NZQA
New Zealand Qualifications Authority
Mana Tohu Matauranga O Aotearoa

Assessment Report

Level 2 Technology 2016

Standards 91358 91359 91360 91363 91367 91371

91358: Demonstrate understanding of how technological modelling supports risk management

Candidates who were awarded **Achievement** commonly:

- utilised their own practice in their reports, or explained a case study in relation to their own practice
- used different sorts of functional modelling and/or prototyping, explaining its relevance to their final outcome
- identified multiple stakeholders or used a few, but with clear and differing feedback requirements that managed risks appropriately
- talked about how stakeholders influenced their outcomes at particular points in the technological process
- talked about types of modelling for particular stakeholder types
- wrote about what “could” be done technically alongside what “should” be done at key stages of their product development.

Candidates who were assessed as **Not Achieved** commonly:

- wrote about an outcome that they had arrived at without risk, discussing their “practice” skills rather than understanding risk management
- identified themselves as the client or stakeholder
- completed reports using online case studies or resources, often with no student voice, practice, or understanding
- utilised writing frames that limited their success.

Candidates who were awarded **Achievement with Merit** commonly:

- structured their report in a logical order, with good formatting and images that were referenced/labelled and relevant to practice

- discussed multiple types of modelling linking to stakeholder feedback and/or to managing risks
- talked about how severe or benign the risk was after modelling and stakeholder input
- referenced a risk matrix they had used throughout their project
- explained how their technological modelling was affected by what “could” be done technically at different stages of their outcomes development
- practice was supported by the discussion of the “should” aspects often including economic, time allocations, meeting brief, and specifications to assist completion of their outcome.

Candidates who were awarded **Achievement with Excellence** commonly:

- discussed valid and reliable stakeholders as those who had certain expertise – for example, as their experience in the field would give them more validity
- talked about stakeholder groups and types of modelling that were tailored to meet outcomes development
- synthesised modelling, risk management, and stakeholder input into a cohesive report, often with a strong conclusion to support their understanding.

Standard-specific comments

Reports were generally well presented. Most reports were computer-generated and met the specifications with regard to font size and length. There were a number of reports with images missing.

Where there was an absence of headings, structure, and general clarity in candidate writing, it was difficult to identify understanding. Candidates who submitted poorly structured reports that did not communicate understanding were less likely to achieve.

Some candidates used a provided template or list of headings for their submission. Where these templates were complete and well-structured, based on the headings in Explanatory Note 2 of the standard, they were more likely to be successful. In a number of cases, these templates were not complete and made it impossible for the candidate to achieve the standard.

Reports completed using PowerPoint format were usually not successful. These were often case study slide shows with limited candidate input.

In some cases, a portfolio of work was designed to meet the requirements of internal assessments. A number of these reports had well-executed designs, but it was not always clear to markers which evidence was relevant to 91358. Moreover, these assessments often contained small scanned images of larger workbooks that were illegible and added no value to the report as a whole.

Most successful reports began with a general introduction that showed understanding of functional modelling and/or prototyping. This understanding was further elaborated later in the report. Candidates who could not clearly differentiate between these two components of modelling did not achieve.

Explanatory Note 3 of the standard contains the term ‘prototyping’. Successful reports did not need to contain discussion or explanation regarding a prototype. An understanding of the process of prototyping is, however, required to meet the standard.

Successful reports often contained a discussion of the candidate's own practice, supported by professional technologists, or more theoretically based evidence, to demonstrate the candidate's understanding of modelling together with an analysis of the risks managed.

Reference to 'stakeholders' was made in almost all reports. Successful reports explained the role of the stakeholder(s), their influence in the product development and the point in the modelling process where different stakeholders were used. The mention of generic stakeholders or only of self, without reference to their role in the modelling process, often led to a Not Achieved grade.

Candidates who used experts in their fields and discussed in depth why, what, and how their chosen stakeholders would add reliable feedback met the criteria for Excellence.

The term 'risk' in the standard title refers to the risk associated with the successful development of a product. It does not refer to workshop safety, food safety, or other related risks. The 'reduction of risk' is certainly an important part of this standard. A discussion as to how modelling guided the reduction and/or management of risk is required, and for a Merit grade the type, severity, and probability of risk must also be included. It is not sufficient to state that a particular modelling process allowed the 'reduction of risk' without further discussion, identification, and elaboration.

Candidates who wrote about Code of Practice needed to provide enough details for the marker to see the relevance or discuss how this linked to modelling and the managing of risks related to their outcome.

Case studies of practising technologists were a feature of many submissions. These case studies are not required and were very rarely useful. Case studies can be successful only when supported by discussions on different forms of modelling, risks, and stakeholder involvement/feedback with explanations of what "could" and "should" be done at key stages of outcome development. They should not just be appropriated information from online sources.

The terms "could" and "should" from the explanatory notes were often not addressed well by candidates. The term "could" relates to what is technically feasible/possible identified by the modelling process to create/develop a successful outcome, whereas "should' will contain the possible contextual and/or future aspects identified during the modelling process. These factors could be economic, time restraints, or meeting specifications to larger more global issues like the consideration of manufacturing capability, economic viability, social acceptability, sustainability, and ethics.

In all cases, a holistic evaluation of candidate submissions was made. Areas of strength were sometimes sufficient to compensate for weaknesses in another part of a submission.

91359: Demonstrate understanding of the role of material evaluation in product development

Candidates who were awarded **Achievement** commonly:

- presented basic or minimal research about properties of materials
- showed some evidence of material testing, but this was not always relevant to the outcome or specifications
- reported on the testing of materials that were to be used in the outcome.

Candidates who were assessed as **Not Achieved** commonly:

- did not write a brief or specifications linked to the material evaluation or outcome
- did not show evidence related to the performance properties of materials, e.g. changed recipes in food contexts or joints in wood products
- wrote their report on modelling (AS91358) rather than material testing (AS 91359)
- included a large amount of information from the Internet but did not link this information to their own project or decision-making.

Candidates who were awarded **Achievement with Merit** commonly:

- explained the performance properties of the outcome
- explained why different material evaluation procedures were undertaken and how this impacted on the choice of materials that they used in their outcome
- indicated maintenance and disposal concerns of their outcome but did not develop these in depth or they were not relevant or specific to their materials and/or outcome
- explained why the evaluation procedures performed on a material were relevant to the performance specification to the material evaluation
- used a range of information, including information gathered from their stakeholders, to inform the material selection of their outcome.

Candidates who were awarded **Achievement with Excellence** commonly:

- discussed the relationship between performance properties and performance specifications throughout their report as well as the specifics of maintenance and disposal in relation to their outcome
- wrote clearly, concisely, and logically about the ‘journey’ of making the outcome and how material evaluation influenced their decision-making for their outcome
- included a conclusion that linked the final outcome to the brief and how the role of material evaluation influenced their product development
- demonstrated a full understanding of what they had learnt about the materials they had tested as part of their research into meeting the brief/specifications
- stated the properties of the materials and why these materials were chosen in relation to the performance specifications of the final product
- testing was specific to the outcome/specification such as weather-proof product for a bedside cabinet and not just a report of what the class had done testing on.

Standard-specific comments

Overall, there was a significant improvement in the quality of the reports provided from many schools.

Successful candidates had clear project/outcome specifications which set the scene for the rest of the report. This was then linked throughout the report to their testing, results, properties of materials, and final decision making.

Where case studies or Internet information was used, it needed to be linked to the student's brief, the performance indicators of the materials being used, and the outcome, or there needed to be evidence of demonstration of knowledge and understanding around material properties and testing.

Tables are a clear and concise way of displaying and comparing and contrasting materials with the results of testing; however, the information provided needs to be relevant to the headings and should be set up in a way that does not restrict how much information can be provided.

Candidates are reminded that:

- information from other standards such as prototyping should not be included
- headings are helpful as long as the information under the heading is relevant
- quality is more important than quantity.

91360: Demonstrate understanding of redundancy and reliability in technological systems

Candidates who were awarded **Achievement** commonly:

- selected an appropriate technological system or systems to report on
- described the application of redundancy to a specific technological system
- described the application of reliability to a specific technological system
- understood redundancy as duplication of function
- understood reliability as consistency of function
- provided clear evidence using technical details
- described the social, cultural, and/or environmental importance of reliability and redundancy.

Candidates who were assessed as **Not Achieved** commonly:

- had a limited understanding of what a system is
- misunderstood the meaning of redundancy
- wrote in general terms about redundancy and/or reliability without linking it to a specific technological system

- had an imprecise understanding of a technological system; sometimes candidates reported on organisational systems such as people making backup copies of data
- reproduced technical detail without linking it to redundancy or reliability.

Candidates who were awarded **Achievement with Merit** commonly:

- explained why decisions regarding redundancy were made in the development of a specific technological system
- explained why decisions regarding reliability were made in the development of a specific technological system
- made the links explicit in the development stages of a specific technological system to redundancy and reliability.

Candidates who were awarded **Achievement with Excellence** commonly:

- discussed how redundancy and reliability implications influenced design and maintenance decision-making in the development of a system.

Standard-specific comments

Generally, candidates presented their work in a suitable manner, most providing submissions on A4 pages within 10-page limit. Candidates who submitted fewer than 10 pages were not disadvantaged.

Reports on grade boundaries were often not improved by using 10 pages. Generally, the reverse was true, with candidates presenting material they did not understand in an apparent attempt to fill up the report. This frequently worked against the candidate.

Candidates should restrict their report to what they really do understand.

Candidates were required to demonstrate their understandings of redundancy and reliability in technological systems. Candidates chose from a wide range of appropriate systems. Candidates who based their reports on existing, rather than their own, electronic systems generally did better because the candidate’s own practice seldom included the redundancy aspects of systems required to meet the standard.

Candidates who purposefully chose systems where there was sufficient information on the design and maintenance aspects of technological systems did well. When choosing systems to write about in the report, candidates need to make sure that they have access to all the information they need.

Many candidates did not satisfactorily cover the design and maintenance aspects; those who did presented information on aspects such as automatic detection and indication of errors, systems that can automatically correct errors, extra reliability or redundancy to avoid human input, and features of the systems that assisted maintenance personnel.

Many candidates included diagrams and images but seldom referred to these in their explanations. Images and diagrams should be strategically used to support candidates own explanations and discussions.

Many candidates did not satisfactorily reference their work where this was required.

91363: Demonstrate understanding of sustainability in design

Candidates who were awarded **Achievement** commonly:

- described a Life Cycle Analysis (LCA) model and the Sustainability Venn Diagram and then used these to inform their own Technological Practice and/or critique a product and the practice of others
- described how design decisions or interventions could increase the sustainability of a product
- described how life cycle analysis of an outcome enabled them to identify innovative practice that addressed social, economic, or environmental concerns and could contribute to, and enhance, product sustainability.

Candidates who were assessed as **Not Achieved** commonly:

- included models of Life Cycle Analysis (LCA), Cradle to Cradle and/or the Sustainability Venn Diagram but had no descriptors and showed limited understanding
- described Life Cycle Analysis (LCA) but with limited evidence that informed the considerations to determine the focus for design interventions
- focused on Fairtrade and ethics rather than sustainability in design
- produced a report that was limited to how and why materials may be produced, recycled, or reused, or limited their report to explanations about how to prolong the life of an outcome
- described the life cycle of a material such as cotton, plastic. or aluminium without incorporating ‘design’
- produced a report where large sections were “cut and paste”, with no student voice or discussion of own technology practice.

Candidates who were awarded **Achievement with Merit** commonly:

- explained how Lifecycle Analysis (LCA) influenced innovations made by designers in case studies
- submitted evidence derived from their own Technological Practice and conducted an LCA of an existing product and explained the focus for design innovation. This knowledge was often applied within their own development of a sustainable technological outcome
- explained how the competing priorities and compromises were managed within the development and lifecycle of a sustainable technological outcome
- showed an in-depth understanding of sustainability in design – in particular, design decisions that impacted on the sustainability of the outcome (both positive and negative).

Candidates who were awarded **Achievement with Excellence** commonly:

- emphasised the competing priorities and compromises made as a result of life cycle analysis in the development of a sustainable technological outcome. This was often evident within naturally occurring evidence where a student was required to address dilemmas and balance in different aspects of the LCA; conflicting social, environmental, and economic factors; and demands within their own practice

- discussed how life cycle analysis can influence a technologist's design decisions to improve the social, economic, or environmental sustainability of an outcome
- discussed their own technological practice, and that of another technologist's, in relation to sustainability in design
- included a high level of independent voice and reflective comment on their practice that justified the compromises made and illustrated, and demonstrated an understanding of sustainability in design.

Standard-specific comments

Gains in overall achievement were most evident at the higher grades.

Successful candidates explored Life Cycle Analysis (LCA) and used the 'Sustainability Venn Diagram' to identify areas where economic, environmental, and societal related factors could be influenced and resolved by innovative design decisions to increase the sustainability of a product. Often candidates were able to identify alternatives that would increase the sustainability of a product, both within their own technological practice and/or in the practice of others.

Successful candidates also used the "Venn Diagram" to identify viable, bearable, equitable and sustainable considerations that impact on a designer's decision-making process, and how these impacted on the life cycle of the product.

A considerable number of candidates reported on life cycle analysis without showing evidence of understanding of life cycle assessment as a method for assessing the environmental aspect of a product through its life cycle.

A common issue was candidates stating, inaccurately, that 'the product meets the LCA', where LCA is an assessment of all the outputs and inputs into a product's life from raw materials to its disposal.

It is essential that the candidate's chosen context aligns with the achievement standard and enables the candidate to demonstrate an in-depth understanding of sustainability in design.

Reports that followed a template often enabled candidates to gain achieved grades; this did, however, limit higher achievement. Candidates would benefit from a report structure that included, innovation, competing priorities, compromises, and relevance to either their practice or the practice of others.

Reports would benefit from being proofread for consistency. Candidates should ensure that all report writing guidelines are adhered to as there were instances of font sizes enlarged, and margins being extended.

91367: Demonstrate understanding of advanced concepts relating to managing shared information within information

systems

Candidates who were awarded **Achievement** commonly:

- identified and explored a real existing system within a real existing organisation, most commonly KAMAR SMS or Google Drives within school settings
- reported real details about each of the systems within the organisation with focus on the processes and procedures in the organisation
- briefly listed hardware and software for an information system, and described their functions
- identified users of the information system and described, access rights and permissions, privacy requirements, and management of legal issues such as copyright within the organisation
- described both the legal and ethical considerations present in an organisation, and the related procedures and policies employed by the organisation to ensure that the privacy processes and appropriate permissions were applied
- described the organisation's backup procedures/conventions
- explained the organisation of the above concepts within processes that manage data to the point where it became information fit for specified purposes
- stuck to the formatting as suggested by NZQA (i.e 10 A4 pages with normal 2.54 cm margins and font of approx. 12pt).

Candidates who were assessed as **Not Achieved** commonly:

- produced reports that were so poorly structured that it was difficult to extract any relevant information
- reported on commonly used web sites (such as Facebook, YouTube or Tumblr) and were unable to produce the evidence required by the standard
- often reported "assumed" detail for an organisation's procedures
- listed hardware and software without describing how they affected the systems and or processes
- did not identify Input, Output, Storage and Manipulation correctly for data entering a specific information system and outputting as fit for purpose information. Manipulation was often described as correcting data that was incorrectly inputted into the information system
- did not accurately explain how the system took data and turned it into information that was fit for purpose.

Candidates who were awarded **Achievement with Merit** commonly:

- explained how all the advanced concepts (hardware, software, input output, storage manipulation, backup, privacy, permissions) worked together in a process to produce information that was fit for purpose for an organisation
- discussed the advantages and disadvantages of the overall information system in a specific organisation clearly explained the processes within an organisation to manage the permission, etc
- explained the backup and data security process and procedures employed by an organisation and the importance of these

- explained the importance of an organisation's responsibilities with regards to privacy, legal and ethical issues and how the chosen organisation addressed these issues.

Candidates who were awarded **Achievement with Excellence** commonly:

- evaluate the overall information system in a specific organisation
- evaluated effectiveness of information's systems, backup systems and procedures for privacy and permission
- provided comprehensive review of various components of an information system within the context of an organisation requirements for shared information
- could give clear well thought through recommendations for backup procedures and procedures relating to privacy and permission
- clearly explained the processes within an organisation to manage the permission, etc.
- discussed their chosen organisation's information system in detail, evaluating the components, and offered an alternative procedure where they felt it was warranted.

Standard-specific comments

Not all candidates complied with the 10-page limit when submitting their reports. In many reports, the margins were much smaller than the recommended 2.54 cm, and many students used smaller font sizes as well. Where a judgement call was required, candidates who were on the boundary were affected.

The clear majority of candidates again chose their school as the case study. The candidates who chose their school as the case study could achieve this standard as they had ready access to the key staff involved in the management of all the components of their school's information system. Some candidates who chose other businesses also had the same benefits. Candidates who chose organisations such as Facebook or Google were not able to comprehensively discuss backup procedures and legal/ethical issues; in many cases, they made assumptions based on their school's procedures.

Although most candidates could identify and explain data input and output clearly, many candidates failed to show a clear understanding of data manipulation, in particular how raw data is turned into information and reported. Good examples of this included candidates explaining how teachers entered their NCEA assessment grades and then this was turned into school reports and grade point averages.

Many candidates described their school's approach to legal and ethical considerations, but few evaluated the robustness of the school's procedures or suggested alternative processes.

Candidates performed well when they listed the main components of an information system and then discussed the role of each component. Their reports were well structured, and the evidence was easy to locate for markers. Some candidates wasted pages describing the hardware components of their school's computer network without specifically relating this to the school's information system. In some cases, this resulted in commentary on backup, legal, and ethical considerations being shortened as candidates appeared to have limited pages left for these sections.

The key difference between Merit and Excellence grades for many candidates was their ability to evaluate and discuss an organisation's information system rather than explain the significance of the individual components and describe the advantages and disadvantages of each.

Candidates who attained Excellence grades evaluated the components and suggested alternatives that were well thought through and robust. For example, they suggested alternative options for backup such as online as opposed to taking tapes home. Candidates who gave authentic examples attained higher grades.

91371: Demonstrate understanding of advanced concepts from computer science

Candidates who were awarded **Achievement** commonly:

- followed a prescribed template
- laid out work clearly with appropriate headings
- showed understanding of more than one type of data in bits with images to support their understanding
- used in class activities to demonstrate all three encoding concepts
- related encoding to current typical uses
- referred to Neilson's heuristics and related it to one HCI
- showed only the violations of heuristics on a device
- did not attempt the Merit requirements
- failed to evaluate a HCI, rather they just reviewed a HCI
- did not discuss a widely used technology, only discussing a concept.

Candidates who were assessed as **Not Achieved** commonly:

- followed a poorly prescribed template
- described only one or two of the three required concepts of Data Representation, Encoding, and Usability Heuristics
- described only one or two of the three required concepts of encoding: compressing coding, error control coding, and encryption
- described only one way in which different types of data could be represented using bits, such as text, numbers, images, etc.
- lacked detail in their descriptions
- explained an HCI but didn't relate it to Neilson's Heuristics
- had information or examples from CS Field Guide without adding own understanding.

Candidates who were awarded **Achievement with Merit** commonly:

- compared and contrasted different ways in which different types of data could be represented using bits; such as ASCII and Unicode, 8 bit and 24 bit colour, etc. and discussed the implications
- discussed how a widely used technology in common use is enabled by one or more of compression coding, such as JPEG, ZIP, etc, or error control coding such as ISBN, etc; or encryption, such as Internet banking, email, etc.
- observed others using a given human-computer interface, such as a chosen device, software application, etc., so that they could evaluate the HCI against Nielsen's usability heuristics
- used annotated photographic or diagrammatic evidence to demonstrate their understanding
- gave detailed and personalised answers to the questions
- evaluated an HCI, including good and bad things about the HCI.

Candidates who were awarded **Achievement with Excellence** commonly:

- evaluated a widely used system for compression coding, such as ZIP; or error control coding, such as ISBN; or encryption, such as e-mail message encryption techniques
- suggested several relevant improvements to a given human-computer interface based on their evaluation of the HCI in terms of Nielsen's usability heuristics
- did original research beyond what the class was taught
- wrote in their own voice, providing evidence from their own experiences to support any factual or referenced material
- used 'student voice' related to their own investigations to show comprehensive understanding
- produced neatly formatted documents which contributed to their understanding
- conducted personalised experiments to demonstrate their understanding
- gave realistic suggested improvements of an HCI
- showed deep understanding of the concepts, using examples and images to support their discussions and referenced personal experiences in a meaningful way
- laid out their work clearly, with good line spacing
- went beyond what was in the Computer Science field guide.

Standard-specific comments

Candidates who met the specified limits received the grade appropriate to the evidence presented. Where candidates repeated material from sources without using the information to establish understanding the evidence, or, appropriate referencing, the evidence did not establish understanding.

Candidates who could demonstrate understanding of advanced concepts had been provided with interesting and relevant in-class activities and could talk about their own experiences. They had done further research and used correct terminology.

The personalisation of students' submissions is reducing, as teachers rely too heavily on the Canterbury University Computer Science Field Guide.

Technology subject page