
7	David Jones	39814	Year	Male	YES		1	1	3	Performance	39.2
1	Ed Smith	38353	Year 10	Male	YES		1	2	1	Interview	39.3
6	Helen Hunt	40509	Year	Female	YES		1	2	2	Performance	44.0
10	James Bradley Highphi	39814	Year	Male	YES		1	2	3	Performance	32.1
3	Jane Jones	39143	Year 8	Female	YES		2	3	1	Interview	23.8
4	Janet Brown	39296	Year	Female	NO		2	3	2	Performance	33.7
2	Ned Smith	38718	Year 9	Male	YES		2	3	3	Performance	35.0
9	Richard Smith	39814	Year	Male	YES		2	4	1	Interview	23.8
<b>a</b>							2	4	2	Performance	32.9
Comp	petitions						2	4	3	Performance	30.6
ComplD	Name		Cont	actNan	ne		Contac	tEmail		ContactP	hone
BNEReg21	BNE Regional 202	1	Marky N	Mark	k funky@bunch.com		m		41212144	4	
DDReg21	Darling Downs Re 2021	ional Will Smith		ith fresh@		h@prince.com.au		41422453	414224531		
Online21	QLD Online Event	2021	Mrs An	ne Hath	away	hathawa	ayh@som	eville.ql	d.edu.a	u 73899778	38
		021 Mr David Smi				dshith97@eq.edu.au				733219319	

See all data table in the appendix

Sample data	Field	Field size	Data Type	Description
	MemberID	Integer	Number	Primary key
	Name	50	Text	Not Null
Members	Dateofbirth	Date	DateTime	Not Null
	Grade	8	Text	"Year 1" "Year 12"
	Gender	1	Text	М, Р, О
	Mediastatus	з	Text	"YES", "NO"
	CompID	Integer	Number	Primary Key
	TeamID	Integer	Number	Primary Key
Results	Round	Integer	Number	"1", "2", "3"
	Туре	11	Text	"Performance", "Interview"
	Score	Integer	Real	Not Null
	CompID	Integer	Number	Primary Key
	Name	12	Text	Not Null
Competitions	ContactName	50	Text	Not Null
	ContactEmail	50	Text	Not Null
	ContactPhone	10	Integer	Not Null



#### Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- schools examine the Retrieving and comprehending criterion 7–8 performance level descriptors and the Analysing criterion 7–8 performance level to ensure consistency of the match with evidence in students responses including
  - understanding that student responses for accurate and discriminating recognition and discerning description of relevant programming elements, user-interface components and useability principles require a highly contextualised response which goes beyond generic descriptions of these elements
  - acknowledging it is not necessary for responses to define information; the cognitions describe how students are to engage with the subject matter
  - understanding that the level of contextualisation contributes to the quality of a response and means the difference between accurate and discriminating recognition and discerning description, and accurate recognition and effective description of relevant programming elements, user interface components and useability
- schools examine the Synthesising and evaluating criterion 3–4 performance level descriptors to ensure consistency of the match with evidence in students responses including

- understanding that the purpose of the video component is to demonstrate functionality and, where a response has not provided one, there is limited evidence to support effective generation of user interface and programmed components of the digital solution. Where a video response is omitted, the highest possible mark for this criterion is 3
- schools examine the Communicating criterion 3–4 performance level descriptors to ensure consistency of the match with evidence in student responses including
  - recognising that spoken features are not required for IA2. Written and visual features are the only modes of communication that are assessed, indicating that the video component does not require sound or voice-over recording to demonstrate functionality and support effective generation
  - understanding that discerning decision-making about, and fluent use of, written and visual features include symbolisation, using mind maps, and one or more of constructed sketches, annotated diagrams, images or screenshots of the user and developer problem, algorithms communicated in pseudocode that demonstrate knowledge and understanding of programming features, and interrelationships between user experiences and data in the prototype digital solution (section 4.6.2)
  - acknowledging that responses with excessive use of written features are not necessarily indicative of discerning decision-making about, and use of, written features. Note that the syllabus describes annotations as 'a specific language feature for communicating' (section 1.2.2).
  - understanding that a referencing list and a recognised system of in-text referencing is necessary for discerning decision-making about, and fluent use of, referencing conventions (section 4.6.2).

### Additional advice

- Students may require guidance for formatting multimodal responses to the syllabus conditions, e.g. PowerPoint slides could be formatted to A3 size so that when the response is exported, it is easy to determine if a response has exceeded conditions and support judgments for the Communicating criterion
- Syllabus conventions for pseudocode recognise that there is no standard format and that it will vary between programmers (section 1.2.5). While pseudocode is not intended to be written in a particular programming language, if it is, it is important that the intent of algorithmic statements are made clear with annotations or code comments to demonstrate knowledge and understanding of programming features relevant to the task.



# Project — folio (25%)

The IA3 Project — folio assessment focuses on the problem-solving process in Digital Solutions that requires the application of a range of cognitive, technical and creative skills and theoretical understandings. The response is a coherent work that documents the iterative process undertaken to develop a solution to a problem. It may include written paragraphs and annotations, data, tables, algorithms, diagrams, sketches, illustrations, digital prototypes and models.

This assessment occurs over an extended and defined period of time. Students may use class time and their own time to develop the folio.

### Assessment design

#### Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Validity priority	Number of times priority was identified in decisions*
Alignment	66
Authentication	3
Authenticity	4
Item construction	30
Scope and scale	10

Reasons for non-endorsement by priority of assessment

\*Each priority might contain up to four assessment practices.

Total number of submissions: 175.

#### **Effective practices**

Validity priorities were effectively demonstrated in assessment instruments that:

- referenced a specific API, JSON or XML dataset in the technical proposal attachment or stimulus section of the task
- included a task description aligned with the subject matter for Unit 4
- provided scaffolding consistent with the instrument conditions, e.g. a page-by-page breakdown that did not exceed or reduce syllabus conditions for page count.

#### Practices to strengthen

It is recommended that assessment instruments:

- refer to the stimulus attachment as a technical proposal to align to the specifications and language of the syllabus. The technical proposal document is optional for IA3 but, where provided, it must comply with the syllabus specifications for consistency
- include an accessible link or screenshot of sample data for stimulus, e.g. test links to ensure they are not broken and provide a screenshot of sample data for links that are only accessible within a school environment. The datasets must be accessible to endorsers
- include scaffolding that provides prompts and cues to students about the requirements for their response without repeating or contradicting instrument conditions or instructions.

#### Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	0
Language	14
Layout	10
Transparency	2

Reasons for non-endorsement by priority of assessment

\*Each priority might contain up to four assessment practices.

Total number of submissions: 175.

#### **Effective practices**

Accessibility priorities were effectively demonstrated in assessment instruments that:

• correctly used technical terms from Unit 4 subject matter with accurate spelling, grammar and punctuation.

#### Practices to strengthen

It is recommended that assessment instruments:

- use an appropriate list hierarchy; formatting errors such as misaligned bulleted lists can reduce clarity and change the meaning or emphasis of list components
- use correct spelling and grammar, and technical terms aligned with Unit 4 subject matter.

# Assessment decisions

### Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Retrieving and comprehending	83.33%	15.52%	0%	1.15%
2	Analysing	83.91%	15.52%	0%	0.57%
3	Synthesising and evaluating	77.59%	21.84%	0%	0.57%
4	Communicating	89.08%	9.77%	0.57%	0.57%

Agreement trends between provisional and confirmed marks

#### **Effective practices**

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- evidence was accurately matched to effective description of the data security processes and strategies
- evidence was matched to the appropriate quality for generated components of the data exchange solution, e.g. the data exchange between two digital systems was clear.

#### Samples of effective practices

The following is an excerpt from a response that illustrates the characteristics for the criteria at the performance level indicated. The sample may provide evidence of more than one criterion. The characteristics highlighted may not be the only time the characteristics have occurred throughout the response.

These excerpts have been included:

• to demonstrate 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.

#### Analysis (6–7 marks)

#### Excerpt 1

Digital Solutions – IA3

Solution 2: Google Calendar (Event Management) (Google, 2021)

# Redacted for copyright

#### Description:

Google Calendar is a service that allows users to set/delete events with specific dates, times, locations, and descriptions. Google Calendar also allows the creator of an event to invite other guests to view existing event. Events can contain reminders that activate regularly or at certain times and are able to appear as notifications on the devices of individuals that are involved with the event (A user's google account is connected to the device and is also included as a guest to the event). These notifications operate possibly through the use of a Google API that grabs important information of the event (Event name, time, location, etc.) and interacts with the interface of the user's device to display a notification and message to the user.

#### **Recommendations for Proposed Solution:**

The selected aspect of Google Calendar focuses on event management. If the proposed solution were to focus more on event management, actions found in the Google Calendar application would be simplified and applied to the solution. These actions would further enhance the application's ability to create and edit existing fishing events. To emphasise event management in the proposed solution, the solution would possibly have a button for every event row, that when pressed would toggle between 3 different event statuses. The three different event statuses that could be toggled between would be the "Confirmed", "Cancelled" and "To be announced" (TBA) states. The solution would be connected to a calendar app, accessible to fishing club members (registered users), with each event being initially "TBA". Then, upon pressing the button and changing the status to "Confirmed", the application would interact with the calendar application to change the event's status or name to be "Confirmed", which would be seen by all registered users. This toggle would also be the same with the "Cancelled" state, which would either change the name/status of the event or just delete the event entirely. This is similar to the Google Calendar app, as the digital solution would be able to alter event statuses and would also allow other users to view the event and its details.

17.	s of existing solu	tions		Below is the analysis of the Brisbane Bus App with smaller
Brisbane B	Bus App		10 12 10	annotations that highlight the
Brisbane Bus an	nd Train uses multiple Qu	ueensland open data	sets including:	efficiency of the Data, Security
the Translink OPIA	TFS dataset to enable us	pian urps; ers to favourite bus/t	rain stops.	and interface
TransLink real ti	ime data	Beautified API that		
Data Output – E	Beautified API	represent each new heading on a new line to made the code easier to		Different links to the API
"records": {     (		read (Online JavaScript Beautifier, 2021)	Data Input (End Po	ints)
"Week ending": "Go Card Trips "Adjustments":	: "2012-07-05T00:00:00", 5": 2537265.6, : 4014,	-	End Point Example: The Data API can be acce	sed via the following actions of the CKAN action
"fixed fares a	as a percentage of all go card trips": is a	2218058,	API.	*
"1d": 2, "Week ending": "Go Card Trips	: "2012-07-15T00:00:00", s": 2778332.6,		Create https://www.c	data.qld.gov.au/api/3/action/datastore_create
"go card Adjus "fixed fares a	stments per 10,000 go card trips": 14.2 as a percentage of all go card trips":	Different ID	Update https://www.d	lata.qld.gov.au/api/3/action/datastore_upsert
"_1d": 3, "Week ending":	2012-07-22100:00:00",	values for each Bus	Ollery https://www.	lata old gov au/ani/3/action/datastore search
"Go card trips "Adjustments": "go card Adjus "files for	stments per 10,000 go card trips": 20.7 stments per 10,000 go card trips": 20.7	1937054, route	Query	
Trixed fores a	es a serventage of all go card trips":		(via https://www.c	data.qld.gov.au/api/3/action/datastore_search_s
Data Formats			SQL)	
XML	XML format th continuous co	nat portrays data as a de	Security	
<data></data>	Week ending 2012-07 00	TAR . AR . AR . Hack and	ng	
> <go card<="" td=""><td>Trips&gt;2537265.6</td></go> <td>rd Trips&gt;<adjustment< td=""><td>s - Nol</td><td>ey needed as it is opendata</td></adjustment<></td>	Trips>2537265.6	rd Trips> <adjustment< td=""><td>s - Nol</td><td>ey needed as it is opendata</td></adjustment<>	s - Nol	ey needed as it is opendata
>4014 <td>ustments&gt;<go adju<="" card="" td=""><td>stments per 10,000 g</td><td>o - Crea</td><td>tive Commons Attribution 3.0</td></go></td>	ustments> <go adju<="" card="" td=""><td>stments per 10,000 g</td><td>o - Crea</td><td>tive Commons Attribution 3.0</td></go>	stments per 10,000 g	o - Crea	tive Commons Attribution 3.0
go card tr	ips> <fixed a<="" as="" fares="" td=""><td>percentage of all g</td><td></td><td><ul> <li>Free to: share and adapt</li> </ul></td></fixed>	percentage of all g		<ul> <li>Free to: share and adapt</li> </ul>
card trips	>2.27% <td>a percentage of all</td> <td>. go</td> <td>data</td>	a percentage of all	. go	data
card trips	() () () () () () () () () () () () () (			
JSON				
<pre>% % fields": [{"type":" "records": "</pre>	"int","id":"_id"},{"info":{"notes"	":"","type_override":"timesta	rp",	
[1, "2012-07-08T00 [2, "2012-07-15T00	:00:00",2537265.6,4014,15.8201805	8, "2.27%"], 7. "2.34%	JSON formattin represents the	g which data for each ID
[3, "2012-07-22T00 [4, "2012-07-29T00	:00:00",2905857.17,6044,20.799370 :00:00",3187487.8,10889,34.161699	54,"2.36%"], 38,"2.23%"],	on one line with heading shown	in the first line CSV format in a
5,"2012-08-05100	:00:00",3211559.2,8016,24.9598388	1,"2.24%"],		table that sets out the data with each
CSV				specific heading
Week ending Go Car	rd Trips Adjustments go card Ac	justments per 10,000 go car	d trips fixed fares as a perce	entage of all go card trips
15/07/2012 27	78332.6 3963	15.82	395097	2.34%
22/07/2012 290	5857.17 6044	20.75	937054	2.36%
29/07/2012 318	8/48/.8 10889	34.10	103338	2.23%
Interface	e-140 📾	-		12:48
~	Brisbane Bus	<ul> <li>Stop 600395</li> </ul>		< Routes 375(Today) 🦁 📆
Search	101 102 103 104	Eagle Junction	platform 1	Scheduled Timetable
100	New - Comp         Annu - Comp	As at 9:43 PM	more platforms	11 50 AM Canwools St at Bandon, step 22 Outbound
bar that 100 links 105	112 113 114 115	WOODDING 8	· · · · · · ·	12-45 PM Stafford City
bar that 100 bar that 105 links 105 query to the 111	The second se			
bar that links 105 query to the 111 available 116	117 118 120 121	AL	Contraction of the	12:03 PM Stafford City Inbound 100 PM Carwoola Stat Bardon, step 22
bar that links 105 query to the available bus trip	Number         Description         Description <thdescriparty in="" scription<="" th="" the="">         Description</thdescriparty>	20-48	Spec	12/03 PM Statford City hotourd 1/00 PM Carwoola St at Bardon, stop 22 iffic vol. nur. Carwoola St at Bardon, stop 22
bar that links 105 query to the available bus trip 112 112 112 112 112 112 112 112 112 112	Strate Tray         Neuroscience         Neuroscience </td <td>ocation nap that</td> <td>sture line - Brisbane City Inbound</td> <td>Izes nu         Station City           100 M         Canvools St at Earton, step 22           ific         or.nu         Canvools St at Earton, step 22           cable         or.nu         Canvools St at Earton, step 22           bas your         Stational City</td>	ocation nap that	sture line - Brisbane City Inbound	Izes nu         Station City           100 M         Canvools St at Earton, step 22           ific         or.nu         Canvools St at Earton, step 22           cable         or.nu         Canvools St at Earton, step 22           bas your         Stational City
bar that links query to the available bus trip	Number         Stream of the stream of t	ocation nap that ortrays earby 21:03 Shore	turound sture line - Sirsbane City Inbound citife line - Cleveland line	Tota Fue Statistic Cir 1997 V Cannoola e Endon, sep 22 Cannoola e Endon, sep 22 Collection Cir table or ruy Statistic Cir Imes and Ir AM Statistic Cir Marcola Cir Collection Cir Statistic Cir
bar that links query to the available bus trip 100 100 100 100 100 100 100 100 100 1	Control Line         Schematrik         American Line         American Lin	ocation nap that fortrays earby tations gar your 21:15 BDV 21:15 BDV	theorem intervention Sessance City intervention - City intoound	Incol NM         Stafford City           Stafford City         Canvolatili it is Broken, step 22           offic         Convoluti it is a Broken, step 22           Colored         Colored           Imps and City         Stafford City           Imps and City         Stafford City           Imps and City         Stafford City           Imps and City         Canvolati it is a Broken, step 22           Canvolati it is a Broken, step 22         Canvolati it is a Broken, step 22           Canvolati it is a Broken, step 22         Canvolati it is a Broken, step 22
bar that links query to the available bus trip Individual Information	State         State         State         State         State           177         118         100         121         State         State           180         121         124         125         State         L           180         131         134         125         State         L           184         132         134         125         State         L         L           184         132         134         125         State         State <td>acation nap that cortrays earby tations pcation 21:33 SHC 21:33 SHC</td> <td>The second secon</td> <td>1203 W         Stafford City           1203 W         Stafford City           Stafford City         Canvolation it is disclosin, step 22           Convolution it is disclosin, step 22         Convolution           Inters and Inters and Canvolation it is disclosin, step 22         Canvolation it is disclosin, step 22           Inters and Intersion         Intersion City         Canvolation it is disclosin, step 22           Intersion         Intersion City         Canvolation it is disclosin, step 22           Intersion         Canvolation it is disclosin, step 22</td>	acation nap that cortrays earby tations pcation 21:33 SHC 21:33 SHC	The second secon	1203 W         Stafford City           1203 W         Stafford City           Stafford City         Canvolation it is disclosin, step 22           Convolution it is disclosin, step 22         Convolution           Inters and Inters and Canvolation it is disclosin, step 22         Canvolation it is disclosin, step 22           Inters and Intersion         Intersion City         Canvolation it is disclosin, step 22           Intersion         Intersion City         Canvolation it is disclosin, step 22           Intersion         Canvolation it is disclosin, step 22
Individual that contains: 500	Marcine         Marcine         Marcine         Marcine         Marcine           77         718	coation ang that corrange that	TREASURE THE SING AND CITY. INDOUND Citie line - Cleveland Ine Inbound Citie line - Cleveland Ine Inbound Citie line - Cleveland Ine Inbound Citie line - Cleveland Ine	1203 W         Stafford City           1203 W         Stafford City           Stafford City         Canvolation R + Bindow, nep 22           Convolution R + Bindow, tesp 22         Convolution R + Bindow, tesp 22           Immedian         In //W           Stafford City         Stafford City           Immedian         In //W           Stafford City         Canvolation St + Bindow, tesp 22           Immedian         Canvolation St + Bindow, tesp 22           Stafford City         Stafford City
bar that links links the second bus bus trip links the second bus links the second links the second links	Image: second	coation nap that iortrays earby 21:03 Surf 21:03 Surf 21:15 Airpo 21:33 Strong 21:33 Surf 21:33 Airpo 21:33 Airpo 21:33 Airpo 21:33 Airpo	HINGHING AND	first and the starting Cry
bor that links guery to the bus trip Individual bus trip specific data 10 10 10 10 10 10 10 10 10 10	No.         No. <td>coation and that ortrays earby 21:03 SMC 21:03 SMC 21:15 Alipp 21:33 SMC 21:33 SMC 21:33 SMC 1 Mins Alipp 19 Mins SMC</td> <td>Insource     Spectromeric     Spect</td> <td>Trans w         Staffind Cry           16/04         Canwook St et Burlow, step 22           fair         es rw         Canwook St et Burlow, step 22           fair         Barlow Cry         Barlow Cry           mation         es rw         Canwook St et Burlow, step 22           raw         Canwook St et Burlow, step 22           raw raw         Canwook St et Burlow, step 24           raw raw         Canwook St et Burlow, step 24</td>	coation and that ortrays earby 21:03 SMC 21:03 SMC 21:15 Alipp 21:33 SMC 21:33 SMC 21:33 SMC 1 Mins Alipp 19 Mins SMC	Insource     Spectromeric     Spect	Trans w         Staffind Cry           16/04         Canwook St et Burlow, step 22           fair         es rw         Canwook St et Burlow, step 22           fair         Barlow Cry         Barlow Cry           mation         es rw         Canwook St et Burlow, step 22           raw         Canwook St et Burlow, step 22           raw raw         Canwook St et Burlow, step 24           raw raw         Canwook St et Burlow, step 24
bar that links guery to the available bus trip 10 10 10 10 10 10 10 10 10 10 10 10 10	No.         No. <td>acation nap that cortrays tations coation 20:48 Case 21:33 Sec 21:33 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:35 Sec 21:</td> <td>A INJOURN Anno line - Sintano City hobund title line - Cleveland line hobund line - Varsty Lakes line hobund hokund hokund hokund hokund hokund hokund hokund hokund hokund hokund hokund</td> <td>Table of Cry         Statistic Cry           fic         Carwook St at Bandow, step 22           file         Statistic Cry           file         Statistic St et Bandow, step 22           file         Carwook St et Bandow, step 22           file         Statistic Cry           file         Statistic Cry</td>	acation nap that cortrays tations coation 20:48 Case 21:33 Sec 21:33 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:34 Sec 21:35 Sec 21:	A INJOURN Anno line - Sintano City hobund title line - Cleveland line hobund line - Varsty Lakes line hobund hokund hokund hokund hokund hokund hokund hokund hokund hokund hokund hokund	Table of Cry         Statistic Cry           fic         Carwook St at Bandow, step 22           file         Statistic Cry           file         Statistic St et Bandow, step 22           file         Carwook St et Bandow, step 22           file         Statistic Cry
ber that links query to the available bus trip 10 10 10 10 10 10 10 10 10 10 10 10 10	Bits         Bits <th< td=""><td>cation nap that portasy tations pocation 21:15 App 21:15 App 21:15 App 21:15 App 21:15 Struct 21:33 SHC 21:33 SHC 11 Mins BOV 19 Mins BOV 19 Mins BOV</td><td>A INJOURNAL A INJOURNAL A INDOURD A INDOURD A INDOURD</td><td>Normality         Statustic Cry Statustic Cry Carwook St &amp; Baron, step 22           fife table share         er or or or or statustic Cry Statustic Cry         er or or statustic Cry Statustic Cry           1974         Dation Cry Statustic Cry Statustic</td></th<>	cation nap that portasy tations pocation 21:15 App 21:15 App 21:15 App 21:15 App 21:15 Struct 21:33 SHC 21:33 SHC 11 Mins BOV 19 Mins BOV 19 Mins BOV	A INJOURNAL A INJOURNAL A INDOURD A INDOURD A INDOURD	Normality         Statustic Cry Statustic Cry Carwook St & Baron, step 22           fife table share         er or or or or statustic Cry Statustic Cry         er or or statustic Cry Statustic Cry           1974         Dation Cry Statustic
bor that links guery to the available bus trip Dus information specific data 100 100 100 100 100 100 100 100 100 1	Bits         Bits <th< td=""><td>Accation nap that portrays tations pocation 21:15 APO 21:15 APO 21:15 APO 21:33 SHC 1 Mins APO 19 Mins BOV 19 Mins BOV 21 Mins BOV 21 Mins BOV</td><td>A INJOURD There line 3 indiane City. Inbound Inte - Utaryia Lakes line Inbound Inte - Varsia Lakes line Inbound Inte - Varsia Lakes line Inbound Inte - Cleveland Inte Inbound Inte - Cleveland Inte Inbound Inte - Cleveland Inte Inbound Inte - Utaryia Lakes line Inbound Inte - Utaryia Lakes line Inbound Inte Inte - Cleveland Inte Inbound</td><td>Toto I W         Statistic City           1970 W         Statistic City           fife         Canvoks Br &amp; Bons, step 22           fife         Statistic City           mines and         Balling City           1970 W         Balling City           1970 W         Balling City           1970 Convols St &amp; Bons, step 22           213 W         Statistic City           1971 Convols St &amp; Bons, step 22           213 W         Statistic City           1971 Convols St &amp; Bons, step 22           1971 Convols St &amp; Bons, step 23</td></th<>	Accation nap that portrays tations pocation 21:15 APO 21:15 APO 21:15 APO 21:33 SHC 1 Mins APO 19 Mins BOV 19 Mins BOV 21 Mins BOV 21 Mins BOV	A INJOURD There line 3 indiane City. Inbound Inte - Utaryia Lakes line Inbound Inte - Varsia Lakes line Inbound Inte - Varsia Lakes line Inbound Inte - Cleveland Inte Inbound Inte - Cleveland Inte Inbound Inte - Cleveland Inte Inbound Inte - Utaryia Lakes line Inbound Inte - Utaryia Lakes line Inbound Inte Inte - Cleveland Inte Inbound	Toto I W         Statistic City           1970 W         Statistic City           fife         Canvoks Br & Bons, step 22           fife         Statistic City           mines and         Balling City           1970 W         Balling City           1970 W         Balling City           1970 Convols St & Bons, step 22           213 W         Statistic City           1971 Convols St & Bons, step 22           213 W         Statistic City           1971 Convols St & Bons, step 22           1971 Convols St & Bons, step 23
ber that links generation the second seco		Acation nap that bortrays tations position 21:03 SHC 21:13 SHC 21:15 App 21:15 App 21:15 App 21:15 App 21:15 App 21:18 BDV 21:33 SHC 21:33 SHC 21:35 SHC 21:	I HIGHERT I HIGHERT INTERING INTERIO	Top 0 //         Statution City           Top 0 //         Statution City           Top 0 //         Convoid St at Backins, step 22           Statution City         Statution City           Top 0 //         Statution City           Statution City         Statuti
ber that links links bus trip links bus trip links bus trip links link	Bits         Bits <th< td=""><td>ccation app that bortrays tations pocation 21:03 SHC 21:03 SHC 21:13 SHC 21:14 SHC 21:15 APP</td><td>* Howard Hard Nor - Bristane City </td><td>Table of the state of</td></th<>	ccation app that bortrays tations pocation 21:03 SHC 21:03 SHC 21:13 SHC 21:14 SHC 21:15 APP	* Howard Hard Nor - Bristane City 	Table of the state of
ber that Inds valiable bus trip Individual bus trip Individual Bas information specific data Recommenda - For the app	All         All <td>Accession and that cortars tations costion 20:48 20:48 21:03 Shore 21:15 Shore 21:15 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:35 Shore 2</td> <td>Insource     Insource     Insource</td> <td>Incol NV     Statistic Cive       Incol NV     Statistic Cive       Incol NV     Canvool Ste Bandow, Ste 22       Incol NV     Bandow Cive       Incol NV     Ba</td>	Accession and that cortars tations costion 20:48 20:48 21:03 Shore 21:15 Shore 21:15 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:33 Shore 21:35 Shore 2	Insource	Incol NV     Statistic Cive       Incol NV     Statistic Cive       Incol NV     Canvool Ste Bandow, Ste 22       Incol NV     Bandow Cive       Incol NV     Ba
ber that links query to the svaliable bus trip information specific data Recommenda - For the app layout and of page 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Image: New York         Image: New	Accation accation 20:48 21:03 21:03 21:15 BDV 21:15 BDV 21:15 BDV 21:33 SHC 1 Mins BDV 21:33 SHC 1 Mins BDV 21:33 SHC 1 Mins BDV 21:33 SHC 1 Mins BDV 21:33 SHC 1 Mins BDV 1 Mins 1 Mins BDV 1 Mins 1 Mins	A INJURIE Anto line - Sintance City - Inbound time - Clevisiand Ine - Inbound Ine - Varsity Lakes line - Inbound - Inb	Income         Battering Cry           Income         Battering Cry           Information         Battering Cry     <
Individual bus trip	Image: second	Accession and that cortange tations coation 20:48 21:03 21:03 21:15 BOV 21:15 BOV 21:15 BOV 21:33 SHC 1 Mins BOV 1 Mins SHC 1 Mins BOV 1 Mins 1 Mins BOV 1 Mins 1	Insourd     I	Table of the state of
Individual bus trip bus trip bus trip bus trip Bus informations specific data Recommendaa - For the app layout and on new users fi - For the data	All         All <td>Acation ation could be to im- rered and confusing all the different asp- ended application</td> <td>Insource     Insource     Insource</td> <td>Test /vir         Matrice City           Test /vir         Cannod 314 Ellism, nite 22           file         61/V         Samod 244 Ellism, nite 22           strik         Samod 244 Ellism, nite 22         Samod 244 Ellism, nite 22           strik         Samod 244 Ellism, nite 22         Samod 244 Ellism, nite 22           strik         Samod 244 Ellism, nite 22         Samod 244 Ellism, nite 22           strik         Cannod 34 Ellism, nite 22         Samod City           Samod City         Samod City         Samod City           Test /vir         Samod City         Samod City           Samod City         Samod City         Samod City           Test /vir         Samod City         Samod City           Samod City         Samod City         Samod City           strik         Cannod Samod Samod City         Samod City           Samod City         Samod City         Samod City           Samod City<!--</td--></td>	Acation ation could be to im- rered and confusing all the different asp- ended application	Insource	Test /vir         Matrice City           Test /vir         Cannod 314 Ellism, nite 22           file         61/V         Samod 244 Ellism, nite 22           strik         Samod 244 Ellism, nite 22         Samod 244 Ellism, nite 22           strik         Samod 244 Ellism, nite 22         Samod 244 Ellism, nite 22           strik         Samod 244 Ellism, nite 22         Samod 244 Ellism, nite 22           strik         Cannod 34 Ellism, nite 22         Samod City           Samod City         Samod City         Samod City           Test /vir         Samod City         Samod City           Samod City         Samod City         Samod City           Test /vir         Samod City         Samod City           Samod City         Samod City         Samod City           strik         Cannod Samod Samod City         Samod City           Samod City         Samod City         Samod City           Samod City </td
har that links query to the available bus trip us information that contains specific data	Alterna         Normality	Action could be to impred and confusing ation could be to impred ation at	Spectrum thrue line - Sindano City - Inbound time - Varsity Lakes line - Inbound time - Varsity Lakes line - Inbound - Inboun	Top://w         Statistic City           1001/W         Comodo Statistics (City           fife         61/%         Comodo Statistics (City           fife         73/%         Comodo Statistics (City           fife         73/%         Statistic City           fife         Fife         Statistic City           fife         Statistic City         Statistic City <t< td=""></t<>

For	mat	Description
JSON		JSON (JavaScript Object Notation) is an open standard file for and data interchange format that uses human-readable text store and transmit data objects consisting of attribute-value and arrays (or other serializable values). CSV (comma-separated values) file is a delimited text file that a comma to separate values. Each line of the file is a data recc
CSV		Each record consists of one or more fields, separated by common The use of the comma as a field separator is the source of the name for this file format
XML		Extensible Markup Language is a markup language that define set of rules for encoding documents in a format that is both human-readable and machine-readable. The World Wide We Consortium's XML 1.0 Specification of 1998 and several other related specifications—all of them free open standards—defi XML.
Uses of JSON It's used while writing JavaScript based applications and websites. JSON format is used for serializing and tran- network connection. It is primarily used to transmit data betwee Web services and APIs use JSON format to It can be used with modern programming I <b>davantage of JSON</b> JSON is Faster - JSON syntax is very easy to JSON sis faster - JSON syntax is very easy to sa an syntax which provide us a easy parsing the data. Since it syntax is very small and lif t executes the response in faster way. Server Parsing - On the server-side parsing developers want if the parsing will be fast or torong point that indicates us to use the JSO Schema Support - It has wide range of supp the operating systems, so the applications in doesn't require much effort to make it all by developement developer thinks for the differ provides that functionality. <b>FOOI of sharing data - JSON is the best tool</b> aven audio, video etc. This is because JSON arises <b>JSON has no error handling for JSON calls.</b> <b>Daladvantages of JSON</b> <b>JSON has no error handling for JSON calls.</b> <b>Dolna sprous if used with untrusted services is</b> <b>SON service returns a JSON response wrappica- tatacks.</b> <b>JSON services rits JSON services, it's we threats which JSON have in that and also be protect it. JSON only have limited supported JSON development.</b>	plications that includes browser smitting structured data over en a server and web applications. provide public data. anguages. use. We have to use only of the data and faster execution of ght weighted that's the reason that is the important part that is the important part that the server side, then only user can this case JSON server-side parsing is non server side. borted browser compatibility with nade with the coding of JSON owser compatible. During ent different browsers but JSON If or the sharing data of any size stores the data in the arrays, so data is a superior file format for web or untrusted browsers, because a beed in a function call, which will be th untrusted browser it can be tion Vulnerable to a variety of ary important to be aware of the aware with the things which can I tools which we can use during	CVV uses •When data has a strict tabular structure •To transfer large database between programs •To import and export data to office applications, Qedco modules •To store, manage and modify shopping cart catalogue CSV downtages •CSV is simple to implement and parse •CSV is processed by almost all existing applications •CSV provides a straightforward information schema •CSV is considered to be standard formation •CSV is considered to be standard format •CSV allows to move most basic data only. Complex configurations cannot be imported and exported this way •There is no distinction between text and numeric values •No standard way to represent binary data •Problems with importing CSV into SQL (no distinction between NULL and quotes) •Poor support of special characters •Lack of universal standard
1.5 Analysis of datas	ets	
Dataset	Des	cription
Brisbane Bus App	Brisbane Bus and Train u open data sets including: Translink OPIA API and Go the Translink GTFS datase bus/train stops.	ses multiple Queensland o card data to plan trips; at to enable users to favourite

S	tructure		Recommendations
ML <data> <row_id="1"><week ending="">201 &gt;<go card="" trips="">2537255.6 &gt;4014<go ca<br="">Card trips&gt;15.82018058XON_</go></go></week></row_id="1"></data>	2-07-08T00:00:00:/Week anding (/Go Card Trips> <adjustments rd Adjustments per 10,000 go &gt; card Adjustments per 10,000</adjustments 		<ul> <li>JSON format to be used as it has the clearest</li> </ul>
<pre>^ fields:: (('type:':l.mt*','at'','d'),('' "*ccod':[ [1,'201-07-8070:00.00;00','27333.6,594 [2,'201-07.5150.00;00','273333.6,594 [2,'201-07.5150.00;00','27333.6,594 [2,'201-07-5070:00;00','32137487.5,100 [5,"2012-08-05T00:00:00','3211555.2,00]</pre>	nfo":{"notes":","type_overnide":"timestam 4,15:8010050,"2.27%"]. 3,14:2030050,"2.38%"], 44,20.79977054,"2.36%"], 49,34.10109938,"2.23%"], 6,24.59503881,"2.24%"],	",	layout and has a format that is easy to read and understand • Datasets to be filtered so that only the required information is used
Week ending Go Card Trips Adjustments go card Adjustme 8/07/2012 2537265.6 4014 15/07/2012 277832.6 3963 22/07/2012 290587.17 0044 29/07/2012 3187487.8 10889	nts per 10,000 go card trips Tixed fares as a percentage o 15.82018058 14.26395097 20.79937054 34.16169938	all go card trips 2.27% 2.34% 2.36% 2.23%	

#### **Practices to strengthen**

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- schools examine the Retrieving and comprehending criterion 7–8 performance level descriptors to ensure consistency of the match with evidence in student responses including
  - understanding that student responses for accurate and discriminating recognition and discerning description of relevant programming elements, user-interface components and useability principles require a highly contextualised response which goes beyond generic descriptions of these elements
  - understanding it is not necessary for responses to define information; the cognitions describe how students are to engage with the subject matter
  - acknowledging the level of contextualisation contributes to the quality of a response and means the difference between accurate and discriminating recognition and discerning description, and appropriate recognition and description of components of data exchange systems and data security processes.
  - a clearer understanding of adept symbolisation. The syllabus defines 'adept' as very/highly skilled or proficient at something; expert (section 6). Adept symbolisation is achievable with or without the use of digital tools. When students symbolise, they represent information, idea development and system interrelationships in pseudocode, algorithms, code, models, sketches, diagrams, tables and/or schemas (section 1.2.1)
  - realising that the proficiency of a diagram or sketch is not necessarily concerned with aesthetics — proficiency looks for how well the response represents information and ideas. A neat or beautiful diagram does not automatically equate to adept symbolisation of information or ideas.
- schools examine the Analysing criterion 6–7 performance level descriptors to ensure consistency of the match with evidence in student responses including
  - a clear understanding of how students determine prescribed and self-determined criteria
  - understanding that the data exchange system requirements and assessable evidence provides the necessary subject matter for determining prescribed criteria, e.g. assessable evidence for evaluation denotes prescribed criteria, self-determined criteria relies on the determined data exchange system requirements not stipulated by the task or assessable evidence, supported by relevant syllabus subject matter
- schools examine the Synthesising and evaluating criterion 9–10 performance level descriptors to ensure consistency of the match with evidence in student responses including

- recognising the difference between the exchange of data within a system, and the exchange of data between two digital systems is clear
- recognising whether the video component demonstrates the functionality of the solution which shows the exchange of data between two digital systems
- an accurate understanding of the difference between external and internal data. This is essential for making judgments in this criterion
- developing a wholistic view of solution requirements, recognising that while the task does not explicitly include generation of a user interface, assessable evidence requires evaluation of the functionality, useability, and efficiency of the components of the digital solution.

#### **Additional advice**

- The assessable evidence does not replace the problem-solving process. While Parts 1, 2 and 3 group assessable evidence for a range of cognitions, there is a relationship between the Parts. The assessable evidence is not a list of steps for completing the task they inform the problem-solving process and provide elaboration on the evidence required for assessment, e.g. it is not necessary for a response to demonstrate more than one mind map; a mind map is a purposeful diagram used to visually organise information and allows the abstract relationships between ideas to be explored (section 6). Parts 1, 2 and 3 describe how evidence should be collated and presented. It is acceptable for students to iteratively develop one mind map and either refer to, duplicate, or include relevant sections in their response as necessary. High level responses would also demonstrate prescribed criteria drawn from the assessable evidence across Parts 1, 2 and 3 to inform solution development.
- The use of conjunctions in ISMG descriptors denotes a relationship between elements; however, in Digital Solutions, it is possible to demonstrate characteristics within a descriptor at varying qualities or performance levels. While there is a relationship between characteristics joined by 'and', the relationship between characteristics across criteria is generally of greater significance, e.g., evidence demonstrated at a high performance level in the Retrieving and comprehending criterion is likely to have a follow through effect on subsequent criteria (such as variable recognition and superficial description would unlikely support considered analysis).



External assessment (EA) is developed and marked by the QCAA. The external assessment for a subject is common to all schools and administered under the same conditions, at the same time, on the same day.

# **Combination response — Examination (25%)**

### Assessment design

The assessment instrument was designed using the specifications, conditions and assessment objectives described in the summative external assessment section of the syllabus. The examination consisted of one paper:

- Paper 1, Section 1 consisted of multiple choice questions (10 marks)
- Paper 1, Section 2 consisted of short response questions (36 marks)
- Paper 1, Section 3 consisted of an extended response question (26 marks).

The examination assessed subject matter from Unit 4. Questions were derived from the context of Digital impacts.

The assessment required students to respond to multiple choice, short response and extended response questions which explored various subject matter from the unit.

The stimulus included a range of scenarios, diagrams, and pseudocode.

### Assessment decisions

Assessment decisions were made by markers by matching student responses to the external assessment marking guide (EAMG). The external assessment papers and the EAMG are published in the year after they are administered.

#### Multiple choice item responses

There were 10 multiple choice items.

Percentage of student responses to each option

#### Note:

- The correct answer is **bold** and in a **blue** shaded table cell.
- Some students may not have responded to every question.

Question	Α	В	С	D
1	69.67	16.94	11.58	0.93
2	37.78	17.05	34.4	10.19
3	53.84	17.4	13.33	14.73
4	13.45	9.14	28.46	48.14
5	23.22	2.74	58.91	14.32
6	2.56	33.18	58.5	5.12
7	1.51	84.23	2.62	11.06
8	16.07	37.43	11.99	33.24
9	9.84	66.36	18.74	4.13
10	23.63	18.16	34.28	23.17

#### **Effective practices**

Overall, students responded well to:

- knowledge retrieval questions about data security, network transmission protocols, and data exchange methods
- analysis questions about data security, algorithm constructs, data flow and SQL.

The following excerpts have been selected to illustrate effective student responses in one or more of the syllabus assessment objectives. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

#### External assessment

### Samples of effective practices

Short response

Assessment objective: Symbolise

Paper 1

**Question 11** 

This question required students to symbolise the data flow for all essential features of an online sales platform, according to the stimulus provided. The essential features are: customer external entity, business owner external entity, customer data store, shopping cart data store, orders data store, products data store, register and login process, payments process, confirm order process, update shopping cart process, and update products process.

Effective student responses:

- symbolised all essential features listed
- · logically symbolised data flow
- used syllabus conventions for data flow diagrams.

These student response excerpts have been included to:

 demonstrate responses that symbolise all essential features of the sales platform, with logical data flow and effective use of syllabus conventions







Assessment objective: Evaluate and justify

Paper 1

**Question 12a** 

This question required students to analyse information and evaluate risks to data confidentiality, integrity, and availability for an app. Students were required to justify their response with three examples.

Effective student responses:

- · logically evaluated risks to data confidentiality, integrity, and availability
- justified their evaluation by providing coherent examples of risks to data confidentiality, integrity, and availability.

This student response excerpt has been included:

• to demonstrate logical evaluation of risks to data confidentiality, integrity, and availability justified with coherent examples.

Evaluate (3 marks)	Excerpt 1
<ul> <li>risks to data confidentiality, integrity, and availability</li> </ul>	Data confidentiality is crucial in keeping the data sofe and secure
availability	from unauthorised access. Kicks to clata comfidentiality may include ULOS
<ul><li>Justify (3 marks)</li><li>justification with</li></ul>	attacks, hacks and malware which will result in the user's details such
coherent examples	as their private address or vehicle being hijacked. Thus, it is important
	to a hourly check for breaches and ensure that the date is safely stared.
	Data integrity ensures that the information the user It is also important
	to ensure that only specific administratore may access the date with a passward.
	Data integrity ensures that the user's data is not who suddenly changed
	due to a malfunction in the system. It is important, to have back-up
	servers of the data in case of a nortural disaster that may wipe the
	users doots from the system permanently. For example, water may exter the
	control with and short circuit the system and thus user are whatle to
	utilise the app due to the suddles failure. Late availability is them
	describes how easily the user can manage / access their information. This is
	important as sort the user may change home addresses and may not be able to update
	colit, his soon information. Risks include system failures, autolated systems and no feature.

Assessment objective: Recognise and describe, and explain

Paper 1

**Question 12b** 

This question required students to identify relevant Australian Privacy Principles and explain an ethical consideration when using the app described in the stimulus.

Effective student responses:

- identified a relevant Australian Privacy Principle (APP) which included an explanation congruent with an APP without identifying its exact title
- · logically explained an ethical consideration relating to the identified APP

This student response excerpt has been included:

• to demonstrate identification of an APP relevant to the system, with logical explanation of an ethical consideration in relation to the identified principle.

Recognise and describe (1 mark)	Excerpt 1
<ul> <li>identification of a relevant Australian Privacy Principle</li> <li>Explain (1 mark)</li> <li>explanation of an ethical consideration</li> </ul>	describes how easily the user can manage / access their information. This is important as not the user may change home addresses and may not be able to update oblit his own information. Risks include system failures, articlated systems and no feature. b) Identify a relevant Australian Privacy Principle and explain an ethical consideration when using app data. [2 marks] Australian Privacy Principle: The data accessed by the mobile application should
	be utilised in an open and transporent way. Ethical consideration: It is important for the mobile application to inform its
	users of the ways they may utilise their information, in case of hacks, scandals and breaches. A disclosure of what the mobile application will
	utilise the users' information for (such as feedback or updates) should be
	of privacy.

Assessment objective: Evaluate

Paper 1

**Question 12c** 

This question required students to perform a desk check for five iterations to decrypt a password. Effective student responses:

- · performed a desk check that decrypted the password using iterations
- contained no errors.

This student response excerpt has been included:

• to demonstrate a desk check that decrypts a Caesar cypher encrypted password with no errors.

Evaluate (2 marks)	Excerpt 1
decryption with iterations	Original: KYIWW ABCDEFGHIJKLMNOPQRSTUVWXYZ
contains no errors	Iteration 1: Shift of 2 = IWGUU
	4 Iteration 2: Shift of 5. Decrypted key = FTORR
	Iteration 3: Shift of 7. Decrypted key = DRBPP
	Iteration 4: Shift of 9. Decrypted key = BPZDA BPZNN
	Iteration 5: Shift of 4. Decrypted key = GTESS GUESS
	A Caesar shift of 4 was utilized.
	The password decrypted password is GUESS

Assessment objective: Symbolise

Paper 1

**Question 12d** 

This question required students to symbolise a simple Caesar cipher using pseudocode.

- symbolised the necessary programming constructs for a simple Caesar cipher
- symbolised an algorithm with no logic errors
- used pseudocode conventions.

This student response excerpt has been included:

• to demonstrate symbolisation of a Caesar cypher encryption algorithm with all the necessary programming constructs and effective use of pseudocode conventions.

Symbolise (8 marks)	Excerpt 1
<ul> <li>symbolisation of necessary</li> </ul>	RECINI
programming constructs	SET cipher = empty string
<ul> <li>effective use of pseudocode</li> </ul>	GET hey
conventions	GET plantext as capital letters
	SET MUMI = Z H: O, B: 1, C . 2 2. 25 3
	SET letters = EU: "A" 1: "B" 2: "C" 25! "Z" ]
	FOR letter IN plaintext
	SET num = nums [letter]
	SET New Num = num t key mod 26
	SET new Letter = letters [new Mum]
	SET Cipher = Cipher + letter
	NEXT let te,
	ENDfor
	OUTPUT CIPHEN
	END

Assessment objective: Explain

Paper 1

#### **Question 13a**

This question required students to explain how checksums, encryption and authentication would improve the security of data exchange for an online silent auction.

Effective student responses:

• explained how the security of the data exchange would be improved through checksums, encryption, and authentication.

This student response excerpt has been included:

• to demonstrate analysis of the silent auction system to explain how the data security could be improved through checksums, encryption, and authentication.

Explanation of	Explain (3 marks)
improved data	• explanation of
security through	improved data
checksums,	security through
encryption and	checksums,
authentication	encryption and
He is a construction	authentication
to the biddiney website a checksum which be mored to	Divintual they are harshed. When a wave wants to login
verity their possword. If a dieta breach was to occur	to the bidding velosite a checksum when be noted to
and posswords new stored as plaintext this would be have	verity their password. If a data breach was to occur
a significant security threat. Encryption can be mored to have	and passwords mere stored as plaintext this would pore
players bid's when they travel across a network. Specifically,	a significant servity threat. Encryption can be used to inde
the new of SSL/TLS will be prosent so wery only bid's	plople's bid's when they travel across a network. Specifically,
hill be encrypted so to no-one else can see offer bids	the nee of SSE/TLS will be proceshed so everyones bid's
Authentication would also improve security as more bound	hill be encrypted so to no-one else can see offer bids
need to enter a possword or uses 2FA to very	Authentication would also improve security improve security
their identity three. This would significantly improve security	the'r identity three. This would significantly improve security
other uses onesmits	other wers oriesmits

Assessment objective: Recommend and justify

Paper 1

**Question 13b** 

This question required students to recommend one encryption method to securely store auction data and justify their response.

- recommended a valid encryption method
- justified the recommended encryption method

This student response excerpt has been included:

• to demonstrate further analysis of the auction system to recommend a valid encryption method for securing data with effective justification.

Recommend (1 mark)	Excerpt 1
recommendation of a valid encryption method	The asymmetric encryption method of RSA would be
Justify (1 mark)	very powerful my to sucredy store duction deta
<ul> <li>effective justification of recommended method</li> </ul>	as it is one of the most secure energiption methods
	due to it's design. As there wouldn't be an exbandomore
	of bids, RSA is the most suitable as even though
	it's much slower than DIES for example, time of
	energption is not a issue as then will be limited
	biols. Another remson if that is the bidding is occurring
	one the internet asymmetric encryption such as RSA is
	much more secure as with symmetric energition the
	key also needs to be transformed along with the
	message which conter be intercepted by an attacker.

#### **Extended response**

Assessment objective: Analyse

Paper 1

**Question 14a** 

This question required students to analyse a stimulus and describe all the ways space, line and tone are used, and how visual hierarchy, proximity and alignment have informed development of the user interface.

- · described how space, line and tone are used in a stimulus user interface
- described how the development of the stimulus user interface is informed by visual hierarchy, proximity and alignment.

This student response excerpt has been included:

- to demonstrate description of how the visual communication elements and principles have been used and informed development of the stimulus user interface
- to show an accurate understanding of the difference between elements and principles.

Analyse (6 marks)	Excerpt 1
<ul> <li>description of elements of visual communication</li> <li>description of principles of visual communication</li> </ul>	Space has been used through adding pressions of the page which do not contain any content. For example, the log in window has a significant left, right, top and bottom margin and these areas of empty space are also seen in the results view. Line has been used to create fields for data entry, to create a esthetically pleasing buttons and tables which contain data, for example the latest results table. The has been used to emphasise the headings of the respective web pages. For example, match manager app" has a bilder font to add tone Visual hierarchy has informed the development through placing the most important elements towards the top of the page. The beding is most important and is thus the first elements close to each other. The email and posswood data fields are in close proximity, and in the navigation bar the three sub-page buttons are placed in alignment to create an aesthetically pleasing user interface.

Assessment objective: Evaluate

Paper 1

#### **Question 14b**

This question required students to evaluate a stimulus to determine the data exchange components required for the app and explain the relationship between them. The three data exchange components include a user interface or presentation component, a server interface or logic component, and a data interface or data component.

- determined a user interface or presentation component, a server interface or logic component and a data interface or data component
- provided a discerning explanation of the relationship between all the components.

These student response excerpts have been included to:

- demonstrate responses that determine the data exchange components for the app with discerning explanations of the relationship between the components.
- show valid variations for responses that demonstrate knowledge and understanding of components of a data exchange components.

Evaluate (6 marks)	Excerpt 1
data exchange components	A data exchange component necessary is the use of JSDN or XML
<ul> <li>explanation of the relationship between components</li> </ul>	to exchange tournament data from across the world to a central
	database on a server. This data would also need to be displayed
	in a readable format on the website. JSON data is quick to
	read and write and is easily parsed as well as well as usable in
	a variety of programming languages. Thus, JSON is the most suitable
	data format. When data is transmitted from one network to
	another, it is necessary that this data be encrypted to ensure
	contidentiality, integrity and availability. A suitable envryption
	method would be RSA, which is used in SSL/TLS and so could
	be easily implemented as a means of securing the transport of data. In
	addition to match, team and schedule data being stored on a central
	database, users must also be stored to allow for the sign up/login
	process. This data must also be encrypted for transmission. Storing
	plaintext passwords in a database is considered inserving thus hashing
	ments recessary for storage. Standing is a suitable hashing
	function which will produce a fixed-length hexadecimal digest
	for each passwork to store in the dutabase. The last aspect which
	must be considered is how data is displayed in the bruser for
	users of the application. The data must be displayed in a readable
	format on all browsers. It is also worth noting than API would be
	a useful to component of the data exchange pas a REST ful service.
	would allow statelys requests responses between esports townsments
	around the world and the central sources

Evaluate (6 marks) Excerpt 2 • determination of three Databases regulaed: or teams-info, schedule, user-information, data exchange components Letast\_ results. · explanation of the relationship between Arm. Administrators must be able to see and update all components tables in the database. database must be hosted on a web server and namet be The users can request the web server for data through the web application. latest results must include teams that exist teams-info. One entry of team name in table many entries in latest results. team\_info Administrators can also use the neb application to update data. It Any updated data will be de automatica 4 displayed on all user's screens. Users will be able to create new entries for the asor-information table by signing up. will need a device, connected, to the internet, to view Users data any

Assessment objective: Recommend and justify

Paper 1

#### **Question 14c**

This question required students to make three justified recommendations, based on survey feedback provided as a stimulus, to improve data security of the system described in the stimulus.

- recommended password input, user-level access, and password management security measures
- logically justified all three recommendations.

This student response excerpt has been included:

• to demonstrate recommendation of security measures that directly address survey feedback with logical justification.

Recommend (3 marks)	Excerpt 1
three recommendations for improving data security	Recommendation and justification 1: To rectify the password being visible to others when logging in, it is suggested that a "hide passwords" but to have a implemented to allow the user that a stimula to
logical justification of recommendations	Whether their password should be visible. This would be implemented through characters displaying as "*" in the passwords field. This would improve data security by ensuring the contidentiality of data. Recommendation and justification 2: It is recommended that a reset password burton be implemented. This would then yead an email to the user dillowing them to reset their password. According to the Australian Privacy Principles, users must be able to modify their personal intermation. Thus, this is the there is a necessity.
	Recommendation and justification 3: Another recommendation is to only display the "input" and "continu" buttons if the user is logged in with administrator privileges. This would resolve the contusion around being unanthorised. This would improve dota security as the presence of these buttons when unauthorised could potentially allow for unitended manipulation of Anta if this unauthorised for was comehow bypassed.

Assessment objective: Symbolise and justify

Paper 1

**Question 14d** 

This question required students to symbolise four changes to the login view of a user interface provided in the stimulus. The changes needed to address all useability issues identified in the stimulus. Students were required to justify how useability principles have informed their changes.

Effective student responses:

- symbolised password reset and show/hide features, removal of the close button or login window, and clear differentiation between login and sign-up features
- justified how useability principles informed all four changes.

These student response excerpts have been included:

- to demonstrate responses that symbolise four changes to the user interface which address all usability issues identified in the survey feedback, with justification
- to show valid variations of responses for symbolising and justifying changes to user interface.

Symbolise (4 marks) Excerpt 1 · symbolisation of four changes that address Match Manager App all useability issues Justify (4 marks) · justification of changes against useability principles ~0G in Porthave an account? Isian Mai hide work? assword Log i٨ 10/901 7 PASSWord To improve safety, the cross button was removed entirely. This provents the potential for user error. To improve the effectiveness of the user interface one chear option for signing up was presented, as having two buttens for sign up was ineffective and unefficient. To improve the utility effectiveness of the application, a veset button was A his additional functionality allows users use the application external mout Aceding attractor intervention to reliticy the issue. adding the hide password is improved button, sately allowing the user to consent to the password being visible during To remove confusion with regard to learnability, login was made a single page not including sign up as well.



#### Practices to strengthen

It is recommended that when preparing students for external assessment, teachers consider:

- more opportunities for students to practice using knowledge by explaining how subject matter applies in a given context. Students should know the difference between defining, describing, and explaining, e.g. explaining how the principles of visual communication have informed changes to a user interface as opposed to defining the principles or describing how they have been used through observation
- revising syllabus conventions for pseudocode, mainly indentation and END type statements, and data flow diagrams, e.g. verbs for processes and nouns for data flows
- reviewing useability principles to ensure students understand them: safety was often misunderstood for security.