



ETITO

INDUSTRIAL  
MEASUREMENT AND  
CONTROL RESEARCH  
FINDINGS

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## 1. Background

These are the findings of the research carried out on the role and context of instrument technicians<sup>1</sup> who engage in the National Certificate in Industrial Measurement and Control (Level 4). The research objectives were:

- To identify broad issues in the workplace and learning environment that impact on the current and future skill needs for instrument technicians
- To gather descriptive information to support the upcoming review of the National Certificate in Industrial Measurement and Control (Level 4)

Legislation passed in 2002 requires Industry Training Organisations to take on a new leadership role in matters relating to current and future skill needs by:

- Identifying current and future skill needs
- Developing strategic training plans to assist industry to meet those needs
- Promoting training that will meet those needs to employers and employees

The findings of this research will contribute to these three processes, which are commonly referred to as the Industry Skills Strategy.

This research focuses on the current situation and future situation in five broad areas: industry environment, skills and attributes, qualifications, and pathways and support systems. Each of these areas covers the following:

- **Industry environment** - addresses the broad issues impacting on the IMC sector as a whole (e.g. technology) and on instrument technicians more specifically
- **Skills and attributes** - addresses what areas need to be focused on with respect to skills, given the changes that can be anticipated in this sector and the attributes that instrument technicians need in order to be successful in their role
- **Qualifications** - addresses the current status of the National Certificate in Industrial Measurement and Control (Level 4) qualification and identifies some specific areas that could benefit from review
- **Pathways** - addresses the school-to-work transition, qualification and career pathways
- **Support systems** - the systems companies have in place to support the performance of instrument technicians as well as the support offered to them by ETITO, training providers and industry associations

The data collected on these broad areas is the basis for identifying trends and patterns and making recommendations.

These research findings are submitted to the ETITO management team for consideration in accordance with our industry skills strategy. ETITO management team takes responsibility for:

- Distribution of research findings in whole or part to specific audiences
- Any establishment of research groups to follow up recommendations
- Any plans and processes for subsequent interventions in line with ETITO's charter, profile, plans, policies and procedures

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<sup>1</sup> Note that for the purpose of this research the title of 'instrument technician' was used as a generic title to represent a person with Industrial Measurement and Control skills and/or qualifications

## 2. Research Methodology

Consultation was a key method of data collection for this research. This was done by surveys, interviews and telephone and email correspondence as follows. Information was also collected from the internet and ETITO's database.

### 2.1. Survey

Three versions of an online survey were sent to the following groups of people who have been on ETITO's data-base during the last 5 years:

- Employers / assessors
- Completed trainees - i.e. people who have completed the National Certificate in Industrial Measurement and Control (Level 4)
- Current trainees - i.e. people currently doing the National Certificate in Industrial Measurement and Control (Level 4)

Survey questions included selections from a fixed range of responses along with some open-ended questions. Responses were received from:

- 24 employers / assessors
- 11 completed trainees
- 24 current trainees

Employers / assessors who responded to the online survey were from companies that had a range of:

- 0-12 completed trainees
- 0-20 current trainees
- 0-8 instrument technicians with no involvement in the National Certificate in Industrial Measurement and Control (Level 4)
- 2 companies with one female instrument technician each (with all others being male)

(See Table 1 & Graphs 1(a) & (b))

The ethnicity of the 107 instrument technicians referred to in the survey is as follows:

- 0 Pacific Islanders
- 1 American
- 1 Australian
- 1 Indian
- 2 Asian
- 4 South African
- 5 British
- 10 Maori
- 83 European New Zealanders
- 107 Total**

(See Table 2 & Graph 2)

### 2.2. Interviews

ETITO conducted in-depth interviews throughout New Zealand, most of which were face-to-face and one-to-one. A small number of interviews were done in focus groups of two to three people and two interviews were completed by telephone. Each interview ranged in length from one to two hours, depending on the detail provided in response to the questions.

Interviews included a combination of broad and open-ended questions, with prompts which the interviewer asked if there was a need to clarify responses.

Companies were sampled to include a wide range of industries for which process control is of current and future importance. These industry sectors included:

- Dairy / processing
- Building products
- Pulp and paper
- Oil and gas production
- Power generation
- Food and beverage (non dairy)
- Mining and minerals
- Water and waste
- Chemical
- Oil refinery
- Contractors
- Vendors
- Consultants (design)
- Training providers of the current National Certificate in Industrial Measurement and Control (Level 4).
- Tertiary institutions that offer advanced qualifications
- The Institute of Measurement & Control

People interviewed within these industry sectors included users and non-users of the current ETITO Industrial Measurement and Control (IMC) qualification. The following groups of people were interviewed:

• Employers / managers	15 (included 3 non-users)
• Completed trainees	4
• Current trainees	4
• Training providers / other tertiary education	6
• Vendor	1
• Consultant	<u>1</u> (a non-user)
<b>TOTAL</b>	<b>31</b>

### 2.3. Email and telephone correspondence

To establish whether or not career advisors were aware of an instrument technician's role, emails were sent to sixteen CareerCentres across New Zealand. Thirteen career advisors from these CareerCentres responded. However as their email responses did not indicate which centre they represented, it was not possible to pinpoint the geographical location of the centre.

A telephone interview was also done with the Managing Director of Crown Recruitment, who specialises in international recruitment of instrument technicians.

### 2.4. Internet search

The internet was used to search for information in relation to this project using key words such as instrument technician and IMC.

### 3. Industry Environment

#### 3.1. Demographics

##### Current trainees

There are 78 current trainees on the ETITO database

##### Gender

- 100% men
- 0% women

##### Ethnicity

- 88.6% are European/Pakeha
- 6.4% are Maori
- 5% are other ethnic groups
- 0% are Pacific Islander

##### Dual skilling

Electricians are the main feeder into IMC roles. The reason given for this is that electricians that work in an industrial environment get exposed to IMC while doing their job. They see it as an interesting and varied job and one which is better paid than an electrician's job.

Out of 78 trainees

- 90% are dual skilling or have completed the National Certificate in Electrical Engineering [Electrician for Registration] (Level 4) first.

##### Age

- 16-19 years = 11%
- 20-24 years = 28%
- 25-29 years = 8%
- 30-39 years = 26%
- 40-49 years = 22%
- 50 years = 5%

In summary, current trainees are male, predominantly European, involved in dual skilling usually with an electrical qualification first and the majority are 30 or older.

##### Registered on-job assessors

Currently there are:

- 54 assessors
- 27 companies who have registered on-job assessors
- 1 polytechnic with 1 on-job assessor

##### Training providers

There are 28 NZQA accredited training providers of IMC although most are only accredited for some IMC unit standards.

Of these 28 training providers the following were active in quarter one and/or quarter two 2006

- Auckland University of Technology
- Christchurch Polytechnic Institute of Technology
- Waikato University of Technology (WINTEC)
- Tasman Pulp and Paper Company Limited - Learning Systems
- Western Institute of Technology at Taranaki

### 3.2. IMC training uptake

As at July 2006 there was a small uptake of the National Certificate in Industrial Measurement and Control (Level 4) in comparison with the industry utilisation of IMC skills/knowledge.

- 78 trainees are funded through Standard Training Measures (STMs)
- 19 trainees are funded through Equivalent Full Time Students (EFTS)

Some employers do not see the current training funding system as attractive enough to engage in the training of IMC apprentices.

### 3.3. Skill shortage

#### 3.3.1. Instrument technician / IMC skill shortage

Most of those interviewed reported that there is an IMC skill shortage. In fact, 92% said they had difficulty in getting skilled IMC staff. The interviews revealed 40 actual vacancies: thirty from Crown Recruitment, recruiting on behalf of different companies, and ten from specific employers / assessors.

Online survey results for employers / assessors showed that 21.7% had vacancies now and 66.7% said they had difficulty filling IMC vacancies. At least eleven (14%) of the instrument technicians who have qualified in the last 5 years have left New Zealand.

(See Graphs 3 & 4)

#### 3.3.2. IMC is seen as a desirable job by trainees and employers

Online survey results identified:

- Most completed trainees (72.7%) and current trainees (75%) consider that they initiated a move into an IMC role. Most employers/assessors (66.7%) say it is employers/assessors who initiated the move. (See Graph 5)
- Most employers/assessors (70.8%), of completed (81.8%) and current (79.2%) trainees agree that people are not persuaded into an IMC role (See Graph 6)
- Most completed (90.9%) and current trainees (95.8%) enjoy their job and all employers/assessors (100%) who answered this question agreed that an IMC role is a desirable one. (See Graph 7). Responses from interviews are consistent with this as only one interviewee out of thirty-one said it was not an attractive job
- Most completed trainees (90.9%) and all current trainees (100%) plan to stay in their role (or other similar role) for the next 5 – 10 years. The company response regarding the likelihood of retaining IMC staff in their company was 69.9% (See Graph 8)

#### 3.3.3. Importing skilled labour

Instrument technicians are listed on the Department of Labour's Immediate Skill Shortage List (effective 28 November 2005), but are not listed on their Long Term Skill Shortage List. Employers report employing IMC people from overseas and the online survey identified 37.5% of companies employ IMC people with qualifications from other countries. (See Graph 19)

Crown Recruitment advise that instrument technicians entering New Zealand can usually be guaranteed a job within two to three weeks of arrival. This depends on their ability to gain a work permit, qualification approval, and Electrical Worker's Registration Board (EWRB) registration.

Survey responses show that New Zealand has brought instrument technicians in from: Asia, Australia, India, Philippines, Scotland, South Africa, United Kingdom, United States of America and Zimbabwe.

As a good level of English is required to perform an IMC role effectively, importing skilled workers without appropriate written and verbal English skills has proven to be a problem for some companies. There is also the concern that instrument technicians from underdeveloped countries may be

inadequately trained for New Zealand expectations of the role. For this reason, these respondents considered a New Zealand IMC qualification superior.

#### 3.3.4. Unqualified instrument technicians

Some companies have people performing an IMC role with no formal IMC qualification. These people perform the role by virtue of the fact that they 'fell into it' after having completed training for another role (e.g. electrician) and then got exposure to the role through work experience and vendor training.

### 3.4. Low profile

Many people reported that an instrument technician's job is an unknown one, or, not understood by the public, and this makes recruitment difficult. 'Who has heard of becoming an instrument technician for a career?' They (assessors, apprentices and design consultants) also reported that they do not know how to explain their job, whether it be to colleagues, school leavers, or family members.

People in IMC believe that management lacks clarity on IMC roles and the importance of them; particularly given the technological advances that can be expected in the future. There is concern that little planning is being done to meet these future demands by training. Furthermore the perceived issue of an ageing IMC workforce is not being addressed. Little mention is made of career planning for instrument technicians in companies even though there are a variety of career paths available.

Feedback gathered from CareerCentres across New Zealand revealed that only four out of thirteen career advisors knew about the job of an instrument technician. The few who did, indicated that there is a low level of interest and awareness of this job in the community at large.

The Department of Labour does not specify IMC as a unique occupation under the standard classification of occupations in their statistics.

Although web searches showed that there is a lot of vendor type information with respect to IMC equipment on the internet, there were very few articles broadly addressing the this sector and the role of instrument technicians specifically.

### 3.5. Technology

#### 3.5.1. Technology advances

Technological advances in process control will impact on companies with large plants through the introduction of more complex, automated, computerised control systems and will impact on society at large by the embedding of control systems into an increasing number of products.

Vendors are bringing in a large number of different control systems into New Zealand. These different control systems make the standardisation of training difficult, as it is impossible to include content on each one of them in an IMC qualification. For this reason, some industry needs on specific coverage and depth on certain control systems will not be included in training. One suggestion to address this vast range of different systems and to develop expertise in specific protocols is to introduce a New Zealand industry standardisation of protocols.

#### 3.5.2. Impact on the Sector

For companies with large plants, complex control systems are purchased from and installed by overseas contractors. Once contractors complete the installation they typically leave the country, which results in installation expertise remaining with the overseas contractors and no expertise being retained in New Zealand. The net result is that the monitoring, troubleshooting and predictive maintenance on these control systems is then picked up by the instrument technicians working within these companies, with some plants even outsourcing this role to New Zealand contractors.

IMC skills and knowledge for the installation of simple systems will however be increasingly required due to the embedding of control systems into an increasing number of products.

### 3.5.3. Technological changes

It is anticipated that technological changes will continue to happen in the IMC sector and will include the following:

- A shift to more automated processes which will allow greater process control
- Less mechanical, more electronic equipment
- A move from electronic analogue to digital
- Increased reliability and accuracy of equipment which results in the need for less maintenance
- A shift from programmable logic controllers (PLCs) to personal computers (PCs)
- Distributed control systems (DCSs) will be upgraded
- More built in testing (BITE) and increased availability of diagnostic technology which will enable a move away from reactive maintenance schedules to predictive ones
- A move to 'plug and play' (i.e. repair by replacement not by fixing)
- A greater reliance on information technology with a swing to 'real time data' which means there will be greater reliance on information provided by industrial controllers
- A move from manual capturing and analysis of data to computerised systems for data networking
- A greater reliance on alternative communication systems utilising various protocols such as wireless and fibre-optic telemetry. This will also include a move from single to double control loops for the purpose of redundancy.

### 3.5.4. Impact on the workforce

Technological changes will affect the need for instrument technicians in the future. However, there are conflicting views as to whether this demand will be for more, or fewer, instrument technicians.

There is also a conflicting view that instrument technicians with a National Certificate in Industrial Measurement and Control (Level 4) will require more or less, specialised skills levels in the future and that the current qualification may, or may not, need to exist in the future. Higher levels of IMC qualifications or more general qualifications with IMC embedded may be what's required.

As technological changes include more reliable remote communications, instrument technicians will be able to do more remote diagnostic fault finding. Less time in the field will be required, which opens up the possibility of them working from home or offsite.

The introduction of planning, predictive maintenance and troubleshooting systems, will allow a move away from a reactive approach to work to a more proactive approach.

A few employers expressed their preference for individual contracts of employment as such contracts of employment provide for greater breadth and flexibility of work.

### 3.5.5. Workforce organisation

There are conflicting views on the use of IMC contractors versus IMC employees. Some companies report that reduced maintenance will mean that there is less demand for full-time IMC employees and hence their preference is to employ IMC contractors as and when they are needed.

The converse argument is that increasing specialisation of process control systems will mean that contractors will not have the skills required for the specific process control system of each company. Such companies might need to employ dedicated IMC people with skills specific to their company needs.

### 3.5.6. Physical and economic environment

External environmental factors linked to air and water quality, efficient power usage and improved product quality (to keep up with export requirements) influence this sector. The IMC sector therefore

needs to ensure it has the technology available to provide monitoring functions to measure these factors and control product quality and efficiency.

Furthermore, some companies are planning expansion of volume and services. This will impact on the need for more IMC knowledge and skills.

## 4. Skills and Attributes

### 4.1. Skills

Even though technology is changing there continues to be a range of both new and old IMC technologies in the marketplace and this will continue for a long time. Instrument technicians therefore need skills, not only to deal with the new technologies, but skills to deal with old technologies as well. Understanding how old technology works has value as it can form the basis for understanding how new technology works.

In the future, the provision of a more general qualification is seen as a way of accommodating the ongoing changes in technology and a way of 'future proofing' skills learnt. Instrument technicians need to understand the underpinning principles of IMC and to be taught how to transfer their skills from general to specific situations. This will also help them cope with the range of technologies that they might work with.

As processes are becoming more automated with more process control, instrument technicians need to develop process technologist type skills. Such skills will give them a good overview and understanding of production processes and allow them to deal with any changes or faults in the process. Good process understanding will also assist them in the shift towards preventative maintenance regimes. Some also predict that IMC departments, within plants, will merge with process engineering departments.

The shift from mechanical to electronic equipment means there is a need to understand both mechanical instrumentation and electrical technology (with analogue and digital applications) as both technologies will continue to be around, for many more years.

There will be less hands-on work and a shift to more use of personal computers, which will result in a need for more complex computer literacy skills. These will include:

- An understanding of the different types of basic user software available (e.g. Windows and its components) and how to use them, including installation and troubleshooting
- An understanding of the different types of proprietary software available and how to use them, including installation and troubleshooting
- How to do more complex loop tuning
- How to work with computer applications for things such as instrument calibration and control valve sizing
- How to install / maintain and problem solve on data communication networks
- How to work with hook up devices
- How to work with instrument interfaces
- How to maintain computers
- How to work with algorithms, even if they don't understand them

Because there will also be greater reliance on analysing information, instrument technicians will need to know how to work with the range of diagnostic tools available and develop their diagnostic troubleshooting and analytical skills.

Industrial controllers will be relied on more to provide information therefore instrument technicians will need to know how to gather, analyse and communicate information using different communication protocols. Their written and verbal communication skills will also have to be very effective.

Information technology (I.T.) skills will be more important as instrument technicians will be increasingly involved in the installation of wireless industrial controls. This requires an in-depth understanding of I.T. for industrial installation.

## 4.2. Attributes

### 4.2.1. Current Attributes

Instrument technicians to perform their role effectively need the following attributes:

- Physical fitness and not colour blind
- High level of English literacy and numeracy
- Intelligence
- Self-discipline and self-motivation
- Independence
- Methodical approach
- Analytical approach
- Completer
- Problem solving ability
- Mechanical aptitude
- Enjoy fixing things and making things work
- Able to deal with change
- Interest in information technology and computers
- Team player

### 4.2.2. Future Attributes

For instrument technicians to perform their role effectively in the future they need the following attributes, over and above the ones identified above:

- More analytical
- More academic ability
- More showing of initiative
- More interested in information technology and computers
- More problem solving ability

## 5. Qualification

### 5.1. Advantages to the employer in employing someone with a National Certificate in Industrial Measurement and Control (Level 4)

The qualification is valued by employers, even though it is a guarantee of only basic knowledge and skills. Employers accept that time constraints dictate what can be taught in the qualification and that the balance of the knowledge and skills required are to be taught on-the-job.

The qualification is seen by employers as providing a national benchmark for quality and in many instances is a basic requirement for employment from a union or occupational safety and hazard perspective. From a contractor's perspective, the employment of someone with this qualification entitles them to tender for work for which they would otherwise not be eligible.

### 5.2. Review of the National Certification in Industrial Measurement and Control (Level 4)

#### 5.2.1. Qualification content

Survey results show that only one employer/assessor was 'not satisfied' with the content currently covered in the National Certificate in Industrial Measurement and Control (Level 4). Most other people

were 'satisfied' or 'very satisfied' that the content currently covered is relevant to the skills needed on the job. They said that not only does it meet the current skill needs in the industry, but it will also meet the future skill needs. (See Graphs 10 & 11) Responses from the survey and interview based this support on the assumption that continuous and rigorous reviews of the qualification will take place to ensure it keeps up to date with industry needs.

Although the qualification currently includes content on obsolete equipment (e.g. pneumatics), some feel that such content should not be removed as not only is such equipment still used in many major industrial plants, but learning about such equipment provides the basis for understanding new technology.

Some believe that the content should be maintenance focused only and that any content relating to installation should be removed as installation is rarely done by instrument technicians in New Zealand. There is a difference in opinion with respect to what 'installation' involves. Therefore any review needs to clarify whether 'installation' refers only to the installation of a brand new system or whether it includes the replacement of existing components.

Content suggestions received include new content areas and more detail in existing content areas. These content areas follow:

- Electronic type training
- Understanding the hardware capabilities and programming of distributed control systems (DCSs), programmable logic controllers (PLCs) and personal computers (PCs) for control
- The use of personal computers in diagnosing and interface configurations
- Understanding and using software packages
- Working with different communication protocols e.g. wireless, fieldbus, fibre-optic, ethernet
- Process control systems
- Process training
- Smart instruments
- Chemical analysis
- Basic understanding of common safety systems e.g. gas boiler system

#### 5.2.2. Off-job training

Survey results identified only four people (one employer / assessor, one completed trainee and two current trainees) who were 'not satisfied' with the off-job training provided. Most other people were 'satisfied' or 'very satisfied'. More current and completed trainees reported they were 'very satisfied' and 'completely satisfied' than employers / assessors. (See Graph 12)

Training provider monopoly was viewed as a problem by some. They felt that this lead to complacency on the part of the training provider and lack of choice for trainees in terms of location. Conflicting views on the effectiveness of off-job training were also expressed, with many saying that it is tutor dependent.

Some expressed strong support for the existing off-job training, comments included:

- It relates to what is done at work
- The delivery and structure of it is good
- It has the latest technology, equipment and software available for trainee use

However, others felt that:

- The course is outdated
- Delivery is slow paced and lethargic
- Booklets are hard to understand and follow, with the Training provider not being receptive to such feedback

- Content and typing mistakes occur in handbooks and assignments
- Communication with trainees is not always good
- Equipment is not up to date or plentiful enough
- Classrooms are cramped
- The National Certificate in Electrical Engineering [Electrician for Registration] (Level 4) and the National Certificate in Industrial Measurement and Control (Level 4) are not well aligned, and the cross crediting is frustrating

Suggestions were made for the training provider to improve on:

- General administration
- The structure and layout of information
- Practical sessions (by making them more intensive and by providing improved coaching and guidance)
- The availability of up-to-date equipment
- The provision of more frequent feedback to employers on trainee progress

#### 5.2.3. Off-job assessment

Survey results show that two people (one employer / assessor and one completed trainee) were 'not satisfied' with the off-job assessment provided. Most other people were 'satisfied'. Some completed trainees (18.2%) and current trainees (20.8%) were 'completely satisfied' with off-job assessment whereas no employers / assessors were. (See Graph 14)

There was concern expressed that the giving of two or three chances to trainees to pass this qualification is diminishing the status of the qualification. Otherwise off-job assessment methods seemed generally to be working well. The following areas for improvement were highlighted:

- Some employers could benefit from knowing what assessment techniques are used and from receiving feedback on trainee progress with off-job assessment
- Analogue and digital assessments could be improved upon by making them more practical
- Online assessments may have advantages
- Trainees should be assessed on everything (possibly in one final exam) and on actual pieces of equipment

#### 5.2.4. On-job training

Survey results show that four people (one employer / assessor and three current trainees) were 'not satisfied' with the on-job training provided. Most other people were 'satisfied' or 'very satisfied'. Completed trainees (27.3%) are more 'completely satisfied' with on-job training than are employers/assessors (9.1%) or current trainees (9.1%) who are currently going through the training. (See Graph 13)

Provided there are good mentors and organisational procedures in place, on-job training continues to be viewed as the best way to learn due to its relevancy, hands-on approach and ability to expose a trainee to the whole process.

An employer's ability to provide exposure to tasks for on-job training varies according to the company's process and instrumentation equipment. It was suggested that employer capability to provide training exposure should be assessed, by ETITO, prior to the signing of a training agreement. Whereas some companies are successfully working with other companies in providing the necessary training exposure, others are not. It is therefore felt that a more formalised system could be put in place by ETITO to facilitate such a process.

There was conflicting feedback in relation to the use of workplace logbooks (WPLBs) for on-job training and assessment. Whereas some viewed it as an effective prompt, others feel that as a system it is:

- Not well managed
- Daunting and complex with too much paperwork
- Difficult, at times, to provide the required evidence

Some employers are not skilled at mentoring and knowing how to structure training. Likewise trainees often lack the confidence or 'know how' on how to go about their training. It was therefore suggested that ETITO could assist employers and trainers in the set up of systems, structures and guidelines to support effective on-job training. The Training Provider wanted a system for feedback on how on-job training is progressing.

#### 5.2.5. On-job assessment

Survey results show that five people (three employers / assessors and two current trainees) were 'not satisfied' with the on-job assessment provided. Most other people were 'satisfied'. Overall, completed and current trainees (36.4%) were more satisfied than employers / assessors with the on-job assessment. (See Graph 15)

In some companies on-job assessment works well and in other companies it does not. Reasons for this include:

- Apprentices are nervous about saying they are ready for assessment
- A shortage of assessors
- Assessors lack time to assess
- Assessors are not thorough enough, and do not follow up to see that trainees correctly complete tasks
- Assessors do not ask for sufficient evidence
- Assessment can be subjective
- Assessors are not moderated regularly enough

The following suggestions were made to overcome on-job assessment issues:

- Trainees and assessors need more clarification of the evidence required
- Assessors need more information/training on what is required of them
- Conduct more regular moderation of assessors and include a constructive feedback process
- Add an additional layer of assessment at a testing station (suitably equipped) to ensure national consistency
- Some of the tasks in the workplace logbook need rewriting

#### 5.2.6. Barriers to completing the qualification

Survey results reveal that although most people feel that there are no barriers to completing the National Certificate in Industrial Measurement and Control (Level 4), a significant minority say that there are. (See Graph 16)

Barriers to completing the qualification include:

- The location of the training provider (i.e. too far away from where someone lives)
- The timing of block courses overlap with planned maintenance shutdowns and hence do not suit employers
- Trainees not given time off work to attend block courses
- Employers are unable to provide the necessary exposure to all required skills, due to factors such as: company processes, lack of instrumentation equipment, seasonal factors, specific unit standards on installation
- Some employers do not provide the necessary coaching or assessment in the workplace to complete the qualification
- Trainees are not given time to do specific on-job unit standards and lack time to document their work and provide appropriate evidence
- Trainees are not working full time in an instrument technician's role
- Some task guides are not sufficiently clear for trainees and assessors to understand how to gather evidence to prove competency
- Trainees are left to work in one area at the expense of exposure to other areas

## 6. Pathways

### 6.1. Recruitment

#### 6.1.1. What attracts somebody into an instrument technician's job now?

The following reasons were given for attracting someone into an instrument technician job now:

- It is well paid
- It is interesting, varied and challenging work due to the range of technologies and instruments, the problem solving required and the opportunities to work in a variety of companies with different processes
- It allows for learning on the job
- It is not too physically arduous and is relatively clean
- It provides great job satisfaction
- It offers job security as it is an area in which there is a skill shortage
- Dual skilling (Electrical and IMC) provides you with another set of skills
- It is internationally accepted enabling an overseas career

#### 6.1.2. What will attract someone into an instrument technician's job in the future?

The following reasons, in addition to the ones above, were given for attracting someone into an instrument technician's job in the future:

- As this job becomes more Information Technology focused there will be less hands-on work which means that it will become an even cleaner job to work in
- It will be considered to be a job which carries a higher status than an electrician or mechanic job as an instrument technician's process control knowledge will be highly valued and they will have a very specialised skill set, the more mundane activities will be handed to electricians
- Due to the above, it is likely to be an even better paid job than it is currently

### 6.1.3. How is recruitment done?

Recruitment methods range from knocking on the door of an employer; to word of mouth; to referrals; and to advertising internally, locally, nationally and internationally. Mediums used for advertising range from newspapers, to magazines, to websites (e.g. Fletcher Building website).

Existing electrical apprentices, ETCO apprentices, people doing polytechnic pre-trade electrical courses, school leavers, IMC training providers and contractors are all viewed as valuable sources of potential recruits.

Although employing locally is preferred, some international recruitment is done. Two recruitment agencies were identified: Scientific and Technical Recruitment and Crown Recruitment. Crown Recruitment services companies across New Zealand and mainly specialise in South African and some United Kingdom placements.

## 6.2. School to Work Transition

### 6.2.1. What is the typical path someone takes when becoming an instrument technician?

Survey and interview results show the following as typical of instrument technicians:

- Most have Form 5 / NCEA Level 1 or higher for math and science
- Prior to embarking on an electrical or IMC apprenticeship very few do any other type of job.
- It is very common to do an electrical apprenticeship first
- Approximately 50% of apprentices dual skill (electrical and IMC)

(See Graphs 20 & 21)

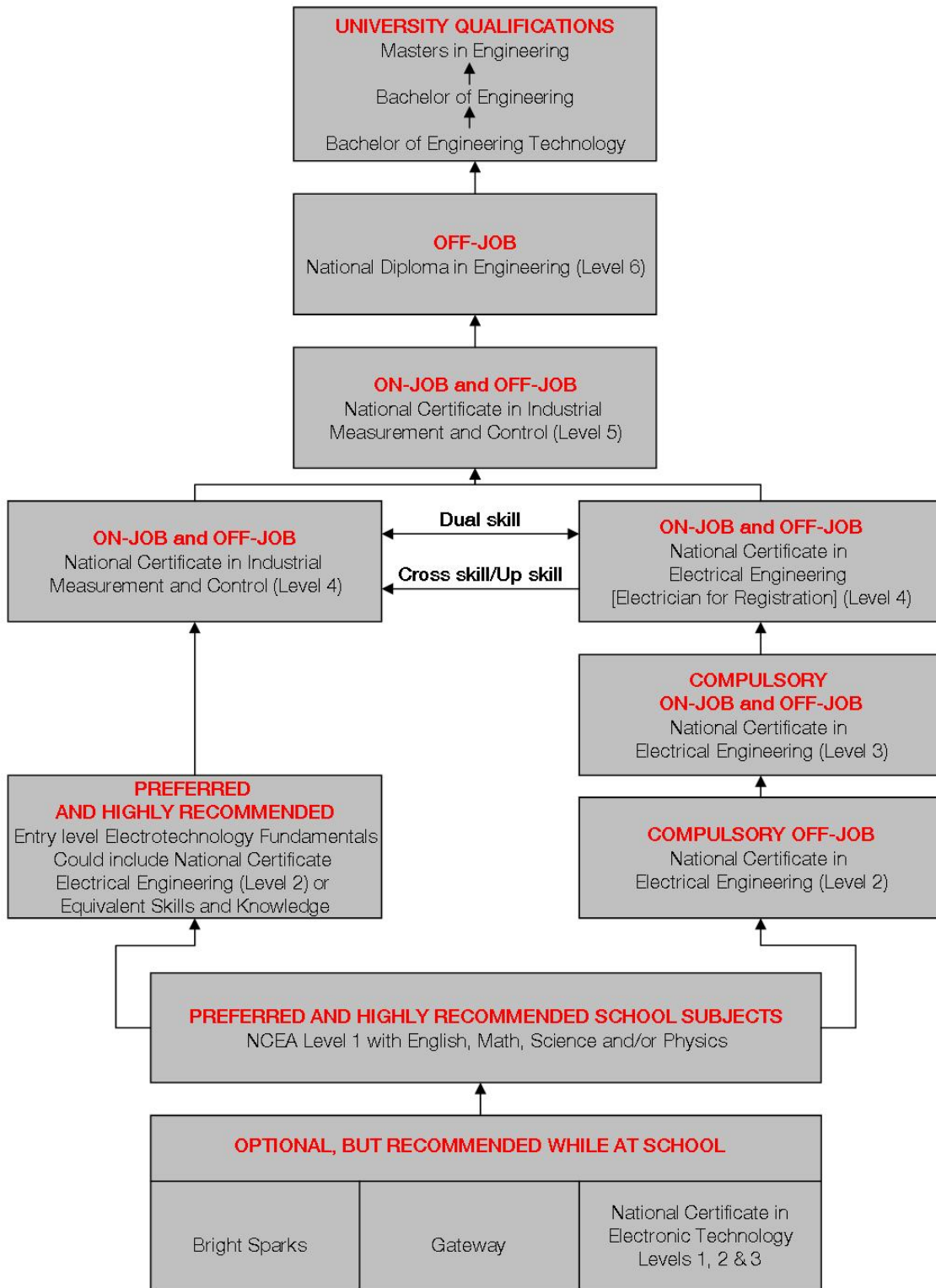
### 6.2.2. What is the ideal path someone should take when becoming an instrument technician?

Those interviewed identify the following as contributing to an ideal path for an instrument technician career.

- From Form 5 / NCEA Level 1 onwards school children should be exposed to the IMC trade, either via career advisors or holiday work. ETITO was seen as the organisation to arrange this
- Completing Form 6 / NCEA Level 2 for math and science and / or physics is an ideal foundation
- Pre- trade courses in electronics or hand tools are regarded as being valuable
- Some recommend that the route you take should be: an electrical apprenticeship first then an IMC apprenticeship, while others recommend the opposite
- There are significant advantages for an IMC career in dual skilling
- Doing an apprentice in a chemical / petrochemical type company is valued as such companies are heavy on IMC equipment (which allows exposure to the full range of instrumentation equipment). These companies also teach an instrument technician to work in a high-risk environment from the start of their career
- Working for a contractor as a qualified instrument technician is recommended. Contractors are in the position to offer a variety of jobs from which the required experience can be gained
- There is a qualification pathway after completing your trade. There is the National Diploma in Engineering which can be followed by a Bachelor of Engineering Technology, or, a Bachelor in Engineering

### 6.3. Qualification Pathways

#### 6.3.1. Current IMC qualification pathway



### 6.3.2. Comments on current IMC qualification pathway

At the moment there are three different routes one can take to get a National Certificate in Industrial Measurement and Control (Level 4). These are as follows: (See Diagram Two)

- Go straight into the National Certificate in Industrial Measurement and Control (Level 4), taking into account the need for some electrical fundamentals training prior to doing so
- Cross-skill / upskill by first doing the National Certificate in Electrical Engineering [Electrician for Registration] (Level 4) and then go on to do the National Certificate in Industrial Measurement and Control (Level 4)
- Dual skill by doing both the National Certificate in Electrical Engineering [Electrician for Registration] (Level 4) and National Certificate in Industrial Measurement and Control (Level 4) concurrently

Interviewed non-users of the National Certificate in Industrial Measurement and Control (Level 4) did not know about the IMC qualifications or the training providers. However, they expressed interest in learning more about them for possible future use in their respective companies.

Some trainees and managers / assessors plus the training provider describe involvement in the National Certificate in Industrial Measurement and Control (Level 5). Some trainees reported engaging in Rockwell courses to extend their IMC qualifications. Many people were however unaware of the availability of this qualification with many commenting that it is not yet properly available or that assessors for it are not yet available. WINTEC reports that they are currently able to offer the Industrial Measurement and Control (Level 5) qualification but enrolment has been slow due to the fact that the draft form of the assessment guide was only made available by ETITO in late 2005.

Survey results show that most completed trainees (60%) are doing or planning to do further IMC qualifications. Whereas most employers/assessors and current trainees did not think that instrument technicians would do any further IMC qualifications. (See Graphs 17(a) & 17(b))

NZQA records show that no National Certificate in Industrial Measurement and Control (Level 5) has been awarded since its registration in 2002. There are also no credits awarded for unit standards that are only part of this qualification and no other qualification.

There is an apparent contradiction above in the reported engagement in further IMC qualifications. Possibly those trainees who say they are working towards National Certificate Industrial Measurement and Control (Level 5) have not yet been assessed on any of the unit standards exclusive to this qualification, at the time this research was conducted. Additional training includes the Rockwell training, specific unit standards in IMC, vendor training and in-house company training.

Some interviewees expressed interest in the National Diploma in Engineering (Level 6) and they viewed the qualification as being important due to the current skill shortage. One of the trainees interviewed was to be sponsored by his company through a Bachelor of Engineering.

### 6.3.3. Other IMC qualifications

Provided the current IMC qualifications keep up to date and the Level 4 qualification is expanded to include process comprehension, networking and automation, it is felt that no further qualifications are needed. Survey results tally with this. (See Graph 18)

Some feedback suggested there was no need for two separate qualifications at Level 4 i.e. National Certificate in Electrical Engineering [Electrician for Registration] (Level 4) and National Certificate in Industrial Measurement and Control (Level 4).

As instrument technicians are likely to require a higher level of skill in the future there could be more need for the National Certificate in Industrial Measurement and Control (Level 5).

Some also felt that there is a future for two forms of electricians: a commercial/domestic electrician and an industrial electrician. This is consistent with some other countries. For example, British Columbia's industrial electrician required competencies encompass IMC skills and knowledge.

## 6.4. Career Pathways

Although instrument technicians can choose to remain trades people, survey results indicate that there are many career opportunities for qualified instrument technicians. (See Graph 22) These career opportunities exist both within New Zealand and overseas.

The instrument technicians' role shift to a greater focus on process control, computers and information technology, is viewed as potentially increasing the transferability of their skills. Although there are a variety of career opportunities for instrument technicians, there seems to be little or no evidence of career planning within organisations for this currently. At present most instrument technicians typically remain in technical roles, and a few move into technical management roles.

Other possible career opportunities for instrument technicians include:

- Industrial electrician
- Fault finder on a plant
- Process controller
- Implementation of control systems
- Electrical automation
- Engineering in fields such as: power, electrical, electronic, factory automation, operations management, distributed control systems (DCSs), project work, integration, networking, software
- Maintenance planning
- Design of instruments, plant layout
- Information technology (computer programming)

## 7. Support Systems

### 7.1. Company Support

#### 7.1.1. Support Systems in place

Feedback was gathered on the existence of human resource support systems, such as induction programmes, mentoring, in-house training, pay structure related to qualification etc; to support instrument technicians. Most people who participated in the survey and interviews worked for large organisations and responses on the whole reflected that such support systems were in place, in their companies.

Those interviewed from some of the smaller organisations, reported that although they did not currently have such systems in place they anticipated a need for them in the future due to organisational growth and occupational safety and hazard requirements.

For both small and large companies, performance management systems, including the giving of feedback on effective as well as ineffective performance, were identified as two systems not firmly in place, or if in place, not working optimally. Survey results of employers / assessors were conflicting as 60.9% reported that the performance of instrument technicians is measured, however only 44.4% of them reported having performance management systems in place. (See Graph 9 & Table 3). Possibly there is informal measurement of performance.

However, survey results for completed and current trainees were consistent. The majority said that performance is not measured and that performance management systems were not in place. (See Graph 9 & Table 3)

Survey results recorded that most employers / assessors (81%) gave both positive and negative feedback to instrument technicians, however, fewer completed trainees (54.5%) and current trainees (43.5%) supported this view. (See Table 3). Interviewees tend to comment predominantly that only negative feedback was given.

If there is a performance management system in place, it tends to relate to overall performance on the job rather than individual key performance areas. Productive performance at the individual level is not measured even though some criteria for measuring effectiveness could be identified from information captured in 'work order histories', or the more up to date 'computer maintenance management systems'. Reasons given for not measuring performance included:

- Measures do not exist
- Unionism
- The potential for up and downstream sabotage of the process just to make ones own performance appear more productive

#### 7.1.2. Barriers to employment

Those interviewed were asked if gender, ethnicity and literacy/language were barriers to employment.

Gender is not directly viewed as a barrier to becoming an instrument technician. Some of those interviewed saw it as an indirect barrier, because there is a historical belief that women do not do trade jobs. Another key point raised was that women, just like men, are mostly unaware of this job as a career choice.

Ethnicity was not identified as being a barrier. However, acknowledgement was made that there are very few Maori and Pacific Islanders in this role. The level of education was seen as a greater barrier.

Other comments were made about the authenticity of qualifications and job experience of people from less developed countries and the subsequent need for New Zealand to train its own instrument technicians.

English is a barrier to employment as good English is required. Reasons for this included:

- The use of difficult technical jargon
- Radio communication
- No room for error as many work on dangerous processes
- Instrument technicians, working for contractors, are often the 'face of the company' to their clients which therefore requires them to have a good command of the English language

## 7.2. ETITO Support

ETITO support was predominantly rated as adequate or good. Survey results identified four people (one employer / assessor (4.5%) and three current trainees (12.5%)) who rated the support given by ETITO in ensuring that future IMC skill needs are met as 'insufficient'. Most employers / assessors rated the support given by ETITO as good or very good, whereas most completed and current trainees rated it as adequate or good. (See Graph 23)

Many interviewees viewed this research process positively as ETITO is typically seen as not giving the IMC sector sufficient focus due to its smallness in size. Likewise there was positive feedback on the recent IMC assessor forum as it demonstrated ETITO's commitment to working with this sector. More assessor forums were requested.

Specific areas for ETITO improvement were:

- Raise its profile and clarify its role
- Make itself known to non-users
- Help to raise the profile of the IMC sector
- Become more proactive
- Move from an organisation who just has good telephone contact to one which has good face-to-face relationships
- Provide more of a guidance/helping role

- Improve its listening skills
- Improve some of its administration functions
- Work more closely with training providers, the Institute of Measurement and Control, advisory groups and universities

### 7.3. Training providers

Training provider support was predominantly rated as good or better. Survey results identified four people (one employer / assessor (4.5%), one completed trainee (9.1%) and two current trainees (8.3%)) who rated the support given by training providers in ensuring that future skill needs are met as 'insufficient'. Most employers / assessors and current trainees rated the support as 'good' or better whereas most completed trainees either rated the support as adequate (27.3%) or 'very good'(45.5%). (See graph 24)

Specific areas for training provider improvement were highlighted. These were to:

- Be available in more than one location
- Work more closely with ETITO and the sector
- Improve integration between polytechnics and universities
- Improve on the standard of delivery of training and the use of more versatile training methods
- Make qualifications known to non-users
- Keep up-to-date on the requirements of effective instrument technicians
- Work more closely with NZQA
- Provide better teaching equipment

### 7.4. Industry Associations

The IMC association was largely unknown, however it was given a good rating for support by some. Survey results identified five people (three employers / assessors (13.6%), one completed trainee (9.1%) and one current trainee (4.2%)) who rated the support given by Industry Associations in ensuring future skill needs are met as 'insufficient'. Most employers/assessors and completed trainees rated the support as 'good' whereas current trainees mostly reported that they 'did not know' what the support was like. A significant number of employers / assessors and completed trainees also reported that they 'did not know' the association at all. (See Graph 25)

Interviewees typically viewed the IMC Institute as:

- Small
- Having a low profile
- Vendor focused
- Having no clearly identified value to members
- Needing to work more closely with ETITO
- Needing to maintain an on-going relationship with ETITO and training providers

Those informed about the proposed development of an Industry Information and Control Centre by University of Auckland and AUT with the support of the IMC Institute, viewed this proposal as something which would force the Institute into a more academic role and a move away from their current, predominant vendor perspective.

The existence of an IMC Advisory Group was unknown to most interviewees. They felt that any Advisory Group needed to work more closely with ETITO.

## 8. Conclusions

- 8.1 Instrument technicians are predominantly European/Pakeha male qualified electricians who are 30 years or over.
- 8.2 The current level of uptake of IMC qualifications is low.
- 8.3 The profile of instrument technicians is low. Students, parents and other workers do not know what an instrument technician does.
- 8.4 NZ is not currently training sufficient people at all skill levels of IMC.
- 8.5 IMC systems are becoming more electronic and more complex. This will impact on future skill needs.
- 8.6 Current qualifications, training providers of off-job training and assessment and on-job trainers are viewed predominantly positively. However suggestions for improvement have been identified.

## 9. Recommendations

- 9.1 That these research findings be considered in the review of the National Certificate in Industrial Measurement and Control (Level 4).
- 9.2 That ETITO explore an appropriate qualification pathway for the future.
- 9.3 That ETITO explore additional ways to assist companies by providing supportive on-job training and assessment structures. For example:
  - More face-to-face contact by ETITO Service Delivery staff
  - Coaching skills for on-job training/assessment
  - Arranging opportunities for on-job training and on-job assessment at other sites and with other companies
- 9.4 That ETITO supports initiatives that raise the profile of the IMC sector.
- 9.5 That the Institute of Measurement and Control become more active. That they focus on raising the profile of IMC and supporting on-going up skilling of members at a national level.
- 9.6 That on-job assessment is more rigorously moderated to ensure consistency of standard.
- 9.7 That the off-job training provider reviews their facilities equipment and training/learning assessment processes.

## APPENDIX 1

### Graphs

#### Graph 1A

##### Employers/Assessors

How many IMC people do you employ? .....25

#### Graph 1B

##### Employers/Assessors

Of the IMC people you employ, how many of these people are male and how many are female? .....26

#### Graph 2

##### Employers/Assessors

Of the IMC people you employ, how many of these people fall into each of the ethnic groups listed below? .....27

#### Graph 3

##### Employers/Assessors

Do you have an IMC vacancy now? .....28

#### Graph 4

##### Employers/Assessors

Is it easy to fill IMC vacancies? .....29

#### Graph 5

##### Employers/Assessors

Do people initiate moving into an IMC role themselves?

##### Completed/Current Trainees

Did you initiate moving into an IMC role yourself? .....30

#### Graph 6

##### Employers/Assessors

Are people persuaded into an IMC role?

##### Completed/Current Trainees

Were you persuaded into an IMC role? .....31

#### Graph 7

##### Employers/Assessors

Do you think that an IMC role is a desirable one?

##### Completed/Current Trainees

Do you like working as an Instrument Technician? .....32

#### Graph 8

Will you (completed/current trainees) or people currently performing an IMC role in your company (employers/assessors) stay in this role (or other similar role) for the next 5-10 years? .....33

#### Graph 9

Is the performance of Instrument Technicians measured in your company? .....34

#### Graph 10

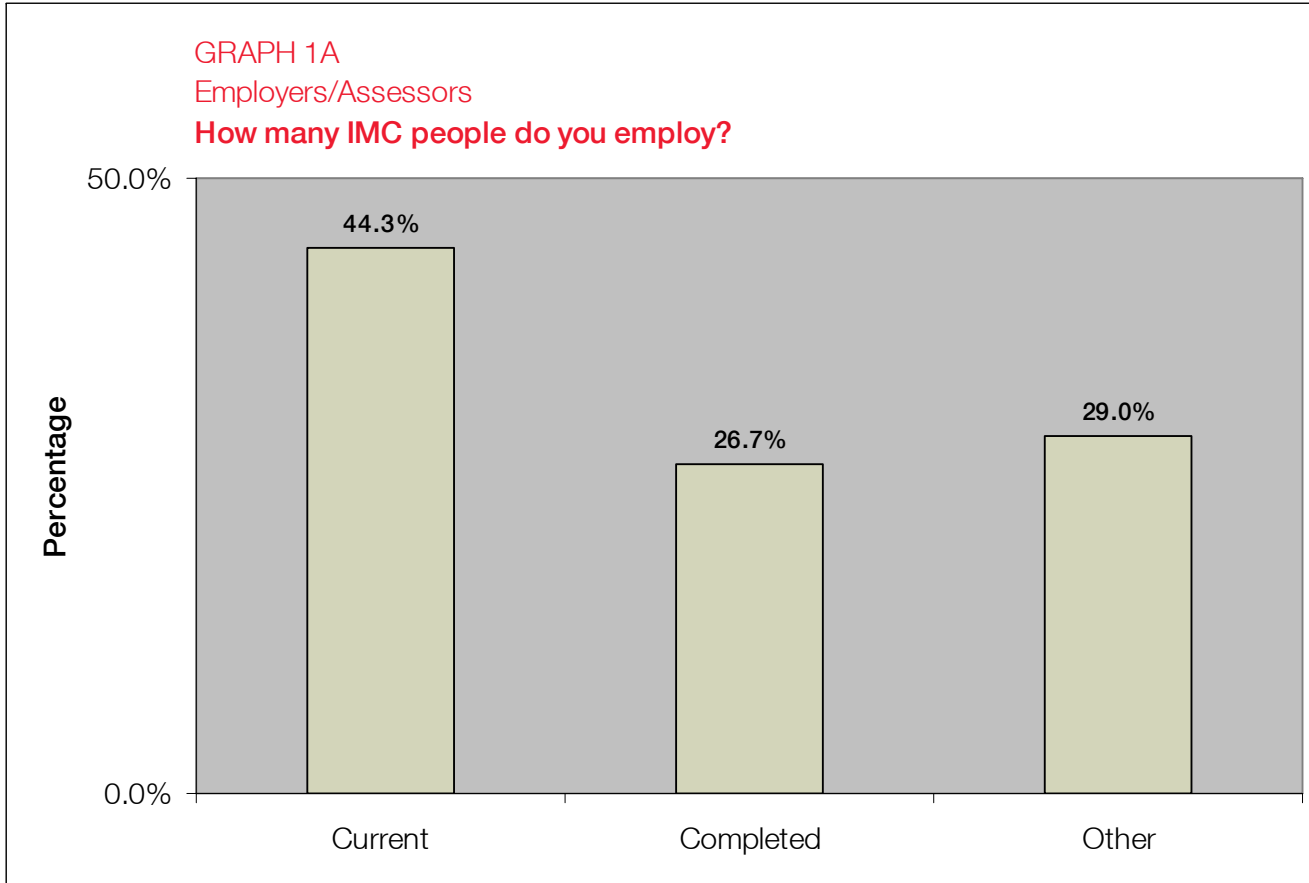
How satisfied are you that the content covered in the National Certificate in Industrial Measurement and Control (Level 4) meets the skill needs in your industry? .....35

#### Graph 11

Will the current National Certificate in Industrial Measurement and Control (Level 4) cope with the future skill needs of the industry? .....36

<b>Graph 12</b>	How satisfied are you with the off-job training for the National certificate in Industrial Measurement and Control (Level 4)? .....	37
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<b>Graph 15</b>	How satisfied are you with the on-job assessment for the National Certificate in Industrial Measurement and Control? .....	40
<b>Graph 16</b>	Are there barriers to someone completing the National Certificate in Industrial Measurement and Control? .....	41
<b>Graph 17A</b>	Are you, or IMC people in your company, doing or planning to do any other currently available IMC qualifications (i.e. other than the National Certificate in Industrial Measurement and Control (Level 4)? .....	42
<b>Graph 17B</b>	Completed Trainees who are planning to or are currently doing a further IMC qualification (i.e. other than the National Certificate in Industrial Measurement and Control (Level 4) .....	43
<b>Graph 18</b>	Do additional IMC qualification need to be made available in the future? .....	44
<b>Graph 19</b>	<b>Employers/Assessors</b> Do you have IMC people in your industry who have an IMC qualification from another country? .....	45
<b>Graph 20</b>	<b>Employers/Assessors</b> What is most typical of IMC people in your industry?.....	46
<b>Graph 21</b>	<b>Completed/Current Trainees</b> What is most typical of you?.....	47
<b>Graph 22</b>	Are there future career opportunities for qualified Instrument Technicians? .....	48
<b>Table 3</b>	What systems are currently available in your company? .....	49
<b>Table 23</b>	How would you rate the support given by ETITO in ensuring future IMC skill needs are met? .....	50
<b>Table 24</b>	How would you rate the support given by the Training Providers in ensuring future skill needs are meet.....	51
<b>Table 25</b>	How would you rate the support given by Industry Associations in ensuring future IMC skill needs are met .....	52

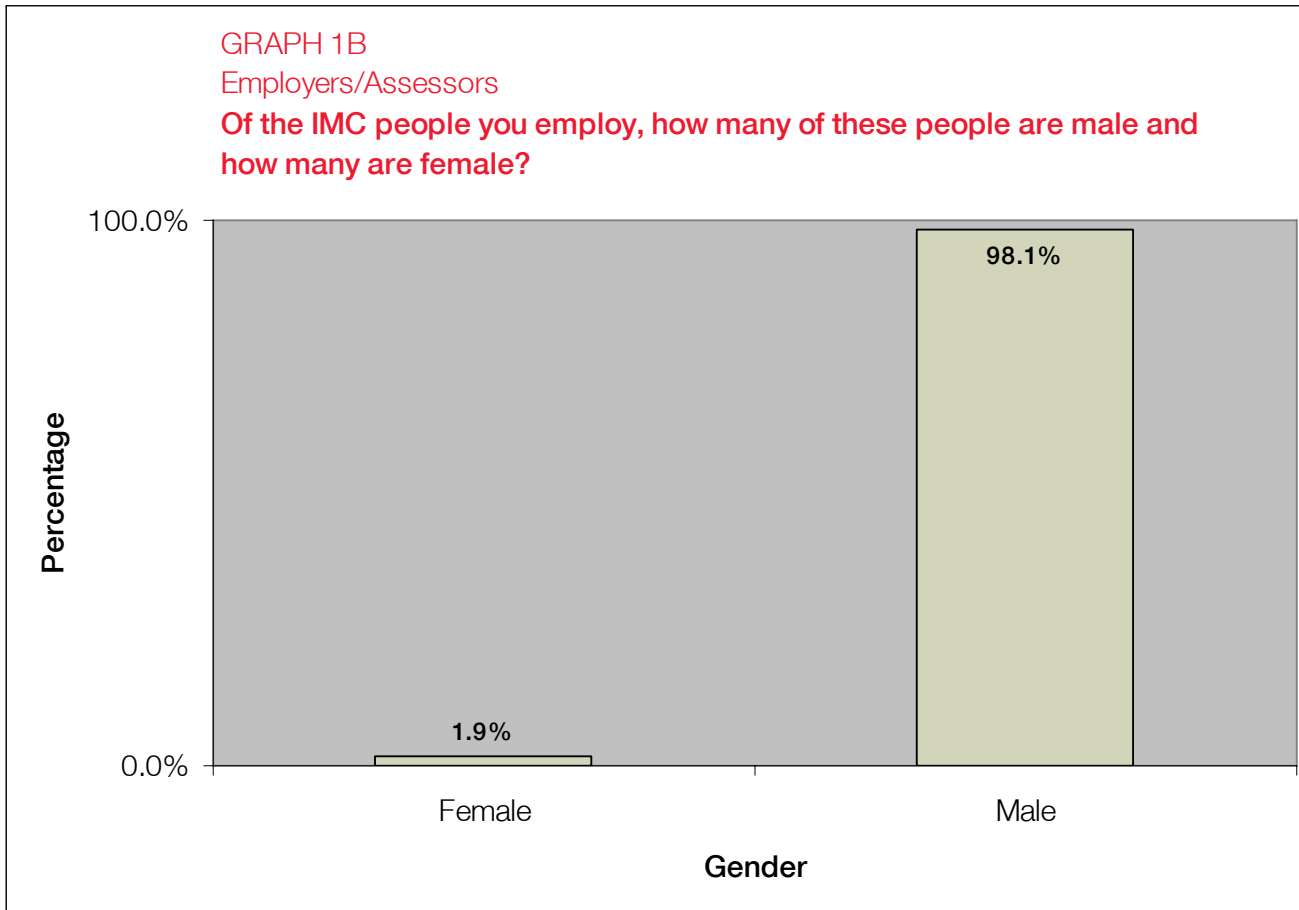
GRAPH 1A  
Employers/Assessors  
How many IMC people do you employ?



GRAPH 1B

Employers/Assessors

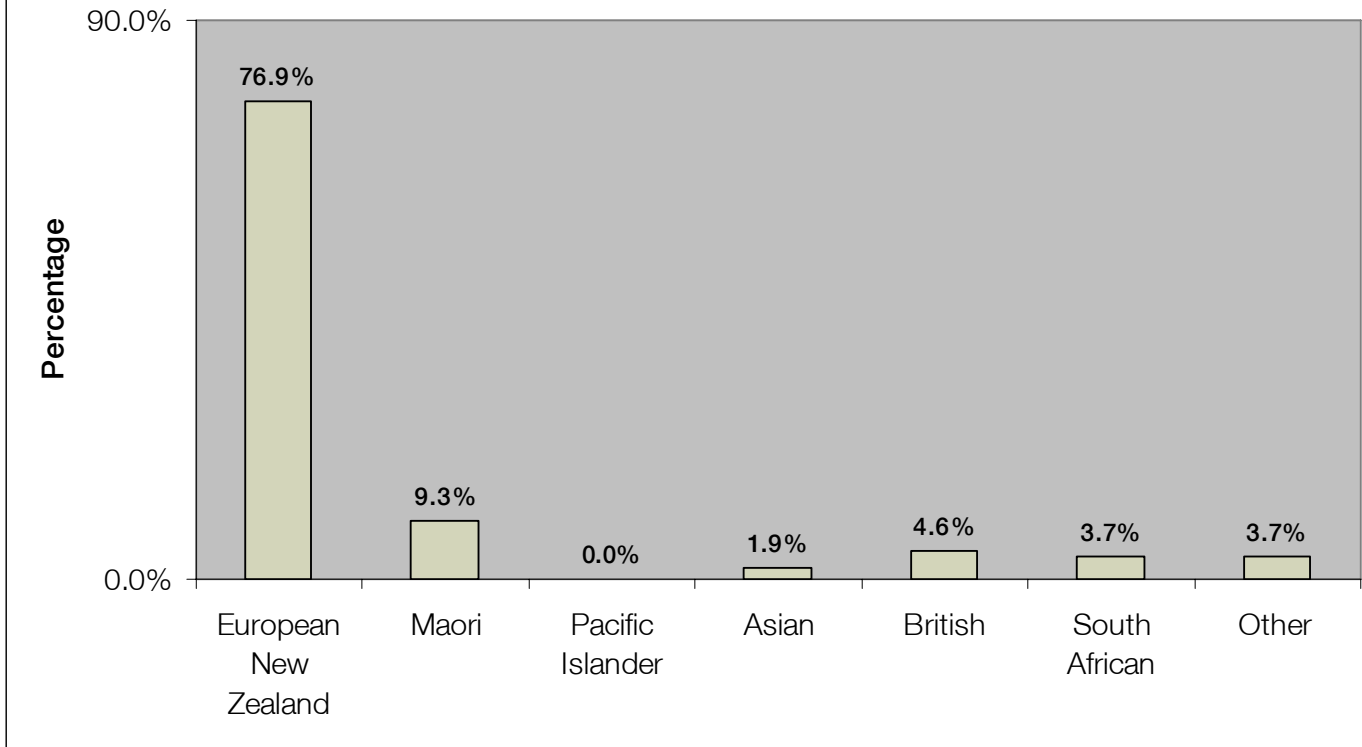
Of the IMC people you employ, how many of these people are male and how many are female?



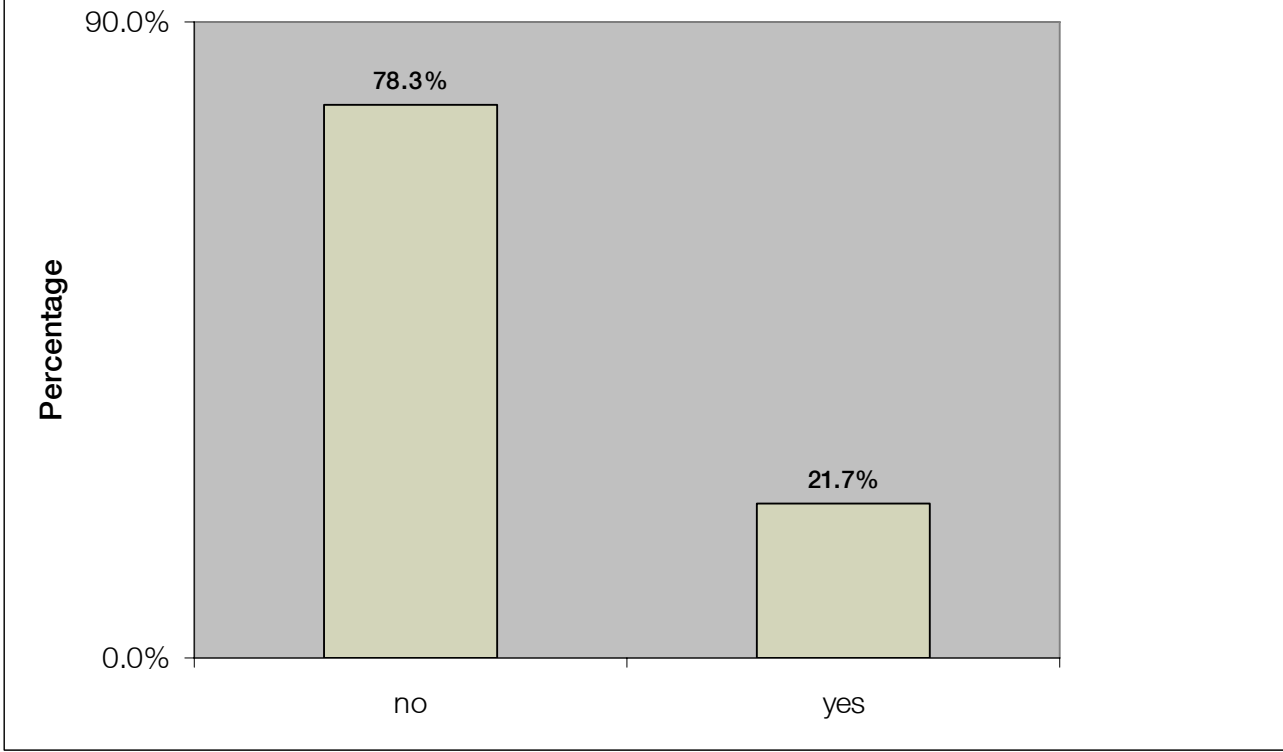
**GRAPH 2**

**Employers/Assessors**

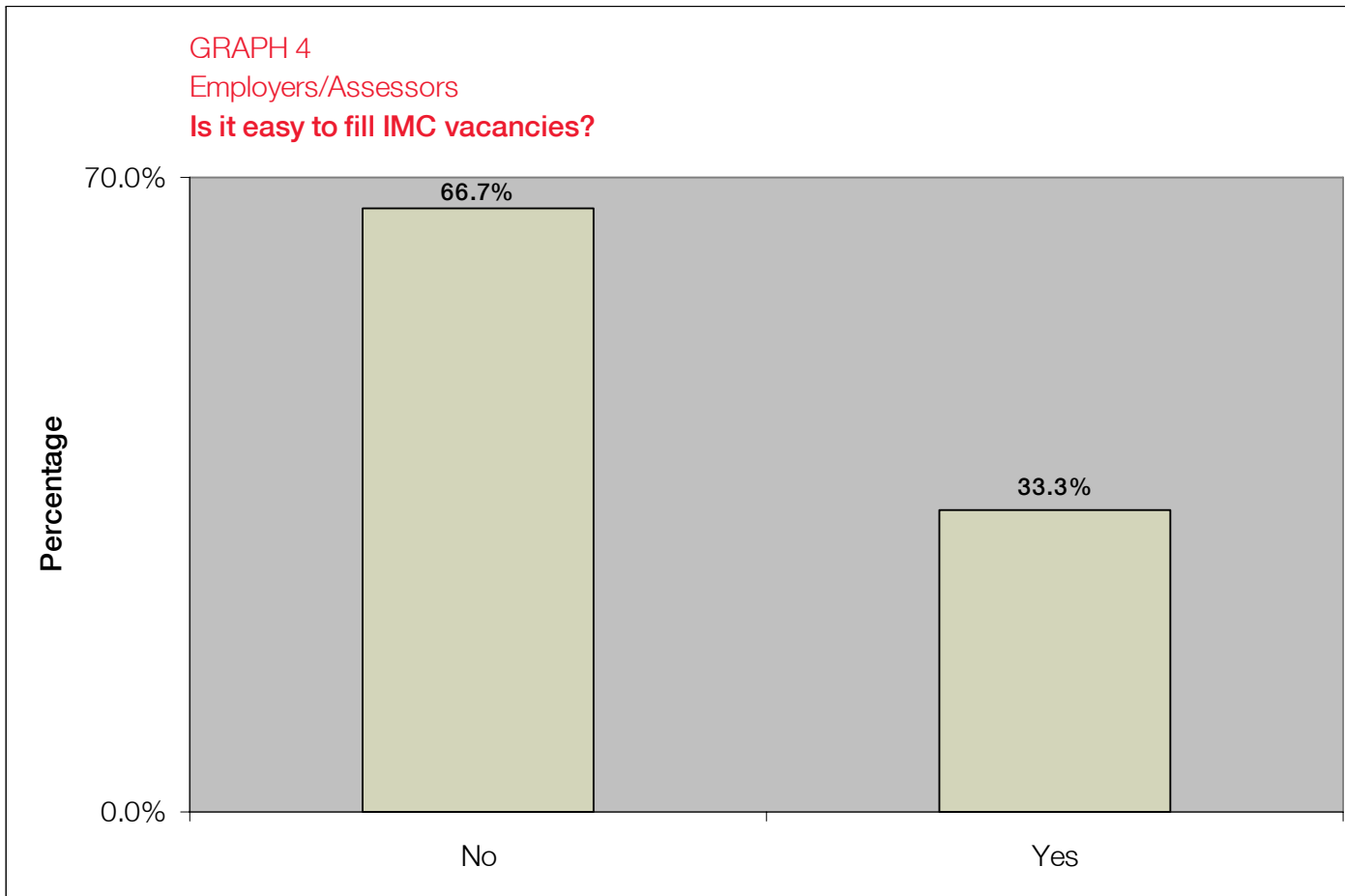
**Of the IMC people you employ, how many of these people fall into each of the ethnic groups listed below?**



GRAPH 3  
Employers/Assessors  
Do you have an IMC vacancy now?

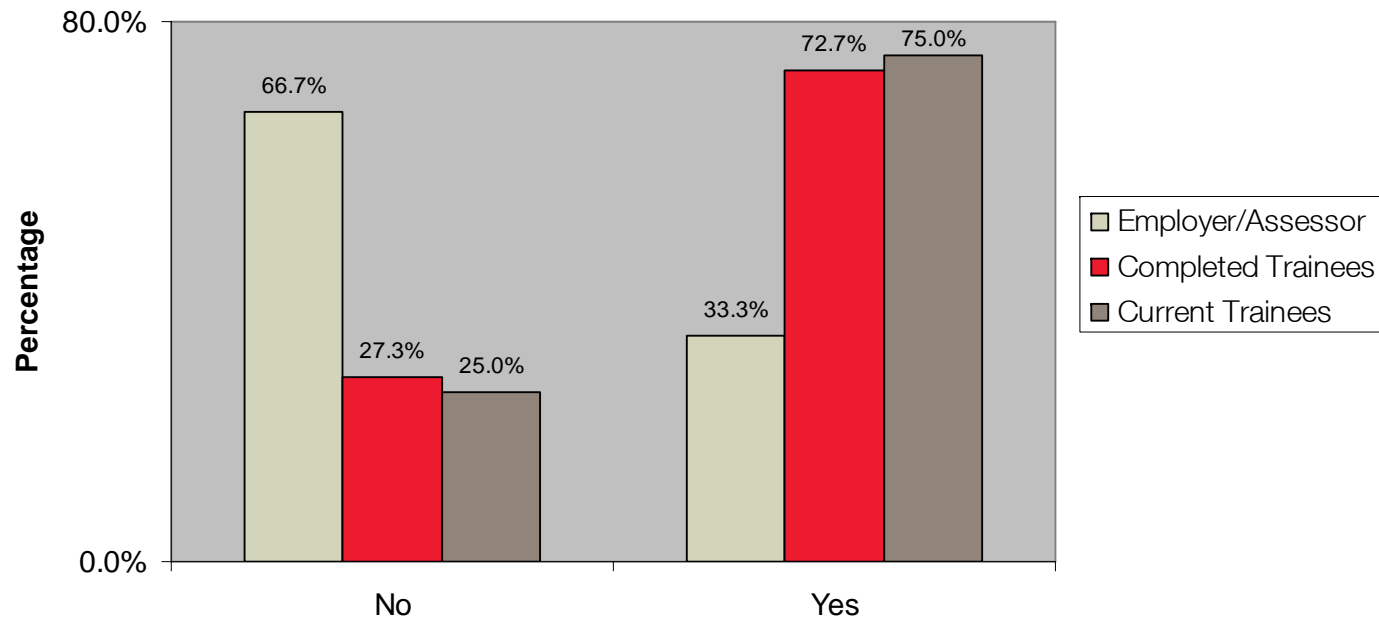


GRAPH 4  
Employers/Assessors  
Is it easy to fill IMC vacancies?



GRAPH 5  
Employers/Assessors  
**Do people initiate moving into an IMC role themselves?**

Completed/Current Trainees  
**Did you initiate moving into an IMC role yourself?**



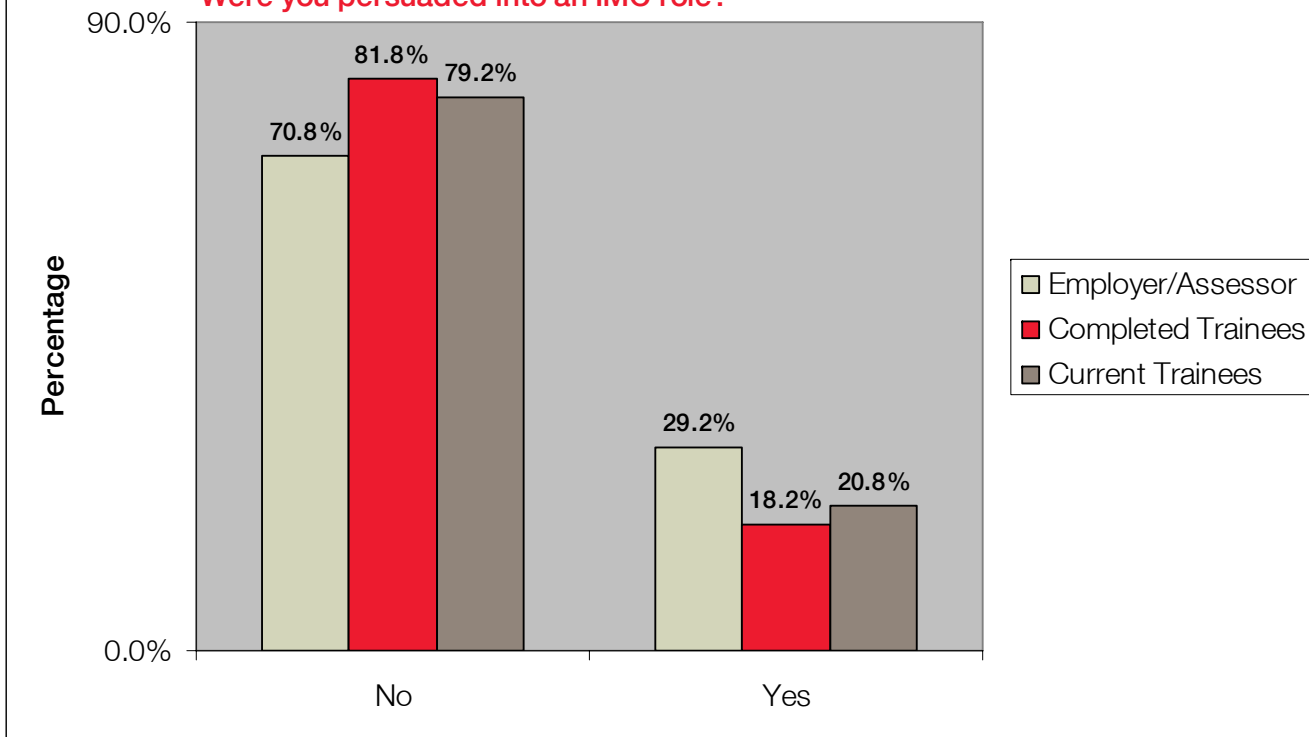
GRAPH 6

Employers/Assessors

Are people persuaded into an IMC role?

Completed/Current Trainees

Were you persuaded into an IMC role?

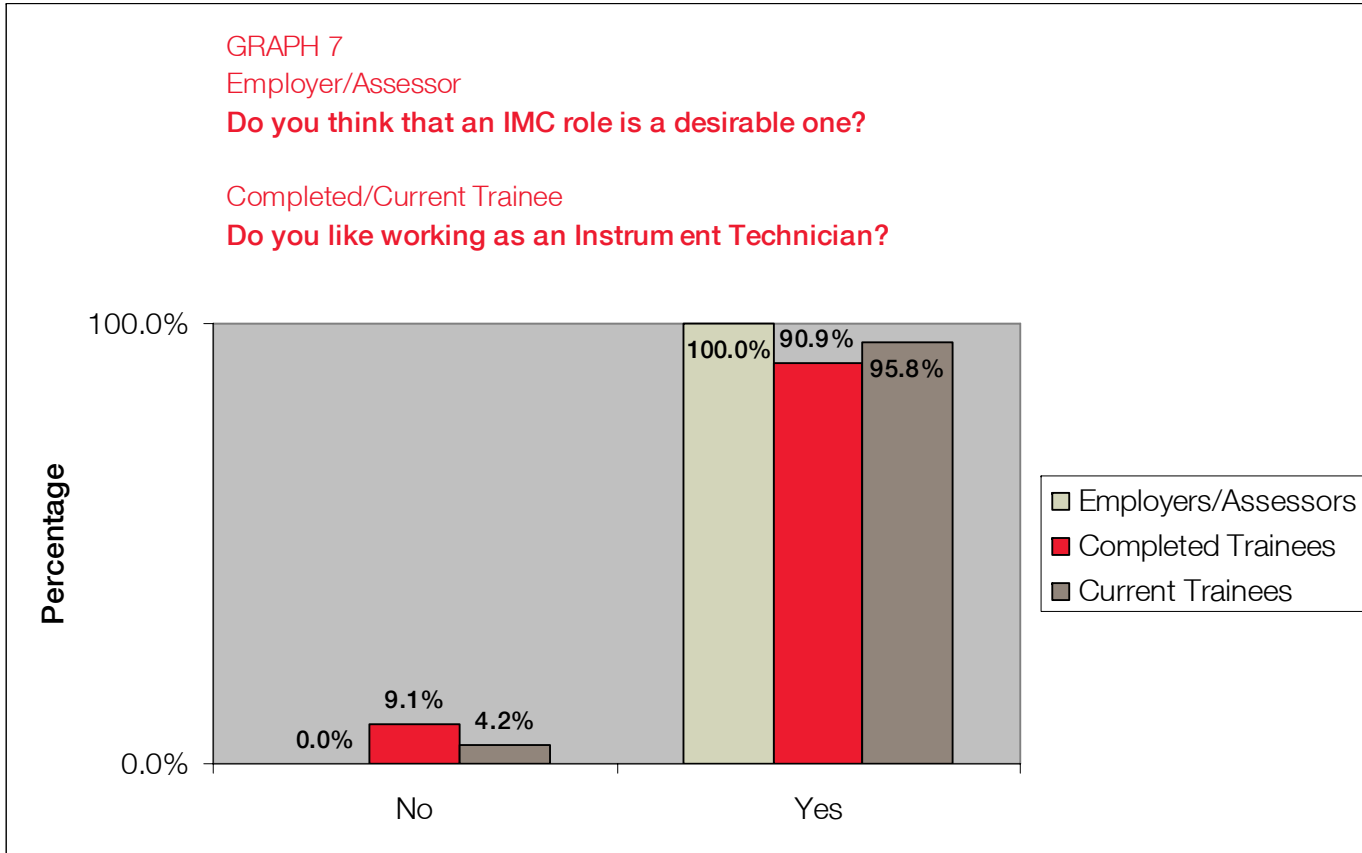


GRAPH 7  
Employer/Assessor

**Do you think that an IMC role is a desirable one?**

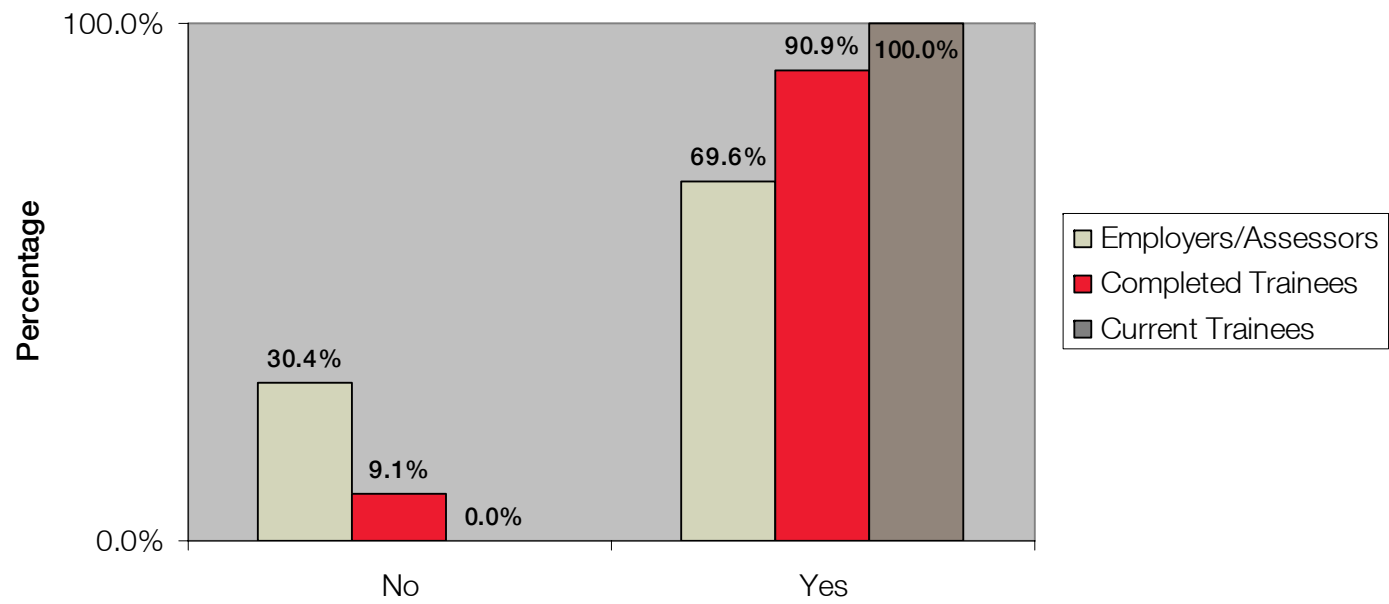
Completed/Current Trainee

**Do you like working as an Instrument Technician?**



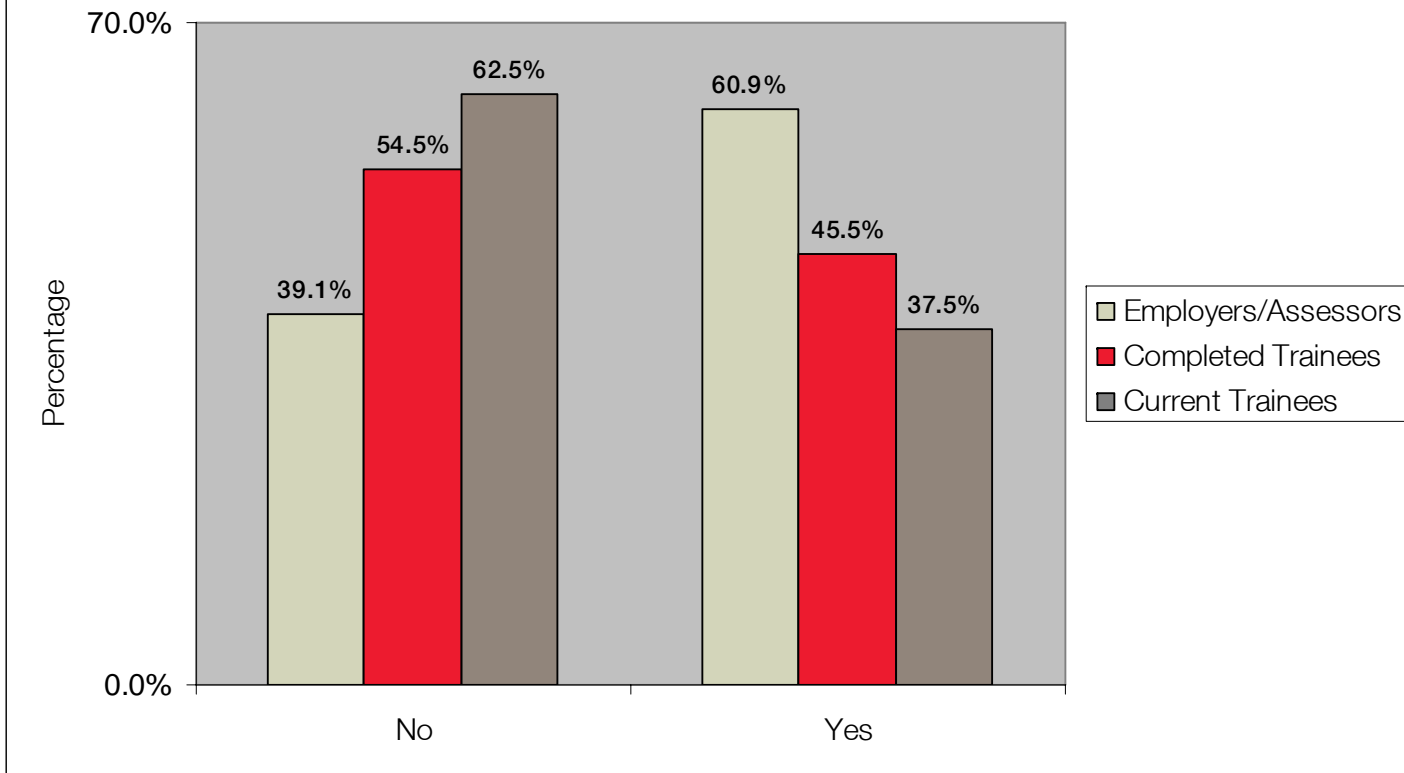
GRAPH 8

Will you (completed/current trainees) or people currently performing an IMC role in your company (employers/assessors) stay in this role (or other similar role) for the next 5-10 years?



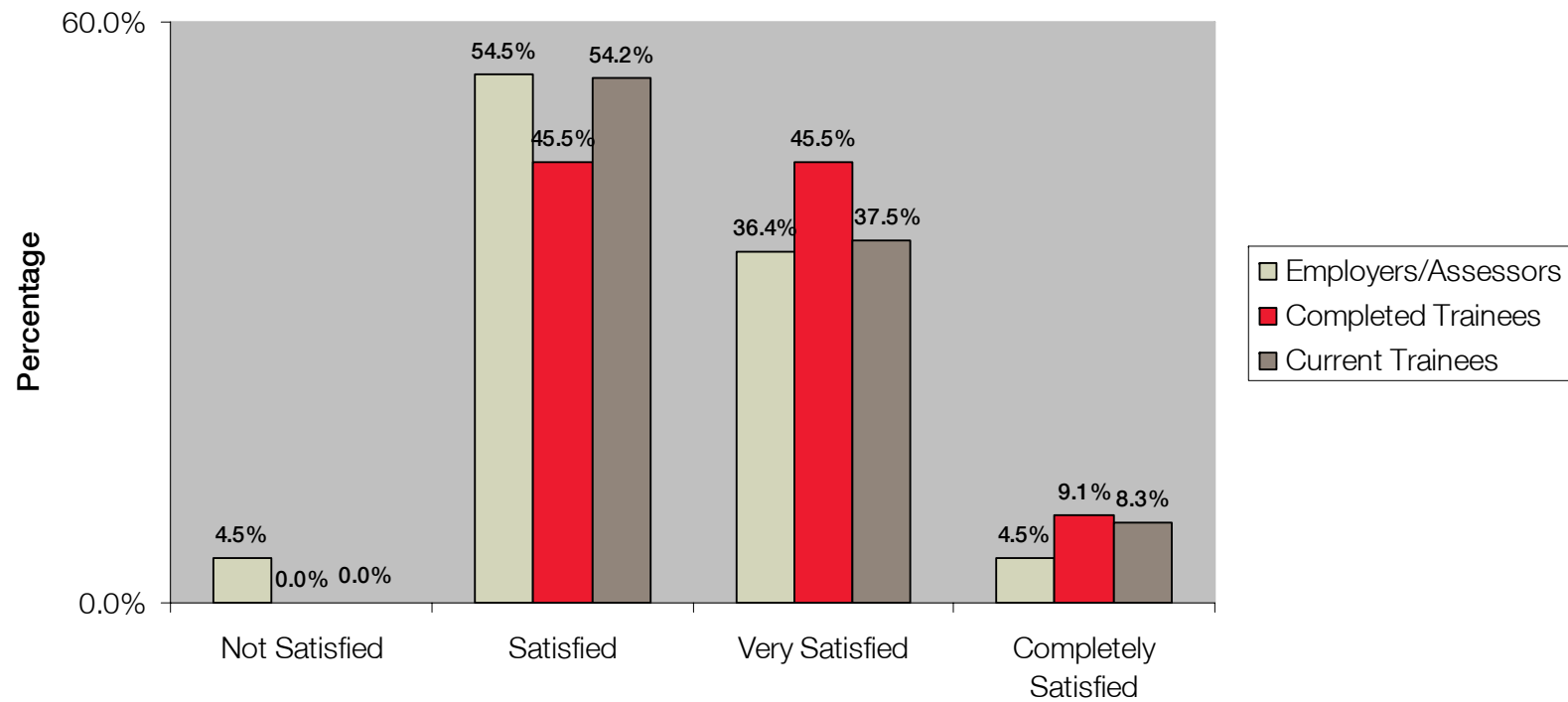
GRAPH 9

Is the performance of Instrument Technicians measured in your company?



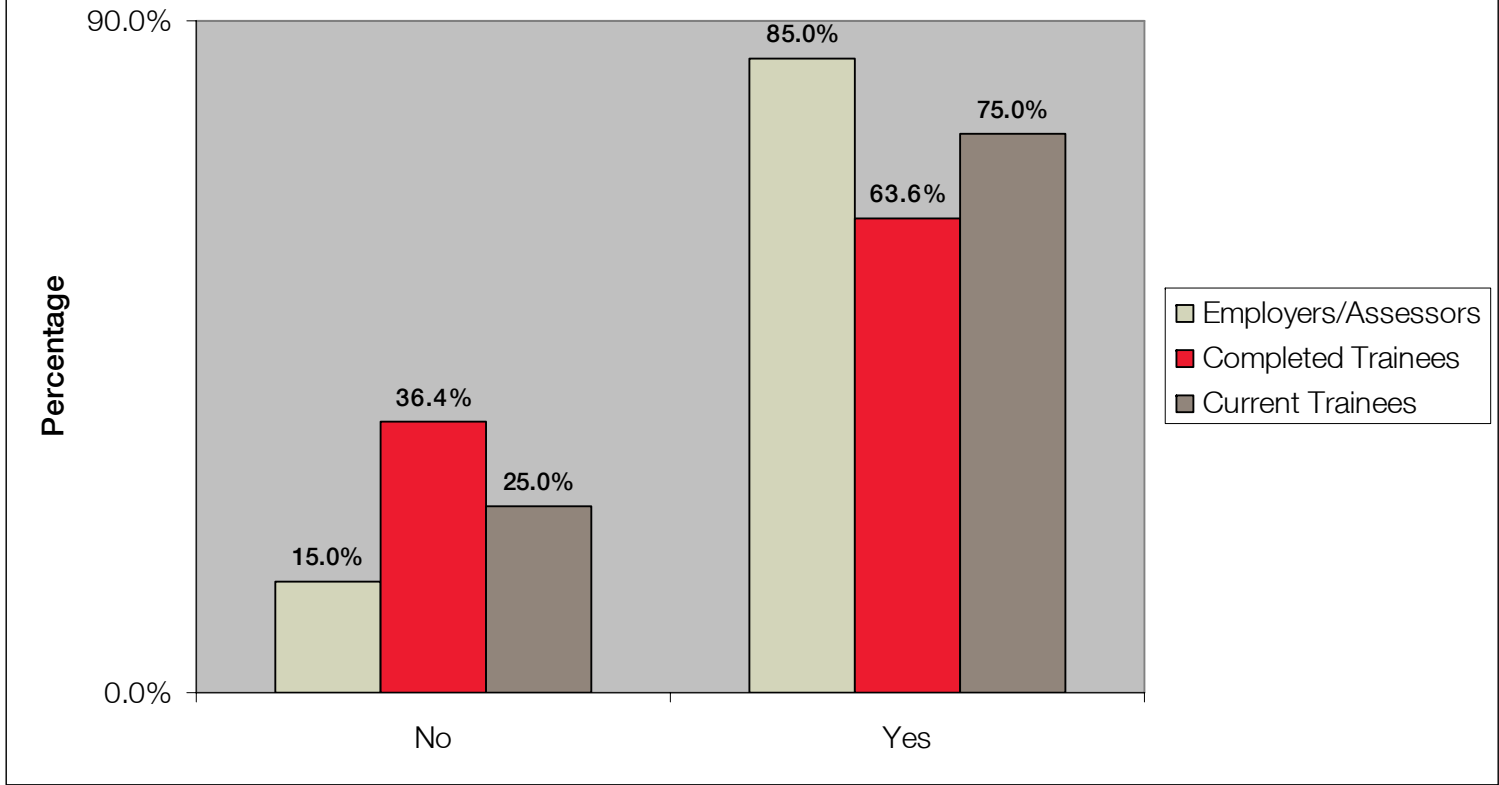
GRAPH 10

How satisfied are you that the content covered in the National Certificate in Industrial Measurement and Control (Level 4) meets the skill needs in your industry?



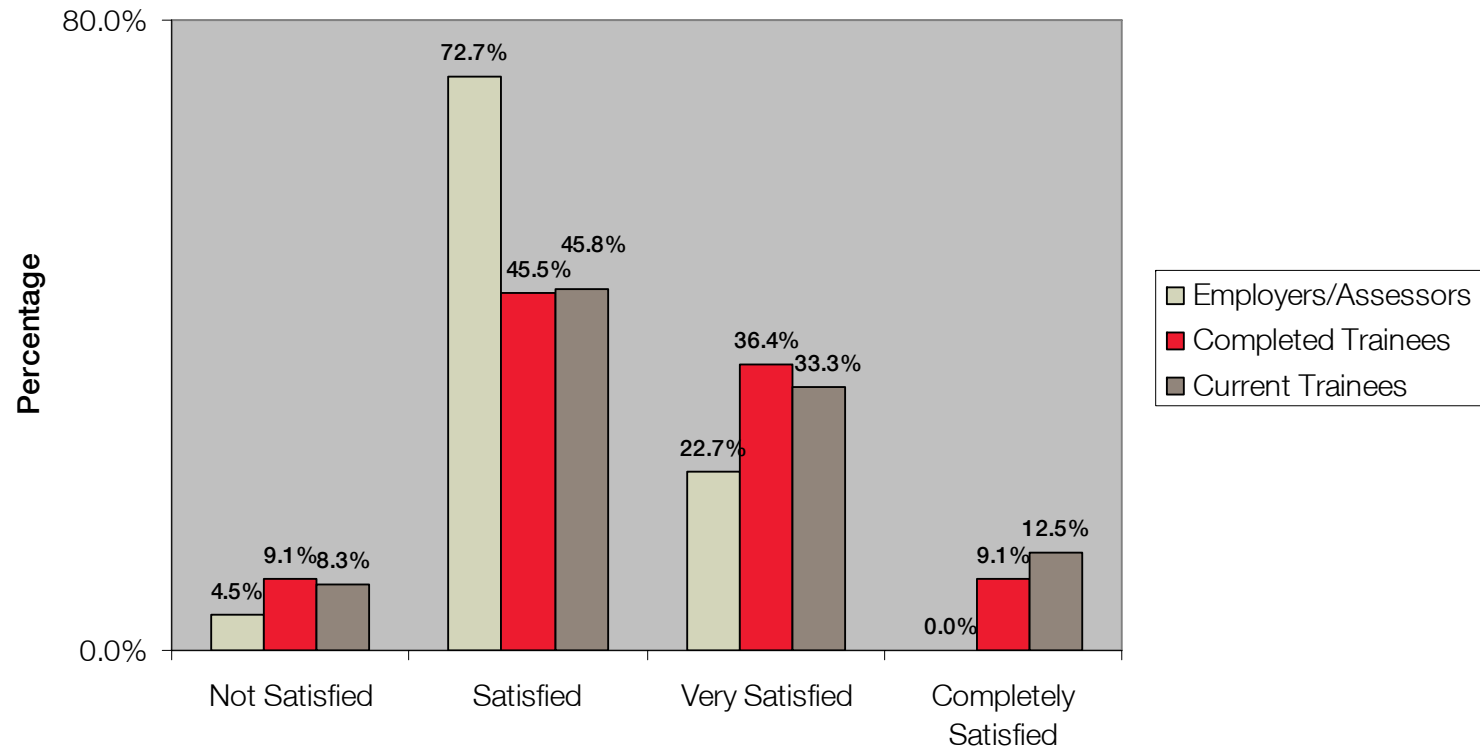
GRAPH 11

Will the current National Certificate in Industrial Measurement and Control (Level 4) cope with the future skill needs of the industry?



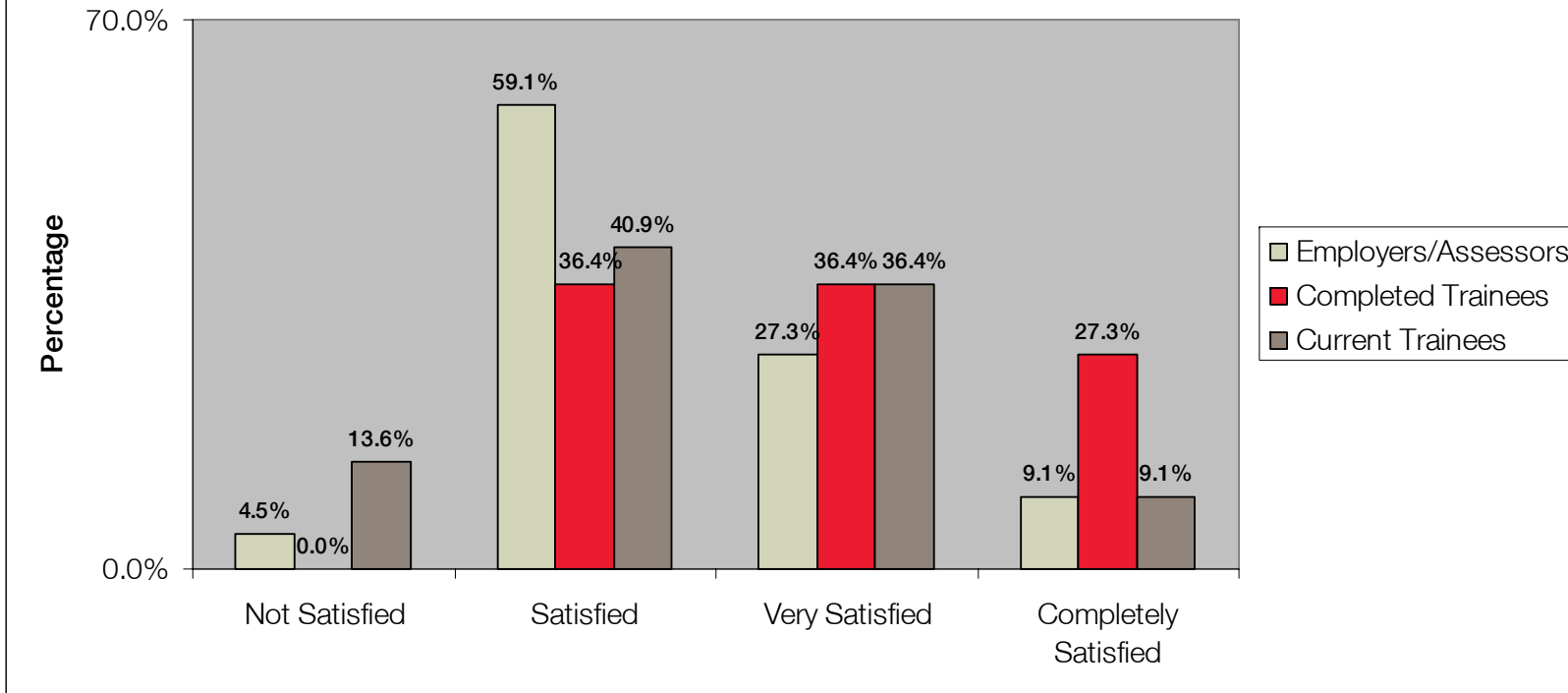
GRAPH 12

How satisfied are you with the off-job training for the National Certificate in Industrial Measurement and Control (Level 4)?



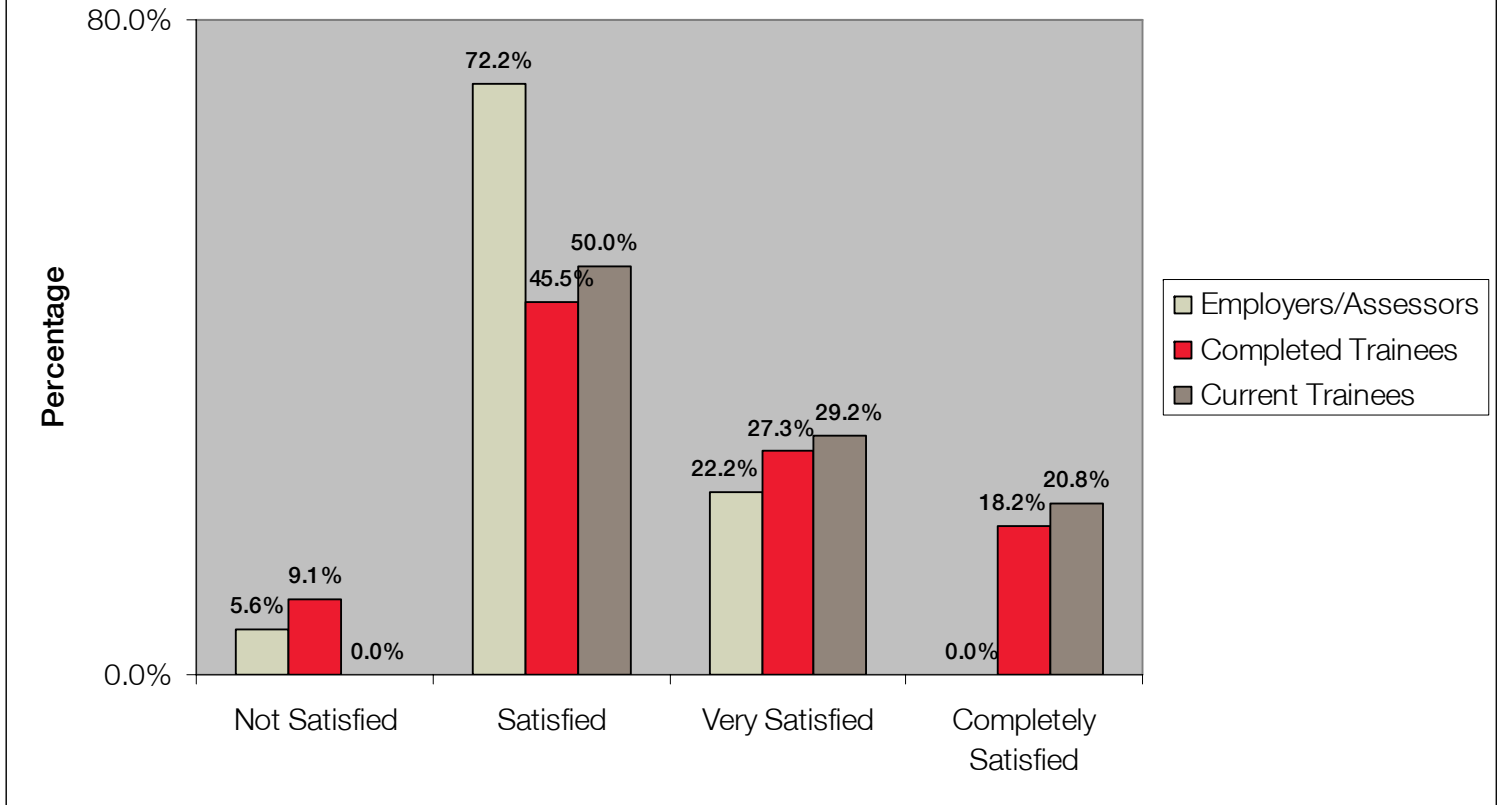
GRAPH 13

How satisfied are you with the on-job training for the National Certificate in Industrial Measurement and Control (Level 4)?



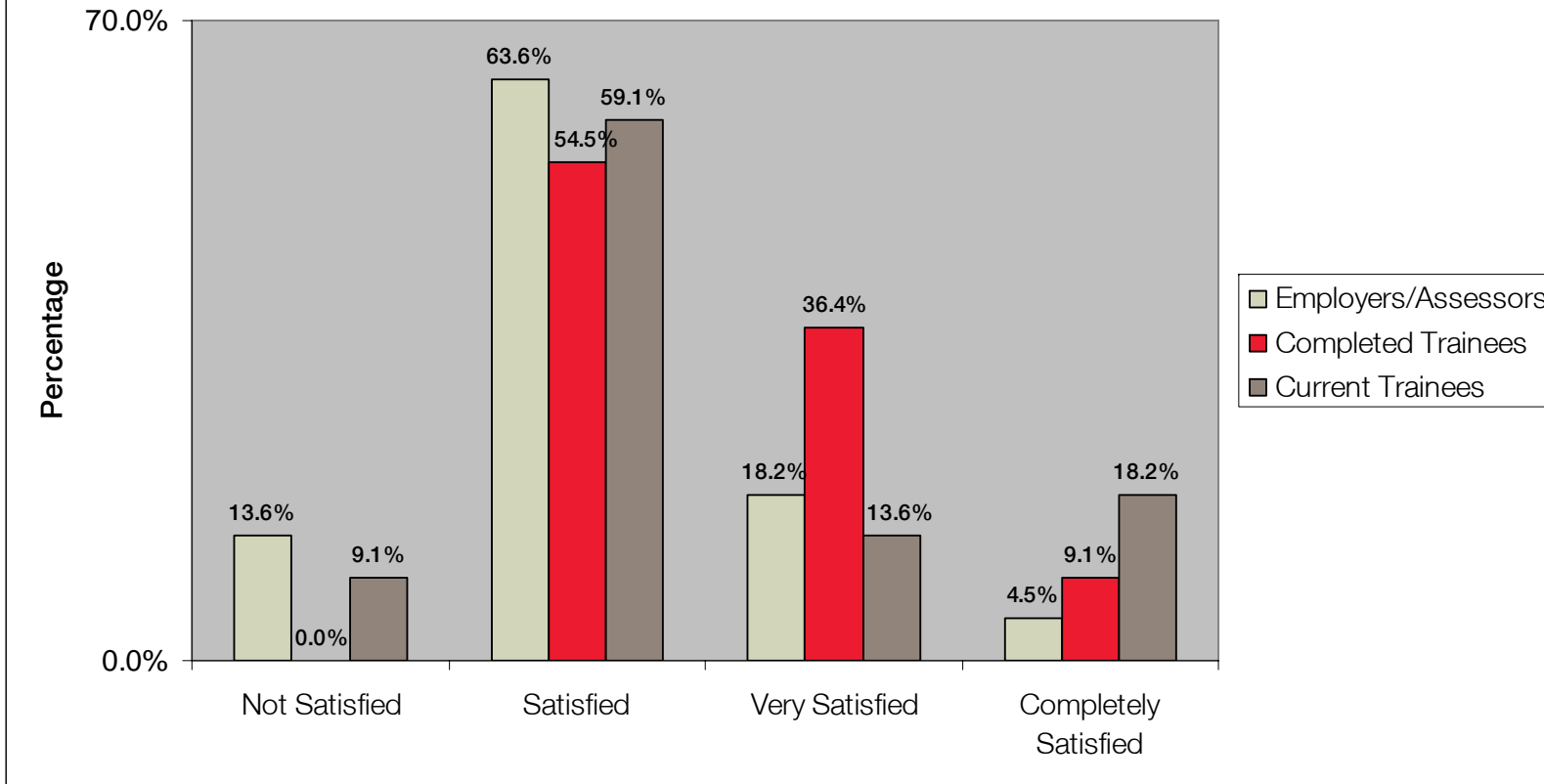
GRAPH 14

How satisfied are you with the off-job assessment for the National Certificate in Industrial Measurement and Control (Level 4)?



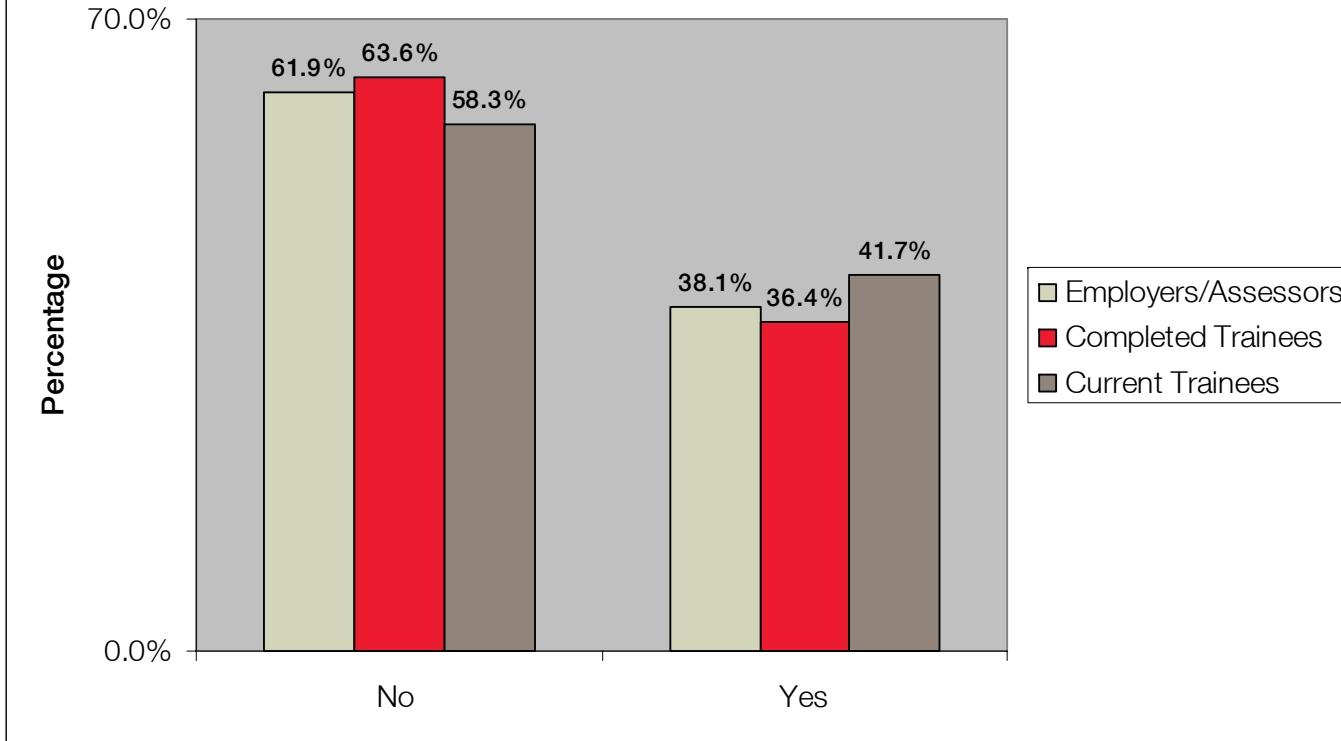
GRAPH 15

How satisfied are you with the on-job assessment for the National Certificate in Industrial Measurement and Control (Level 4)?



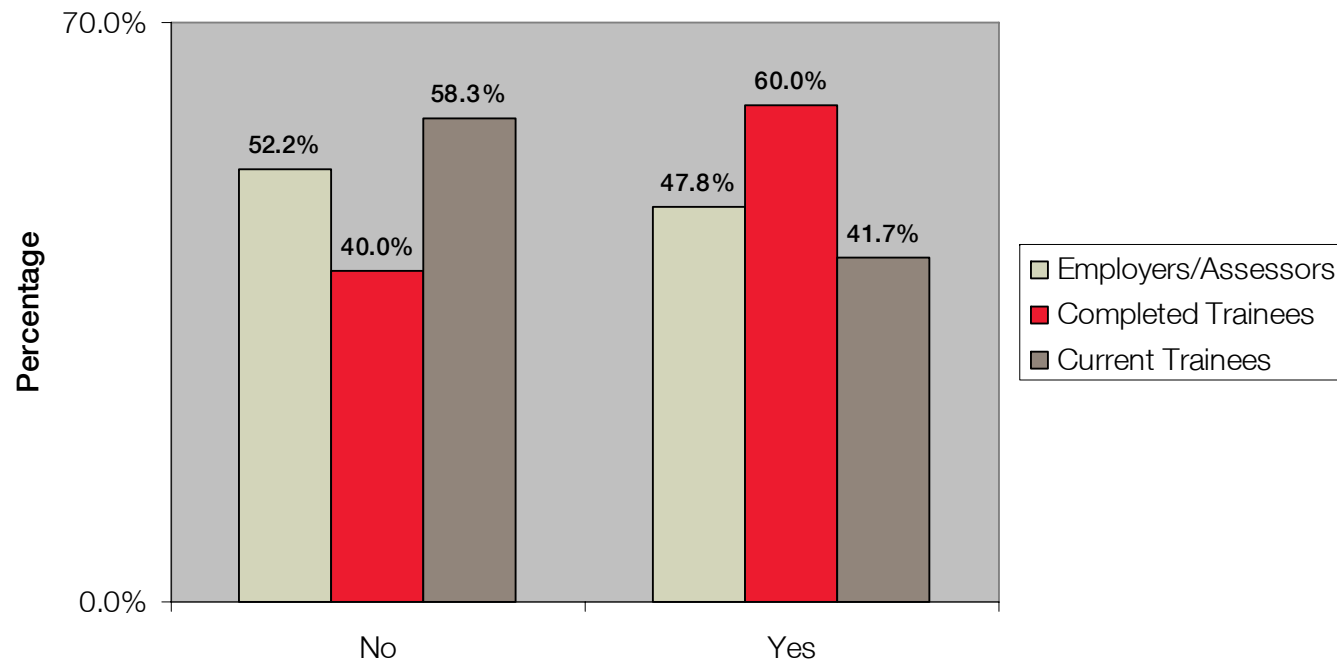
GRAPH 16

Are there barriers to someone completing the National Certificate in Industrial Measurement and Control (Level 4)?

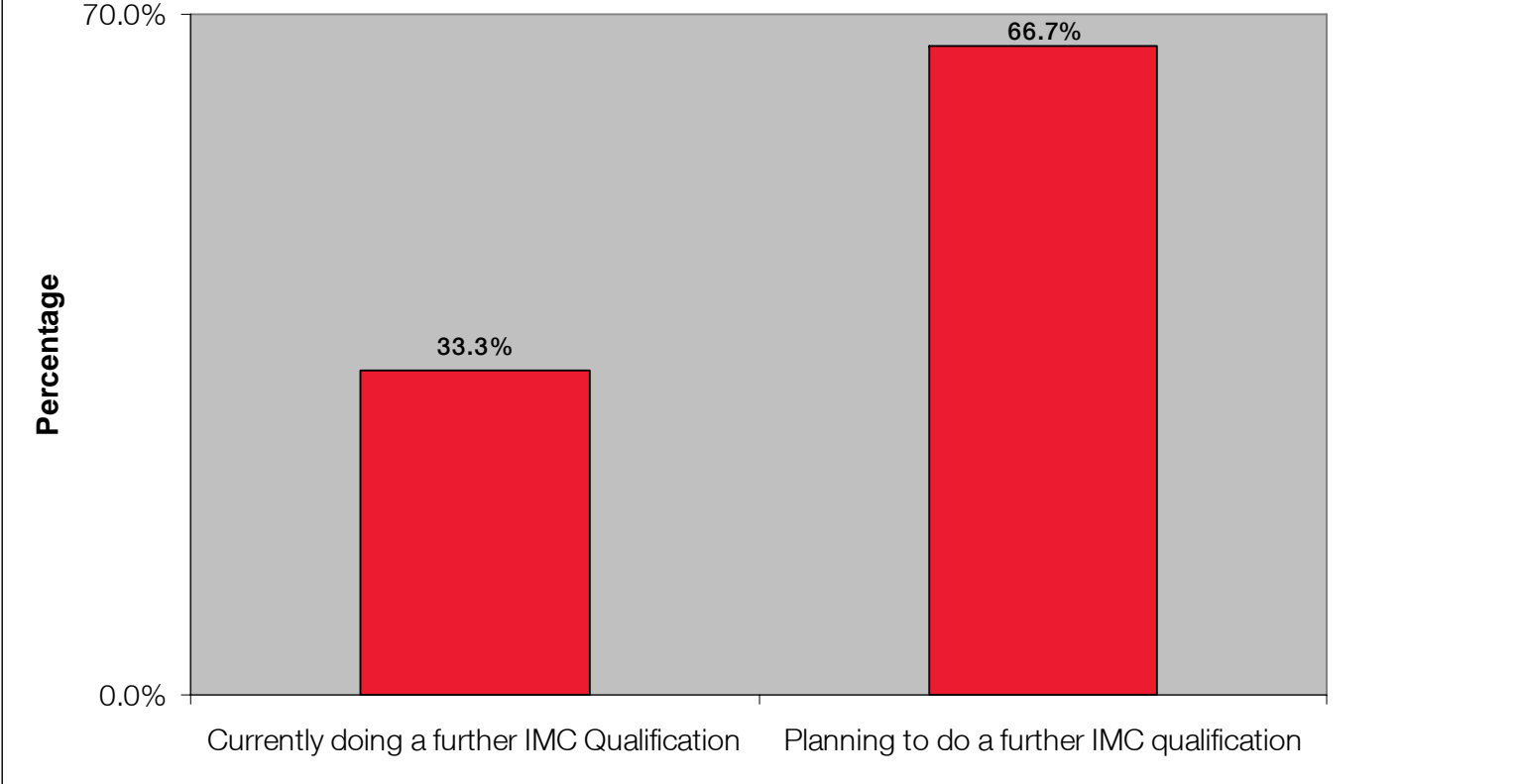


GRAPH 17A

Are you, or IMC people in your company, doing or planning to do any other currently available IMC qualifications (i.e. other than the National Certificate in Industrial Measurement and Control (Level 4))?

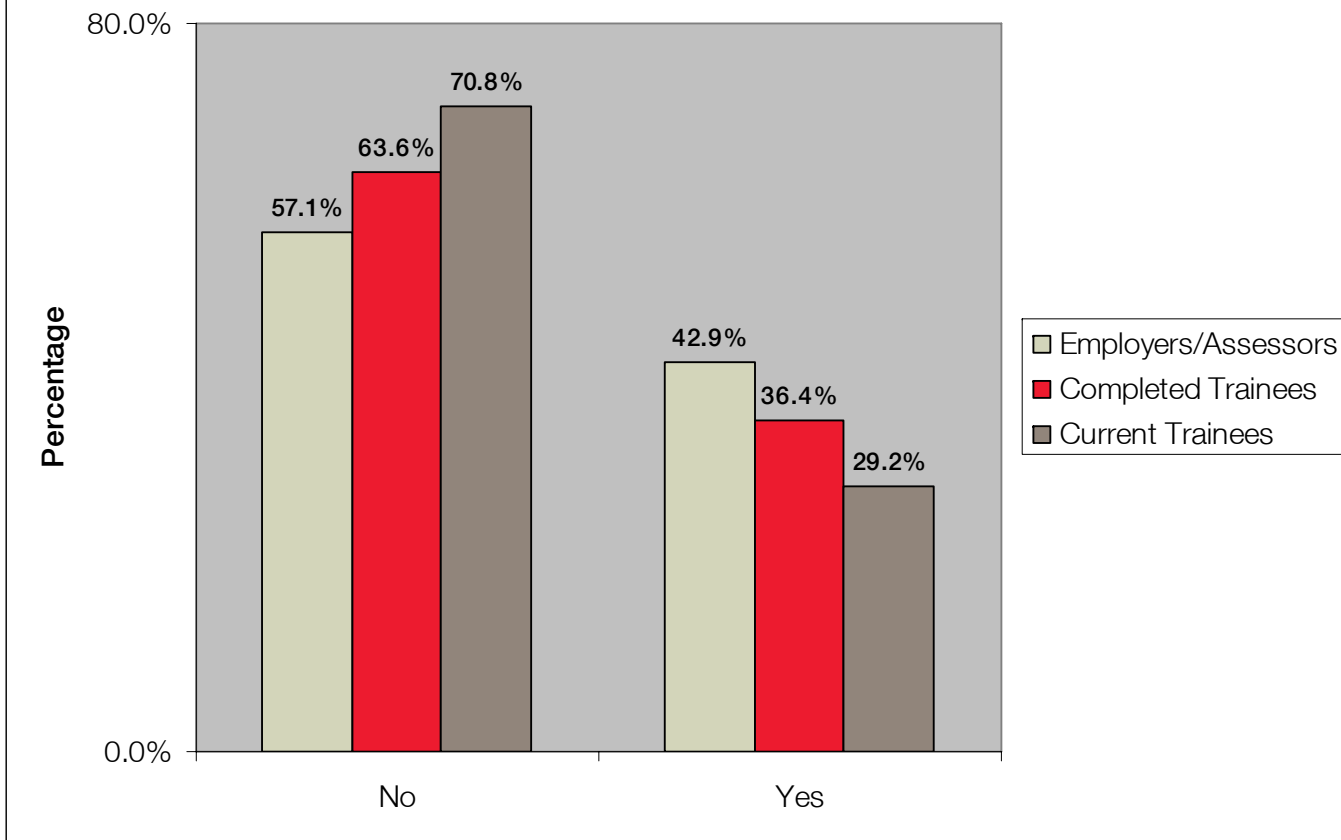


GRAPH 17B  
Completed Trainees who are planning to or are currently doing a further IMC qualification (i.e. other than the National Certificate in Industrial Measurement and Control (Level 4))

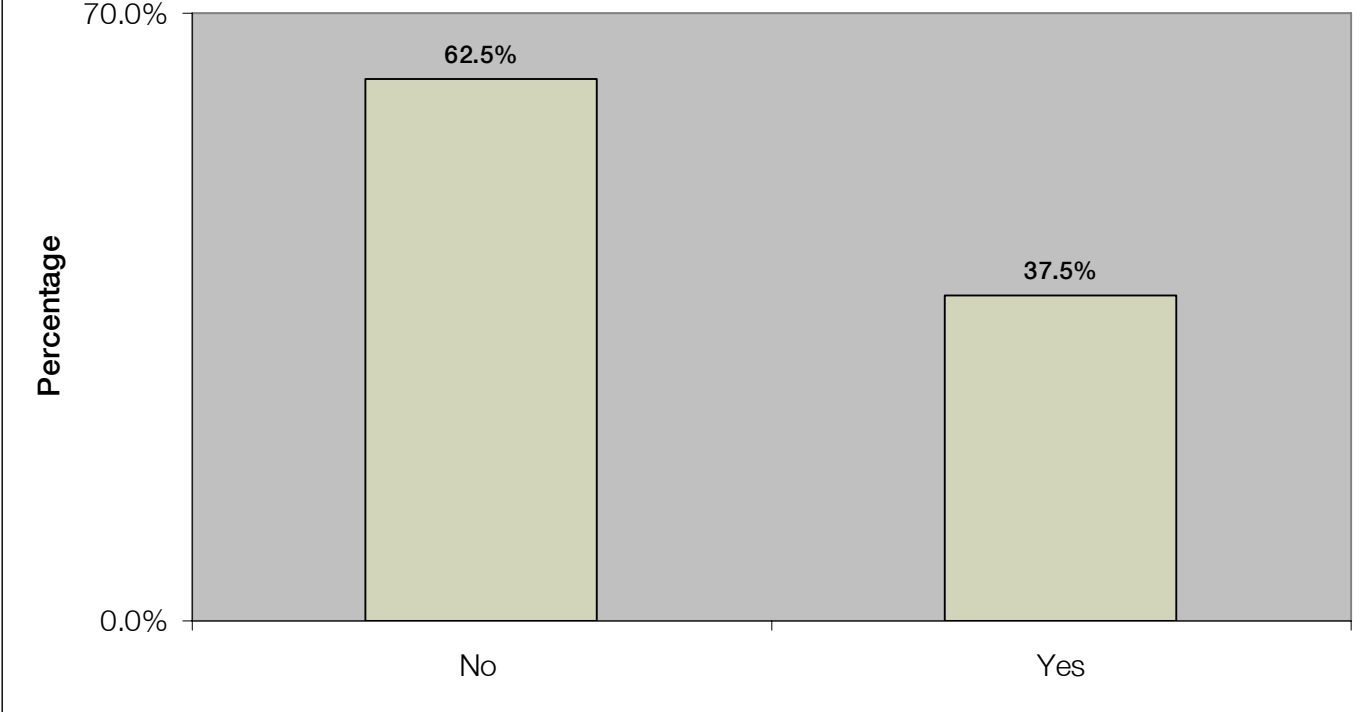


GRAPH 18

Do additional IMC qualifications need to be made available in the future?



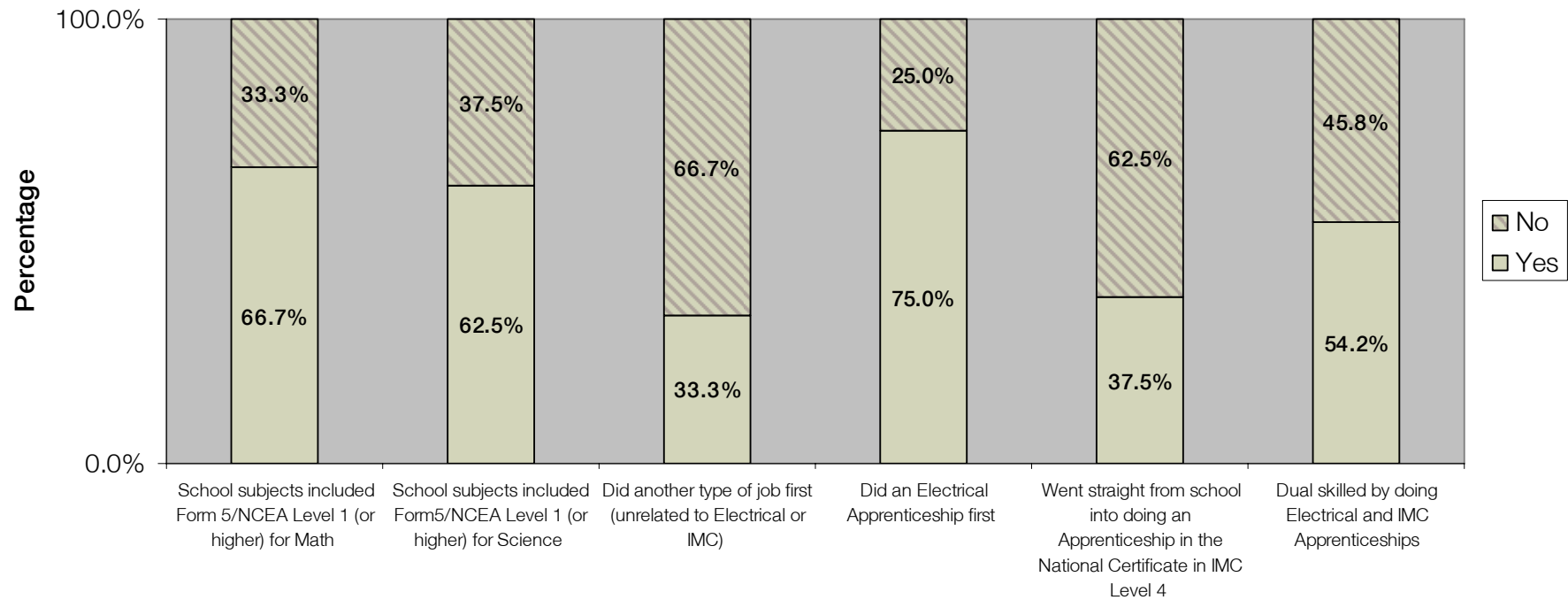
GRAPH 19  
Employers/Assessors  
Do you have IMC people in your industry  
who have an IMC qualification from another country?



GRAPH 20

Employers/Assessors

What is most typical of IMC people in your industry?

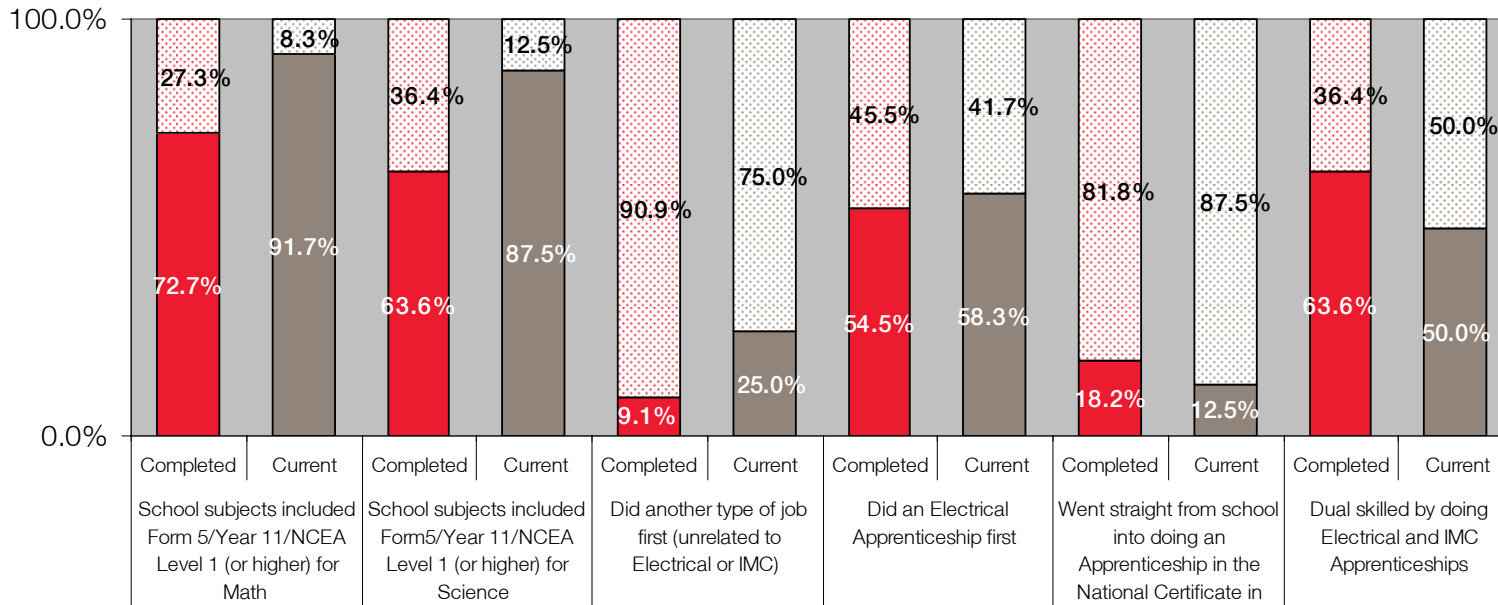


**Note**

Subsequent interviews revealed that dual skilled responses may overlap with 'Did an electrical apprentice first'

**GRAPH 21**  
**Completed/Current Trainees**  
**What is most typical of you?**

Solid colour = "Yes"  
 Dots = "No"



**Note**

Subsequent interviews revealed that dual skilled responses may overlap with 'Did an electrical apprentice first'

GRAPH 22

Are there future career opportunities for qualified Instrument Technicians?

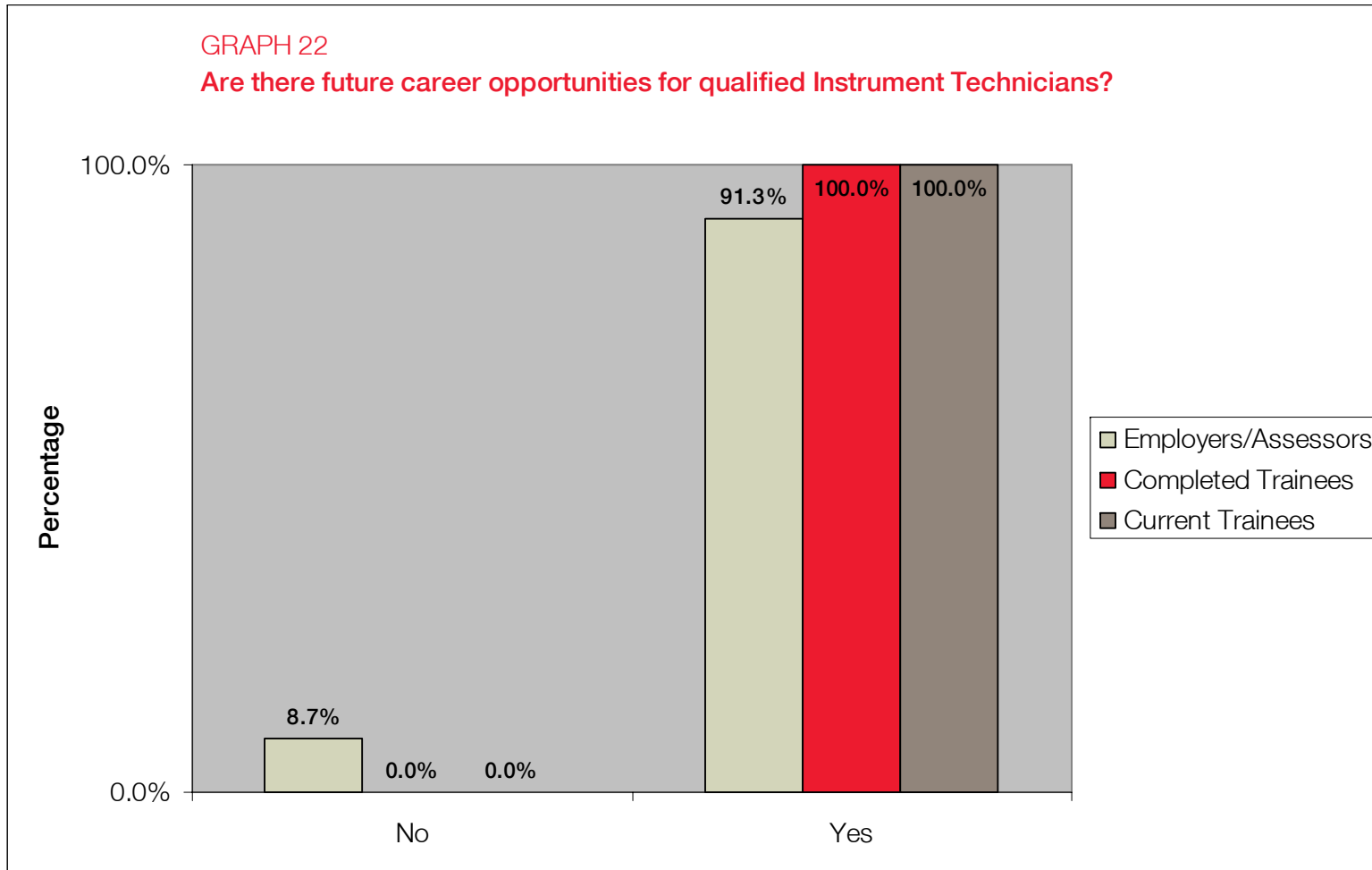


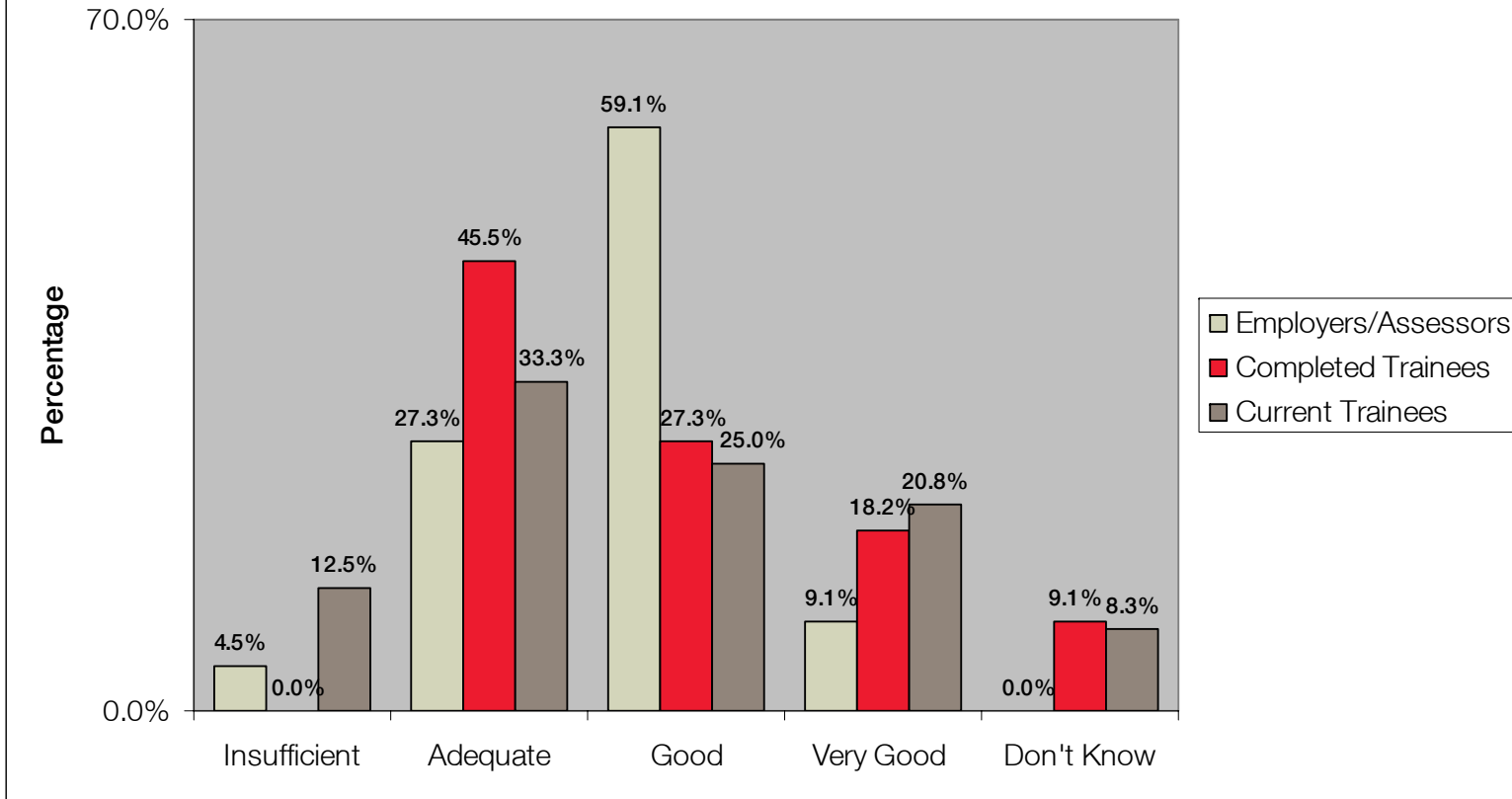
TABLE 3

For those companies where these systems are not currently available, do you think they should be introduced in the future?

		System Currently Available		For those companies where these systems are not currently available, do you think they should be introduced in the future?	
		Yes	No	Yes	No
A set of selection criteria as part of the recruitment process	Employers/Assessors:	80.0%	20.0%	33.3%	66.7%
	Completed Trainees:	81.8%	18.2%	0.0%	100.0%
	Current Trainees:	27.3%	72.7%	27.8%	72.2%
Induction	Employers/Assessors:	85.7%	14.3%	25.0%	75.0%
	Completed Trainees:	81.8%	18.2%	0.0%	100.0%
	Current Trainees:	62.5%	37.5%	33.3%	66.7%
Coaching/Mentoring	Employers/Assessors:	85.0%	15.0%	60.0%	40.0%
	Completed Trainees:	54.5%	45.5%	80.0%	20.0%
	Current Trainees:	62.5%	37.5%	22.2%	77.8%
On-job training to the qualification (content coverage)	Employers/Assessors:	90.5%	9.5%	33.3%	66.7%
	Completed Trainees:	72.7%	27.3%	33.3%	66.7%
	Current Trainees:	83.3%	16.7%	25.0%	75.0%
On-job assessing to the qualification	Employers/Assessors:	90.9%	9.1%	0.0%	100.0%
	Completed Trainees:	72.7%	27.3%	33.3%	66.7%
	Current Trainees:	79.2%	20.8%	40.0%	60.0%
Vendor training	Employers/Assessors:	76.2%	23.8%	37.5%	62.5%
	Completed Trainees:	54.5%	45.5%	0.0%	100.0%
	Current Trainees:	56.5%	43.5%	27.3%	72.7%
In-house training on company specific equipment	Employers/Assessors:	90.5%	9.5%	25.0%	75.0%
	Completed Trainees:	81.8%	18.2%	50.0%	50.0%
	Current Trainees:	56.5%	43.5%	45.5%	54.5%
Industry knowledge development	Employers/Assessors:	89.5%	10.5%	33.3%	66.7%
	Completed Trainees:	63.6%	36.4%	75.0%	25.0%
	Current Trainees:	65.2%	34.8%	66.6%	33.3%
Performance management system	Employers/Assessors:	44.4%	55.6%	25.0%	75.0%
	Completed Trainees:	45.5%	54.5%	16.7%	83.3%
	Current Trainees:	34.8%	65.2%	31.2%	68.8%
Feedback on effective and ineffective performance	Employers/Assessors:	81.0%	19.0%	37.5%	62.5%
	Completed Trainees:	54.5%	45.5%	40.0%	60.0%
	Current Trainees:	43.5%	56.5%	35.7%	64.3%
Pay structure related to qualification	Employers/Assessors:	80.0%	20.0%	28.6%	71.4%
	Completed Trainees:	90.9%	9.1%	0.0%	100.0%
	Current Trainees:	68.2%	31.8%	33.3%	66.7%

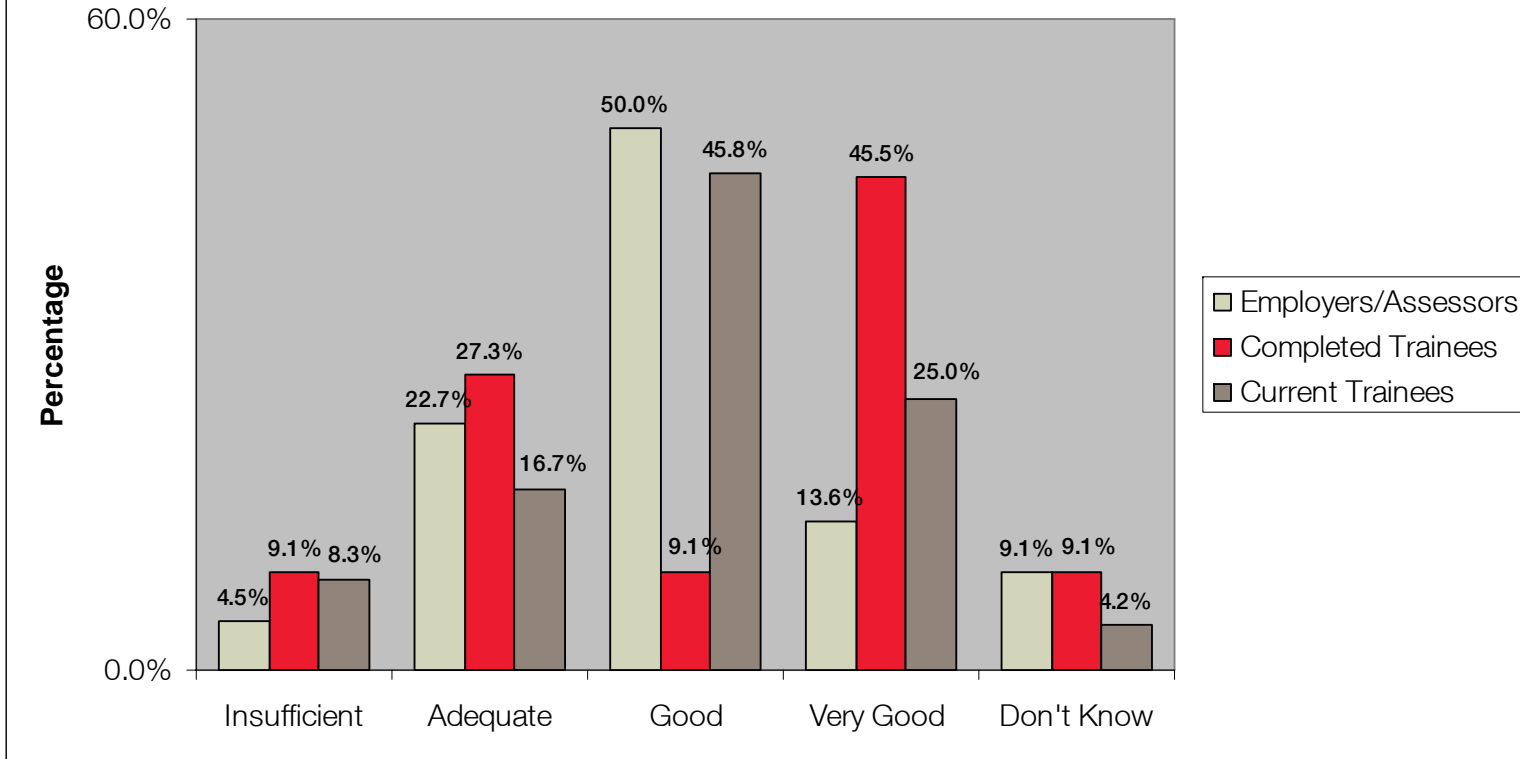
GRAPH 23

How would you rate the support given by ETITO in ensuring future IMC skill needs are met?



GRAPH 24

How would you rate the support given by the Training Providers in ensuring future IMC skill needs are met?



GRAPH 25

How would you rate the support given by Industry Associations in ensuring future IMC skill needs are met?

