

**QQI**Quality and Qualifications Ireland  
Dearbhú Cáilíochta agus Cáilíochtaí Éireann

## Report of the Programme Evaluation Panel

|   |                                 |
|---|---------------------------------|
| <b>Provider's Name:</b>                       | National College of Ireland     |
| <b>Address:</b>                               | Mayor Square                    |
|   | IFSC                            |
|   | Dublin 1                        |
|   |                                 |
| <b>QA procedures agreed on:</b>               | 2006                            |
| <b>QA procedures reviewed on:</b>             | 2010                            |
|   |                                 |
| <b>Programme submitted for approval*:</b>     | <b>Leading to the award of:</b> |
| 1. Bachelor of Science (Honours) in Computing | Honours Bachelor Degree         |
| 2.  |                                 |
| 3.  |                                 |
| 4.  |                                 |
| 5.  |                                 |
| <b>Date submitted to QQI:</b>                 | 11 <sup>th</sup> April 2016     |
| <b>Date of Evaluation:</b>                    | 16 May 2016                     |
| <b>Date of Report:</b>                        | 16 May 2016                     |

### Membership of the Programme Evaluation Panel:

| <b>Role</b>                          | <b>Name</b>           | <b>Area of Expertise</b>                   | <b>QQI Peer Review Reference Listing</b> |
|--------------------------------------|-----------------------|--|--|
| <b>Chairperson</b>                   | Dr Joseph Ryan        | Registrar, Athlone Institute of Technology |  |
| <b>External Specialist</b>           | Prof Christian Horn   | Dundalk Institute of Technology            |  |
| <b>External Specialist</b>           | Dr Liam Noonan        | Limerick Institute of Technology           |  |
| <b>Industry/Employer Perspective</b> | Mr Derek Harnett      | Intel                                      |  |
| <b>Rapporteur</b>                    | Dr Maurice FitzGerald | National College of Ireland                |  |



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## 1 Profile of provider:

The National College of Ireland (NCI) has an immensely proud history as a third level educational institution. Established by the Jesuit order in 1951 as the Catholic Workers College it quickly gained recognition for excellence in its subject fields, particularly human resource management and industrial relations, and for the provision of high quality educational opportunities for employees entering third level education. In the late 1990's the College became the National College of Ireland and entered a new phase of its development expanding its part-time provision to a number of off-campus locations throughout the country and extending its full-time undergraduate programmes to include accountancy, finance and informatics. In 2002 the College moved from its original site in Ranelagh to a new 'State of the Art' purpose built premises in Dublin's International Financial Services Centre.

NCI's educational philosophy and operational structure embody participation, collaboration and applied problem solving strategies. These are enabled by a faculty whose qualifications and professional experience help integrate academic theory with current practical application. The College assesses both the quality of its academic programmes and the academic achievement of its students and utilises the results of these assessments to improve academic and institutional quality.

The primary focus of NCI is on maintaining a centre of excellence that is centered on the changing needs of today's learner. National College of Ireland provides a broad range of high-quality education programmes for today's knowledge-based society.

In line with its mission of widening access to education, the College places a strong emphasis on the needs of the learner, bringing a unique student-centered approach to all aspects of its teaching and research. National College of Ireland provides a range of learning options that extend beyond traditional classroom dynamics, including distance learning and internet-based learning programmes.



## 2 Context of validation

The BSc in Computing was last programmatically reviewed in 2014/15 with 5 elective streams. In order to accommodate the evolving nature of the Computing discipline, the College wishes to introduce three additional elective streams to the programme.

- Internet of Things, (Group Elective 6)
- Cyber Security, (Group Elective 7)

These specialisations complement the existing programme and the suite of specialisations already validated in the area of Mobile Application Development, Software Development, Cloud Computing, Mobile Cloud Gaming and Computing Infrastructure.

In addition, as a result of the most recent Springboard call for tenders, an additional elective module – Domain Skills – has been included in the schedule. This module has been designed to accommodate localised requirements of specific companies or sectors who may wish to offer the programme in-house or to recruit candidates with a specific skillset.

In accordance with QQI Criteria and Policy for Validation, these amendments have been proposed to be considered under differential validation. The report below therefore reflects the consideration of the panel on those elements of the programme that have been amended.

## 3 Planning:

*Programme development since agreement of QA procedures / the last review*

The College has developed a significant number of programmes since its last institutional review culminating in 2015 with a complete programmatic review of its portfolio across the Business, Computing and Education subject areas.

### 3.1 Purpose of the award

*Does the proposed programme address a clear market demand?*    Yes✓        No

The **IoT** elective group comprises a suite of modules which enables the learners to obtain specialised knowledge and technical skills in the area of Internet of Things. In particular, the IoT principles module imparts knowledge of underlining technologies, and the potential impacts of the many machine to one human paradigm. This core theoretical basis is augmented by Fundamentals of Mobile Communication module. IoT is inherently a physical computing domain, as such IoT Software Development serves as the primary practical module for the stream. Therein, the learner will gain experience in building reusable and bespoke IoT software. It was a natural fit to incorporate the existing Multimedia and Mobile Application Development module in the curriculum. Mobile phones, tablets, and wearables are key candidates for M2M communication with constrained devices. The judicious use of multimedia is key to providing a fluid interaction experience for the user.

The **Cyber Security** elective group comprises a suite of modules that enables the learners to obtain specialised knowledge and technical skills in the area of Cyber Security. In particular,



the learners would first get grounding in the key concepts from the Security area (e.g. Security principles module) and practical experience in Cyber Security by developing secure applications (e.g. Secure Programming module) and by identifying malware, attacks, issues and discrepancies (Digital Forensics module and Penetration Testing module).

The **Software Quality and Testing** elective group comprises a suite of modules which enables the learners to obtain specialised knowledge and technical skills in the area of Software Quality and Testing. The modules for this stream were designed and developed based on Industry feedback given by SQS, an international Software Quality and Testing provider and trainer, and Irish Software Association. The modules were developed over a series of discussions, and are designed to meet the industry needs of project management, Quality and Testing theory and practical software testing.

### 3.2 Avoidance of duplication

*Has the Programme Development Team identified the availability of similar programmes locally, regionally, nationally?*

Comment: None Yes✓ No

### 3.3 Stakeholder consultation

*Was the level of stakeholder engagement satisfactory?*

Comment: None Yes✓ No

*Support for the programme (industry/business/community)*

Yes✓ No

The programme is satisfied that the rationale for the amendments made have included appropriate consultation. The programme information would benefit from an articulation of the expected role that graduates would undertake for each of the streams added to the programme – particularly in relation to ensuring that the scope of the role is clearly identified. This is particularly true of the Cybersecurity stream.

### 3.4 Efficient and effective use of resources

*Does the proposed programme represent both efficient and effective use of the provider's resources?*

Comment: None Yes✓ No



### 3.5 Resource development over last 5 years (or in direct support of this programme)

*Specific Comments:*

*Staff:* The panel is satisfied that there are appropriate staff employed to deliver this programme.

*Accommodation:* The panel is satisfied that the College's accommodation is appropriate to this programme.

*Information technology:* The panel is satisfied that the College's ICT infrastructure is appropriate to this programme.

*Library:* The panel is satisfied that the College's Library & Information Service is appropriate to this programme.

*Administration:* The panel is satisfied that there are appropriate administrative and programme administration structures appropriate to this programme.

*Publicity/public information:* The panel is satisfied that appropriate marketing and public information materials are available

### 3.6 Planned development over the coming 5 years?

*Have the QQI award standards been explicitly referred to in the programme and does the programme meet those standards at the specified level?*

Yes✓ No

Comment: None

*Has the Provider complied with Protection for Enrolled Learner requirements?*

Yes✓ No

The panel understands that PEL requirements for any learners recruited under HEA labour activation schemes will be provided by the HEA. Otherwise PEL will be provided under an arrangement with HECA which is currently being finalised and will be made available to QQI prior to the enrolment of any learner.

### 3.7 Access

*Is the expected minimum and maximum number of all learners entering the programme explicitly stated?*

Yes✓ No

Comment: None

*Have any/all prerequisite knowledge, skills or competence or any other specific entry requirement been articulated?*

Yes✓ No

Comment: None



## 4 Quality Assurance

### 4.1 Application of agreed quality assurance procedures for development of programmes

*Were the agreed quality assurance procedures for programme development followed?*

Comment: None Yes✓ No

*Has the programme team demonstrated how programme delivery will be monitored in accordance with agreed QA procedures?*

Comment: None Yes✓ No

*Are programme management arrangements adequate and coherent?*

Comment: None Yes✓ No

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## 5 Programme structure and content

*Is the programme structure well designed, coherent and fit for its stated purpose?*

Yes✓      No

The panel is satisfied that the programme structure has not been affected by the amendments proposed for the programme.

### 5.1 Programme learning outcomes

*Do the programme learning outcomes comply with national standards for the level of award proposed?*

Yes✓      No

While the programme learning outcomes have been previously reviewed, the panel requires that the programme learning outcomes are extracted from the mapping table. An exercise should be undertaken to ensure that the taxonomy used is consistently appropriate to the level of the programme and that they can be appropriately assessed at a modular level

*Are module descriptions adequate and relevant?*      Yes✓      No

Comment: None

*Are modules relevant and current?*      Yes✓      No

Comment: None

*Does the combination of modules chosen have the coherence to support the proposed award?*

Yes✓      No

The panel is satisfied that the coherence of the programme has not been affected by the amendments proposed.

### 5.2 Learning Modes

*Can the teaching and learning strategies proposed support achievement of the required learning outcomes?*

Yes✓      No

Comment: None

*Are the delivery mechanisms proposed adequate to the needs of the programme and the proposed learner cohorts?*

Yes✓      No

Comment: None

### 5.3 Assessment strategies

*Are assessment processes and methods adequately described?*      Yes✓      No



*Are these strategies appropriate to this type of award, in terms of type, frequency and volume?*

Yes✓ No

The panel would like to see more detail at a modular level to ensure that it is clear what is expected of the learner and that the assessment is at the appropriate level.

*Is assessment explicitly linked with intended learning outcomes?* Yes✓ No

Comment: None

*Does the assessment strategy underpin the achievement of the relevant standard of knowledge, skill and competence?*

Yes✓ No

Comment: None

## 5.4 Duration

*What is the intended duration of the Programme?*

One calendar year

*What is the lifespan of the programme (e.g. single cohort intake to satisfy limited local demand; multiple intakes over the following 5 years etc.?)*

This programme has consistently recruited since 2010.

*Does the Panel believe this to be realistic?* Yes✓ No

The panel notes that this programme has consistently attracted Springboard and ICT funding.

*Are there flexible modes of participation?* Yes✓ No

Comment: None

## 5.5 Credits

*Is credit allocation in accordance with national and international guidelines?*

Yes✓ No

Comment: None

*Considering the level, outcomes and volume of each module, is the number of credits attached to each appropriate?*

Yes✓ No

Comment: None

*Considering the stated objective of the programme is the number of credits attached to the award appropriate?*

Yes✓ No

Comment: None



### 5.6 NFQ Level

*Is the proposed level of the programme in accordance with institutional policy/national norms?*

Comment: None Yes✓ No

### 5.7 Programme titles and award

*Is the title consistent with national policy, is it informative and is it fit for purpose?*

Comment: None Yes✓ No

### 5.8 Transfer and Progression

*Has the Programme Development Team identified realistic transfer and progression opportunities/possibilities that learners may avail of following achievement of this award?*

Comment: None Yes✓ No

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## 6 Module Titles, Content and Assessment Strategy

### 6.1 Domain Skills

*Is the title informative and is it fit for purpose?* Yes✓ No

The panel recommends that as this concept is being introduced across a number of programmes, the title of the module should related at minimum to the subject area e.g. Domain Skills for Web Technologies.

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

*Is the content sufficiently informative and is it fit for purpose?* Yes✓ No

Comment: None

*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

Yes✓ No

The parameters for the assessment of this module should be reviewed to ensure that it is scalable and that consistency can be achieved.

*Is the required reading and supplementary reading appropriate, current and realistic?*

Yes✓ No

Comment: None

### 6.2 Internet of Things (IoT) Stream

**The panel accepts the inclusion of this stream/group elective**

#### 6.2.1 IoT Principles

*Is the title informative and is it fit for purpose?* Yes✓ No

Comment: None

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

*Is the content sufficiently informative and is it fit for purpose?* Yes✓ No

In order to facilitate the evolving nature of this subject matter, a placeholder should be set in the module descriptor for 'emerging trends.'



*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

The assessment strategy for the module should be made more specific rather than an outline of what may be used. Yes✓ No

*Is the required reading and supplementary reading appropriate, current and realistic?*

Comment: None Yes✓ No

### 6.2.2 IoT Software Development

*Is the title informative and is it fit for purpose?* Yes✓ No

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed Yes✓ No

*Is the content sufficiently informative and is it fit for purpose?* Yes✓ No

The panel and the programme team had significant discussion over the programming language in use for this suite of modules. The panel is of the view that learners should be exposed to C++ to enable the learners to benefit from this

*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

The assessment strategy for the module should be made more specific rather than an outline of what may be used Yes✓ No

*Is the required reading and supplementary reading appropriate, current and realistic?*

Comment: None Yes✓ No

### 6.2.3 Data Mining & Visualisation Principles

*Is the title informative and is it fit for purpose?* Yes✓ No

Comment: None

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed Yes✓ No

*Is the content sufficiently informative and is it fit for purpose?* Yes✓ No

Comment: None



Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

Is the required reading and supplementary reading appropriate, current and realistic?

The book list should be standardised to include year of publication

Yes✓ No

Comment: None

### 6.2.4 Multimedia and Mobile Application Development

Is the title informative and is it fit for purpose?

Yes✓ No

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose?

Yes✓ No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓ No

Comment: None

## 6.3 Cybersecurity Stream

The panel accepts the inclusion of this stream/group elective

### 6.3.1 Security Principles

Is the title informative and is it fit for purpose?

Yes✓No

This module was previously titled 'Business and Network Security'

Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

Is the content sufficiently informative and is it fit for purpose?

Yes✓ No



Comment: None

*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

*Is the required reading and supplementary reading appropriate, current and realistic?*

Yes✓ No

Comment: None

### 6.3.2 Secure Programming

*Is the title informative and is it fit for purpose?*

Yes No✓

The panel is of the view that this module should be sufficient distinguished from the module delivered on the Higher Diploma in Science in Computing due to the differences of the cohorts taking the module..

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

Yes✓ No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

*Is the content sufficiently informative and is it fit for purpose?*

Yes✓ No

Learners should be exposed to C++ programming in order to benefit most from taking this stream.

*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

Yes✓ No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

*Is the required reading and supplementary reading appropriate, current and realistic?*

Yes✓ No

Comment: None

### 6.3.3 Penetration Testing

*Is the title informative and is it fit for purpose?*

Yes✓ No

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

Yes✓ No



The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

*Is the content sufficiently informative and is it fit for purpose?*      Yes✓      No

Comment: None

*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

Yes✓      No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

*Is the required reading and supplementary reading appropriate, current and realistic?*

Yes✓      No

Comment: None

### 6.3.4 Digital Forensics

*Is the title informative and is it fit for purpose?*      Yes✓No

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

Yes✓      No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed

*Is the content sufficiently informative and is it fit for purpose?*      Yes✓      No

Comment: None

*Does the Assessment Strategy align sufficiently with the intended learning outcomes?*

Yes✓      No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

*Is the required reading and supplementary reading appropriate, current and realistic?*

Yes✓      No

Comment: None

### 6.3.5 Advanced Secure Programming

*Is the title informative and is it fit for purpose?*      Yes✓No

*Are the specific learning outcomes a) properly stated, b) sufficient and c) achievable?*

Yes✓      No

The taxonomy used for the module learning outcomes should be reviewed to ensure that they are appropriate to the level and can be appropriately assessed



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Is the content sufficiently informative and is it fit for purpose?      Yes✓      No

Comment: None

Does the Assessment Strategy align sufficiently with the intended learning outcomes?

Yes✓      No

The assessment strategy for the module should be made more specific rather than an outline of what may be used

Is the required reading and supplementary reading appropriate, current and realistic?

Yes✓      No

Comment: None

## 7 Specific Issues to be addressed by the provider

### 7.1 Conditions of Approval:

- C1. Programme learning outcomes should be separately listed in the documentation. An exercise should be undertaken to ensure that the taxonomy used for these outcomes is consistently appropriate to the level of the programme and their articulation allows the module to be appropriately assessed.
- C2. Module learning outcomes need to be written using a suitable taxonomy (i.e. the verbs employed must be appropriate to their level)
- C3. In turn, there needs to be real alignment and clarity on the one hand regarding how module learning outcomes are assessed and, on the other, that there is appropriately detailed and varied assessment (and reassessment) strategies at module level (as well as across programmes as a whole).
- C4. The assessment approach for the *Domain Skills* module should be reviewed to ensure that it is scalable and standards are consistent.
- C5. The '*Secure Programming*' module should be clearly differentiated from the similar module on the Higher Diploma in Science in Computing.
- C6. The *Principles of Internet of Things* module should include an emerging technologies section should be included in the module to allow for the rapidly evolving nature of the subject
- C7. A graduate profile for each of the additional streams should be outlined which clearly identifies the scope of the award and specialism for both learner & employer

### 7.2 Recommendations:

- R1. Various typos occur throughout the paperwork but, given the fact that these documents constitute a public record, the many uses to which this paperwork can be used beyond this evaluation panel, etc., these should be eliminated as a matter of course.



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- R2. Consider the titling of the Domain Skills module so that it accurately reflects its intent when applied across multiple programmes and/or subject domains.
- R3. Learners should be exposed to C++ programming where they are taking the Internet of Things or Cybersecurity streams.
- R4. Reading lists for all modules should be reviewed to ensure currency and that sufficient supplementary reading is cited.

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## 8 Overall Result of Evaluation Panel Review:

The Programme is recommended to the Programmes and Awards Executive Committee for approval subject to the provision to QQI of a revised submission document including programme schedule(s), which addresses the conditions and recommendations required in the report and which has been signed off by the Panel Chair if necessary.

This report has been agreed by the Evaluation Panel and is signed on their behalf by the Chair.

Panel Chairperson:

Dr Joseph Ryan

Date: 1<sup>st</sup> June 2016

Signed \_

Date \_

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*While QQI has endeavoured to ensure that the information contained in the Report is correct, complete and up-to-date, any reliance placed on such information is strictly at the reader's own risk, and in no event will QQI be liable for any loss or damage (including without limitation, indirect or consequential loss or damage) arising from, or in connection with, the use of the information contained in the Report of the External Evaluation Panel.*



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## Appendix 1: Staff

| Staff Name           | Role  |
|----------------------|---|
| Mr Michael Bradford  | Lecturer                                    |
| Dr Dominic Carr      | Lecturer                                    |
| Dr Adrianna Chis     | Lecturer                                    |
| Mr Sam Cogan         | Computing Support Tutor                     |
| Mr Oisín Creanor     | Associate Lecturer                          |
| Mr Ron Elliott       | Associate Lecturer                          |
| Dr Mike Goldrick     | Learning Support & Development Officer      |
| Dr Paul Hayes        | Lecturer                                    |
| Dr Arghir Moldovan   | Associate Lecturer                          |
| Ms Lisa Murphy       | Lecturer                                    |
| Mr Eugene McLaughlin | Associate Lecturer                          |
| Dr Eugene O'Loughlin | Lecturer                                    |
| Ms Sinéad O'Sullivan | Director of Quality Assurance               |
| Dr Pramod Pathak     | Dean of the School of Computing             |
| Dr Anu Sahni         | Lecturer                                    |
| Frances Sheridan     | Lecturer                                    |
| Dr Paul Stynes       | Vice Dean, Academic Programmes and Research |