COMMUNITY OF PRACTICE

CONSTRUCTION CERTIFICATION PROFESSIONS NSW

Community of Practice Report RT1

CURRENT LANDSCAPE OF QUANTITY SURVEYING AND PROJECT MANAGEMENT SERVICES IN NEW SOUTH WALES

SUMMARY OF THE ROUNDTABLE HELD ON 11 JUNE 2020

Prepared by

Centre for Smart Modern Construction (c4SMC)

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This summary report is an outcome of the Roundtable held on 11 June 2020 to establish current landscape of Quantity Surveying and Project Management services in NSW. The Centre for Smart Modern Construction (c4SMC) at Western Sydney University organised this Community of Practice Roundtables on behalf of the Office of NSW Building Commissioner (OBC), together with representatives from Australian Institute of Quantity Surveyors (AIQS), The Royal Institution of Chartered Surveyors (RICS), and Australian Institute of Project Management (AIPM).

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EXECUTIVE SUMMARY

The concept of a Community of Practice for practitioners involved in certification was introduced by the NSW Building Commissioner in January 2020 to provide a platform for discussion and recommendations on how to improve and modernise the services related to certification in construction against the backdrop of the ongoing reforms in the NSW Construction Industry, mainly including the *Design and Building Practitioners Act* 2020 (NSW) and the *Residential Apartment Buildings (Compliance and Enforcement Powers) Act* 2020 (NSW).

To facilitate this critical initiative, an organising committee was formed to execute a series of Roundtables on three intertwined themes, namely Current and future landscape of construction industry's professional services (Theme 1), Careers in the New Landscape (Theme 2), and Micro learning required for the New Landscape/ changing or upgrading careers in construction (Theme 3). Initial committee members included the Centre for Smart Modern Construction (c4SMC) at Western Sydney University, the Australian Institute of Quantity Surveyors (AIQS), the Australian Institute of Project Management (AIPM), and The Royal Institution of Chartered Surveyors (RICS).

This report details the first Roundtable held on 11 June 2020, which was aimed at understanding the current landscape of professional services provided by the quantity surveying and project management practitioners in the NSW construction industry. With over 90 participants, the roundtable had representation from members of AIQS, RICS and AIPM and academics representing universities in NSW. The event was comprised of informative presentations, industry-academic consultations via group discussion, and a questionnaire survey.

In the Roundtable discussions, it has been found that:

a) QS professions are engaged in a wide range of building and construction activities with varied levels of performance. Most Commonly, QS services relate to Bills of Quantity, Cost Estimation / Planning, Tender Documentation and Project Monitoring.

b) the role of PM is increasingly influential, covering a broader range and typically across the pre contract and construction phases. This activity also extends into certification and compliance.

c) QS and PM professional services are not optimally coordinated and integrated in construction projects.

d) Some QS practitioners reported that there are issues such as lower standard of professional performance resulted from under-pricing of fees due to competition and lack of mutual understanding, communications and collaboration from other consultants and professions. While for PM practitioners, previous definition of project management does not correlate with current industry definitions or project manager terminology and standards.

e) Tertiary education in Australia does not adequately address QS competency requirements.

f) It has been a huge challenge to appropriately recognise nomenclature, education, competency requirements and ultimately professional qualification and align them with international best practice.

g) There are multiple challenges in relation to the rapid introduction of digital technologies, including proof of concept, education skills development and financial investment.

h) For both disciplines, the use of digital technologies is low due to low demand by clients for digital services.

i) QS and PM services may be enhanced by improving QS and PM practitioners' understanding of digitalisation standards and processes.

j) there is tremendous opportunity to improve productivity and quality through embracing digital technologies.

k) QS services may have an expanded role in certification by, for example, undertaking an adjunct certifying role or Independent Performance Audit of construction process.

Based on the discussions, it is recommended that:

1. QS professionals should be engaged as the principal cost consultant on building projects at an early stage to enable development of Cost Plans for the purposes of defining scope, understanding of risk and mitigation of unnecessary costs.

2. Formal recognition by governments of internationally recognised QS and PM competencies and experience should be in place to ensure consistent and quality consultancy on each project from inception to completion.

3. PM practitioners should provide a ‘Handover service’ to manage the development and delivery of a handover document for new buildings.

4. The distinction between a professional and a practitioner needs to be highlighted. Many practitioners providing PM and QS services in Australia today will not have been assessed to ensure they have a baseline level of competency for the service they are providing. Further, many of these practitioners are not regulated against professional standards. This is a concern and consumers should be alerted to the distinction rather than the two being conflated.

Table of Contents

EXECUTIVE SUMMARY 3

1 COMMUNITY OF PRACTICE IN CERTIFICATION PROFESSIONS 7

1.1 FIRST COMMUNITY OF PRACTICE ROUNDTABLE 8

2 THE GROUP DISCUSSION TO ESTABLISH CURRENT LANDSCAPE OF QUANTITY SURVEYING AND PROJECT MANAGEMENT SERVICES 9

2.1 INTRODUCTION TO THE GROUP DISCUSSION 9

2.2 SUMMARIES OF GROUP DISCUSSIONS 11

2.2.1 SUMMARY OF AIQS GROUP DISCUSSION 11

2.2.2 SUMMARY OF RICS GROUP DISCUSSION 15

2.2.3 SUMMARY OF AIPM GROUP DISCUSSION 17

2.3 CONCLUDING SUMMARY OF GROUP DISCUSSIONS 20

3 THE SURVEY TO ESTABLISH CURRENT LANDSCAPE OF QUANTITY SURVEYING AND PROJECT MANAGEMENT SERVICES 21

3.1 INTRODUCTION TO THE SURVEY 21

3.2 ANALYSIS OF THE SURVEY 22

3.2.1 RESPONDENTS' PROFILES 22

3.2.2 QUANTITY SURVEYORS' RESPONSES 27

3.2.3 PROJECT MANAGERS RESPONSES 40

4 CONCLUSION 51

5 APPENDICES 55

Appendix A: Notes from the AIQS group discussion and poll results 55

Appendix B: Notes from the RICS group discussion and poll results 62

Appendix C: Notes from the AIPM group discussion and poll results 66

1 COMMUNITY OF PRACTICE IN CERTIFICATION PROFESSIONS

The concept of Community of Practice in Certification Professions was introduced by the NSW Building Commissioner in January 2020. This was to create a conversation among Certification Professions around the reforms happening in NSW Construction Industry, with the NSW Design and Building Practitioners Act and the NSW Residential Apartment Buildings (Compliance and Enforcement Powers) Act.

An organizing committee has been called and formed to execute a series of Roundtables to facilitate Community of Practice in Certification Professions. Initial committee members included academics at the Centre for Smart Modern Construction (c4SMC), Western Sydney University, and professionals from the Australian Institute of Quantity Surveyors (AIQS), the Australian Institute of Project Management (AIPM), and the Royal Institution of Chartered Surveyors (RICS).

Three themes proposed for these Roundtables are listed below.

Theme 1: Current and future landscape of construction industry's professional services.

The discourse along this theme will be on aspects such as the state of the construction industry in terms of QS/PM services, certification and digitalization, current status/landscape, expected status at 2023, 2025 and 2030.

Theme 2: Careers in the New Landscape

The discourse along this theme will be on aspects such as the impact of digitalisation, impact of industrialisation (off site construction), changes to the role of engineer, QS, PM, need of multi-disciplinary design managers, need for enhancing the processes of certification, dealing with smart buildings, upgrading the current Built World to make it smart, and explore other potential new jobs

Theme 3: Micro learning required for the New Landscape/ changing or upgrading careers in construction.

The discourse along this theme will be on aspects such as training new professionals in new professional roles, training existing professionals in new aspects, creating professional pathways to career diversification and enhancement, and agile learning methods

1.1 FIRST COMMUNITY OF PRACTICE ROUNDTABLE

The first Roundtable was held on 11th June 2020 as a virtual event. The objective of this Roundtable was to initiate a discourse on the current and future landscape of the NSW construction industry's professional services, with the focus on the role of Quantity Surveyors and Project Managers. With over 90 participants, the roundtable had representation from industry, academia, and other professional organisations in NSW. Number of participants that represented each of the main institutes are presented below.

Institutes Represented	Number of Participants
Australian Institute of Quantity Surveyors (AIQS)	20
The Royal Institution of Chartered Surveyors (RICS)	20
Australian Institute of Project Management (AIPM)	16
Academics: University of New South Wales (UNSW), University of Technology, Sydney (UTS), University of Newcastle, and Western Sydney University (WSU)	35

The program was a combination of a plenary session and industry-academic consultations via group discussion. The plenary session included informative presentations by representatives of the Office of Building Commissioner at NSW Department of Customer Service. NSW Building Commissioner David Chandler spoke about the Design and Building Practitioner's Bill which was about to be legislated at that time and about its significance in reclaiming confidence in the construction industry. Matthew Press, Program Director at the OBC illustrated the Six Pillars of Construct NSW for implementing system-wide uplift and Vanessa Carmody, Program Manager, OBC elaborated on Pillar 3 – Lifting skills and capabilities.

The industry-academia consultations were conducted after the plenary session. Details on how it was conducted, and summaries of those group discussions will be presented next in this report.

In addition, a survey was launched to gather further information about the current landscape of Quantity Surveying and Project Management services in NSW. Findings of the survey will also be presented in this report.

2 THE GROUP DISCUSSION TO ESTABLISH CURRENT LANDSCAPE OF QUANTITY SURVEYING AND PROJECT MANAGEMENT SERVICES

2.1 INTRODUCTION TO THE GROUP DISCUSSION

This section reports on the virtual group discussions conducted during the Community of Practice Roundtable to capture the current landscape of the construction industry in terms of Quantity Surveying and Project Management Services, Certification, Compliance and Digitalisation. With over 80 participants, the roundtable had representation from industry, academia, and other professional organisations in NSW. Groups for the discussion were formed based on the three professional bodies separately (AIQS, RICS, AIPM) and academic representatives from several universities across NSW(University of New South Wales, University of Technology Sydney, University of Newcastle, and University of Western Sydney). As depicted on the Figure 1, the discussion was conducted in six small groups were each institution was represented by two groups. Each group had approximately 10-15 participants.

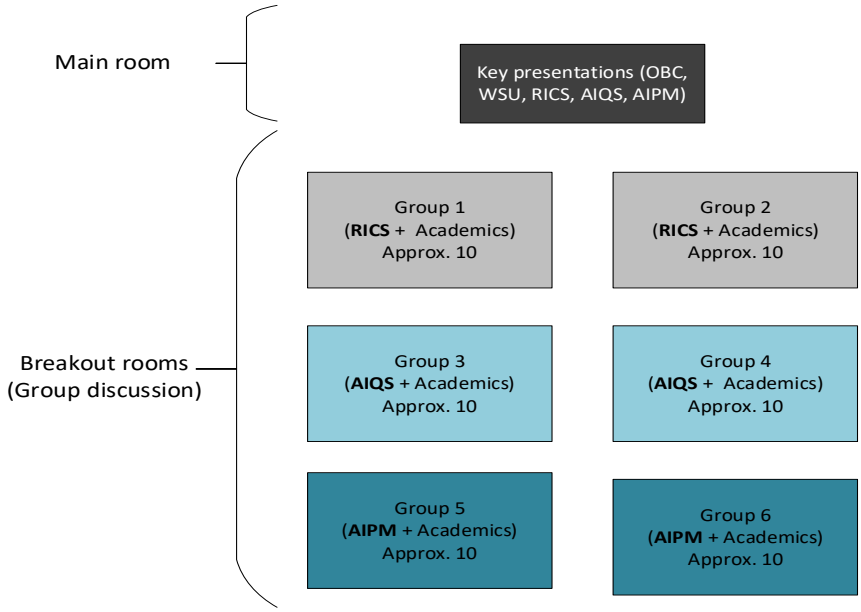

Figure 1: Structure of the arrangements for the virtual group discussion

The discussion in each group was led by academics with standard guide questions. There were four guide questions that facilitated the conversation to derive an overview of the current landscape of QS and PM professional services in NSW, current challenges, the role of

digitalisation in improving the services, and how they can have greater contribution to building certification. These four guide questions are below.

Q1 - **What is the type and state of services offered by QS/PM professions in NSW?**

Q2 - **What are the problems, deficiencies, and possible improvements in QS/PM services?**

Q3 - **How and which QS/PM services can be improved through digitalisation?**

Q4- How can QS/PM services be enhanced to have a greater input in certification?

In addition, during group discussions four poll questions were raised to align with discussion topics to substantiate overall views of discussion. Responses to poll questions are included in the appendices of this report.

Poll 1 -To what extent do you feel that the QS/PM services are valued in the industry? Highly valued |Valued |Moderately valued| Less valued| Least valued

Poll 2- How do you rate the level of challenges associated with the services provided by QSs and PMs? Highly challenging| Challenging| Moderately challenging |Less challenging| Least challenging

Poll 3- To what level would digitalisation of services affect the quality of services rendered by QS/PM? Highly significant | Significant| Moderately significant| Less significant| Least significant

Poll 4- How would you rate the potential for QS/PM to involve in the certification process? High| Medium| Low

Subsequent to the Community of Practice Roundtable the notes recorded from these discussions were shared with three key institutions for validation. The following three sections present the summaries provided by AIQS, RICS, and AIPM respectively.

2.2 SUMMARIES OF GROUP DISCUSSIONS

Summary responses to the four guide questions by representatives of AIQS, RICS, and AIPM are presented below. These summaries of group discussions are prepared by respective institutions after interpreting notes gathered from discussions conducted during the Roundtable.

2.2.1 SUMMARY OF AIQS GROUP DISCUSSION

What is the type and state of services offered by QS professions in NSW?

Services offered by Quantity Surveyors (across both building and infrastructure assets) in NSW include;

- Arbitration / Mediation
- Asset Management
- Benchmarking
- Carbon Measurement
- Contract Administration and Management
- Contract Claims Advice
- Cost Planning and Management
- Replacement Cost Assessments
- Due Diligence Assessments
- Feasibility Studies
- Cost Estimating
- Expert Witness and Opinion
- Facility Management
- Engineering Services Cost Management
- Tax Depreciation
- Tender Documentation and BoQ
- Project / Construction Management
- Construction Finance Reporting
- Risk Management
- Sinking Fund Analysis
- Specification Writing
- Sustainability Consulting
- Independent Certification and Review
- Life Cycle Costing
- Value Engineering and Management
- Elemental and Functional Areas
- Loss Adjusting

The following is in relation to Class-2 buildings.

a) Level of service offered by the Quantity Surveyor depends on the type of construction project and the stage at which they are engaged.

For Class-2 buildings the majority of quantity surveyors are engaged by financial institutions for Construction Finance Reporting purposes. A few quantity surveying firms have established relationships with some Developer-Builders to provide fuller services from feasibility, value management, cost plans, tender estimates, variations, bank reports and progress payment valuations and strata services post completion including initial maintenance schedules and

capital replacement schedules and estimates. Most Class-2 building projects are Design & Construct.

What are the problems, deficiencies, and possible improvements in QS services?

a) Level of competition often leads to underpricing of fees in order to win the job (testament that most clients go for the cheapest option, not necessarily the best). This invariably results in a lower standard of professional performance by the QS firm.

b) In order for best outcome the Quantity Surveyor should be engaged as the principal cost consultant to ensure the project is delivered within the budget parameters, best contract type is utilised, full documentation is in place,

c) Problems are often created by other consultants such as architects who do not produce fully documented drawings. Also a large number of project managers have no idea about the construction process and how buildings are constructed. Engaging a Quantity Surveyor as Project Manager would have a more beneficial outcome.

d) Tertiary education courses do not have enough quantity surveying content.

e) A priced Bill of Quantities should be required as a mechanism for rectifying poor and inadequate documentation for tenderers.

f) Site inspections by the Quantity Surveyor and PCG should be monthly (at a minimum).

g) Principal client and Head Contractor shouldn't be able to include clauses requiring the contracting-out of proportionate Liability.

How and which QS services can be improved through digitalisation?

l) Understanding of how digitalization (e.g. BIM) works and what to look for in digitized drawings.

m) Utilisation of the ANZIQS BIM Best Practice Guide has been developed to establish a base level of knowledge and awareness of Building Information Modelling (BIM) for those

engaged in the quantity surveying, cost estimating, and the broader construction cost management professions.

How can QS services be enhanced to have a greater input in certification?

a) Quantity Surveyor could have an adjunct certifying role in verifying that all relevant certifications are in place. This will assist with reducing risk to financial institutions, particularly those which have financed the development and are subsequently financing the purchase of individual apartments.

b) The Quantity Surveyor could undertake an Independent Performance Audit of the construction process to ensure compliance with design specifications. This will entail the Quantity Surveyor checking all certifications are signed-off by the relevant consultant, deliveries meet design specification requirements prior to proceeding to the next stage of construction. The Quantity Surveyor will review all contract quality documentation, Inspection and Test Plans, as-built drawings, Hold Point, Witness Point and Signature Point checklists, material records and delivery dockets

c) Quantity Surveyors are unlikely to undertake Building Certifiers role as they more than likely won't get P.I. Insurance to cover them. Those who could get P.I. Insurance will be hit with extremely high premiums. Unlikely that Limitation of Liability Schemes will have any material impact on P.I. Insurance premiums for years.

AIQS Concluding Summary

a) The Quantity Surveyor should be engaged as the principal cost consultant on building projects.

b) Construction Certificate should only be issued once design documentation has been finalised or at least at LOD 300. While spending greater time resolving scope and documenting solutions may take more time up front, it has reduced costs in the long term. In such circumstances, early engagement of the quantity surveyor will enable

development of Cost Plans for the purposes of defining scope, understanding risk and mitigating unnecessary costs.

c) Needs to be formal recognition by governments of the quantity surveyors' qualifications and experience. There are a number of individuals calling themselves quantity surveyors who have no formal quantity surveying (or construction) qualifications and experience. This is why AIQS introduced the Certified Quantity Surveyor designation and promotes it so widely.

d) There needs to be a consistency of consultants on each project from inception to completion.

2.2.2 SUMMARY OF RICS GROUP DISCUSSION

What is the type and state of services offered by QS and PM professions in NSW?

Feedback from the group suggests there is no uniform set of QS services delivered for clients, i.e. all clients look at QS competencies differently and use them to meet skill-gaps within their organisation.

Most Commonly, QS services relate to Bills of Quantity, Cost Estimation / Planning, Tender Documentation and Project Monitoring. With the exception of Project Monitoring including managing progress claims and general cost reporting, these services are typically engaged pre contract. QS services are also not as actively engaged risk analysis or sustainability and lifecycle assessments as they could be. Discussion revealed that client demand for digital services is low and as such QS's use of digital technologies is low as percentage of their activity.

In contrast to QS, the role of PM is increasingly influential, covering a broader remit and typically working across the pre contract and construction phases. This activity also extends into certification (typically payments rather than quality) and compliance. Like the QS service however the use of digital technologies continues to be relatively low as a percentage of their activity.

What are the problems and deficiencies in QS/PM services?

Discussion in the group revealed many opportunities to improve soft skills such as communication and client relationship management. Discussion also confirmed that QS and PM services are not typically integrated to best effect in projects. As referenced above there is tremendous opportunity to improve productivity and quality through embracing digital technologies.

How and which QS/PM services can be improved through digitalisation?

The group generally believe the use of BIM smart contracts and measurement technologies are the most advanced technology applications which could be used to improve service delivery in the short and medium term. IOT and blockchain technologies represent leading edge technologies. Multiple challenges exist in relation to the rapid introduction of these including proof of concept, education skills development and financial investment.

How can QS and PM services be enhanced to have a greater input in certification?

The role of building certification—Building Control Surveying—is a critical statutory function for all stakeholders in the built environment. This surveying specialism has a defined set of competencies which neither the QS or PM professional currently meet. Beyond 'certification of payments' typically undertaken by QS's for the purpose of making progress claims, the group was keen to ensure any build-out of certification services by QS/PM was aligned with a clear framework including minimum competency requirements, mechanism to interface with existing building certification role/function, and other considerations like risk/insurance trade-offs and potential for conflicts of interest.

RICS Concluding Summary

The discussions have been helpful to take stock as we periodically do with respect to the roles and their performance in the sector. The discussion directs focus to areas of immediate opportunity as much as it raises questions for further consideration.

It is clear there is an opportunity to further improve client outcomes with the use of digital technologies. It is also evident that the role of QS needs to be defined in the context of our aspiration for that the role can to play a more influential part in both the pre contract and construction phase of development. There is a role for the professional bodies like RICS to play in this and to work with the wider industry to explain the benefit accruing to stakeholders including PM's.

The bigger challenge relates to more clearly defining and differentiating—in the NSW and Australian context—the specialisms of surveyors such that nomenclature, education, competency requirements and ultimately professional qualification are appropriately recognised and aligned with international best practice. This will help clients identify and incorporate specialised skill sets and manage risk.

2.2.3 SUMMARY OF AIPM GROUP DISCUSSION

What is the type and state of services offered by the PM profession in NSW?

The modern workforce is very different today, and many project managers progress into positions from roles such as project administrators, project controllers or junior project managers operating under the supervision of licensed individuals. Project managers are increasingly taking on the responsibilities of engineers, builders, and architects, and frequently have one of these professions as their base discipline. The required framework must include the use of experienced, certified, construction project managers across the design, approval, and construction management.

The role of the PM ensures stakeholder management, and while the function has the authority to manage areas of risk and cost avoidance, it needs to be better defined in areas such as reviewing design, and enforcing contract directions with regards to quality issues. The PM should also be engaged at the early stages of design to ensure the outcomes across design, approval, and construction process.

A strengthening of standards through a certification would ensure a PM is required to demonstrate knowledge and practical experience in the specific areas of project management, that an undergraduate degree cannot.

What are the problems, deficiencies, and possible improvements in PM services?

Definitions of project management in previous legislation have been problematic, with narrow definition of authority and accountability. The undertakings of responsibilities between constructors and designers often takes place without the defined role of a PM to oversee/guide the process. A framework that promotes collaboration and coordination across all stakeholder, trade, and consultant parties is required.

Qualification, appropriate experience, and knowledge is vital to ensuring building quality and standards for large scale / highly complex projects. This includes leadership skills to manage and influence across the vast array of stakeholders.

Qualifications should be widened and a measurement of competency through accredited coursework, CPD requirements and cross industry portfolio experience. The introduction of certification standards and process requires a demonstration of knowledge and practical

experience in the specific areas of project management that an undergraduate degree cannot, and with the aim of having them recognised as an equivalent or approved qualification for project management.

How and which PM services can be improved through digitalisation?

The current building and construction sector is not highly digital. There are real opportunities for digitization of the process, from design and throughout the supply chain.

A focus should be placed on how project managers and their stakeholders can better manage construction projects and ensure high quality builds. Digitisation will improve the designs of buildings through 3D modelling, which will consider all aspects of the building from the architecture through to the engineering. Digitisation will also play a greater role in risk management and project planning, alerting project managers to high risk issues or when a project is going off track.

Digitisation should be integral to the entire design, approval, and construction process for integrated project delivery, from digital documentation and e-signatures through to e-planning portals and online contractor/ consultant rating systems. Digitisation will provide efficiencies across the process and may incorporate or replace some more junior roles. In the project management profession, Project Scheduling and Project Controller roles are increasingly being replaced by digitisation.

For a company that has a portfolio of projects where resourcing is going, AI software can be introduced to look at where there are blow outs and problems. It can alert the project manager if they need to allocate more money to a program in their portfolio of projects, so that it does not fall behind and is not in need of resources.

How can PM services be enhanced to have a greater input in certification?

The role of the PM and QS is to ensure allowances have been made and to manage compliance on all critical & noncritical stages/deliverables and these stages begin in planning and design

concept (not construction). There is a process generally called ‘safety in design’ which requires a manager to oversee. The cost of this is very minor compared to the cost of risk.

PMs can provide a ‘Handover service’ and can be engaged to manage the development and delivery of a handover document for new buildings. This may include:

- Facilitating a final defect report developed by a third-party or the PM firm. This would include the designers input based on their apparent certification of the designs.
- Review of building contract to determine conditions applied to the contractor and designers on ‘hold and witness’ points, design certification, certified as built drawings, installation certification, warranties, occupation certificates are valid, dilapidations reports are accepted and any local authority acceptances or conditions outstanding are finalised.
- PM to procure any items mentioned from the contracted parties. These items should be included as mandatory to achieve retention release and defect period finalisation.
- Develop and issue a final document.

AIPM Concluding Summary

Previous definition of project management does not correlate with current industry definitions or project manager terminology and standards. The use of experienced, certified construction project managers is vital. Qualifications should be widened and a measurement of competency in place to ensure the appropriate experience and knowledge for large scale / highly complex projects.

Automation, digitisation and new technologies need to be considered in new frameworks and legislation. Using the construction industry as an example, problems with buildings such as the Mascot Towers and other high rises, have shone a spotlight on the quality of project delivery.

A focus will be put on how project managers and their stakeholders can better manage construction projects and ensure high quality builds. That will mean leadership skills and EQ will be what project managers need to differentiate themselves, as this is something that AI

currently can't do. In the future leadership and people skills, as well as strategic thinking is going to be key.

2.3 CONCLUDING SUMMARY OF GROUP DISCUSSIONS

The above summaries of group discussions were provided by individual institutions after interpreting notes gathered by discussions. Original scripts with itemised discussion statements are provided in the Appendices.

3 THE SURVEY TO ESTABLISH CURRENT LANDSCAPE OF QUANTITY SURVEYING AND PROJECT MANAGEMENT SERVICES

3.1 INTRODUCTION TO THE SURVEY

This reports on the survey conducted prior to the Community of Practice Roundtable to capture the current landscape of the construction industry in terms of Quantity Surveying and Project Management Services, Certification, Compliance and Digitalisation. The questionnaire was conducted online through 'Qualtrics' survey platform where links were emailed to all the participants of the Roundtable, who were representing the institutions, Australian Institute of Quantity Surveyors (AIQS), Australian Institute of Project Management (AIPM) and Royal Institution of Chartered Surveyors (RICS). We received 70 responses out of the 89 questionnaires that were emailed with a response rate of 79%. There were 7 incomplete surveys, resulting the number of surveys that will be considered for analysis to be 63 in total.

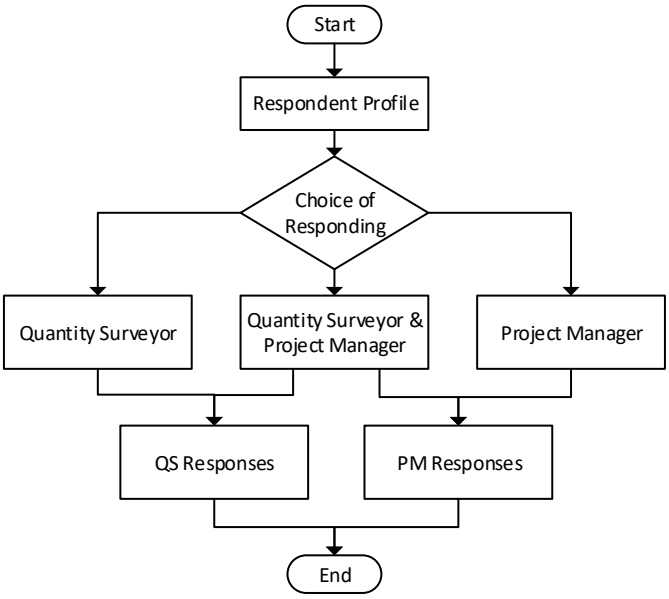

Figure 2: Structure of the survey

As the questionnaire survey was targeted to gather data related to quantity surveying and project management professionals, the respondents were requested to select either one profession or both depending on their service profile (Figure 2). As a result, we gathered data from 23 quantity surveying professionals and 23 project management professionals while the remaining 17 had represented both quantity surveying and project management professionals. Therefore, effectively there were **40 responses for quantity surveying** related survey and **40 responses for project management** related survey.

3.2 ANALYSIS OF THE SURVEY

3.2.1 RESPONDENTS' PROFILES

Q1 - What are the professional institutions that you are associated in corporate grade memberships? (Choose multiple answers if applicable)

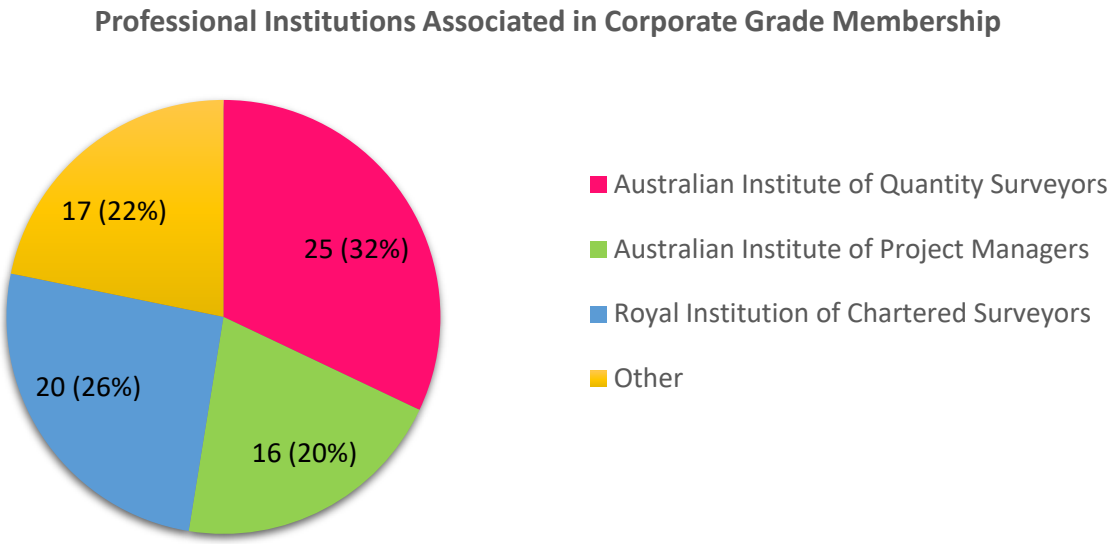

Figure 3: Professional institutions associated in corporate grade membership

Table 1: Professional institutions associated in corporate grade membership

Professional Institution	Count
Australian Institute of Quantity Surveyors	25
Australian Institute of Project Management	16
Royal Institution of Chartered Surveyors	20
Other*	17

*Other categories included the following institutions:

- Asset Management Council
- Association for Project Management (UK)
- Australian Institute of Architects
- Australian Institute of Building
- Australian Property Institute
- Chartered Institute of Building
- Chartered Quality Institute
- Chartered Institute of Management Accountants
- Engineers Australia

Q2 - What is your organisational background?

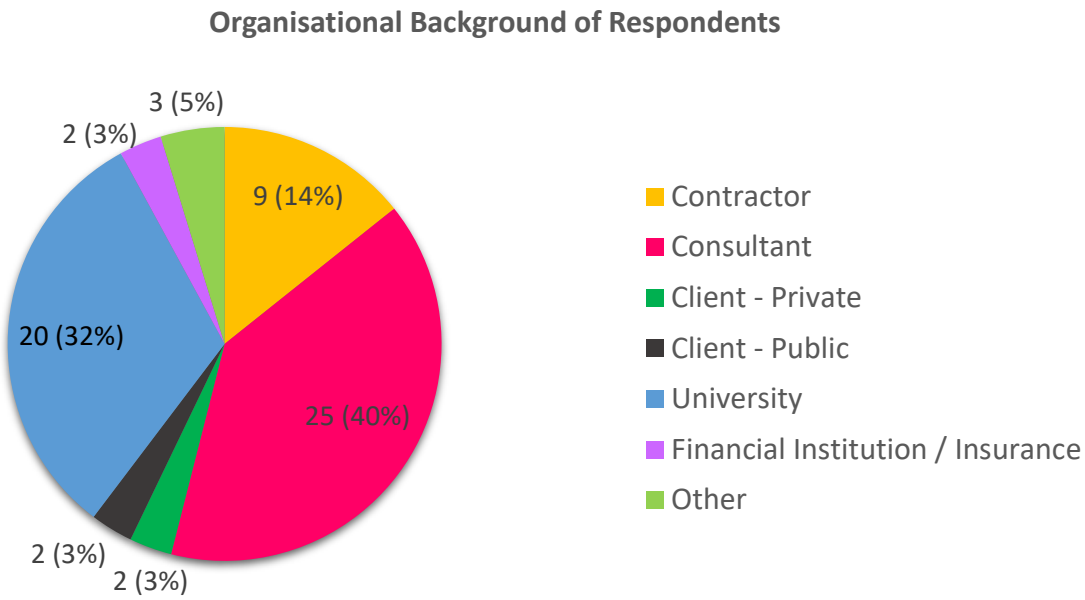

Figure 4: Organisational background of respondents

Table 2: Organisational background of respondents

Organisational Background	Count
Contractor	9
Consultant	25
Client - Private	2
Client - Public	2
University	20
Financial Institution / Insurance	2
Other*	3

*Other organisations included the following:

- Consultant & Contractor
- Higher Education Provider
- Work for AIPM

Collectively, the survey respondents represent 63% from the industry (contractors, consultants, clients, financial institutions) and 32% from academia.

Q3 - What area(s) closely associate(s) with your work background?

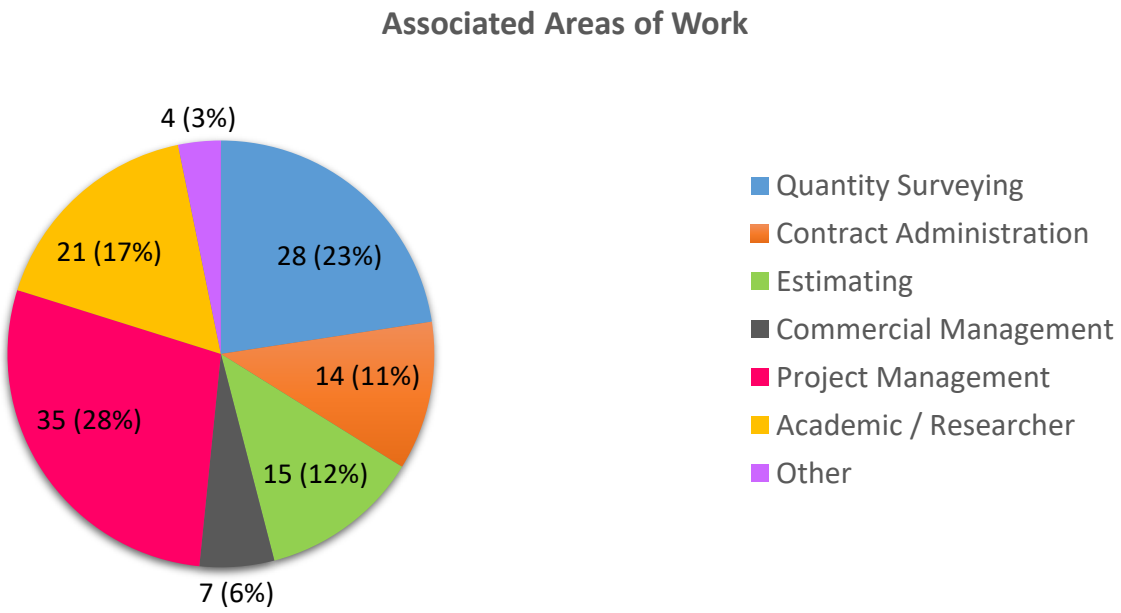

Figure 5: Associated areas of work of respondents

Table 3: Associated areas of work of respondents

Associated Areas of Work	Count
Quantity Surveying	28
Contract Administration	14
Estimating	15
Commercial Management	7
Project Management	35
Academic / Researcher	21
Other*	4

*Other categories include:

- Building Surveyor
- Chartered Building Surveyor
- Cost Planning / Quantity Surveying
- Defect advisory services

Q4 - What managerial role do you play?

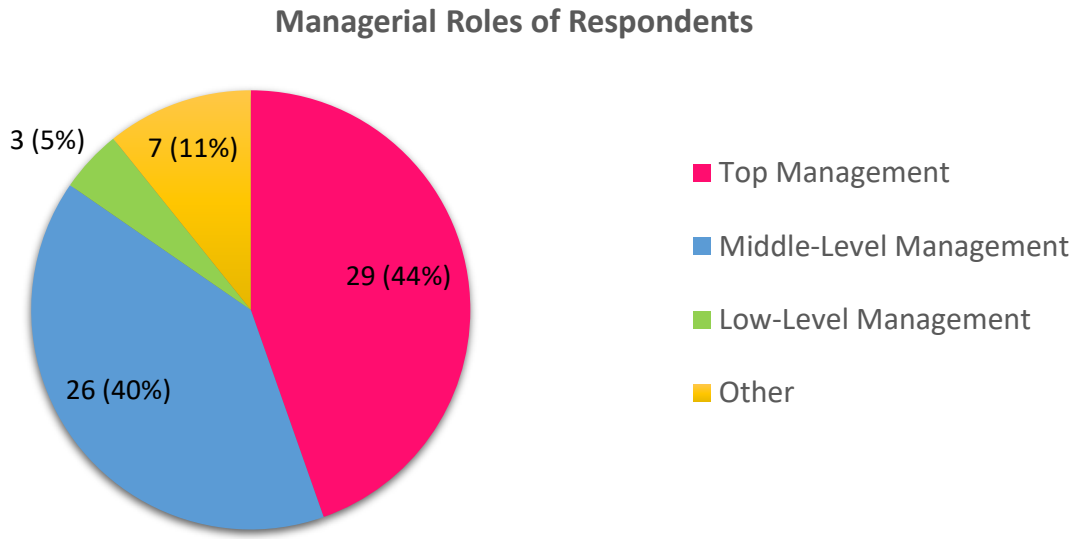

Figure 6: Managerial role of respondents

Table 4: Managerial role of respondents

Managerial Role	Count
Top Management	29
Middle-Level Management	26
Low-Level Management	3
Other*	7

*Others include academic roles and one sole practitioner.

This indicates that the survey respondents predominately fall into higher levels of management (84% in middle-level or top-level management).

Q5 - What is your total work experience in the construction sector?

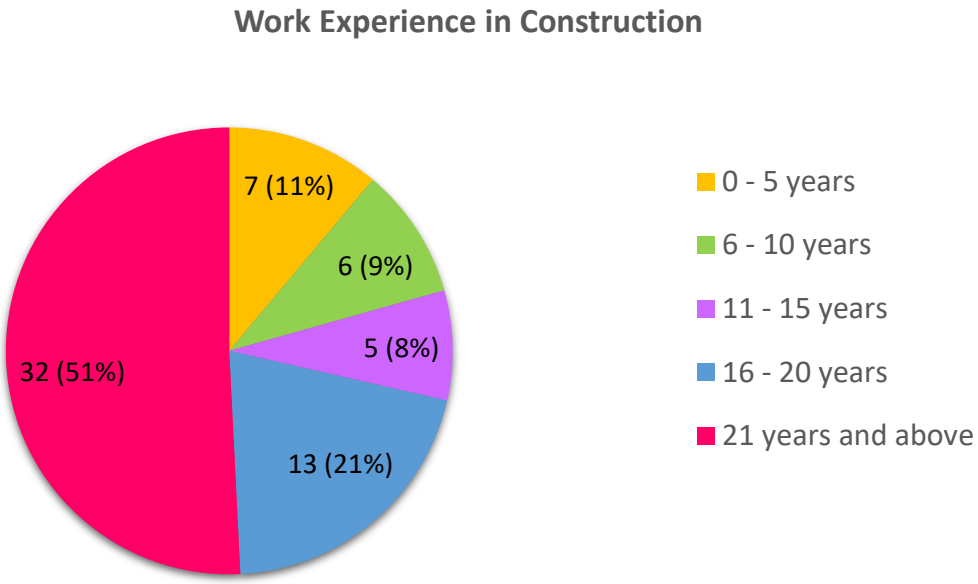

Figure 7: Respondents' work experience in construction

Table 5: Respondents' work experience in construction

Work Experience	Count
0 - 5 years	7
6 - 10 years	6
11 - 15 years	5
16 - 20 years	13
21 years and above	32

Collectively, 80% of respondents have more than 10 years of experience.

3.2.2 QUANTITY SURVEYORS' RESPONSES

Q1- As you perceive, to what extend does the Quantity Surveyor involve in the following QS services in the pre-contract stage?

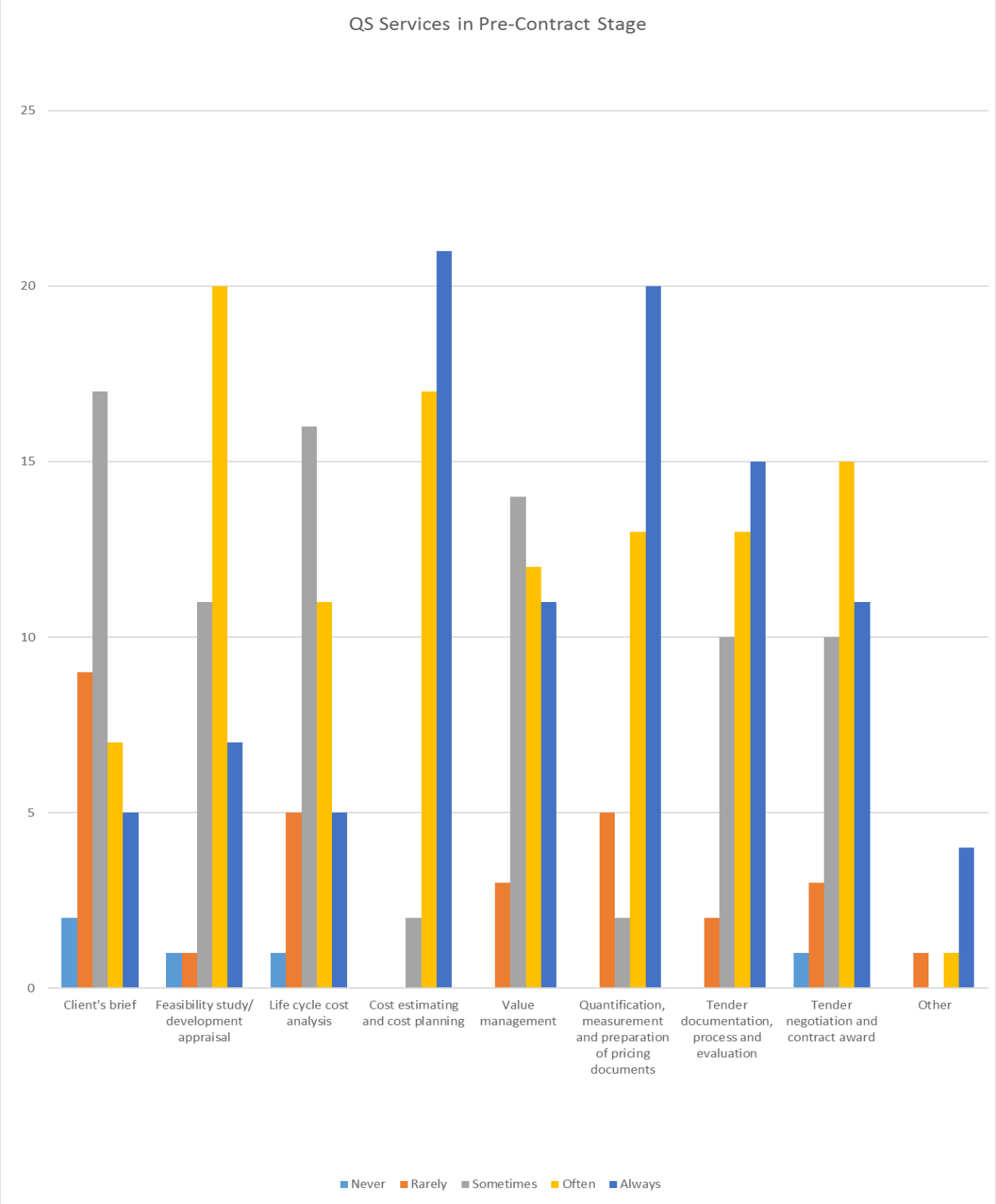

Figure 8: QS services in pre-contract stage

Table 6: QS services in pre-contract stage in ranked order

QS Services in Pre-Contract Stage	Never	Rarely	Sometimes	Often	Always	Mean Rating (MR)	Rank
Cost estimating and cost planning	0	0	2	17	21	4.48	1
Quantification, measurement and preparation of pricing documents	0	5	2	13	20	4.20	2
Tender documentation, process and evaluation	0	2	10	13	15	4.03	3
Tender negotiation and contract award	1	3	10	15	11	3.80	4
Feasibility study/ development appraisal	1	1	11	20	7	3.78	5
Value management	0	3	14	12	11	3.78	5
Life cycle cost analysis	1	5	16	11	5	3.37	7
Client's brief	2	9	17	7	5	3.10	8
Other*	0	1	0	1	4		

*Other QS Services in pre-contract stage included following;

- Financial Reporting including Cash flow
- Guiding PMs with little experience running projects by themselves
- Introduced to Development by Financier
- Risk/ Risk Analysis/ Risk Management

Q2 - As you perceive, to what extend does the Quantity Surveyor involve in the following QS services in the post-contract stage?

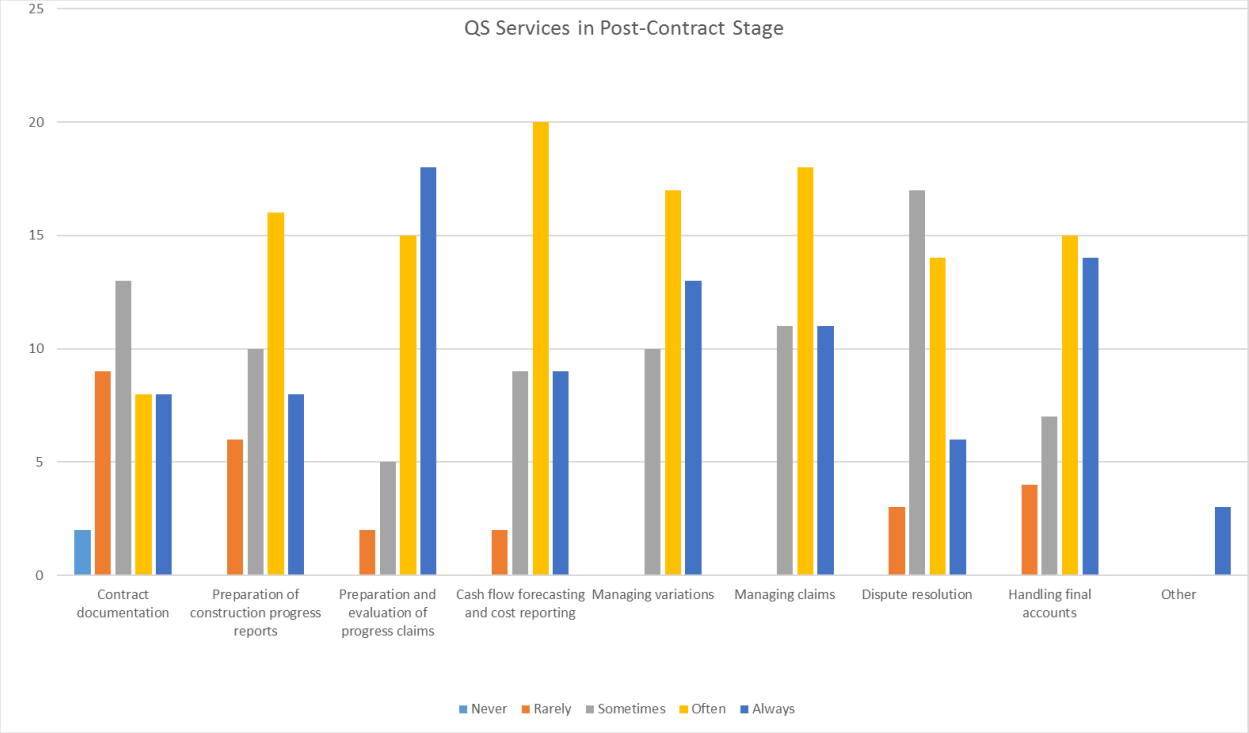

Figure 9: QS Services in post-contract stage

Table 7: QS Services in post-contract stage in ranked order

QS Services in Pre-Contract Stage	Never	Rarely	Sometimes	Often	Always	Mean Rating (MR)	Rank
Preparation and evaluation of progress claims	0	2	5	15	18	4.23	1
Managing variations	0	0	10	17	13	4.08	2
Managing claims	0	0	11	18	11	4.00	3
Handling final accounts	0	4	7	15	14	3.98	4
Cash flow forecasting and cost reporting	0	2	9	20	9	3.90	5
Preparation of construction progress reports	0	6	10	16	8	3.65	6
Dispute resolution	0	3	17	14	6	3.58	7
Contract documentation	2	9	13	8	8	3.28	8
Other*	0	0	0	0	3		

*Other QS Services in post-contract stage included following;

- How often are PM's taking on roles/tasks outside their qualifications
- Preparing Drawdown Reports for financier
- Value Engineering

Q3 - As you perceive, to what extend does the Quantity Surveyor involve in the following specialist QS services?

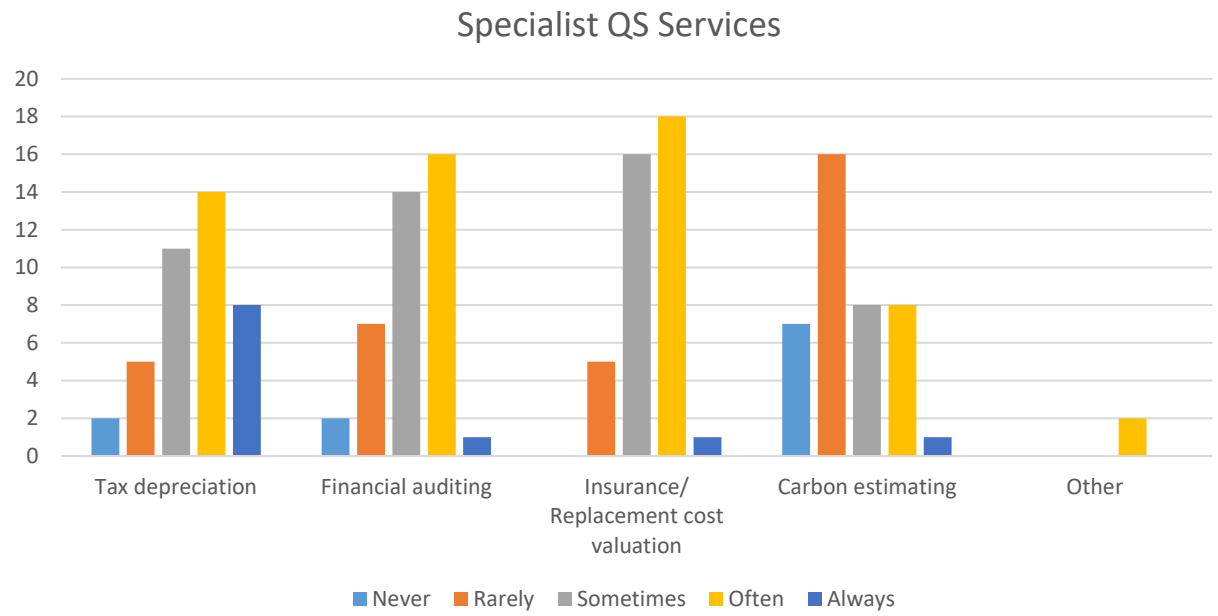

Figure 10: Specialist QS Services

Table 8: Specialist QS Services in ranked order

Specialist QS Services	Never	Rarely	Sometimes	Often	Always	Mean Rating (MR)	Rank
Tax depreciation	2	5	11	14	8	3.53	1
Insurance/ Replacement cost valuation	0	5	16	18	1	3.38	2
Financial auditing	2	7	14	16	1	3.18	3
Carbon estimating	7	16	8	8	1	2.50	4
Other*	0	0	0	2	0		

*Other Specialist QS Services included following;

- Cost benefit analysis
- Expert Witness Quantum

Q4 -What is the level of involvement by a Quantity Surveyor in the following services related to certification?

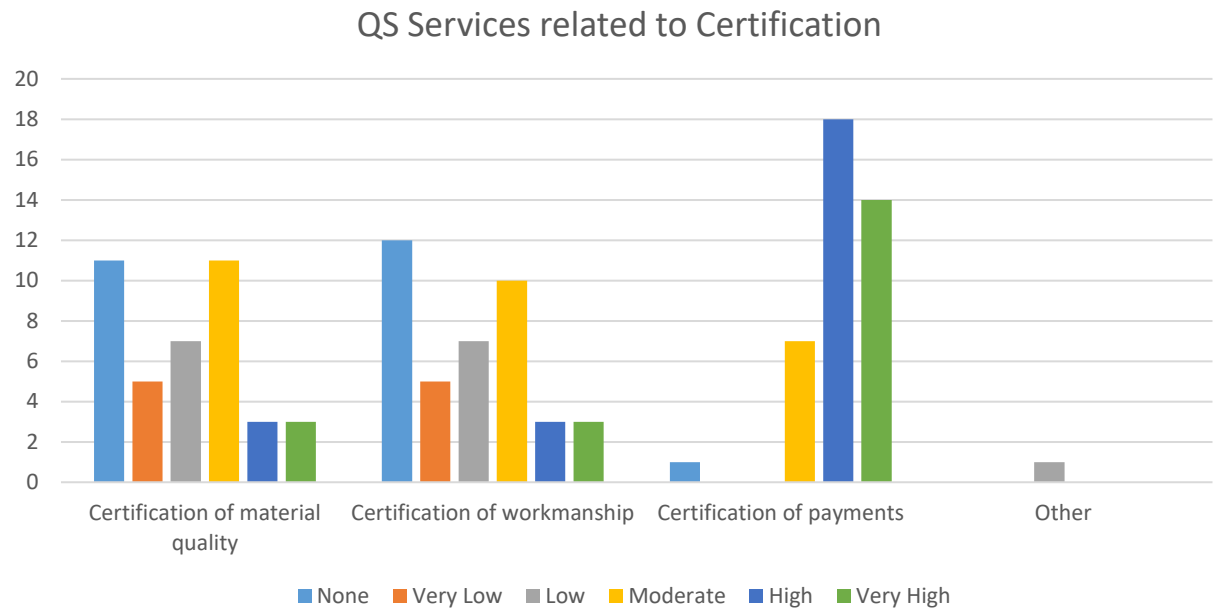

Figure 11: QS services related to certification

Table 9: QS services related to certification in ranked order

QS Services related to Certification	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Certification of payments	1	0	0	7	18	14	5.08	1
Certification of material quality	11	5	7	11	3	3	2.98	2
Certification of workmanship	12	5	7	10	3	3	2.90	3
Other*	0	0	1	0	0	0		

*Other QS Services related to certification included following:

- Financial reporting to client

Q5 - What is the level of involvement by a Quantity Surveyor in the following services related to compliance?

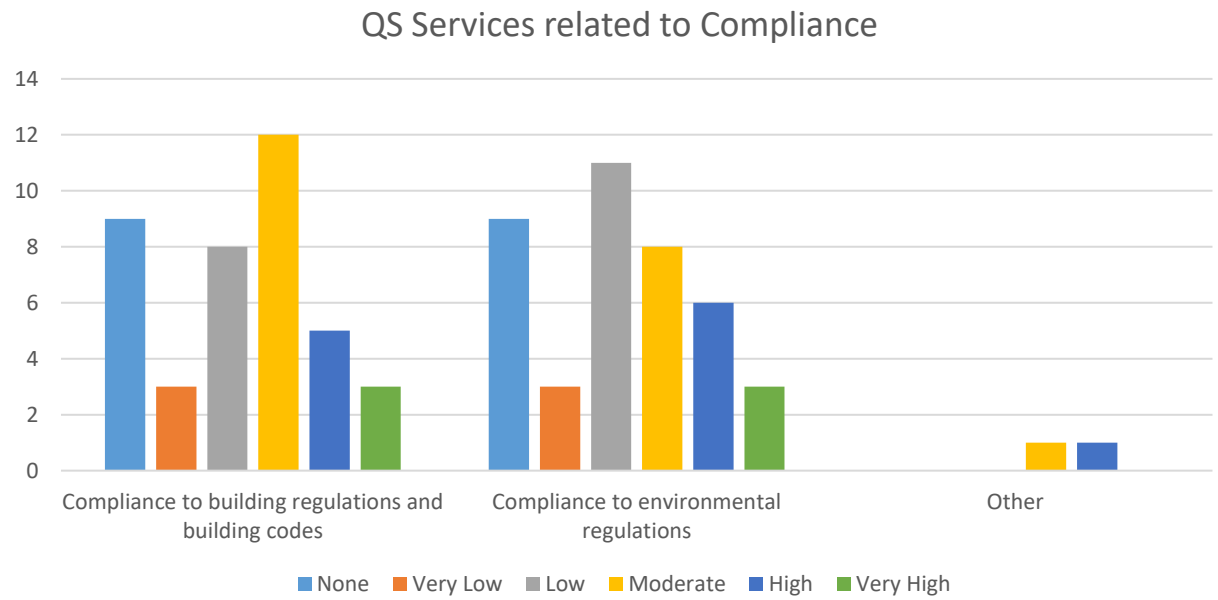

Figure 12: QS services related to compliance

Table 10: QS services related to compliance in ranked order

QS Services related to Compliance	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Compliance to building regulations and building codes	9	3	8	12	5	3	3.25	1
Compliance to environmental regulations	9	3	11	8	6	3	3.20	2
Other*	0	0	0	1	1	0		

*Other QS Services related to compliance included following:

- Compliance with CC and OC requirements
- DA requirements

QS's involvement in compliance is quite noticeable with most of the responses being marked moderate or higher.

Q6 - What is the level of involvement by a Quantity Surveyor in the following services related to Building Information Modelling (BIM)?

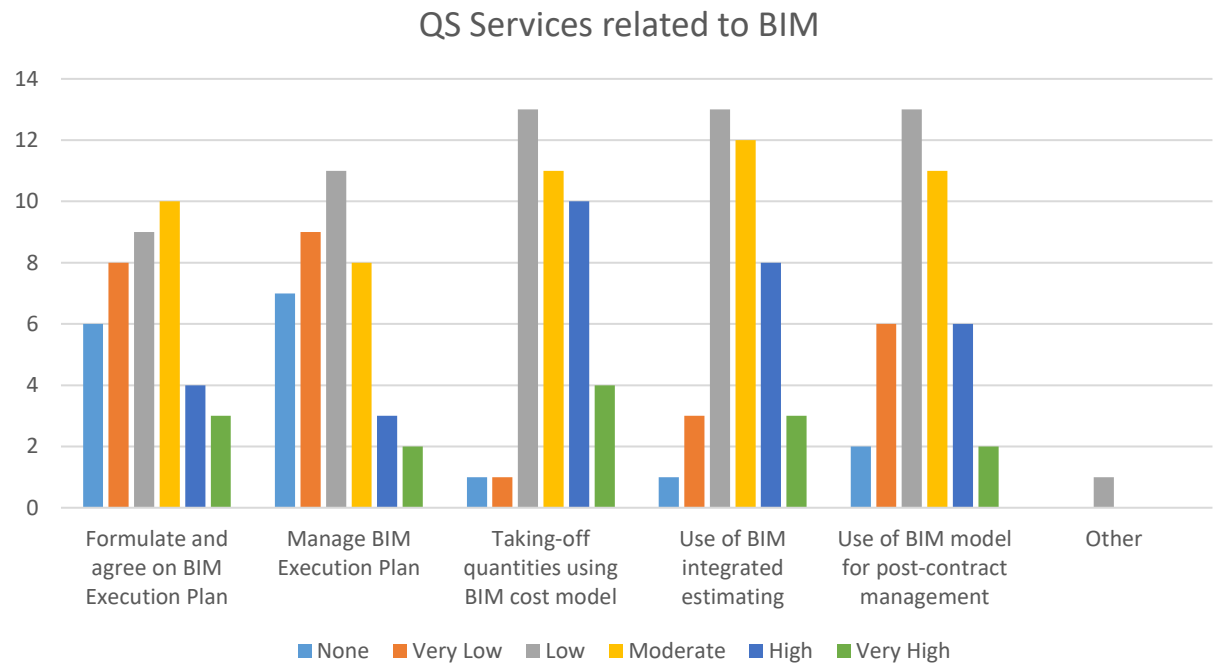

Figure 3: QS services related to BIM

Table 3: QS services related to BIM in ranked order

QS's involvement in BIM	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Taking-off quantities using BIM cost model	1	1	13	11	10	4	4.00	1
Use of BIM integrated estimating	1	3	13	12	8	3	3.80	2
Use of BIM model for post-contract management	2	6	13	11	6	2	3.48	3
Formulate and agree on BIM Execution Plan	6	8	9	10	4	3	3.18	4
Manage BIM Execution Plan	7	9	11	8	3	2	2.93	5
Other*	0	0	1	0	0	0		

*Other QS Services related to BIM included following:

- Design team willingness to code for a QS to extract from BIM

Q6 was further analysed to see if there is any significant difference in rating and ranking between the whole sample (including academics) and the sub-sample excluding academics. Accordingly,

Table 12 summarises the responses for Q6 excluding that of academics or researchers. The ratings are slightly lower while the ranking has remained the same, indicating that there is no significant difference of the responses received for Q6, based on the professional background of the respondent.

Table 12: QS services related to BIM in ranked order (excluding academics/ researchers)

QS's involvement in BIM	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Taking-off quantities using BIM cost model	1	1	7	7	8	1	3.92	1
Use of BIM integrated estimating	1	3	6	8	7	0	3.68	2
Use of BIM model for post-contract management	2	6	7	5	5	0	3.20	3
Formulate and agree on BIM Execution Plan	4	8	5	5	3	0	2.80	4
Manage BIM Execution Plan	5	8	6	4	2	0	2.60	5
Other*	0	0	0	0	0	0		

Q7 - Indicate your own level of familiarity with the following developments in digitalisation that are related to Quantity Surveying.

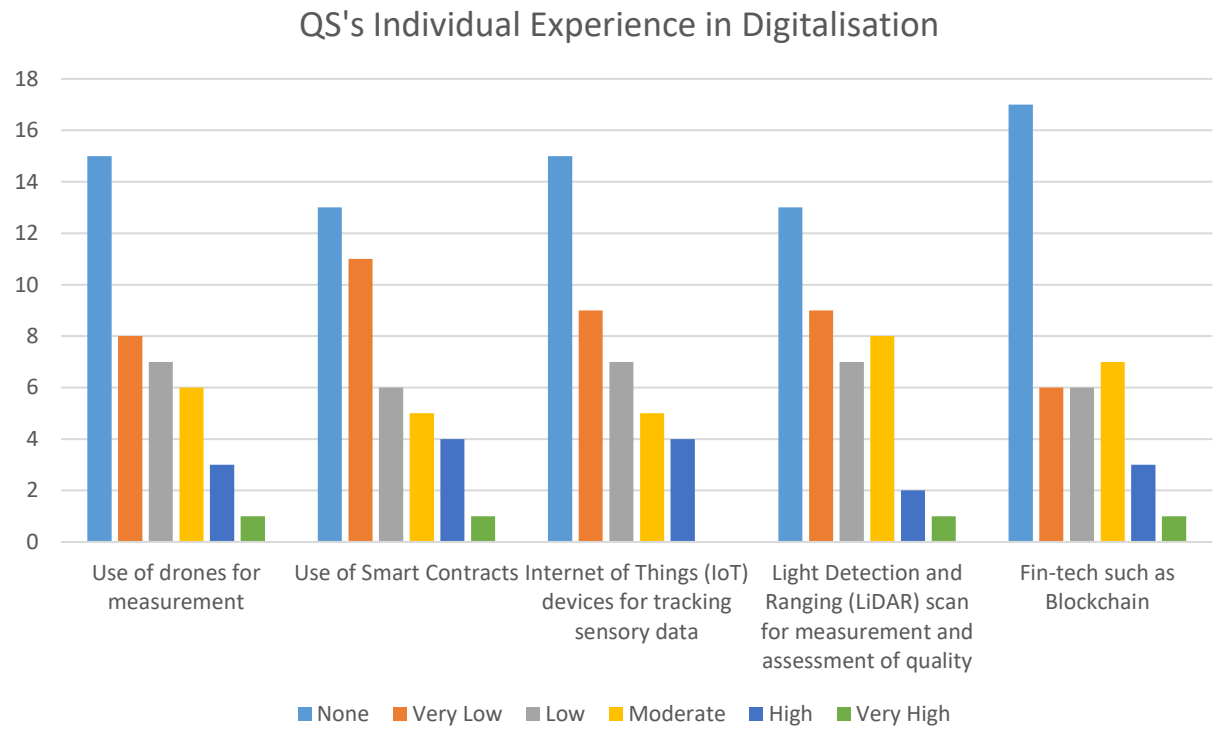

Figure 142: QS's individual Experience in digitalisation

Table 13: QS's individual Experience in digitalisation in ranked order

QS's Individual Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	13	9	7	8	2	1	2.50	1
Use of Smart Contracts	13	11	6	5	4	1	2.48	2
Use of drones for measurement	15	8	7	6	3	1	2.43	3
Fin-tech such as Blockchain	17	6	6	7	3	1	2.40	4
Internet of Things (IoT) devices for tracking sensory data	15	9	7	5	4	0	2.35	5

Q7 was further analysed to see if there is any significant difference in rating and ranking between the whole sample (including academics) and the sub-sample excluding academics. Accordingly, Table 14 summarises the responses for Q7 excluding that of academics or researchers. The findings are quite similar between the whole sample and the sub-sample. While the digitalisation

level is consistently low across all of the five areas within the two samples, while the use of LiDAR and use of drones for measurement have achieved equal top ranking.

Table 14: QS's individual experience in digitalisation in ranked order (excluding academics/ researchers)

QS's Individual Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	8	7	6	3	1	0	2.28	1
Use of drones for measurement	9	6	6	2	2	0	2.28	1
Use of Smart Contracts	9	8	6	1	1	0	2.08	3
Internet of Things (IoT) devices for tracking sensory data	10	7	6	1	1	0	2.04	4
Fin-tech such as Blockchain	12	5	5	3	0	0	1.96	5

Q8 - Please elaborate on your experience related to digitalisation where you have rated 'Moderate', 'High' or 'Very High' in Q7.

Use of drones for measurement

- Drones are already being used for earthworks measures, tracking sensory data for site movements of equipment etc.
- I have seen projects where drones have been used for measurement
- Civil contracts measuring large earthworks
- Progress payments and onsite construction progress are managed using drones or mobile phone scans

Use of Smart Contracts

- Smart contracting in procurement.

Internet of Things (IoT) devices for tracking sensory data

- I have some contact with hardware / software engineers and have tried to keep abreast of literature in these fields

Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality

- LiDAR usage in GIS and Digital engineering applications for conversion into quantities
- LiDAR is used to assist in the development of project models

Fin-tech such as Blockchain

- Blockchain is starting to be used by contractors to increase liquidity in their organisation

General

- We have an appetite for such innovations but many times are stifled by the asset owner/client in their use due to a perceived lack of confidence or understanding
- Many of these tools and concepts have been trialled in the construction industry but not become the norm and are difficult to implement without client buy-in
- Being a researcher involved in the blockchain area, I'm quite familiar with smart contract development and application of blockchain to resolve issues in the construction industry.
- Involve in research on blockchain/ smart contracts
- Research experience on these topics

Q9 - Indicate your perception of Quantity Surveyors' level of familiarity in general, with the following developments in digitalisation.

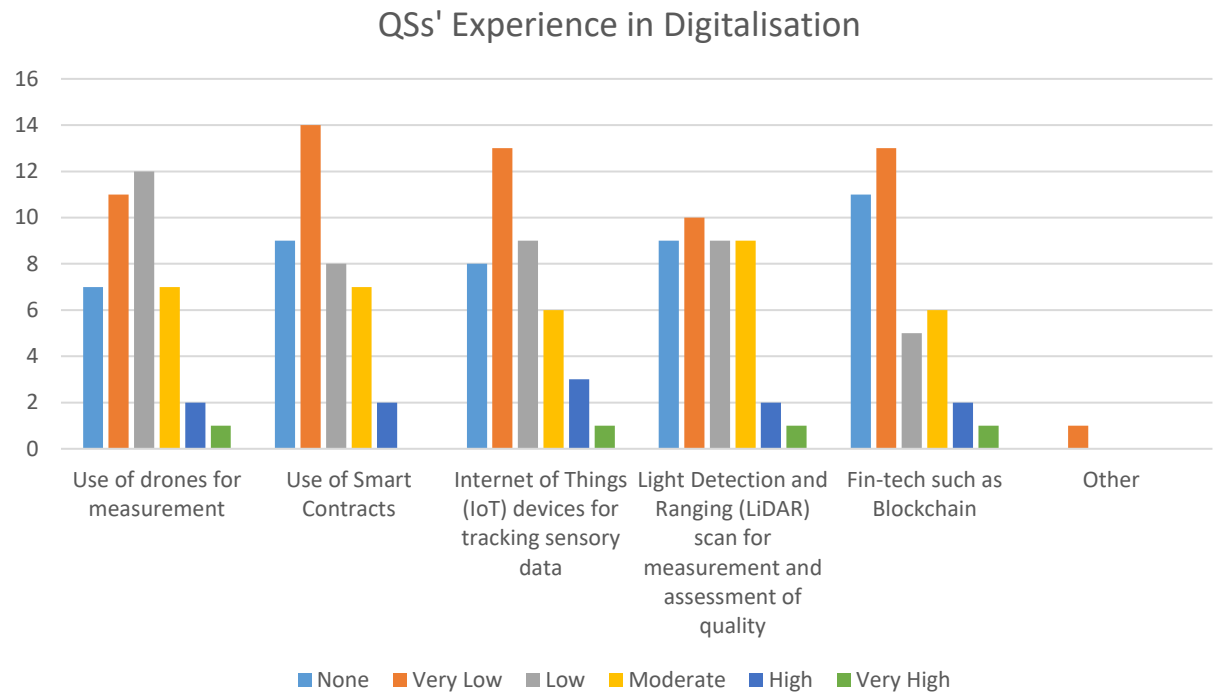

Figure 15: QSs' experience in digitalisation

Table 11: QSs' experience in digitalisation in ranked order

QS's Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Use of drones for measurement	7	11	12	7	2	1	2.73	1
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	9	10	9	9	2	1	2.70	2
Internet of Things (IoT) devices for tracking sensory data	8	13	9	6	3	1	2.65	3
Use of Smart Contracts	9	14	8	7	2	0	2.48	4
Fin-tech such as Blockchain	13	13	5	6	2	1	2.35	5
Other*	0	1	0	0	0	0		

* QS's other experience in digitalisation included following;

- 3D digital designs

Q9 was further analysed to see if there is any significant difference in rating and ranking between the whole sample (including academics) and the sub-sample excluding academics. Accordingly, Table 16 summarises the responses for Q9 excluding that of academics or researchers. The ranking has remained the same. However, similar to the findings in Q7, the digitalisation levels are consistently low across all of the five areas within the two samples.

Table 16: QS's individual experience in digitalisation in ranked order (excluding academics/ researchers)

QS's Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Use of drones for measurement	6	6	7	5	1	0	2.56	1
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	8	6	5	5	1	0	2.40	2
Internet of Things (IoT) devices for tracking sensory data	6	9	6	3	1	0	2.36	3
Use of Smart Contracts	7	10	5	3	0	0	2.16	4
Fin-tech such as Blockchain	11	8	2	3	1	0	2.00	5

3.2.3 PROJECT MANAGERS RESPONSES

Q1 - As you perceive, to what extend does the Project Manager involve in the following PM services in the pre-contract stage?

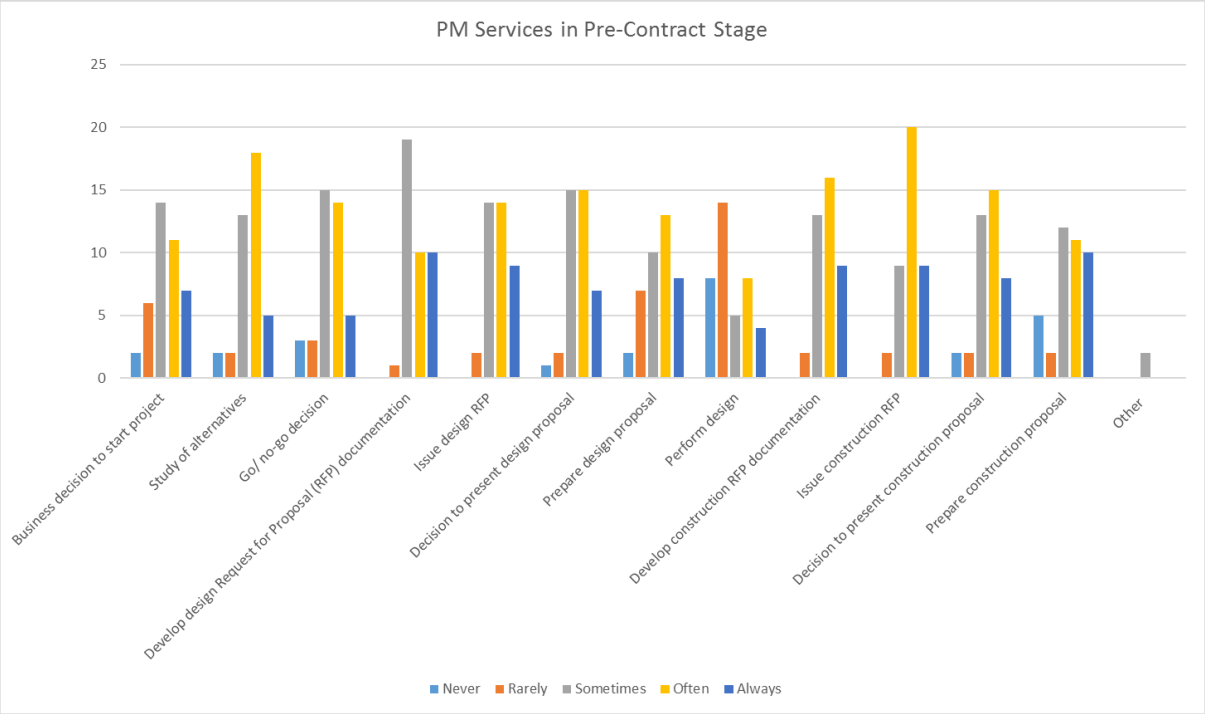

Figure 36: PM services in pre-contract stage

Table 17: PM services in pre-contract stage in ranked order

PM Services in Pre-Contract Stage	Never	Rarely	Sometimes	Often	Always	MR	Rank
Issue construction RFP	0	2	9	20	9	3.90	1
Develop construction RFP documentation	0	2	13	16	9	3.80	2
Issue design RFP	0	2	14	14	9	3.77	3
Develop design Request for Proposal (RFP) documentation	0	1	19	10	10	3.73	4
Decision to present design proposal	1	2	15	15	7	3.63	5
Decision to present construction proposal	2	2	13	15	8	3.63	5
Study of alternatives	2	2	13	18	5	3.55	7
Prepare construction proposal	5	2	12	11	10	3.48	8
Prepare design proposal	2	7	10	13	8	3.45	9
Business decision to start project	2	6	14	11	7	3.38	10
Go/ no-go decision	3	3	15	14	5	3.38	10
Perform design	8	14	5	8	4	2.58	12
Other*	0	0	2	0	0		

*Other PM Services in pre-contract stage included following;

- Feasibility study and concept design
- Gateway review

Q2 - As you perceive, to what extend does the Project Manager involve in the following PM services in the post-contract stage?

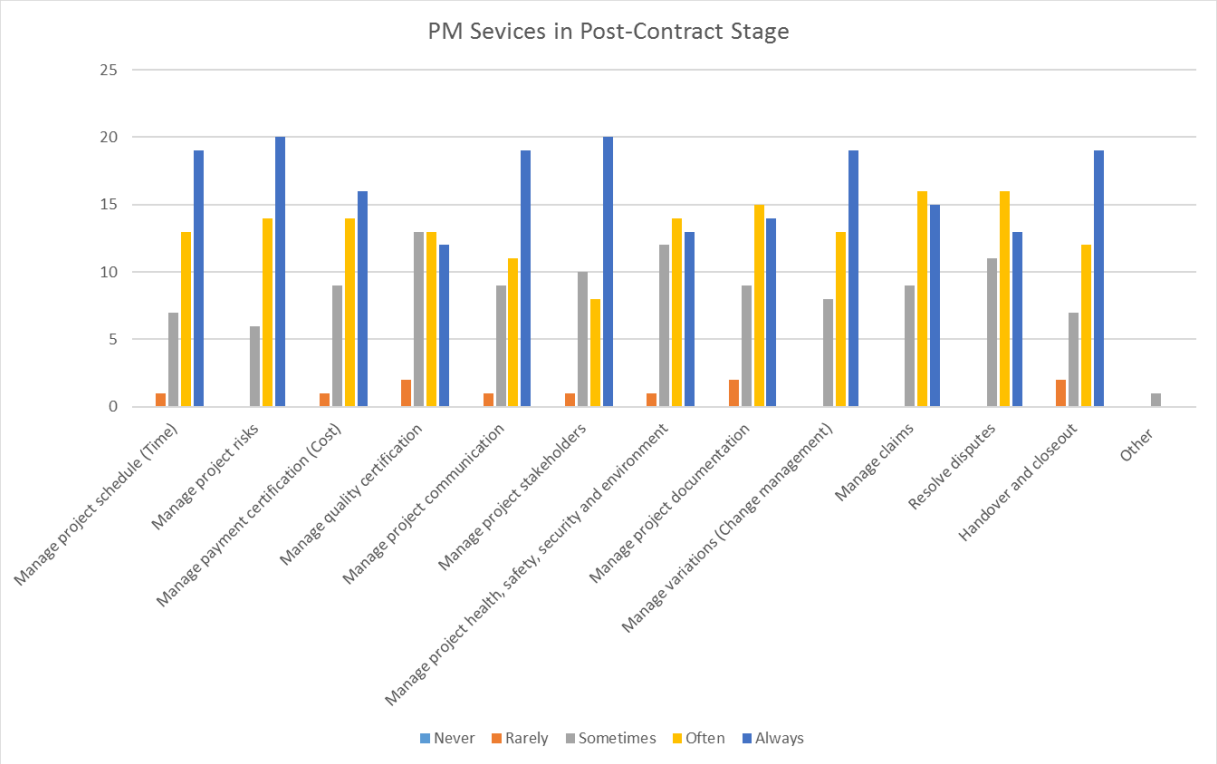

Figure 17: PM services in post-contract stage

Table 12: PM services in post-contract stage in ranked order

PM Services in Post-Contract Stage	Never	Rarely	Sometimes	Often	Always	MR	Rank
Manage project risks	0	0	6	14	20	4.35	1
Manage variations (Change management)	0	0	8	13	19	4.28	2
Manage project schedule (Time)	0	1	7	13	19	4.25	3
Manage project stakeholders	0	1	10	8	20	4.21	4
Manage project communication	0	1	9	11	19	4.20	5
Handover and closeout	0	2	7	12	19	4.20	5
Manage claims	0	0	9	16	15	4.15	7
Manage payment certification (Cost)	0	1	9	14	16	4.13	8
Resolve disputes	0	0	11	16	13	4.05	9
Manage project documentation	0	2	9	15	14	4.03	10
Manage project health, safety, security and environment	0	1	12	14	13	3.98	11
Manage quality certification	0	2	13	13	12	3.88	12
Other*	0	0	1	0	0		

*Other PM Services in post-contract stage included following;

- Post project review

Q3 -What is the level of involvement by a Project Manager in the following services related to certification?

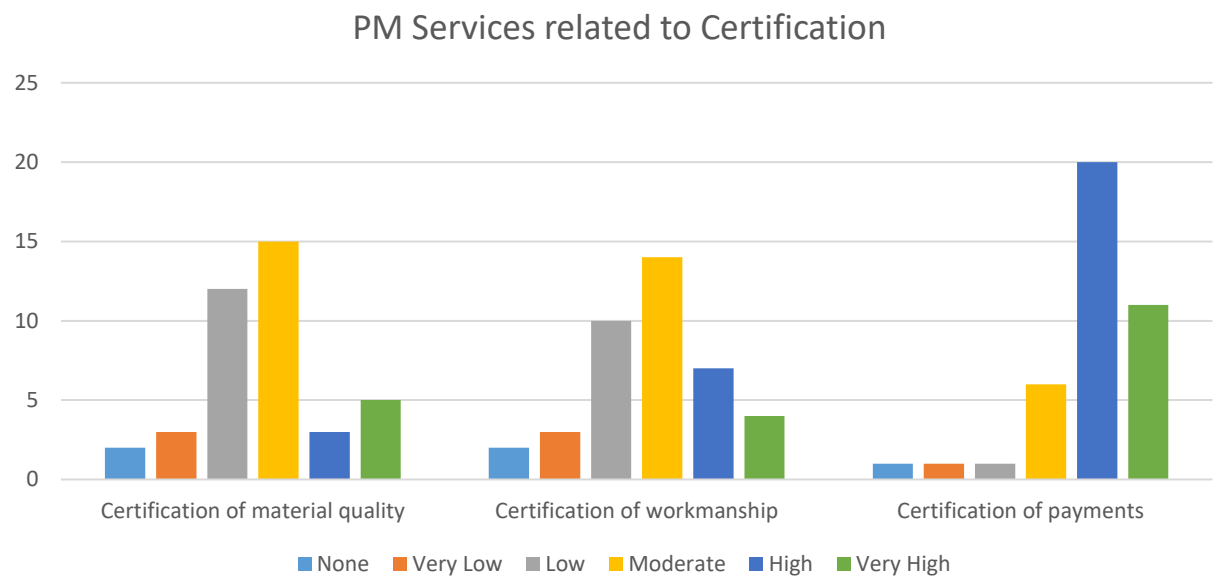

Figure 18: PM services related to certification

Table 139: PM services related to certification in ranked order

PM Services related to Certification	None	Very Low	Low	Moderate	High	Very High	MR	Rank
Certification of payments	1	1	1	6	20	11	4.90	1
Certification of workmanship	2	3	10	14	7	4	3.83	2
Certification of material quality	2	3	12	15	3	5	3.73	3

Q4 - What is the level of involvement by a Project Manager in the following services related to compliance?

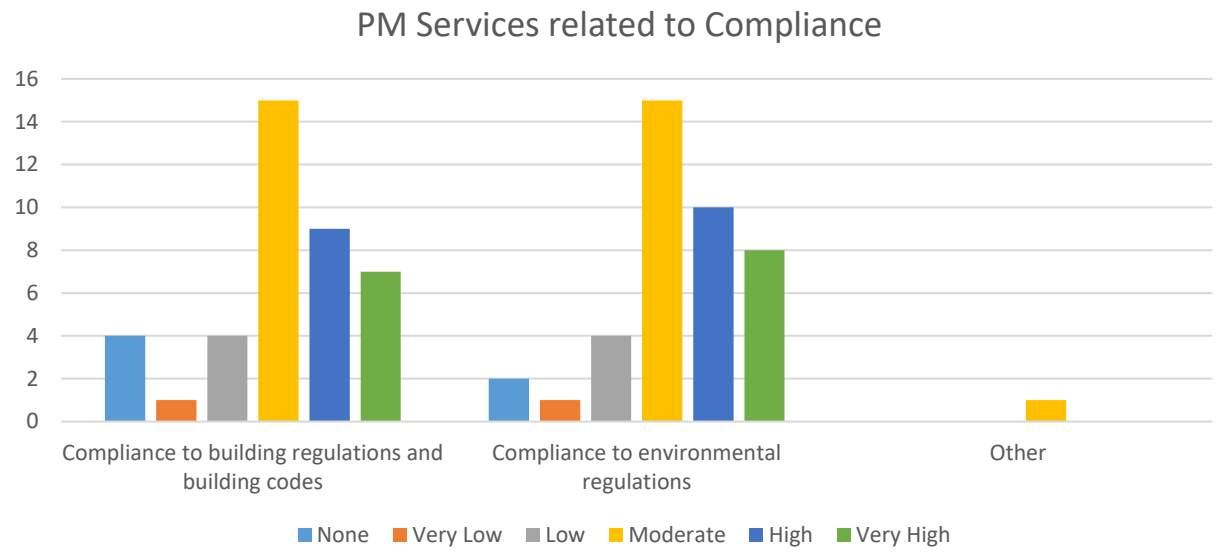

Figure 4: PM services related to compliance

Table 19: PM services related to compliance in ranked order

PM Services related to Compliance	None	Very Low	Low	Moderate	High	Very High	MR	Rank
Compliance to environmental regulations	2	1	4	15	10	8	4.35	1
Compliance to building regulations and building codes	4	1	4	15	9	7	4.13	2
Other*	0	0	0	1	0	0		

*Other PM Services related to compliance included following;

- DA requirements

Q5 - What is the level of involvement by a Project Manager in the following services related to Building Information Modelling (BIM)?

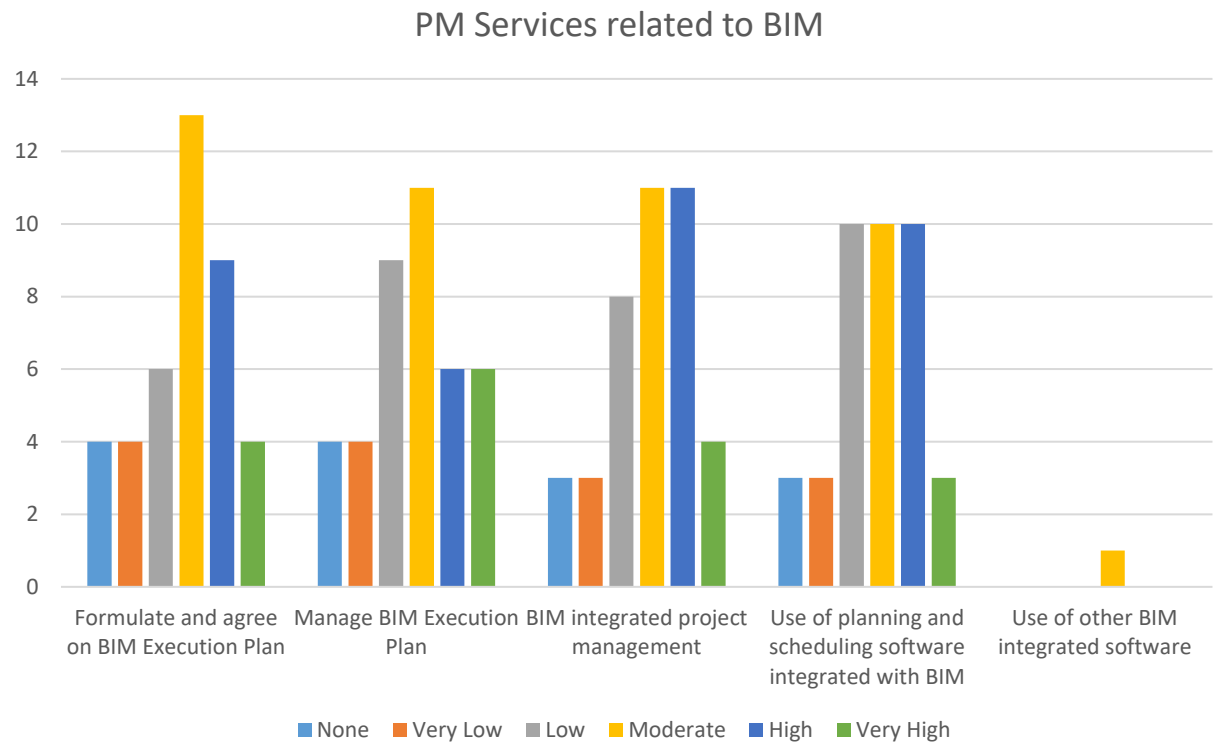

Figure 20: PM services related to BIM

Table 21: PM services related to BIM in ranked order

PM's involvement in BIM	None	Very Low	Low	Moderate	High	Very High	MR	Rank
BIM integrated project management	3	3	8	11	11	4	3.90	1
Formulate and agree on BIM Execution Plan	4	4	6	13	9	4	3.78	2
Use of planning and scheduling software integrated with BIM	3	3	10	10	10	3	3.77	3
Manage BIM Execution Plan	4	4	9	11	6	6	3.73	4
Use of other BIM integrated software	0	0	0	1	0	0		

Q5 was further analysed to see if there is any significant difference in rating and ranking between the whole sample (including academics) and the sub-sample excluding academics. Accordingly, Table 22 summarises the findings based on the respondents of the sub-sample. The ranking has remained the same between the whole sample and the sub-sample, irrespective of the professional background.

Table 22: PM services related to BIM in ranked order (excluding academics/ researchers)

PM's involvement in BIM	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
BIM integrated project management	3	2	6	6	7	1	3.60	1
Formulate and agree on BIM Execution Plan	4	3	4	7	5	2	3.48	2
Use of planning and scheduling software integrated with BIM	3	3	8	4	5	1	3.33	3
Manage BIM Execution Plan	4	3	6	7	3	2	3.32	4
Use of other BIM integrated software	0	0	0	0	0	0		

Q6 - Indicate your own level of familiarity with the following developments in digitalisation that are related to Project Management.

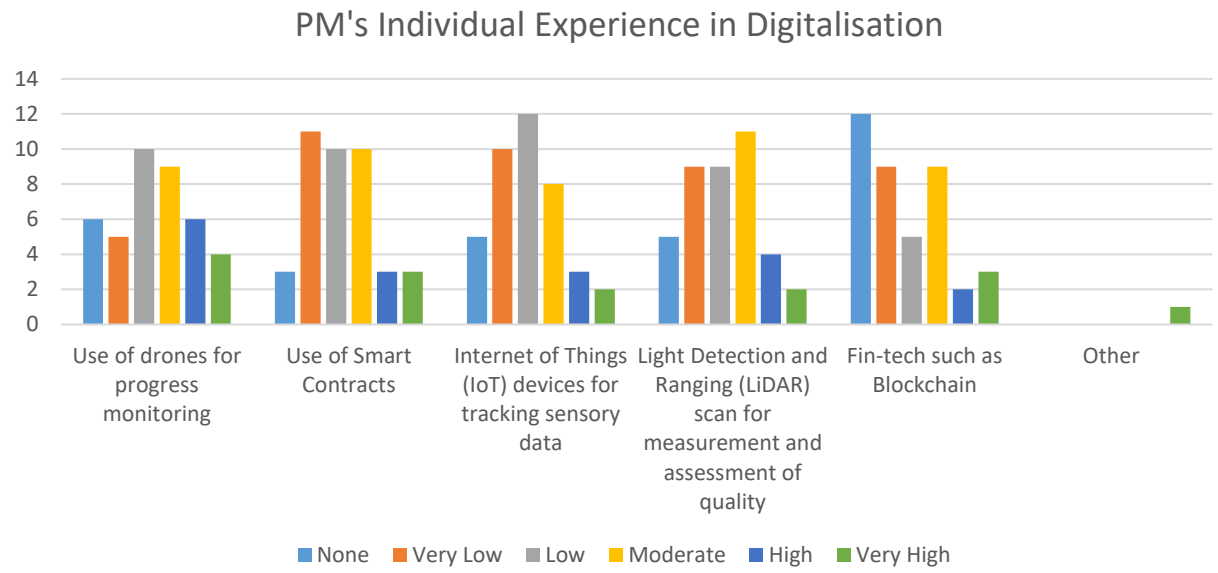

Figure 21: PM's individual experience in digitalisation

Table 23: PM's individual experience in digitalisation in ranked order

PM's Individual Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	MR	Rank
Use of drones for progress monitoring	6	5	10	9	6	4	3.40	1
Use of Smart Contracts	3	11	10	10	3	3	3.20	2
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	5	9	9	11	4	2	3.15	3
Internet of Things (IoT) devices for tracking sensory data	5	10	12	8	3	2	3.00	4
Fin-tech such as Blockchain	12	9	5	9	2	3	2.73	5
Other*	0	0	0	0	0	1		

* PM's other individual experience in digitalisation included following;

- Dash pivot, formalise, Dropbox business

Q6 was further analysed to see if there is any significant difference in rating and ranking between the whole sample (including academics) and the sub-sample excluding academics. Accordingly, Table 24 summarises the findings based on the respondents excluding academics or researchers. The ranking has mostly remained the same between the whole sample and the sub-sample.

Table 24: PM's individual experience in digitalisation in ranked order (excluding academics/ researchers)

PM's Individual Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Use of drones for progress monitoring	5	2	7	5	4	2	3.28	1
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	3	6	8	6	2	0	2.92	2
Use of Smart Contracts	2	8	9	4	1	1	2.88	3
Internet of Things (IoT) devices for tracking sensory data	4	8	9	3	0	1	2.60	4
Fin-tech such as Blockchain	9	5	5	5	0	1	2.40	5

Q7 - Please elaborate on your experience related to digitalisation where you have rated 'Moderate', 'High' or 'Very High' in Q6.

Use of drones for progress monitoring

- Civil contracts measuring large earthworks
- Progress payments and onsite construction progress are managed using drones or mobile phone scans
- Use of drones for facade and roof inspections as part of defect inspections
- We have used drones on site however due to Trade Union objections we were only permitted to fly on weekends or after hours when trades weren't on site.
- I have utilised drones for assessing building progress at heights
- Subject to the surrounding built environment, drones are regularly used for monthly progress records as well as updating of web-sites for community awareness
- Have been using drones for the past 3-4 years for damage assessments, project monitoring both externally and for larger internal industrial
- I am a drone pilot and has been involved in several drone related projects. I am also familiar with laser scanning and its application for digital twin development.
- Assisted in monitoring of projects in far distant areas
- In most of these topic areas have participated in the direct application of the technology or worked with teams that have explored application of them where they are more experimental in nature.
- Worked with professionals using this technology

Use of Smart Contracts

- Development of decision trees
- Assisted in monitoring of projects in far distant areas
- In most of these topic areas have participated in the direct application of the technology or worked with teams that have explored application of them where they are more experimental in nature.

Internet of Things (IoT) devices for tracking sensory data

- I have some contact with hardware / software engineers and have tried to keep abreast of literature in these fields
- Assisted in monitoring of projects in far distant areas

- In most of these topic areas have participated in the direct application of the technology or worked with teams that have explored application of them where they are more experimental in nature.

Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality

- Assisted in monitoring of projects in far distant areas
- In most of these topic areas have participated in the direct application of the technology or worked with teams that have explored application of them where they are more experimental in nature.
- Worked with professionals using this technology

Fin-tech such as Blockchain

- Use of blockchain to manage construction payments
- Assisted in monitoring of projects in far distant areas
- In most of these topic areas have participated in the direct application of the technology or worked with teams that have explored application of them where they are more experimental in nature.
- Worked with professionals using this technology

General

- We have an appetite for such innovations but many times are stifled by the asset owner/client in their use due to a perceived lack of confidence or understanding.
- Very high experience
- Many of these tools and concepts have been trialled in the construction industry but not become the norm and are difficult to implement without client buy-in
- Involve in research on blockchain/ smart contracts
- Research experience on these topics
- The use of smart contacts is not something I have heard of but there are a lot more digital methods for managing projects that are not mentioned. Online platform that provide photographic reporting and sign off, document cloud platforms that provide secure documents to specific resources. In summary they are easy to use and efficient digital platforms that people ear already familiar with that are not been used at their capacity.

Q8 - Indicate your perception of Project Mangers' level of familiarity in general, with the following developments in digitalisation.

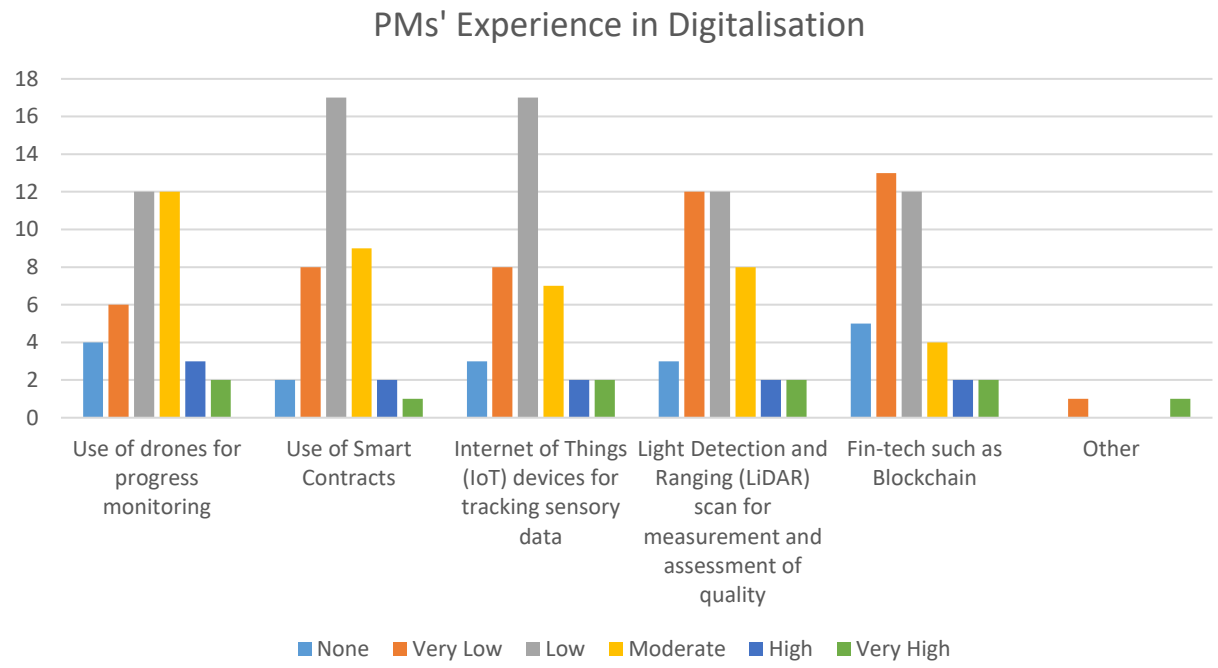

Figure 22: PMs' experience in digitalisation

Table 25: PMs' experience in digitalisation in ranked order

PM's Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	MR	Rank
Use of drones for progress monitoring	4	6	12	12	3	2	3.26	1
Use of Smart Contracts	2	8	17	9	2	1	3.10	2
Internet of Things (IoT) devices for tracking sensory data	3	8	17	7	2	2	3.08	3
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	3	12	12	8	2	2	3.00	4
Fin-tech such as Blockchain	5	13	12	4	2	2	2.76	5
Other*	0	1	0	0	0	1		

* PM's other experience in digitalisation included following;

- 3D digital designs
- Dash pivot, formalize, Dropbox business

Q8 was further analysed to see if there is any significant difference in rating and ranking between the whole sample (including academics) and the sub-sample excluding academics. Accordingly, Table 26 summarises the findings based on the respondents excluding academics or researchers. The ranking has remained the same between the whole sample and the sub-sample.

Table 26: PMs' experience in digitalisation in ranked order (excluding academics/ researchers)

PM's Experience related to Digitalisation	None	Very Low	Low	Moderate	High	Very High	Mean Rating (MR)	Rank
Use of drones for progress monitoring	4	2	7	9	2	0	3.13	1
Use of Smart Contracts	1	5	13	5	0	0	2.92	2
Internet of Things (IoT) devices for tracking sensory data	3	4	13	3	1	0	2.79	3
Light Detection and Ranging (LiDAR) scan for measurement and assessment of quality	2	8	9	4	1	0	2.75	4
Fin-tech such as Blockchain	4	7	9	2	1	0	2.52	5

4 CONCLUSION

The aim of the Community of Practice roundtable (CoP RT) series is to bring together allied certification professions to a single platform to discuss, debate and agree on issues related to the community. It provides the opportunity to present issues in a collective and collegiate manner o the government where regulative or legislative interventions are required. The office of the NSW Building Commissioner act as the conduit to reaching government. The concept of the CoP RT was promulgated by the NSW Building Commissioner in January 2020 with these aspirations in mind.

The first iteration of the CoP RT was held on 11 June 2020 with the aim of establishing current and future landscape of quantity surveying and project management professional services. It involved three professional bodies: Australian Institute of Quantity Surveyors (AIQS), the Australian Institute of Project Management (AIPM), and The Royal Institution of Chartered Surveyors (RICS). The roundtable was convened by the Centre for Smart Modern Construction. Over 90 professionals representing these professional bodies and academia participated in the deliberations of the roundtable.

Views of the participants were gathered through a participant survey and an immersive engagement workshop. The roundtable provided a platform for the individual professionals and academics to express their views. It also provided the opportunity for the professional bodies to review these views as a representative body. The consensus reached out of the key findings can be summarised as follows:

a) QS professions are engaged in a wide range of building and construction activities with varied levels of performance. Most Commonly, QS services relate to Bills of Quantity, Cost Estimation / Planning, Tender Documentation and Project Monitoring.

b) the role of PM is increasingly influential, covering a broader range and typically across the pre contract and construction phases. This activity also extends into certification and compliance.

c) QS and PM professional services are not optimally coordinated and integrated in construction projects.

d) For QS practitioners, there are issues such as lower standard of professional performance resulted from under-pricing of fees due to competition and lack of mutual understanding, communications and collaboration from other consultants and professions. While for PM practitioners, previous definition of project management does not correlate with current industry definitions or project manager terminology and standards.

e) Tertiary education in Australia does not adequately address QS competency requirements.

f) It has been a huge challenge to appropriately recognise nomenclature, education, competency requirements and ultimately professional qualification and align them with international best practice.

g) There are multiple challenges in relation to the rapid introduction of digital technologies, including proof of concept, education skills development and financial investment.

h) For both disciplines, the use of digital technologies is low due to low demand by clients for digital services.

i) QS and PM services may be enhanced by improving QS and PM practitioners' understanding of digitalisation standards and processes.

j) there is tremendous opportunity to improve productivity and quality through embracing digital technologies.

k) QS services may have an expanded role in certification by, for example, undertaking an adjunct certifying role or Independent Performance Audit of construction process.

Based on the discussions, it is recommended that:

1. QS professionals should be engaged as the principal cost consultant on building projects at an early stage to enable development of Cost Plans for the purposes of defining scope, understanding of risk and mitigation of unnecessary costs.

2. Formal recognition by governments of internationally recognised QS and PM competencies and experience should be in place to ensure consistent and quality consultancy on each project from inception to completion.

3. PM practitioners should provide a 'Handover service' to manage the development and delivery of a handover document for new buildings.

4. The distinction between a professional and a practitioner needs to be highlighted. Many practitioners providing PM and QS services in Australia today will not have been assessed to ensure they have a baseline level of competency for the service they are providing. Further, many of these practitioners are not regulated against professional standards. This is a concern and consumers should be alerted to the distinction rather than the two being conflated.

The roundtable managed to clearly establish the current landscape of QS and PM professional services. It provided a discourse into the challenges and issues faced by the professions in providing their services. It highlighted the need for regulating standards and the role of the professional body and the government in doing so. The roundtable also identified the changing landscape of services predominantly driven by the pressures of digitalisation, industrialisation and globalisation of the construction industry. The possible legislative influences through the introduction of the Design and Building Practitioners Act 2020 (NSW) and the Residential Apartment Buildings (Compliance and Enforcement Powers) Act 2020 (NSW) were discussed in providing the key points identified above.

There was clear recognition from all parties and participants for the need for positive change and the need for enhancement of quality of professional services in construction. The professional bodies and government have a vital role to perform in regulating the services and improving competencies and professional service standards. These will no doubt involve re-skilling and enhancing the skill set of the professionals in keeping with changes brought forward by digitalisation, industrialisation and legislative pressures.

5 APPENDICES

Appendix A: Notes from the AIQS group discussion and poll results

Below are notes derived from participants views that were expressed during the AIQS group discussions for each question.

1. What is the type and state of services offered by QS professions in NSW?

1.1. The role of the QS differs across the sectors, depending on the point at which they are engaged. In some cases, QS is one of the very first consultants to be engaged early in a project, before the budget is even set.

1.2. Class 2 buildings, with the exception of public housing, is not largely a government regulated sector. QS role is more significant in defence, healthcare and commercial projects.

1.3. Class 2 residential sector lags behind all other sectors. QS role is very limited in this sector due to time restrictions and services not being valued sufficiently.

1.4. Some of the large QS firms maybe driving the profession through lowest fee-based competition, leading to issues in the services provided.

1.5. QS role in the banking sector may not be delivering the expected services at times as well.

1.6. AIQS has a role to play in regulating the QS services as well as bringing some innovation to the role.

1.7. There's a cost to get a proper input from the QS. Currently it is a very traditional role limited to basics like estimating and cost planning functions.

1.8. More regulations are needed (QSs were already involved in defective buildings)

1.9. If a particular procurement model takes precedence with the proposed system, it will impact when the QS gets involved in the project; whether they can guide the client throughout the process or whether they are picked up later on.

1.10. Feasibility will not change much from the current service offering. High level tendering type documentation will be affected in terms of what's acceptable.

1.11. Qualified QS should be responsible for reporting and progress claims assessments onsite. This should be a fair reflection of what the fees are.

1.12. QS should be engaged from project inception to set the parameters, and work as the lead with designers, rather than being reactive to what they have been given. Although this bill doesn't address the change from reactive to proactive, the government is in a key position to change how that relationship works.

1.13. There is an opportunity for AIQS and QSs to get involved in the regulation of certifiers. It's important to make sure that certifiers are held to standards as well.

1.14. his bill will increase the requirements for more detailed design documentation

1.15. Private developers aim to make a profit, especially in apartment asset class and Class 2 buildings, and the scope of service of a QS is reduced to reduce the fees, compared to projects such as health and public sector. There is an opportunity for the interface for QS to change with the new legislation.

1.16. Information put up on the e-portal will drive some of the behaviour across the industry and make people more accountable.

1.17. Most inquiries on Class 2 buildings are around DA estimates (Capital Value Investment Reports) or early feasibility costing, and then you don't hear anything. Developers or project managers are running everything for the job. There is less coordination with the documentation to be able to review and analyse and provide the costs. If QS and PM roles are legislated in terms of their engagement, like certifiers are, it will force developers to make us part of the process.

1.18. PMs, on average, are a lot younger than QSs, and they are running projects while QSs answer to them and provide guidance. There are lots of gaps in industry experience of those responsible for the process.

2. What are the problems, deficiencies and possible improvements in QS services?

2.1. QS is not valued by the developer market. Usually the importance is more given to the Architect, the Market Advisor/ Agent and the Builder.

2.2. Developers usually know the market and the background based on their own experience. So the QS engagement is much less.

2.3. Based on the fee, the QS role is made insignificant at times.

2.4. Hard to introduce QS early into residential sector projects due to time restrictions and fluidity of the information compared to other sectors like defence where things are more rigid.

2.5. From a developer's perspective, the push towards a declared design, or the submittal of 'Approved for Construction' set of documentation prior to moving to the site, could be troublesome.

2.6. As-built drawings are rarely checked properly. It's an overwhelming task.

2.7. Ethical implications - our fees are being undercut by 2/3rd other professionals. There are people who claim themselves to be QSs who are not qualified properly.

2.8. However, the other group concluded that, for QSs, there aren't many ethical issues. QSs rarely get professional indemnity claims. But there are fundamental issues in other parallel professions that usually lead to more serious damages.

2.9. Are bankers employing the correct persons as their QSs? Need to explore deficiencies there.

2.10 The QS firms can help improve the deficiencies of the QS services.

2.11 Curriculums need to be updated based on the requirements of the evolving QS services.

2.12 There is no actual mandated, or legislative requirement for a QS to be involved in certification.

2.13 It comes down to the fact that certifiers or engineers have check points, but not for QSs, they only have best practices based on the professional background in certain organisations. It is not legislation driven.

2.14 There is no real requirement from the point of view of whether the development going ahead or not.

2.15 From a risk point of view, QS is secured and insured.

2.16 There is a big gap for a QS to check quality in a point of view based on the Building Codes of Australia. It is a different scope, requires scoping up and the AIQS has to be careful as major expert witness reports are required.

2.17 Earlier involvement of the QS is again important as a QS cannot do anything after all technical decisions are made. QS not involving earlier affects the quality of the service delivered.

2.18 Traditionally, the QS has a contractual arrangement. The feasibility study, and the DA cost plans are carried out to check the economical side of a project and all of a sudden, a financier comes in without any contractual relationship. It is an ethical dilemma in finding who is the client; is that the person whom you have a contractual obligation to or the financier?

2.19 Solution for this could be going back to 90's method where client is the person to be responsible for by the QS. Banks will have their own QS separately. It will reduce the ethical dilemmas up to a certain extend.

2.20 There is a skill set which is not possessed by a QS and has to be considerate about the Professional Indemnity Insurance.

2.21 Some QS services are eroded by some PM services, when the QS joins the project later, boundaries of roles are not clear within the team.

2.22 In relation to defects, once a building is built, trying to rectify afterwards is not working. It has to be ensured that defects are minimal or zero. Therefore, the right person needs to be there to take care of defects before they occur.

3 How and which QS services can be improved through digitalisation?

3.10 Can’t beat knowledge with experience only. Need to move with digitalisation

3.11 Technology does not make the QS redundant. Things become quicker and easier to perform but the services remain the same more or less.

3.12 E-planning portal can be truly helpful to the QS based on the details that can be accessed prior to going to site, rather than simply the Development Application (DA) drawings. Timing also plays a major role here. If so, they need to be loaded to the portal concurrent with the approval process.

3.13 DA drawings have much less detail now compared to non-digital era. So the concept of declared design would be helpful in promoting adequate details, especially for class 2 buildings.

3.14 From a developer's perspective, currently there's a disconnect between the authorities regarding drawings. DA drawings were supposed to be with just enough details to approve a development.

3.15 Training and education play bigger roles in digitalisation, the tools already exist.

3.16 The biggest benefit from an e-planning portal would be at the start of a job. The QS currently gets a watered-down view of documentation and is told by the developer that certain drawings aren't available yet. An e-portal would give the exact documentation and provide a flag for finalisation of their reporting.

3.17 In a progress claim point of view, everyone could see those certificates or inspections coming in live.

3.18 If there is a revised drawing or a revised design, it needs to be costed.

3.10 All the steps in digitalisation are going to cost more and will be factored into the development cost.

3.11 According to a study, 50 - 60% of all defects in a project could have been avoided in the design stage. More upfront involvement from consultants and architects in getting things right will reduce defects.

4 How can QS services be enhanced to have a greater input in certification?

4.10 It is agreed that QS has a big role related to as-built drawings. However, it may not be about certification of the as-built drawings as it is out of the QS's expertise.

4.11 QS is one of the few professionals who is in the job from beginning to the very end.

4.12 QS can be the coordinator for as-built drawings.

4.13 If all drawings are on the portal, it will be easier with certifications as well.

4.14 A banker's QS role has a lot of obligations in terms of flagging any defects or delays. With digitalisation, such inputs can be improved.

4.15 Is QS happy to play a bigger role in certification? Depends on the fee as well.

4.16 Does the QS actually want to be involved in the certifier's role? Can a QS provide more value in certification?

4.17 QS do not have PI insurance to be responsible for certifying.

4.18 If we were to find parameters, if the insurers are on board, and if the QS has proper skills, this can be done. Anyhow this should not be something that us QS's should jump into.

4.10 There is a potential opportunity, as QSs are very good and reviewing drawings and developing designs. This skill can be utilised in as-built drawing certification. Rather than simply electronically check the drawings, QSs knowledge can be utilised here to review the changes that occurred between the drawings and documents. Likewise reviewing certificates as well. Of course, not all QSs will be capable of this task.

4.11 Need guidance around being insurers covering the risk.

Below are the collective responses for the four poll questions from participants of AIQS groups.

Poll Results		
Poll Question 01	***To what extent do you feel that the QS services are valued in the industry?***	
Response	**AIQS 1 – 5 responses**	**AIQS 2 – 11 responses**
Highly valued	20%	9%
Valued	20%	36%
Moderately valued	40%	36%
Less valued	20%	18%
Least valued	-	-
Poll Question 02	***How do you rate the level of challenges associated with the services provided by QSs?***	
Response	**AIQS 1 – 5 responses**	**AIQS 2 – 10 responses**
Highly challenging	20%	40%
Challenging	40%	40%
Moderately challenging	40%	20%
Less challenging	-	-
Least challenging	-	-
Poll Question 03	***To what level would digitalisation of services affect the quality of services rendered by QS?***	

Response	AIQS 1 – 5 responses	AIQS 2 – 11 responses
Highly significant	-	45%
Significant	20%	18%
Moderately significant	60%	27%
Less significant	20%	9%
Least significant	-	-
Poll Question 04	***To what level would digitalisation of services affect the quality of services rendered by QS?***	
Response	**AIQS 1 – 5 responses**	**AIQS 2 – 11 responses**
High	40%	27%
Medium	40%	36%
Low	20%	36%

Appendix B: Notes from the RICS group discussion and poll results

Below are notes derived from participants views that were expressed during the RICS group discussions for each question.

1. What is the type and state of services offered by QS and PM professions in NSW?

1.1. Types and state of QS has changed massively. Regular quantity surveying has changed to tax, infrastructure, carbon estimating etc. Even after PM joined some parts have been taken over by PM

1.2. Shifting the risk to the contractor only might not be the solution. Procurement management plays an important role too.

1.3. There is a gap between what the industry needs and university provides.

1.4. Education of the designers also needs to improve. In the market, there is a lack of capable, quality designers.

1.5. Certification is diminished after moving from private to public

1.6. Certification plays an important role. Some subcontractors who have no competency come up with designs which are not of good quality. Then there will be many defects. So that's why certification is important.

1.7. Many contractors try to do things quickly and cheaply. Enormous amounts are spent on training as well. Anyone can call themselves a project manager, this creates problems.

1.8. The role of QS is still uncertain in the regulations.

2. What are the problems and deficiencies in QS/PM services?

2.1. Predictive analysis is needed to know the skills required in future.

2.2. Regulatory framework enables to do that as well.

2.3. The industry has to come to university and say what the industry expects from them. It's not easy but this is a possible solution.

2.4. Some graduates can't write a letter even due to poor English. Some are not competent in measuring using technologies like Revit.

2.5. Quality of the data is important. Entering accurate data is important.

2.6. The lecturers are expected to do a PhD only, but doesn't expect industry experience.

2.7. Efficient capturing and use of data is important. Individually it can be done. But a smarter way could be quite beneficial. Taking pre-contract data to post-contract stage and analysing is important.

2.8. In contract documentation, people don't understand the missing information. Which can create deficiencies in the latter stage.

2.9. QS reports are not adequate in the view of banks.

2.10. Lack of accountability in the industry is a problem

2.11. Building regulations need to be improved. The role of QS need to be defined in the revised regulations.

2.12. QS comes to the design stage later, which is quite disadvantageous. Both PM and QS can give a good contribution, if joined from the beginning. With their experience, they can give good opinions on the design process.

2.13. It is good if QSs are involved in the development approvals.

2.14. Challenge of everybody wanting to make profits: Dollar factor as a challenge

2.15. Proposed legislation will help various institutions to improve their services and validity to the professions.

2.16. Banks are not assisting in payments for services.

2.17. Relevance of QS is decreased. QS gets lots of push backs. Universities need to play a role to improve.

3. How and which QS/PM services can be improved through digitalisation?

3.1. Digital signatures are being used in the industry. But to date some participants have not been asked to use the digital signature. May be because they are using secure portals such as Aconex etc.

3.2. Practical completion and occupational certification are independent unless they are tied together in the contract.

3.3. Progress claims are certified by QS. The bank requires a certified QS to certify to release funds on bonds etc.

3.4. Data literacy is important.

3.5. Legislation could push digitalisation

3.6. Liabilities and what it attracts is important

3.7. All services can be improved through digitalisations: E-portal and digital signatures are excellent, Digitalised formats for As-built drawings; Digital scanning of practical completion and the final completion of the project.

3.8. Slow change in digital applications in the industry is a barrier. Training everyone (engineers, graduates) is important.

3.9. A good model is required as a big step for private sector in the industry.

3.10. How inspections can be turned into digitalisation on site?? Use of BIM need to be mandated. Scanning the progress of work at site for certifying the progress payments.

3.11. There is a shortage in skills required to change the role though there is a huge potential for changes in the role of QS. Training everyone is important

4. How can QS and PM services be enhanced to have a greater input in certification?

4.1. Communication is important. Digitalisation can play a major role in that.

4.2. To assess the buildings, a PM / QS could play a good role

4.3. Building surveying and certification need to be supported as well.

4.4. QA, Engineers (mechanical, electrical etc) can review the plan at the design stage.

4.5. More training required for QS in legal services

4.6. Ramifications for poor services.

4.7. Lawyers should be sub-consultants instead.

4.8. QS should be more involved in certification.

4.9. Buyers should not be paying for incomplete services.

4.10. Empowerment of institutions and professionals

4.11. Standards should be synchronised among institutions

4.12. The process of certification should be more detailed. Industry associations should formulate standards for certifications.

4.13. More training for QS is required for them carry out the certification in a legal manner.

Below are the collective responses for the four poll questions from participants of RICS groups.

Poll Results		
Poll Question 01	***To what extent do you feel that the QS/PM services are valued in the industry?***	
Response	**RICS 1 – 11 responses**	**RICS 2 – 6 responses**
Highly valued	0%	14%
Valued	9%	29%
Moderately valued	73%	57%
Less valued	18%	0%

Least valued	0%	0%
Poll Question 02	***How do you rate the level of challenges associated with the services provided by QSs and PMs?***	
Response	**RICS 1 – 10 responses**	**RICS 2 – 6 responses**
Highly challenging	30%	50%
Challenging	50%	50%
Moderately challenging	20%	0%
Less challenging	0%	0%
Least challenging	0%	0%
Poll Question 03	***To what level would digitalisation of services affect the quality of services rendered by QS/PM?***	
Response	**RICS 1 – 10 responses**	**RICS 2 – 6 responses**
Highly significant	40%	17%
Significant	20%	33%
Moderately significant	40%	50%
Less significant	0%	0%
Least significant	0%	0%
Poll Question 04	***How would you rate the potential for QS/PM to involve in the certification process?***	
Response	**RICS 1 –10 responses**	**RICS 2 – 6 responses**
High	30%	83%
Medium	20%	0%
Low	50%	17%

Appendix C: Notes from the AIPM group discussion and poll results

Below are notes derived from participants views that were expressed during the AIPM group discussions for each question.

1. What is the type and state of services offered by the PM profession in NSW?

1.1 Client-side PM versus on-site project manager definition is a real issue and needs definition in the regulation Project managers on site save the client money, but they are reluctant to spend the money.

1.2 Clerk of works, superintendent and PM roles need to be defined.

1.3 Superintendent need additional powers to enforce contract directions with regards to quality issues.

1.4 The sector is not very digital at all.

1.5 People do not price in cost avoidance that PM's provide.

1.6 PM should be engaged at early stage with design - but that's not always the case.

2. What are the problems, deficiencies, and possible improvements in PM services?

2.1 There is a balance between client fully documenting vs getting the building to complete. As David Chandler said some key elements are not documented enough to define the scope and allow too much 'room to move'.

2.2 Work in silos, no cohesive, collaborative way of working.

2.3 Lack of understanding the client brief in detail.

2.4 All stakeholders do not have the same level of understanding.

2.5 The Definitions used in old legislation is problematic...many of our members are complaining about it because they don't fit the narrow definition.

2.6 We need PM to be able to have more experience and be able to interrogate consultant’s design and justifications.

2.7 A big concern if PM's are going to be more accountable for certification how will this affect Professional Indemnity Insurance. This will then require PM fees to increase.

2.8 There is a lack of Co-ordination between the trades which is caused by inadequate funding or appropriate PM experience.

2.9 By and large it has been a profession of administration and not leadership.

2.10 Level of experience.

2.11 Understanding the current legislation.

2.12 A lot of the contractors working in general construction would not get past the front gates in the chemical / industrial sector due to their poor attitudes to the Client's needs and expectations, e.g. get in/out as quickly as possible - irrespective of the consequences.

2.13 D&C, in theory, allows practical building experience to be injected into a building, but that blurs responsibilities between constructors and designers -often without a PM to oversee/guide the process.

2.14 Because they are not being able to add value, they are still considered an added cost.

2.15 PM haven't tried to influence the way the industry delivers projects.

2.16 Certifiers and to a lesser extent, PMs depend on the builder for ongoing work, if they find fault or raise too many defects the builder won't use them

2.17 Price constraint doesn't let people do the work they want to do.

2.18 PM hasn't lived up to its expectation. PM has been a little more than a post office in terms of sending and receiving communication.

3. How and which PM services can be improved through digitalisation?

3.1 Real opportunities of engagements from design throughout the supply chain.

3.2 Integrated project delivery, alliance contracting.

3.3 Contractor and consultant ratings would be useful. Indicators should be developed to determine the rating level.

3.4 A centralised online system to be used throughout the project lifecycle to capture all the required documents. Blockchain will improve quality, reliability.

3.5 Digital signatures just need to be implemented into contracts, not invented. The software is out there!

3.6 Able to have e-planning portal interface with information management systems (ie Aconex, iTWOcx (projectCentre), teambinder, BIM software etc...)

3.7 Early involvement of parties, early stage decisions.

3.8 There is a real process needed to upskill client awareness around digital opportunities - but there is also benefits at time to face to face communications.

3.9 There are differences in scale: tier 1s might have the resources but smaller ones do not have.

3.10 It is important to specify what needs to be signed off, not just how (electronic). We still have some designers that are hesitant to provide certification of their design even when it complies with the brief and applicable standards etc. specification of what is needed around the key building elements is needed.

3.11 Challenge is dealing with human beings and their appetite to data process -< whether it is on a paper or a tablet, that culture is important.

3.12 E-planning portal on top of recording as built need to also have a method of recording materials used so when there is a product recall it can be easily identified.

4. How can PM services be enhanced to have a greater input in certification?

4.1 The role of the PM and QS is to ensure allowances have been made and to manage compliance on all critical & noncritical stages/deliverables and these stages begin in planning and design concept (not construction). There is a process generally called 'safety in design' which requires a manager to oversee. The cost of this is very minor compared to the cost of risk.

4.2 PMs can provide a 'Handover service' to include the following PMs can be engaged to manage the development and delivery of a handover document for new buildings. This may include;

4.2.1 Facilitate a final defect report developed by a third-party or the PM firm. This would include the designers input based on their apparent certification of the designs.

4.2.2 Review of building contract to determine conditions applied to the contractor and designers on 'hold and witness' points, design certification, certified as built drawings, installation certification, warranties, occupation certificates are valid, dilapidations reports are accepted and any local authority acceptances or conditions outstanding are finalised.

4.2.3 PM to procure any items mentioned from the contracted parties. These items should be included as mandatory to achieve retention release and defect period finalisation.

4.2.4 Develop and issue a final document.

4.3 Litigation practitioners' interest it not in resolution. They want to continue till money dries out.

4.4 Complicated thing about certification is that there are a lot of technical questions.

4.5 Sometimes litigation persists without any proper foundation. Outstanding opportunity for PMs to stand up and take up a leadership role.

4.6 A simplistic answer is by realistic fees.

4.7 How do we manage the PM being the point of contact for problems for clients up to 7 years after the build completed?

4.8 Independent inspections.

4.9 Having an automated system that can check compliance.

4.10 Insurance premium in tandem with the level of verification.

Below are the collective responses for the four poll questions from participants of AIPM groups.

Poll Results		
Poll Question 01	***To what extent do you feel that the PM services are valued in the industry?***	
Response	**AIPM 1 – 9 responses**	**AIPM 2 – 4 responses**
Highly valued	0%	25%
Valued	0%	50%
Moderately valued	78%	25%
Less valued	22%	0%
Least valued	0%	0%
Poll Question 02	***How do you rate the level of challenges associated with the services provided by PMs?***	
Response	**AIPM 1 – 9 responses**	**AIPM 2 – 6 responses**
Highly challenging	22%	50%
Challenging	56%	33%
Moderately challenging	11%	17%
Less challenging	11%	0%
Least challenging	0%	0%

Poll Question 03	***To what level would digitalisation of services affect the quality of services rendered by PMs?***	
Response	**AIPM 1 – 9 responses**	**AIPM 2 – 6 responses**
Highly significant	56%	84%
Significant	33%	16%
Moderately significant	11%	0%
Less significant	0%	0%
Least significant	0%	0%
Poll Question 04	***How would you rate the potential for PMs to involve in the certification process?***	
Response	**AIPM 1 –…responses**	**AIPM 2 – 7 responses**
High	67%	100%
Medium	33%	0%
Low	0%	0%