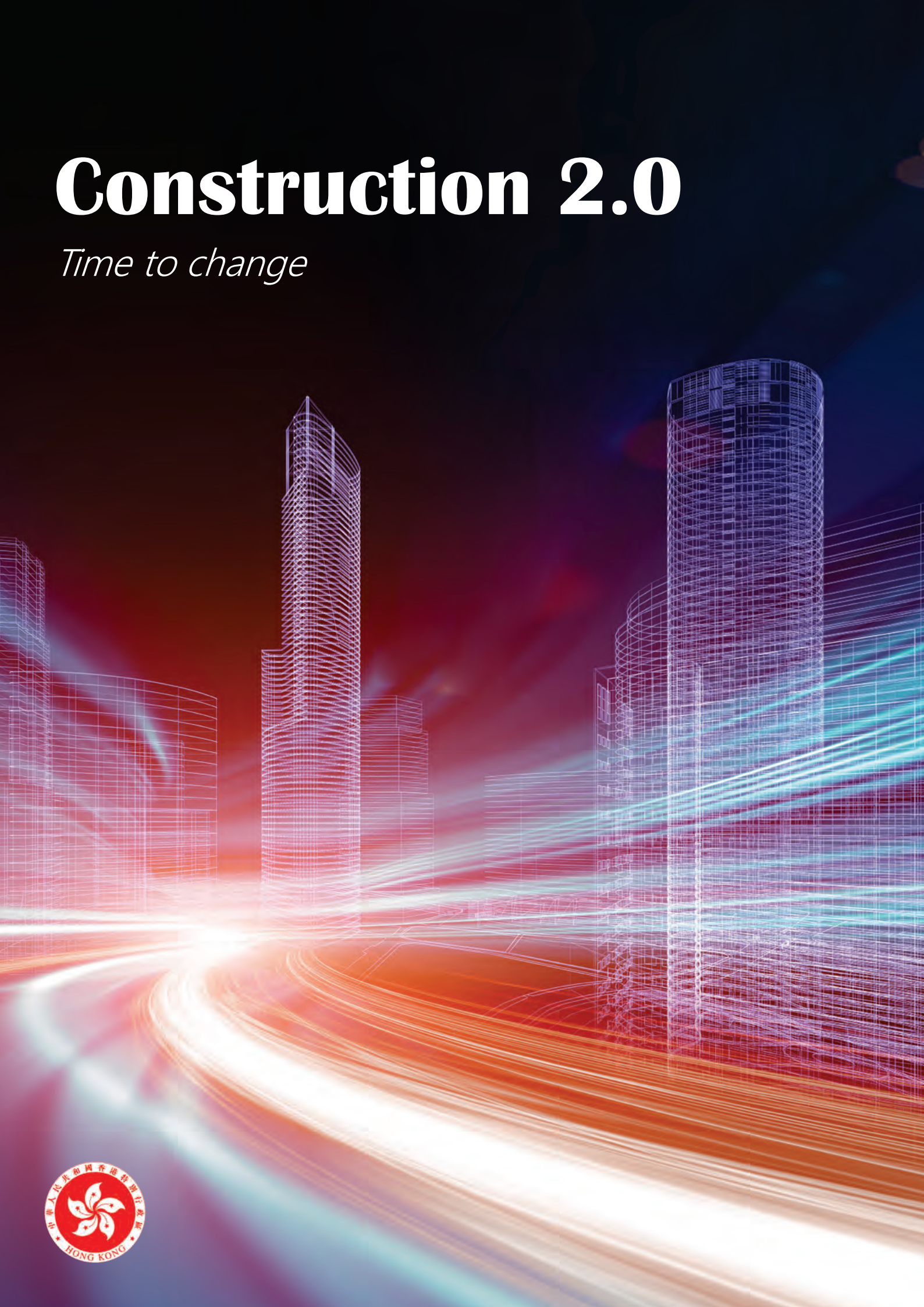
Construction 2.0

Time to change



Contents

This publication has been produced with the assistance of KPMG and was published in September 2018.

About this publication

The construction industry (the Industry) has played a key role in positioning Hong Kong as one of the most recognisable, dynamic and admired cities in the world. It has been an instrumental driver of economic growth and enabler of social development for many generations. Whilst the past has been highly productive, the Industry is facing a challenging future.

A core aspect of the challenge ahead is centred on the significant volume of predicted construction activity. Over the next 10 years, construction investment of approximately HK$2.5 trillion to HK$3 trillion is expected, a material increase over the HK$1.9 trillion recorded in the past 10 years. Whilst a healthy and growing pipeline is encouraging, questions remain as to the capabilities and resources available to deliver against this pipeline. This includes an increasingly ageing construction workforce, a tendency to lag in innovation and in the adoption of advanced technologies as well as being labelled one of the most expensive construction markets in the world.

In recent years the Industry has also witnessed a series of incidents related to certain high profile mega-projects. These incidents have included unsatisfactory cost performance, commissioning delays, site safety incidents and in a more recent case, alleged issues related to the quality of construction delivery. These events have led to heightened levels of media scrutiny, reduced levels of public confidence and challenges in recruiting the next generation of high performing talent.

To address these challenges and ensure a bright and prosperous future, the Government of the Hong Kong Special Administrative Region (Government) is taking the initiative to be a leading agent for change. This is presented in Construction 2.0 – an expression of the Industry changes required across three key pillars: Innovation, Professionalisation and Revitalisation.

To ensure Construction 2.0 can reach its full potential, Government is undertaking specific and targeted actions. For example, the HK$1 billion Construction Innovation and Technology Fund has been established to promote innovation and investment in construction delivery. But it doesn't stop there, a wide range of other current and planned initiatives focused on Innovation, Professionalisation and Revitalisation are underway. However, for the Industry to move dramatically and productively into the future, all Industry stakeholders – public and private – need to be positively contributing to this development story.

The Development Bureau, with the assistance of KPMG, formulated this publication with the goal of highlighting the current challenges facing the Industry and the delivery of one primary message: it is *Time to Change*. Stakeholders are encouraged to provide feedback as to how the Industry can be developed in a productive and sustainable manner so that we can collectively move the Industry to the next level and beyond.

Executive summary

Construction in Hong Kong

Introduction

Hong Kong has a proud reputation as one of the world's leading global cities. In developing this global reputation, the Hong Kong local construction industry (the Industry) has played a significant role in building the foundations and physical structures that have supported the success and long term development of Hong Kong's economy and community.

Despite its history of achievements, in recent years the Industry has experienced increasing pressures and public scrutiny as a result of higher costs, declining productivity levels and a series of incidents recorded on certain mega-projects. These challenges and others have led to an important juncture whereby change is needed to ensure a productive Industry future can be attained.

In this respect, Government has developed Construction 2.0 to strengthen and maintain Hong Kong's established regional leadership position in construction, whilst enhancing the Industry's sustainability and long term growth prospects. Construction 2.0 is comprised of three key pillars: Innovation, Professionalisation and Revitalisation.

Objectives of this publication

The objectives of this publication are as follows:

1. To outline Government's vision for the future of the Industry.

2. To stimulate and promote discussion within the Industry and to garner feedback as to what changes are necessary to address the challenges being faced and how the Industry can move forward together to deliver a bright and productive future.

Core challenges facing the Industry

To develop the strategy and actions to carry the Industry forward, first the Industry needs to understand the core challenges being faced – now and in the future. The core challenges described in this publication include:

- Significant future construction volumes;
- High costs;
- Unsatisfactory mega-project performance;
- Unsatisfactory site safety performance;
- Declining productivity; and
- A lack of creativity & innovation.

Construction 2.0

Government has developed Construction 2.0 to strengthen and maintain Hong Kong's established regional leadership position in construction, whilst enhancing the Industry's sustainability and long term growth prospects. These aims are represented through a focus on three key pillars: Innovation, Professionalisation and Revitalisation.

Pillar 1: Innovation

The vision: The development of an Industry culture that embraces change, innovation and new technologies to drive forward productivity, efficiency and enhanced project delivery outcomes.

Pillar 2: Professionalisation

The vision: Improved professionalism of the Industry through step change increases in project leadership, project management, procurement capabilities and professional skills and practices within Government and the private sector, to deliver higher quality construction and built assets, combined with a first priority focus on safety, construction supervision and quality in the workplace.

Pillar 3: Revitalisation

The vision: Reinvigorating the appeal and benefits of joining the Industry to attract and nurture growing numbers of young and energetic talent to the workforce and increasing the agility at the individual, organisational and Industry levels.

The way forward

Measuring future performance

To implement Construction 2.0, achievable and measurable performance targets should be considered. Further details of these measures are listed in Section 4 titled *The Way Forward*.

Working together

This publication offers views on the challenges, actions to address and potential methods of measuring performance to encourage and stimulate shareholders to share views as to how the Industry can be developed in a healthy, productive and sustainable manner. We hope that all Industry stakeholders can get behind Construction 2.0 so that we can work together to take the Industry to the next level and beyond.

How to provide feedback

Feedback on this publication can be sent to the following:

- By website: www.hkc2.hk
- By fax: 2537 1961
- By email: feedback@hkc2.hk
- By post : Project Cost Management Office, Development Bureau, 16th Floor, West Wing, Central Government Offices, 2 Tim Mei Avenue, Tamar, Hong Kong

Construction in Hong Kong

Introduction

Hong Kong is regarded as one of the world's leading global cities. This reputation is affirmed by the city's status as a global financial services centre, gateway where "East meets West" and entry point to one of the world's fastest growing economies, China. In developing this global reputation, the Industry has played a significant role in literally building the foundations and physical structures that have supported the success and development of Hong Kong's economy and community.

Whilst the Industry has a proud and long history, it has not been without its challenges. In the year 2000, Government appointed the Construction Industry Review Committee (CIRC) in response to the spate of piling incidents in public housing estates, where non-compliant works were revealed due to alleged corruption. In 2001, the CIRC published a report called *Construct for Excellence* which introduced over 100 recommendations directed at achieving long term improvements in Industry practice and performance. This report is now being commonly referred to as "Construction 1.0." Fast forward to today, the Industry has evolved in many ways; the types and complexity of projects being implemented, the technologies and methods used to plan and deliver projects as well as the challenges being faced by the Industry and its participants as a whole. With further change and disruption expected in the future, the Industry has reached an important juncture in which the future vision and strategy for the Industry needs to be decided – this is referred to as "Construction 2.0."

Importantly, the aims of Construction 2.0 are to strengthen and sustain Hong Kong's established regional leadership position and long-term development whilst enhancing the foundations of the Industry to ensure its ongoing sustainability and prospects. These aims will be delivered through a focus on three key pillars: Innovation, Professionalisation and Revitalisation.

The impact of the Industry on Hong Kong

Quality of infrastructure

Hong Kong is recognised as holding arguably the highest quality infrastructure globally. According to the 2017-18 World Economic Forum's (WEF) Global Competitiveness Index, Hong Kong is ranked as the global number one in eight consecutive years for the quality of its infrastructure.[1]

Economic contribution

Construction represents a major driver of the Hong Kong economy – according to the Census and Statistics Department (C&SD), the Industry makes up 5.2% of Gross Domestic Product (GDP). It is worth noting that this excludes the contribution provided to a number of inter-related sectors such as real estate (5.1%), professional and business services (5.9%) and transport & storage (5.9%) to name a few.[2]

Employment

In addition to its economic contribution, the Industry is also a significant provider of employment. Across the Industry, there were approximately 340,000 employed persons from managers to workers in 2017, an increase from 270,000 in 2011. This included an estimated 120,000 manual workers employed at construction sites in 2017.[3]

1. World Economic Forum (2010-2017), Global Competitiveness Report.
2. Census and Statistics Department (2018), 2016 Gross Domestic Product by major economic activity.
3. Census and Statistics Department survey.

Important Industry milestones

1998 — Airport Core Programme

The 10-project Airport Core Programme (ACP) was completed in 1998, with eight projects completed on time and within budget. This performance, when coupled with the scale and complexity of the programme, helped to establish the modern day reputation and regional leading position of the Industry.[4]

1999-2000 — Building challenges in public housing

In the late 1990's, there were a series of building problems experienced in the public housing market.[5] By way of example, excessive uneven foundation settlements were discovered in the Tin Chung Court development. In that example, the contractor, the external consultant and procedures adopted (including the contracting system and contract documentation) were determined to be responsible. In another case, piling problems at the Yu Chui Court in Shatin were reported, resulting in a number of arrests, including Housing Department (HD) staff. A series of Legislative Council (LegCo) meetings were held to discuss measures to improve building quality in public housing and to rebuild public confidence.

2001 — Construction Industry Review Committee

In response to the public housing incidents referred to above, Government appointed the CIRC which produced a report titled *Construct for Excellence*. The report introduced over 100 recommendations directed at improving industry practices and performance.[6] The report initiated what is now considered to be the first generation of major reform of the Industry.

2007 — Ten Major Infrastructure Projects

To keep pace with the region's development, the 2007-2008 Policy Address of Government introduced the Ten Major Infrastructure Projects (TMIP).[7] A number of these projects, including the Hong Kong-Zhuhai-Macao Bridge (HZMB) and the Shatin to Central Link (SCL) are still under construction at the time of writing. Because of their scale and the duration involved in planning, design and construction, these projects have proven to be a major driver of Industry growth since the time of the Policy Address.

2009 — Construction costs taking off

After hitting a trough in 2009, local construction costs commenced a steep upward trend that has persisted in subsequent years. This growth in cost is considered a threat to the overall financial sustainability of Government and the future prospects of the Industry.

2015 — Task Force on Managing Cost of Public Works

In order to strengthen cost control for public works, the then Financial Secretary set up a Task force in 2015 to examine the causes behind escalating construction costs and to formulate corresponding measures.[8]

2016 — Project Cost Management Office

As announced in the 2016 Policy Address and the 2016-17 Budget, the Development Bureau (DEVB) set up the Project Cost Management Office (PCMO) in June 2016 with a mandate focused on achieving Industry-wide improvements in relation to cost and project management of capital works projects by drawing up cost control measures, cost reduction initiatives and steering and monitoring related work undertaken by bureaux and works departments that are responsible for project delivery.[9]

2018 — Construction Innovation and Technology Fund

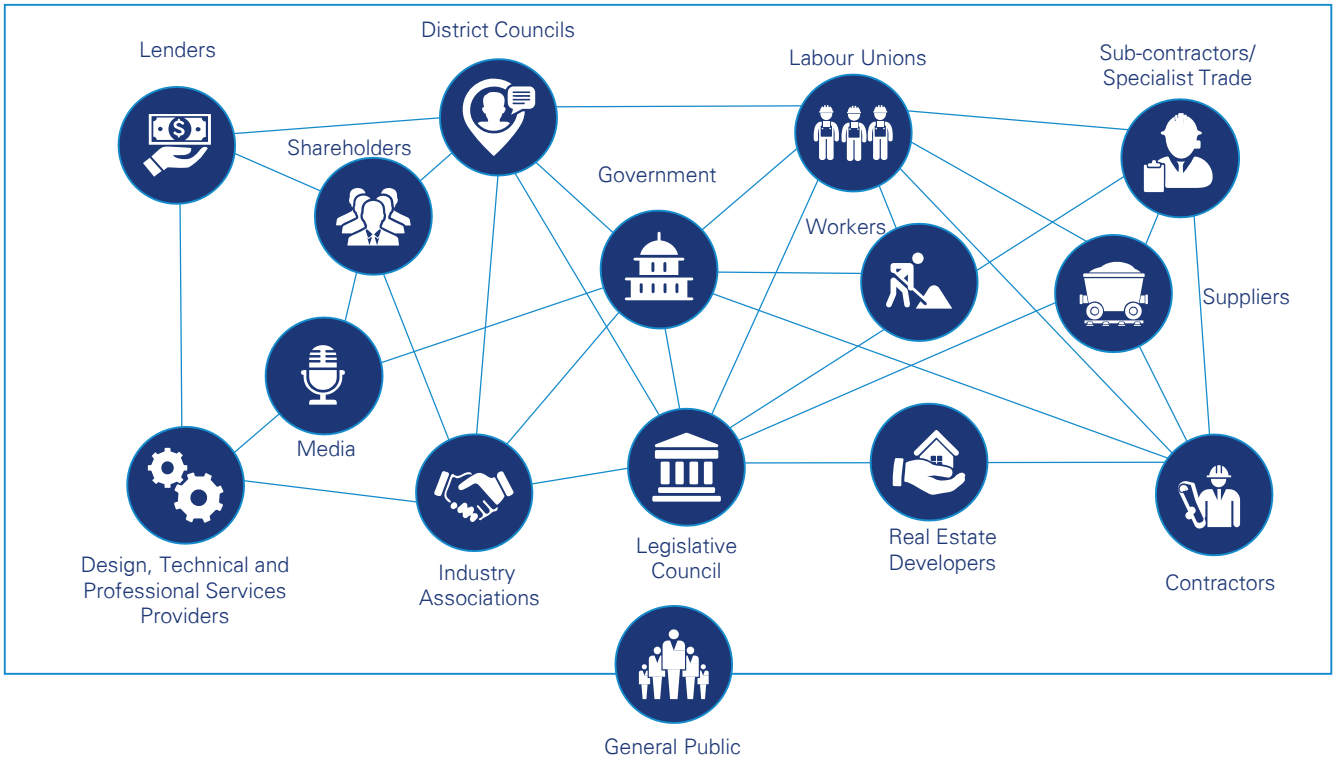
In the 2018-19 Budget, the Financial Secretary set aside HK$1 billion for the establishment of the Construction Innovation and Technology Fund[10] to provide impetus to transform the local construction industry through automation, industrialisation and digitisation.

4. Legislative Council Secretariat (1998), Matters Relating to the Opening of the New Airport at Chek Lap Kok.
5. Legislative Council (2000), Paper for meeting of the Panel on Housing: Follow-up action to examine the building problems in public housing (LC Paper No. CB(1)79/00-01(03).
6. Construction Industry Review Committee (2001), Report of the Construction Industry Review Committee: Construct for Excellence.
7. 2007-08 Policy Address.
8. The 2016 – 17 Budget.
9. Development Bureau (2016), Follow-up Actions to Meeting on 15 March 2016 (LC Paper No. CB(1)816/15-16(01)).
10. The 2018 – 19 Budget.

The Industry ecosystem

The Industry ecosystem is a complex collection of public, private and other stakeholder groups that either play a role in, or are impacted by, the day-to-day execution of the Industry's activities. Understanding the range of groups involved in the ecosystem, as shown in Figure 1, is important in analysing the challenges and opportunities for the Industry.

Figure 1 – The Industry ecosystem



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The objectives of this publication are as follows:

1. To outline Government's current and preliminary vision for the future of the Industry.

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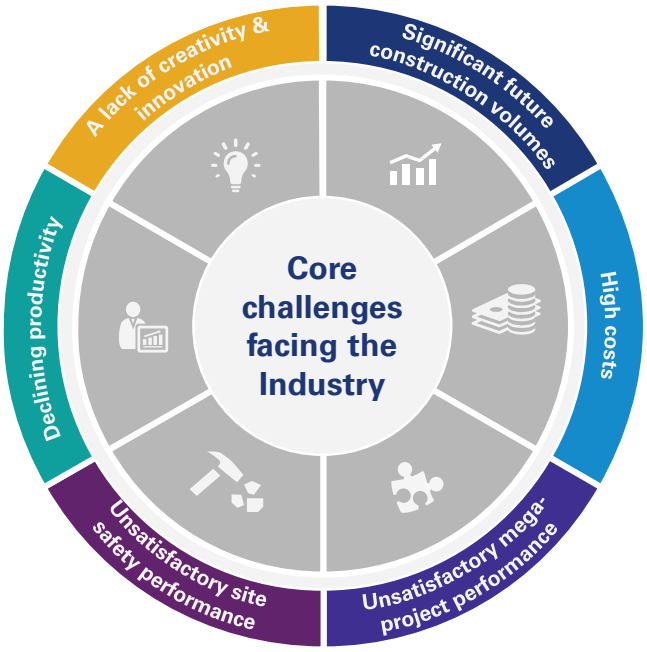
Core challenges facing the industry

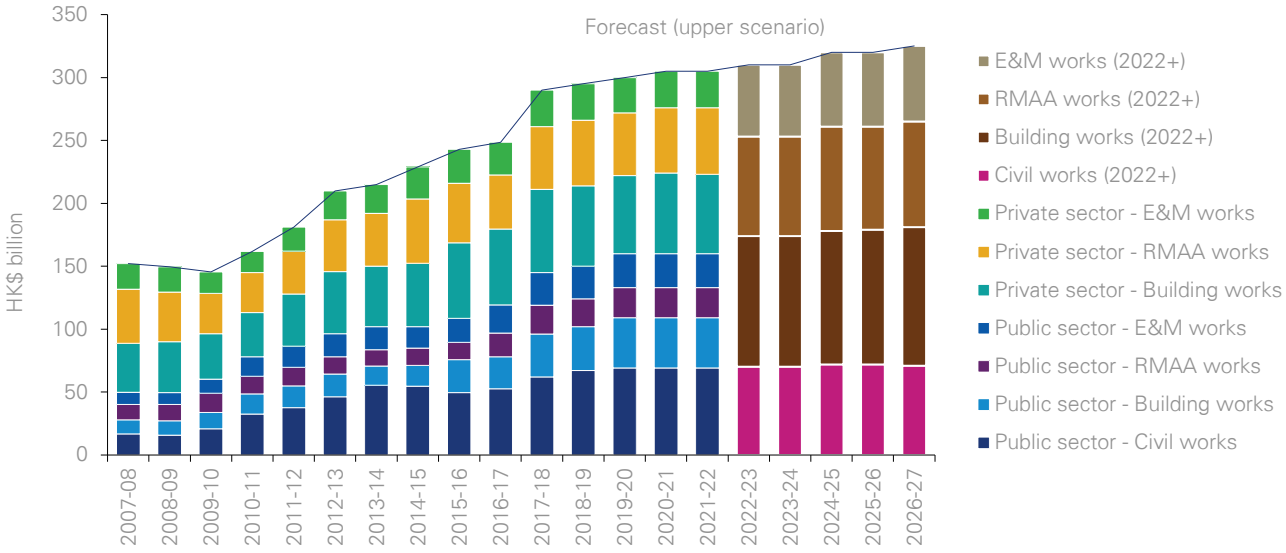
To develop the strategy and actions to carry the Industry forward, first the Industry needs to understand the core challenges being faced – now and in the future.



Challenge 1: Significant future construction volumes

Arguably the most significant challenge facing the Industry is the significant level of construction activity projected in coming years, including the Three-Runway System (3RS), Hospital Development Plan, public housing programme, Railway Development Strategy 2014 and many more. This is exemplified in the upside projections prepared by the Construction Industry Council (CIC) for future construction volumes, as illustrated in Figure 2.[11]

Figure 2 – Hong Kong Construction Activity



Source: Construction Industry Council

While this projected level of activity is expected to generate significant and attractive commercial opportunities, it also places increasing pressure and risk on the Industry's workforce. Unless the root causes of the challenges further discussed in subsequent sections of this publication are addressed, the risk and incidences of project failures will potentially rise, to the detriment of the Industry and Hong Kong.

11. Construction Industry Council (2018), Construction expenditure forecast for public and private sectors.

Challenge 2: High costs

Escalating costs represent a global theme impacting the construction market, and Hong Kong is no exception. This is highlighted by two independent studies that both placed Hong Kong as the city with the third highest construction costs globally in 2018, as detailed in Table 1.

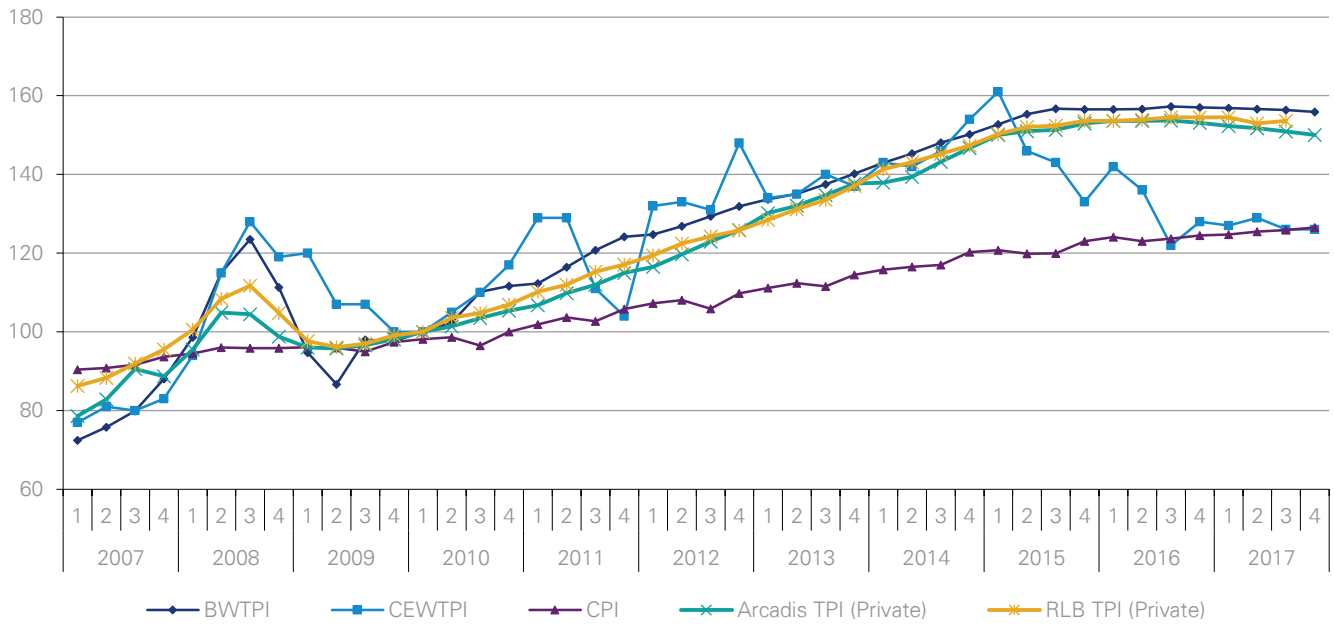
Table 1 – Top 5 most expensive cities to build globally

Ranking	Arcadis International Construction Costs 2018[12]	Turner & Townsend International Construction market survey 2018[13]
1	New York City	San Francisco
2	San Francisco	New York City
3	Hong Kong	Hong Kong
4	Zurich	Toronto
5	London	Boston

In addition to being recognised as a high cost global construction market, a major contributor to this has been the rapid cost growth experienced in recent years. To illustrate this, between 2007 and 2017 construction prices in Hong Kong – as demonstrated by the Building Works Tender Price Index (BWTPI) published by the Architectural Services Department (ArchSD) and the Civil Engineering Works Tender Price Index (CEWTPI) – grew at compound annual growth rates (CAGR) of 7.23%[14] and 4.62%.[15]

This contrasts with a CAGR of 3.25% for the Consumer Price Index (CPI)[16] over the same period as illustrated in Figure 3. This level of cost growth is also reinforced by tender price indices produced by Arcadis[17] and Rider Levett Bucknall (RLB)[18], which both measured a construction costs CAGR over 5% for the Industry over the same period.

Figure 3 – Tender price indices vs. CPI



Source: Architectural Services Department, Civil Engineering and Development Department, Arcadis, Rider Levett Bucknall, Census and Statistics Department

12. Arcadis (2018), International Construction Costs 2018.
13. Turner & Townsend (2018), International Construction Market Survey 2018.
14. Architectural Services Department (2018), Building Works Tender Price Index.
15. Civil Engineering and Development Department (2018), Civil Engineering Works Tender Price Index.
16. Census and Statistics Department (2018), Hong Kong Annual Digest of Statistics.
17. Arcadis (2017), China and Hong Kong Quarterly Construction Cost Review.
18. Rider Levett Bucknall (2017), Quarterly Construction Cost Update (September 2017).

If construction cost growth rates persist at these levels or greater, Hong Kong may go on to become the most expensive construction market in the world. This may also lead to further adverse effects for the broader Hong Kong economy and community. These include increased costs associated with real estate and infrastructure development, reduced commercial investment feasibility – potentially leading to higher costs of housing and lower residential affordability, as well as reduced employment opportunities in a wide range of industries that rely on construction activity stimulus.

Case study on project costs

The development of the New Broadcasting House (New BH) of Radio Television Hong Kong (RTHK) in Tseung Kwan O was announced in the 2011-12 Policy Agenda.[19] The construction cost of the New BH was estimated at HK$1.6 billion in 2009.[20] The revised cost estimate in 2013, however, significantly increased to HK$6.1 billion.[21] Ultimately, the funding application for the construction of the New BH was not supported by the Public Works Subcommittee (PWSC) of LegCo in January 2014 due to concerns regarding the scope of the project and the associated cost estimate. At the time of writing, the project continues to be unfunded.

19. The 2011-12 Policy Address – Policy Agenda.
20. Legislative Council (2009), Brief on Public Service Broadcasting and the Future of Radio Television Hong Kong (LC Paper No. CTB(CR) 9/17/9).
21. Legislative Council (2013), Item for Public Works Subcommittee of Finance Committee (LC Paper No. PWSC(2013-14)28).

Challenge 3: Unsatisfactory mega-project performance

Construction performance refers to the frequency with which projects are delivered on-time, on-budget and to a high quality standard. Whilst the concepts of on-time and on-budget are relatively straightforward, quality can be more complicated. In this regard, quality not only refers to the standard of the end construction product, but also the quality of procedure and practice. In terms of the latter this includes proper supervision, reporting procedures, safety practices and use of technologies to communicate and deliver on-site activities.

In analysing the Industry's performance across these dimensions, most of the data that is available is centred on budget performance for Government projects. In this regard, Hong Kong has witnessed a divergence between overall performance and complex, mega-project performance.

Overall performance

Over the period from 2008 to 2017, performance on Government projects under the Capital Works Programme (CWP) has generally been to a good standard, particularly from a budget perspective.[22] Although certain projects required additional funding owing to project specific circumstances, the majority of approved projects were delivered at or under the original Approved Project Estimates (APE). Additional funding was required in approximately 10% of the projects and the amount represented some 8% of the total provision.

Also of importance, this period of time was particularly active for the Industry, with approximately 850 Category A projects[23] having their final accounts settled.[24] In terms of cost, the original APE of these projects totalled approximately HK$240 billon as compared with cumulative final accounts of approximately HK$210 billion – leading to an overall surplus of HK$30 billion. Effectively, this means the surplus generated at the portfolio level was more than able to offset the cost overruns incurred by a selected number of projects.

To reinforce the positive nature of this performance, in KPMG's annual Global Construction Survey, published in October 2017,[25] Professor Bent Flyvbjerg of the University of Oxford pointed out that Hong Kong (and the Netherlands) is better than many other jurisdictions when it comes to project cost estimation, based on his findings of a study covering over 100 international jurisdictions.

Complex mega-projects performance

Mega-projects are those that come with high levels of procurement, design and/or construction complexity as well as scale. They typically take multiple years to implement and often involve high levels of risk to the participants involved.

Unfortunately, a number of complex mega-projects in Hong Kong have suffered from underperformance in the form of delays, cost overruns and/or quality failures in recent years. These incidents have been well documented through extensive media coverage – leading to reduced levels of public confidence in the Industry. Examples are detailed in Table 2.

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22. CWP comprises the Public Works Programme ("PWP") and capital subvention works projects. PWP is the programme of works through which the Administration invests in publicly owned facilities and infrastructure. Capital subvention works projects include school buildings for the aided sector and private schools, university teaching and research facilities, public hospitals and other works projects of subvented organisations. CWP is financed by the Capital Work Reserve Fund established by Resolution of the Legislative Council ("LegCo") on 20 January 1982. Sourced from: Legislative Council (2014), Background brief on Capital Works Programme (LC Paper No. CB(1)925/13-14(04))
23. Category A projects are projects which have been granted an Approved Project Estimate (APE) by the Finance Committee of LegCo.
24. Legislative Council (2018), Press Release: LCQ17 Major infrastructure projects experiencing cost overruns.
25. KPMG Global Construction Survey 2017 - Make it, or break it.

Table 2 – Performance of selected mega-projects

	Cost[26]		Timeline	
Project	Original APE	Revised APE	Original scheduled completion date[27]	Latest scheduled completion date
Hong Kong-Zhuhai-Macao Bridge	HK$56.5bn	HK$70.8bn	End of 2016	To be announced
Guangzhou-Shenzhen-Hong Kong Express Rail Link	HK$69.6bn	HK$89.2bn	2015	Sep 2018
Shatin to Central Link	HK$79.8bn	HK$80.7bn	2018-2020	2019-2021[28]
Liantang/Heung Yuen Wai Boundary Control Point	HK$26.7bn	HK$35.4bn	End of 2018	End of 2018[29]

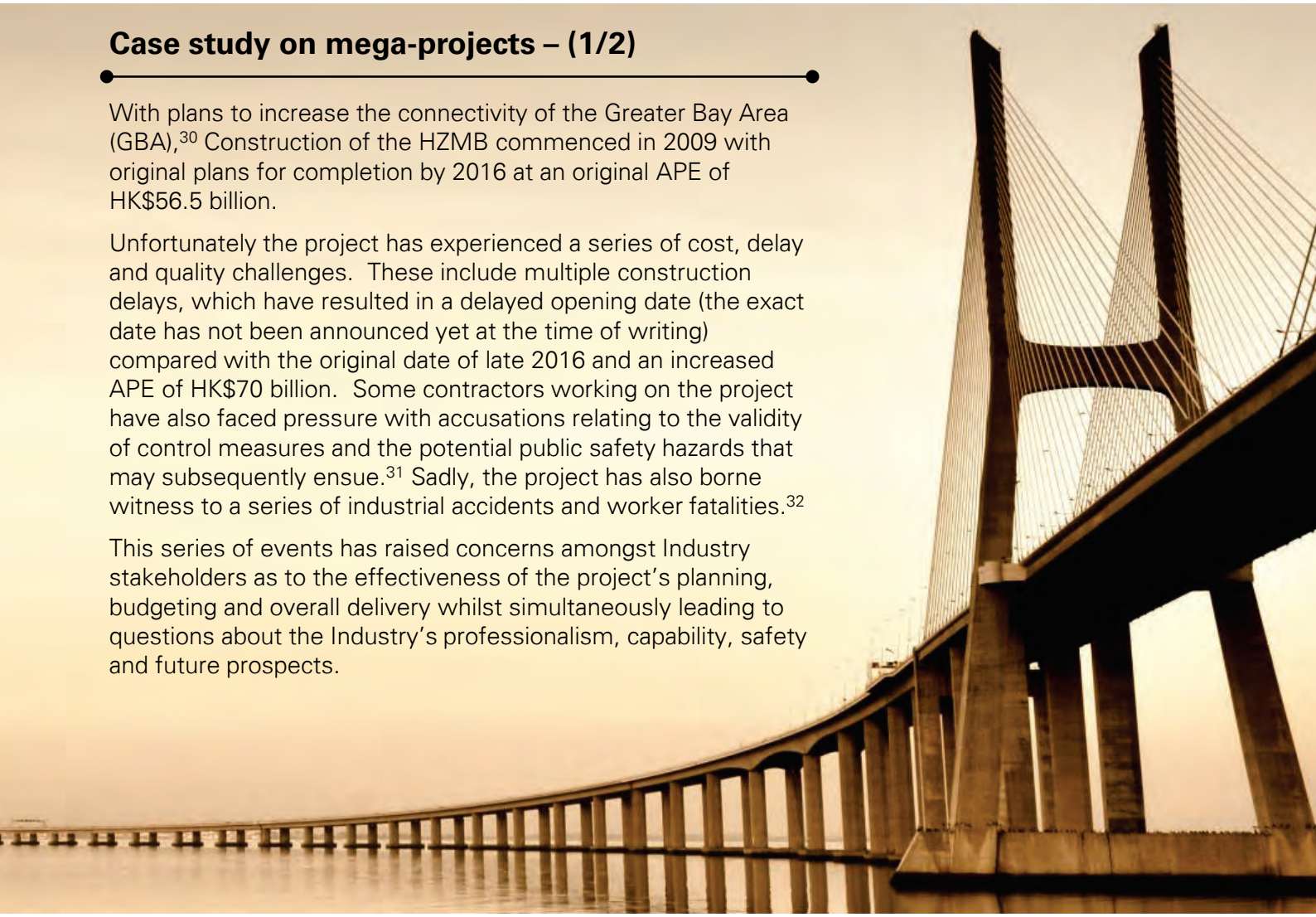
Some of the events witnessed on these projects have led to significant levels of public attention and scrutiny and have arguably had a detrimental impact to the image of the Industry. If this situation persists in the future, public confidence in the Industry would be expected to decline, Hong Kong's status as a high quality market for infrastructure could be at risk, future generations of Industry employees may look elsewhere and private sector players may become less willing to invest and grow their participation in the Industry.

Case study on mega-projects – (1/2)

With plans to increase the connectivity of the Greater Bay Area (GBA),[30] Construction of the HZMB commenced in 2009 with original plans for completion by 2016 at an original APE of HK$56.5 billion.

Unfortunately the project has experienced a series of cost, delay and quality challenges. These include multiple construction delays, which have resulted in a delayed opening date (the exact date has not been announced yet at the time of writing) compared with the original date of late 2016 and an increased APE of HK$70 billion. Some contractors working on the project have also faced pressure with accusations relating to the validity of control measures and the potential public safety hazards that may subsequently ensue.[31] Sadly, the project has also borne witness to a series of industrial accidents and worker fatalities.[32]

This series of events has raised concerns amongst Industry stakeholders as to the effectiveness of the project's planning, budgeting and overall delivery whilst simultaneously leading to questions about the Industry's professionalism, capability, safety and future prospects.



26. Sourced from Government's funding application papers submitted to Public Works Subcommittee and Finance Committee of LegCo.
27. Sourced from Government's funding application papers submitted to Public Works Subcommittee and Finance Committee of LegCo.
28. MTR Corporation (2017), Press Release: Latest Estimate of Cost to Complete for SCL Project (PR109/17).
29. Legislative Council (2017), Background brief on Central-Wan Chai Bypass Tunnel, Lung Shan Tunnel and Cheung Shan Tunnel (LC Paper No. CB(4)1409/16-17(02)).
30. The Greater Bay Area (GBA) represents a national development strategy to economically and socially integrate nine cities in Guangdong Province, as well as Hong Kong and Macau to create a world-class city cluster rivalling the world's leading bay areas.
31. Legislative Council (2017), Information note on concrete test reports associated with the works under the HZMB and related projects.
32. Transport and Housing Bureau (2018), Press Release: Industrial accidents of HZMB Main Bridge.

Case study on mega-projects – (2/2)

The SCL project is a major rail construction project that involves the development of a new metro line from Hong Kong Island to the New Territories, crossing underneath Victoria Harbour. In terms of construction delivery, the project involves a majority Government-owned corporation performing the role of project manager on behalf of Government under an entrustment agreement, with the actual delivery of the works then contracted to a series of specialist and general contractor groups.[33]

During the delivery of this project, reports have surfaced regarding the quality of certain elements of the construction works, compliance with selected regulatory requirements and transparency relating to project reporting, recording and addressing technical complexities. A Commission of Inquiry was established by the Chief Executive in Council on 10 July 2018[34] to inquire into steel reinforcement fixing works and any other works regarding public safety in respect of the diaphragm wall and platform slab construction works at the Hung Hom Station Extension.

There has also been wide media coverage regarding settlement monitoring data exceeding certain levels, which led to orders for a halting of relevant excavation works at the Exhibition Centre Station.[35] The project has also experienced a cost overrun of HK$847.7 million[36] due to unfavourable ground conditions, price adjustments and modification of the construction schemes. Archaeological discoveries and other factors encountered during the construction have also led to commissioning delays.[37]

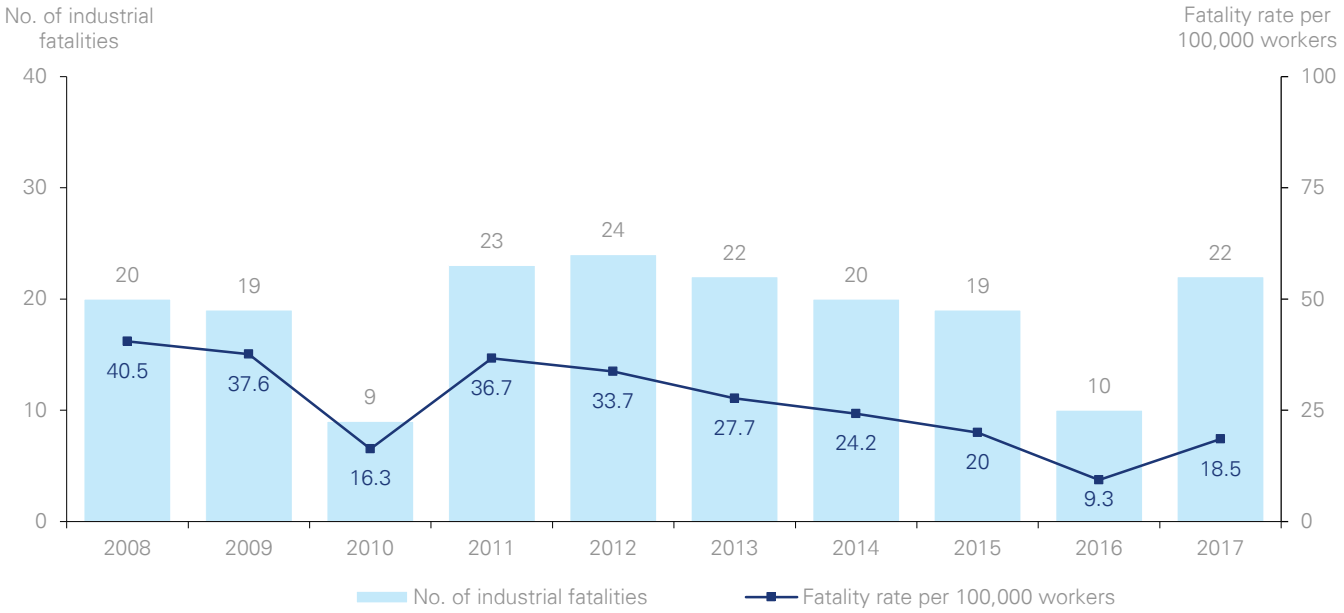
Amidst these events, the project has also seen the resignation of a number of senior individuals within the organisation managing this project, including the Projects Director.

33. Legislative Council (2018), Legislative Council Panel on Transport Subcommittee on Matters Relating to Railways Progress Update of the Construction of the Shatin to Central Link (LC Paper No. CB(4)1151/17-18(05)).
34. Government of HKSAR (2018), Commission of Inquiry into the Diaphragm Wall and Platform Slab Construction Works at the Hung Hom Station Extension under the Shatin to Central Link Project appointed.
35. Highway Department (2018), Press Release dated 10 Aug 2018, Settlement monitoring points at Exhibition Centre Station of Shatin to Central Link works project.
36. Legislative Council (2017), Item for Public Works Subcommittee of Finance Committee (Paper No.PWSC(2016-17)43).
37. Highways Department (2018), Background of the Shatin to Central Link.

Challenge 4: Unsatisfactory site safety performance

Safety performance represents arguably the most important measure of the overall effectiveness, professionalism and quality performance of the Industry. Over the past decade, although fatality and accident frequency rates per worker in Hong Kong have declined, the absolute number of reported cases has continued to rise, as illustrated in Figure 4. In particular, the number of reported deaths that occurred in the Industry in 2017 was 22, representing a large increase when compared with recent years.[38] With the ultimate goal being zero fatalities within the Industry, it is clear that there is scope for improvement.

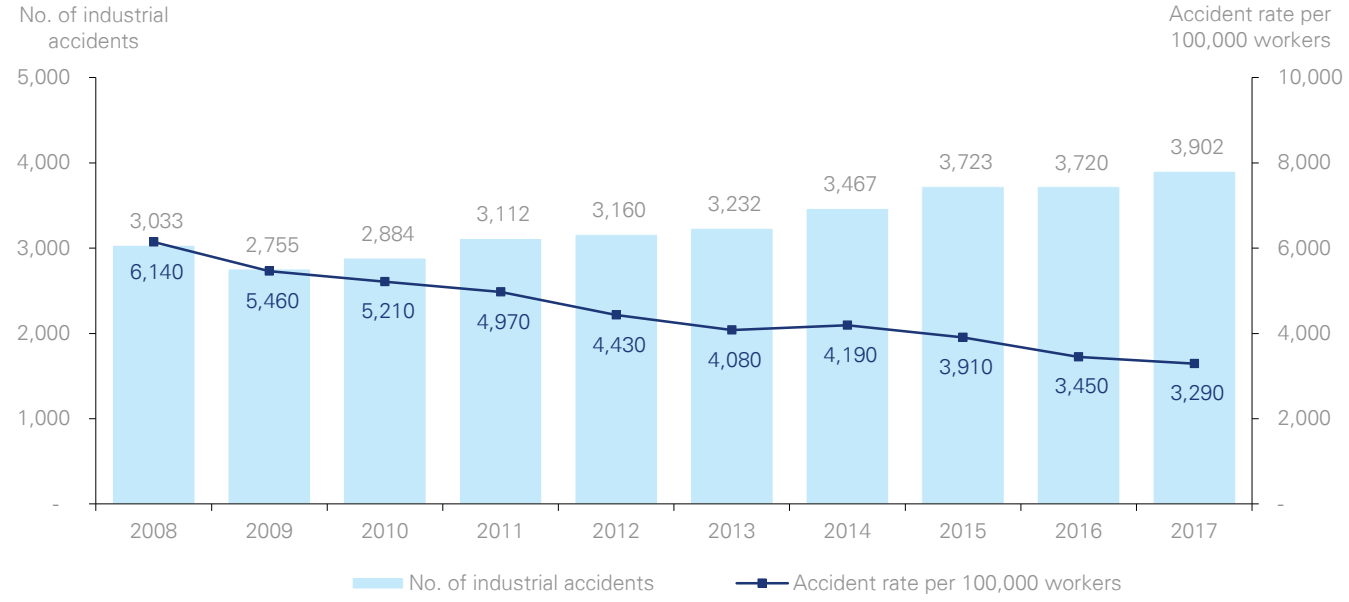
Figure 4 – Industrial fatality statistics in the Industry



Source: Labour Department

As illustrated in Figure 5, the accident rate in the Industry has witnessed gradual improvement in recent years, reaching a figure of 3,290 accidents per 100,000 workers compared with 6,140 in 2008. Despite this positive trend on a per worker basis, total industrial accidents continue to rise in absolute figures on a year on year basis – another trend in need of rectification.

Figure 5 – Industrial accident statistics in the Industry

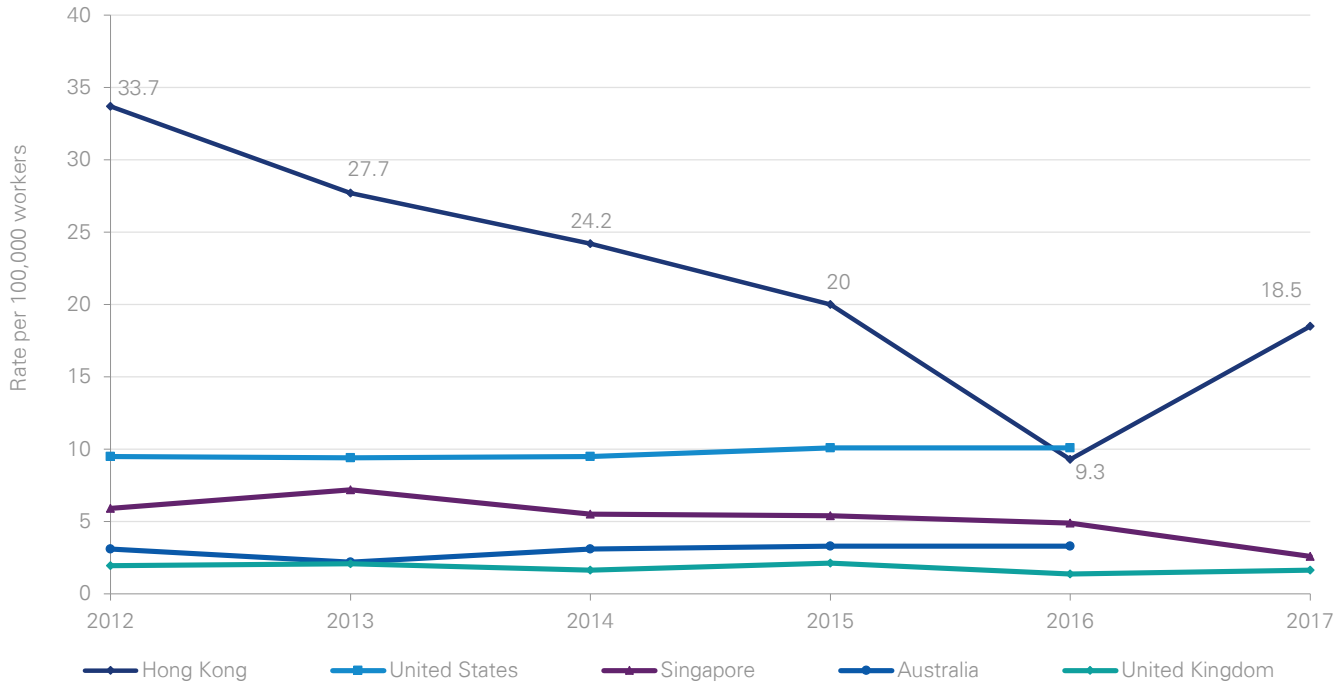


Source: Labour Department

38. Labour Department (2018), Summary of Occupational Safety and Health Statistics of 2017.

When the Industry's safety performance is contrasted with selected developed market peers, Hong Kong's relative underperformance becomes more pronounced. For example, in 2016, average construction fatalities per 100,000 workers in the UK (1.37) were approximately 14% of the level experienced in Hong Kong (9.3), whilst Singapore recorded a level (4.9) broadly equivalent to 50% of Hong Kong, as illustrated in Figure 6. In 2017, Hong Kong's performance deteriorated further with a doubling of the fatality rate – further highlighting the need for improvement.

Figure 6 – Fatality rate of the global construction industry



Source: Labour Department (Hong Kong); Bureau of Labour Statistics, (US); Ministry of Manpower (Singapore); Safe Work Australia, (Australia); Department of Work and Pensions (UK), KPMG Analysis

As already mentioned, these figures emphasise that safety performance in the Industry has significant scope for improvement. Indeed, reducing or eliminating site incidents and fatalities to the full extent possible remains an imperative to ensure the Industry is as safe as possible for current and future generations of construction employees.

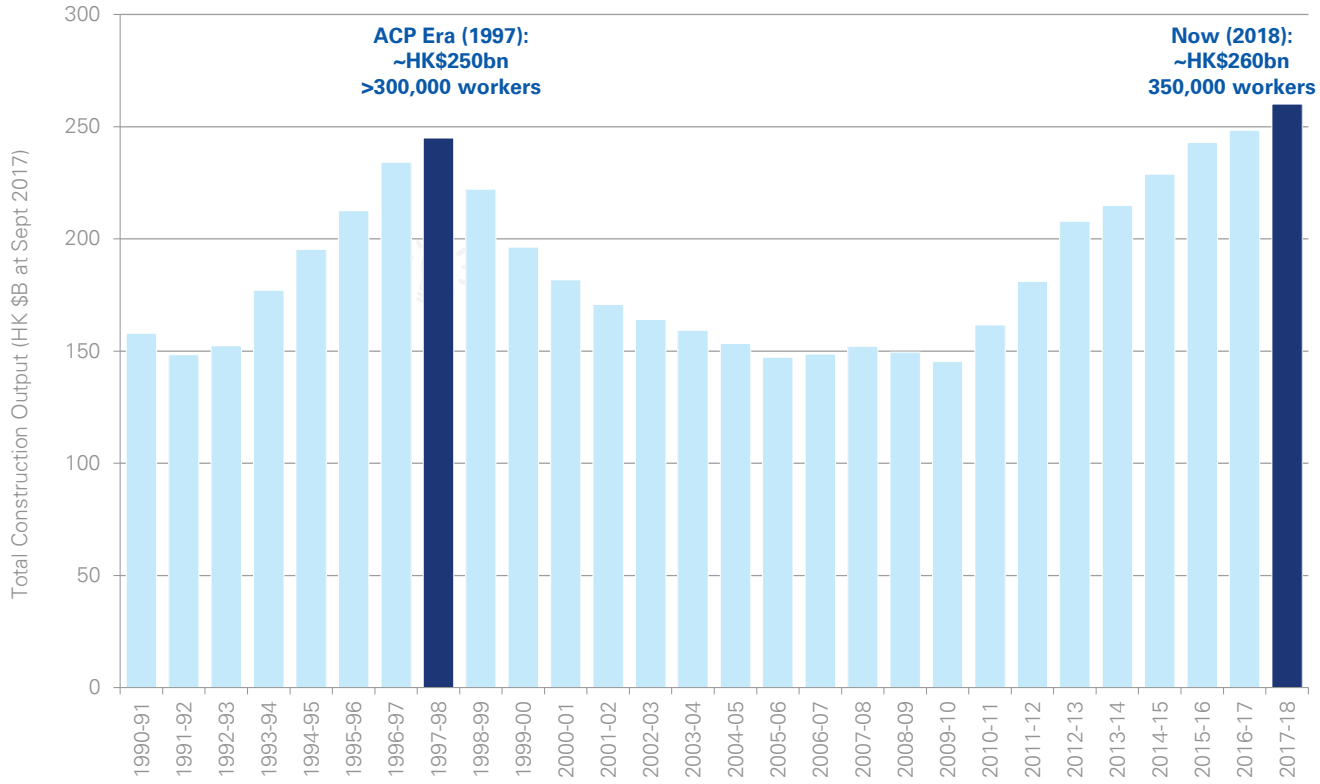
Challenge 5: Declining productivity

In coming years, the Industry is expected to experience increasing levels of workload pressure. This is manifested in the form of a projected shortfall in skilled construction workers of between 5,000 to 10,000 people between 2018 and 2022.[39] These workforce shortages have the potential to materially contribute to the continued increases in construction costs as well as potentially raising the risk profile of Hong Kong construction projects through uncertainty around project scheduling.

In analysing productivity, it is worthwhile understanding the major flows of construction activity in Hong Kong in recent years. Upon the completion of the Hong Kong International Airport via the ACP in 1998, the Industry's construction output had been on a steady decline until it reached, and stayed at a level of around HK$150 billion per annum in the mid and late 2000s. The next major wave of activity was driven by Hong Kong's TMIP from 2007-08 onwards.

Looking to more recent times, encouragingly, since 2015-16, construction activities have matched or exceeded levels recorded in 1997. However, on deeper analysis it is apparent that the Industry is employing a significantly higher numbers of workers to achieve similar levels of output, as illustrated in Figure 7. This begs the question, after two decades of advancement in technology and construction capability, has the Industry's productivity actually deteriorated?

Figure 7 – Hong Kong Construction Industry total construction output



Source: Construction Industry Council

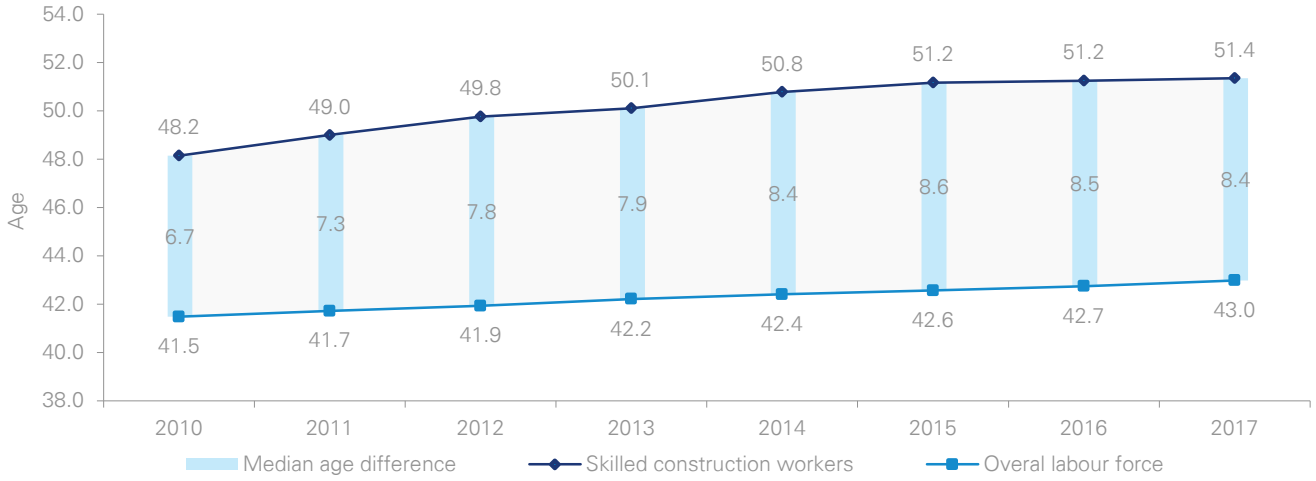
The issue of productivity is further exacerbated by the lack of a clear and transparent method of measurement – at this point there appears to be no regular, objective and agreed measure of productivity and all that can be relied upon is a broader measure of labour productivity across industries – the Hong Kong *Labour Productivity Index*. However, this index excludes construction activities in its calculation, further highlighting the lack of reliable data available.[40] This means it is difficult to assess industry performance from year to year and project to project, leading to missed opportunities when it comes to generating competition in the market which will lead to greater performance improvement.

39. Construction Industry Council (2017), Skilled Construction Workers Forecast (2018-2022).
40. Census and Statistics Department (2018), Labour Productivity Index.

In contrast, Singapore has an established system for measuring labour productivity, which is conducted on an annual basis and has shown reported performance improvements in recent times, with 2017 recording the fastest level of productivity growth over the past seven years.[41]

The average age of the Industry workforce is also believed to be a significant factor driving past, current and future productivity levels. Between 2010 and 2017, the median age of the skilled construction workforce rose from 48.2 years to 51.4 years as illustrated in Figure 8.[42] In addition, the median age of skilled construction workers is dramatically higher than the overall workforce in Hong Kong.

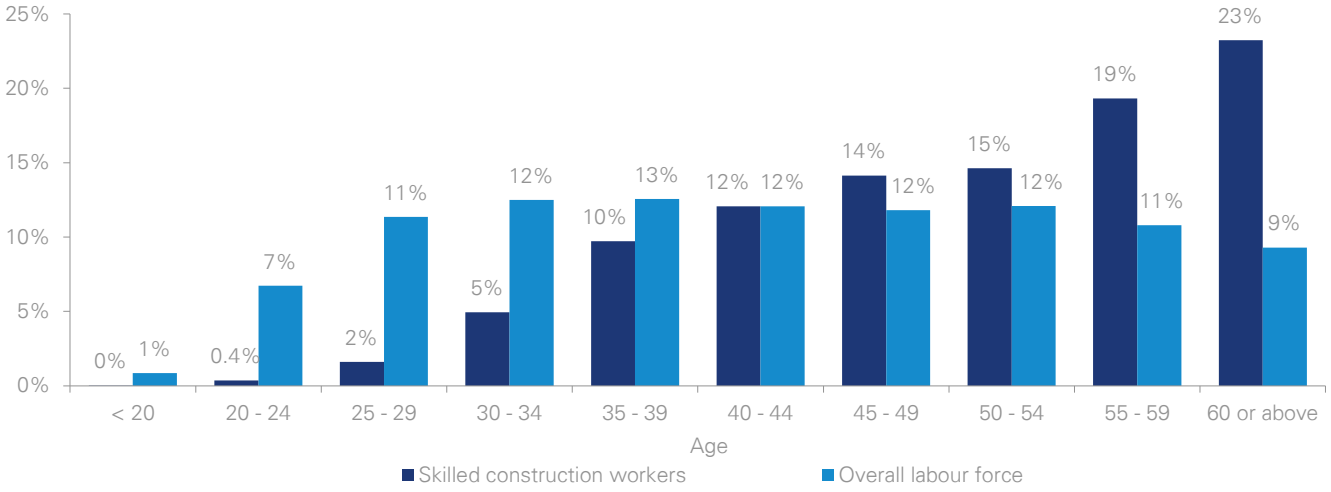
Figure 8 – Median age of skilled construction worker vs. overall labour force



Source: Construction Industry Council, Census and Statistics Department, KPMG Analysis

In terms of age distribution, 23% of total skilled workers in the Industry are above the age of 60, compared with only 9% for the overall workforce in Hong Kong, as illustrated in Figure 9.[43]

Figure 9 – Age distribution of skilled construction workers vs overall labour force in 2017



Source: Construction Industry Council, Census and Statistics Department, KPMG Analysis

When these figures are considered collectively, it can be concluded that the Industry is under pressure when it comes to recruiting and retaining younger workers – potentially limiting the pipeline of new ideas, approaches and fresh ways of doing business.

41. Ministry of Trade and Industry Singapore (2017), Economic Survey of Singapore 2017.
42. Census and Statistics Department (2017), Quarterly review on general household survey (October to December 2017), Construction Industry Council data (2017).
43. Census and Statistics Department (2017), Quarterly review on general household survey (October to December 2017), Construction Industry Council data (2017).

Challenge 6: A lack of creativity & innovation

The WEF's Global Competitiveness Report 2017-2018 highlighted 'insufficient capacity to innovate' as the most problematic factor in conducting business in Hong Kong. It is arguable that the Industry's performance is also reflective of this broader theme across a number of dimensions.

Approval process and construction regulation	A common theme discussed in the Industry relates to the scope for reduction in the number of technical circulars impacting public projects, as well as the volume of regulation and processes related to construction approvals from statutory bodies. This is backed by a general sentiment within the Industry that whilst these processes are designed to reduce the risk of engineering and construction failure, there is a high level of regulatory overlap and duplication, adding extra costs associated with compliance and risk management.
Tender specification and procurement	Traditional approaches towards the tendering of public projects have involved high levels of design and construction specification with a view to reducing the risks associated with delays, uncertainty and contract variations. However, in many cases this approach leads to reduced design and delivery freedom for the private sector, inhibiting innovation and the adoption of new approaches. Also, the traditional approach in Hong Kong often involves referring to precedent approaches of comparable (and in some cases incomparable) projects in determining procurement and contracting methodologies rather than adopting bespoke, purpose built contract structures based on market appetite and project suitability.
New design and construction methods	Unlike many other developed market jurisdictions, adoption levels of new approaches to design and construction such as Building Information Modelling (BIM) and Modular Integrated Construction (MiC) continue to be limited. Singapore, for example, has established a pipeline of MiC projects,[44] with six projects completed and 25 still in-progress as at April 2018.[45] The UK, on the other hand, aims to deliver one million homes through MiC methods by the end of 2020.[46]
Incentives for the private sector to invest in new technology	In KPMG's 2017 Global Construction Survey, 55% of all respondents indicated the global industry is ripe for disruption, however, approximately 52% of respondents have not yet developed a technology strategy. This indicates that at a global level, the industry recognises that change is coming, but many have not yet done anything to plan for it. Looking closer to home, it is also arguable that the local Industry is in need of change. For this to occur, an important element relates to private sector investment in new and innovative technologies, systems and ways of doing business. To drive this, private sector groups need to be encouraged, incentivised or possibly even mandated to invest in these areas.

Where to from here?

Adapting and integrating new technologies as well as the pursuit of innovation are expected to have a positive impact on the Industry's productivity levels – reducing pressure on future costs and the risk of project failures. If the Industry is able to find ways to embrace innovation as a key pillar of the future, the sustainability of the Industry's position and its contribution to the Hong Kong economy and general community can continue to be meaningful.

44. Prefabricated prefinished volumetric construction (PPVC) is Singapore's most promising example of utilising DfMA technology. It involves the integration, automation and assembly of components in a manner that is similar to MiC technology.
45. Building and Construction Authority, Singapore, "Singapore's Construction Productivity Journey."
46. Constructing Excellence, Modular Construction in UK Housing.

Other challenges

In addition to the above core challenges, there are many other challenges currently facing the Industry. It is worth highlighting a sample of these to reinforce the message that change is needed to upgrade and take the Industry into the future.

Segregation of project phasing

In modern times, high levels of cohesion and integrated working methods between major phases of work including design, construction and operation of major projects are considered critical success factors in driving maximum positive project outcomes. Enhanced communication, higher levels of end-user based project planning and more integrated methods of procurement are some of the elements considered necessary to improve Industry performance.

Risk allocation and partnering with the private sector

Risk allocation refers to the allocation of risks between the public and private sectors in respect of project planning and delivery. This includes risks related to design, construction, operations, legal/regulatory matters, political events, financial events and various others.

In Hong Kong there is no clear-cut or standardised approach towards the allocation of the full range of project risks. To position Hong Kong as a market that is sophisticated, commercial and appealing to all parties – both local and international – the Industry need to shift towards an approach that standardises the allocation of the typical set of project risks to the maximum extent whilst taking a bespoke approach to project specific risks. In adopting this approach greater adherence to the principle of allocating risk to the party that is best capable of managing a particular risk should also be considered. This is the general approach adopted in leading international infrastructure markets, such as Australia[47] and the UK[48] as it's believed to deliver maximum value for money for the public sector whilst generating a greater sense of partnership between the public and private sectors.

Project funding approvals

In recent years, the funding approval of capital works projects has been a publicly sensitive issue and subject to considerable political debate. This has led to inconsistent funding approval volumes from year to year. Although a greater number of funding approvals have occurred in the most recent legislative year, inconsistent approvals have the potential to create unpredictable workload peaks and troughs.

Indeed, private sector groups depend on consistency of workflow to support continued investment in people, technology and resources. If the Industry continues to be exposed to inconsistent work approvals and project opportunities, it is expected that private sector investment and commitment to the Industry could be jeopardised.

47. National PPP Guidelines of the Australian Government.
48. Public Private Partnership Guidance of the United Kingdom.

Fragmentation of the Industry

According to a C&SD report titled *Key Statistics on Business Performance and Operating Characteristics of the Building, Construction and Real Estate Sectors in 2016*, of the 24,197 establishments[49] in the Industry, over 75% recorded a gross value of construction work activity that was less than HK$5 million.[50] Only 321 of these establishments are classified as main contractors, and close to half of the total gross value of construction works performed in the Industry was attributed to these main contractors alone. These figures indicate the existence of a high degree of market control within a few organisations.

Another feature of the Industry that is noticeable from the above figures is the high level of fragmentation that exists outside of the leading main contractor groups. This is believed to be at least partially a result of the significant level of subcontracting that occurs on Hong Kong construction projects, particularly private building contracts. Whilst high levels of subcontracting can be beneficial from the point of view of securing specialist skills for complex tasks, this practice also has the potential to encourage the participation of intermediary organisations seeking to generate commissions without delivering any physical work or services. One unintended consequence of this practice is increased revenue and margin pressure on the overall construction value chain, potentially leading to rushed works, lower quality construction outcomes and increased safety risks.

Public image

This section has highlighted a series of challenges being experienced by the Industry. Whilst the overall impact of these challenges is difficult to measure, it would be reasonable to assume that many of these have adversely impacted the public image of the Industry in recent times – particularly those that have received significant media attention such as major project incidents related to safety, time, cost and quality.

This is important to highlight because public image is a major influencer on the level of future support the Industry receives across a wide range of dimensions such as: the willingness of young talent to join the Industry workforce; the appetite of the private sector to invest in people, technology and other resources; and the level of confidence and support the Industry receives from important stakeholders including the general public, providers of capital and the media to name a few.

Unless the Industry acts now to address these challenges, the future prospects of groups in the Industry ecosystem and the Industry's contribution to Hong Kong will likely be compromised.

49. An establishment is ideally an economic unit which engages, under a single ownership or control, in one or predominantly one kind of economic activity at a single physical location. In the context of construction, the requirement of a single physical location is relaxed for practical purposes. Sourced from Census and Statistics Department.
50. Census and Statistics Department (2016), Key Statistics on Business Performance and Operating Characteristics of the Building, Construction and Real Estate Sectors in 2016.

Construction 2.0

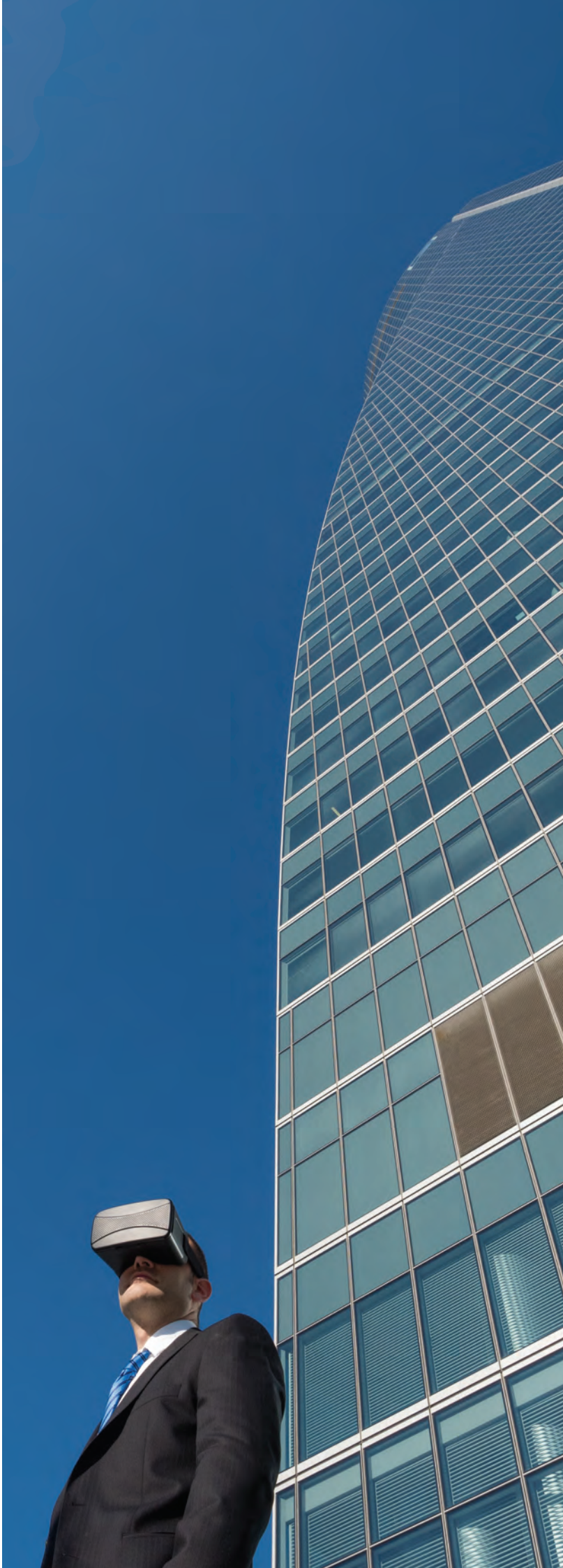
Three key pillars

The Industry is currently experiencing challenges that need to be carefully addressed through positive and forward thinking. To achieve a step change in Industry performance; Government, Industry professionals and organisations need to redefine how aspects of the Industry, such as governance, the workforce and technology, interact and supplement one another.

In response to these challenges, DEVB has developed Construction 2.0, which rests on three key pillars: Innovation, Professionalisation and Revitalisation.

Pillar 1: Innovation

The vision: The development of an Industry culture that embraces change, innovation and new technologies to drive forward productivity, efficiency and enhanced project delivery outcomes.



What is Innovation in the built asset environment?

At its simplest level, innovation can be thought of as new ideas, tools or ways of carrying out an action. It may also be thought of as the application of enhanced solutions to meet new or existing challenges. In applying these definitions to the Industry ecosystem, innovation could be defined as the discovery and application of new approaches and tools that support the planning, design, construction, funding and operation of built assets to achieve enhanced outcomes over the norm.

Why innovate?

The global economy is presently experiencing pervasive and lasting disruption from technological advancement and innovation. Social media, autonomous vehicles, advanced manufacturing, drone technology, public and private transport electrification, big data and artificial intelligence are just some of the advancements that are changing the world and the global construction industry.

By removing existing barriers to innovation and technological adoption and shifting the culture to one that embraces change, the Industry will discover new ways of delivering built assets that will ultimately be to the benefit of industry professionals, businesses and the Hong Kong general public:

Time – Delivering projects more efficiently and reducing the risks of delay, will allow resources to be more efficiently allocated and utilised.

Cost – Leading to more efficient use of labour, plant and materials involved in the construction of assets is expected to result in reduced cost, enhanced financial returns to businesses and more efficient use of tax payer funds.

Quality & longevity – Assisting in delivering higher quality, more visually appealing and challenging designs and/or longer lasting built assets.

Safety & People – Leading to reduced safety incidents and fatalities as well as reductions in site activities with high labour intensity.

Functionality – Assisting in delivering longer lasting and more functional built assets.

Current actions underway

A series of actions are being implemented that aim to change the innovation landscape for the Industry.

Establishment of the Construction Innovation and Technology Application Centre in 2017

The vision for CITAC is to exhibit and introduce world leading construction technology solutions to the Industry. Being the central driver of innovation and transformation in the Industry, CITAC aims to be at the heart of promoting off-site construction, the Internet of Things (IoT), robotic applications and wider adoption of the New Engineering Contract (NEC) to improve the effectiveness of project management, enhance cost-effectiveness and productivity as well as safeguard occupational health and safety.

Building Information Modelling (BIM)

There are diverging views around the world as to the definition of BIM. In a recent UK Survey[51] almost 75% of respondents believed more clarity was needed on its definition. To address this, the Royal Institute of British Architects (RIBA), buildingSMART and the Construction Project Information Committee (CPIC) came together to produce an agreed definition for the UK:

> *"A digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition."*

In Hong Kong, it was mandated by Government in 2017 that BIM must be used on all capital works projects with a budget of HK$30 million or more.[52] This is a positive step for the Industry because if used properly, BIM has the potential to play a significant role in enhancing the quality of information and decision making capability in construction time-and-cost monitoring, operation and maintenance planning and long-term asset management.

51. The NBS (2013), NBS International BIM Report 2013.
52. Development Bureau (2017), Technical Circular No. 7/2017.

Off-site construction

Off-site construction using Design for Manufacture and Assembly (DfMA) and MiC is having an increasing impact on the global construction industry. In certain overseas projects these technologies have been proven to reduce costs and uplift productivity and performance in safety, quality and sustainability.

By way of example, a UK analysis in 2015 showed that nearly 50% of on-site construction projects that did not use MiC or DfMA failed to reliably predict their completion dates. Importantly, evidence from Buildoffsite, an industry-wide campaigning organisation that promotes greater uptake of off-site techniques in UK construction, suggests that schedule savings of up to 60% are possible through off-site manufacture when compared to conventional construction methodologies.[53]

Whilst off-site construction may not be suitable for every project, in Hong Kong major benefits are anticipated in construction activities related to residential housing and accommodation, hospitals and healthcare facilities and other built-assets involving multi-level repetitive design form. At a more specific level and as detailed in DEVB Technical Circular (Works) No. 1/2016, off-site pre-fabricated rebar products may be used in a capital works contract if the contractor opts to engage a yard on the Civil Engineering and Development Department's (CEDD) List of Approved Steel Reinforcing Bar Prefabrication Yards for Public Works to supply pre-fabricated rebar products for the works under the contract. This represents another big step forward in Hong Kong's adoption of off-site construction methodologies.

To capture the full benefits from off-site construction technologies and to promote the adoption of MiC, Government has announced in the 2017 Policy Agenda[54] that certain public projects, such as the University of Hong Kong's student residence at Wong Chuk Hang, will pilot the use of this technology.

MiC vs. pre-fabrication

There is often much confusion over the difference between MiC and pre-fabrication construction methods, yet in reality they have certain similarities. Pre-fabrication generally refers to off-site factory pre-construction of components of works, whilst MiC refers to the complete off-site factory pre-construction of volumetric modules of buildings with all finishes, building services and even furniture.

53. Buildoffsite (2013), Off-site Construction: Sustainability Characteristics.
54. 2017 Policy Address – Policy Agenda.

Design for buildability

Due to the complex nature of construction, the deliverability of design can be a significant contributor to the success and overall quality outcomes of a project. In theory the potential effectiveness of project delivery, otherwise known as 'buildability', can be heavily influenced by the amount of information designers collect from experienced contractors in ensuring their design is achievable and realistic, capable of straightforward assembly, amenable to standardised and sequential construction whilst also ensuring maximum functionality when operational.[55]

In Hong Kong, Government is promoting the adoption of the guiding principle of "design for buildability" which is focused on reducing costs without undermining quality and safety. DEVB has mandated[56] the implementation of Buildability Evaluation System (BES) for vetting and monitoring design of public building projects.

Other approaches to enhance buildability include Early Contractor Involvement (ECI), whereby contractors are engaged early in the project lifecycle to advise design groups and project owners as to the buildability of their designs to assist in lowering cost whilst still ensuring visual appeal and effective function is maintained.

Smart infrastructure

Smart infrastructure is defined as new age infrastructure that combines traditional bricks and mortar hard assets with digital technologies. The objective of smart infrastructure is to provide higher quality infrastructure information systems that enable better decision making, quicker project delivery, an enhanced user experience and lower costs.

According to the Cambridge Centre for Smart Infrastructure and Construction, smart infrastructure represents a global opportunity worth GBP 2 trillion to 4.8 trillion.[57] Given the increasing prevalence of this topic in the global construction and business communities, it should also be considered as part of the future development of Hong Kong, both within the public and private sectors.

Whilst the benefits of smart infrastructure are well understood, what is less clear is how, and to what extent, this concept should be adopted and integrated into master-planning and design development for projects in Hong Kong?

55. Simonsson, Peter (2011), Buildability of Concrete Structures: Processes, Methods and Material.
56. DEVB Technical Circular (Works) No. 6/2018.
57. Cambridge Centre for Smart Infrastructure and Construction (2018), Smart Infrastructure Paper.

Pillar 2: Professionalisation

The vision: Improved professionalism of the Industry through step change increases in project leadership, project management, procurement capabilities and professional skills and practices within Government and the private sector, to deliver higher quality construction and built assets, combined with a first priority focus on safety, construction supervision and quality in the workplace.

Defining professionalisation of the Industry

Professionalisation of the Industry refers to enhancements in performance across a wide range of activities to achieve improvements in the quality of built assets, reduced frequencies and severity of project incidents and failures, as well as lower levels of cost and time overruns on projects.

The benefits of professionalisation

With the reputation of the Industry arguably at a historical low point, there has never been a more important time to raise the game. However, it's not all doom and gloom – if professionalism levels can be lifted through specific and targeted measures, the potential to realise industry-wide benefits is significant. Below are specific areas of focus:

Risk management – Through enhanced project management and leadership the Industry will be better equipped to identify, manage and allocate risks effectively – with a view towards reducing the number of project incidents and creating enhanced working relationships amongst Industry stakeholders

Professionalism – Professionalisation should include the adoption of professional judgment and output-based project decision making, structured around common sense and commercial principles rather than a primary focus on regulations and technical circulars. This approach is expected to lead to greater potential returns to all participants and stakeholders

Reputation – A professional industry is one that attracts strong support from a wide range of stakeholders including the media, shareholders, public bodies and, of course, the general public. This support is necessary to underpin the future health, growth and sustainability of the Industry

Safety – By placing safety at the core of the Industry, workers, their families and the next generation of talent will have greater confidence in the care and welfare levels within the working environment – leading to reduced incidents and fatalities along with knock-on benefits in respect of higher performance, motivation, employee pride and retention

Project performance – Increased professionalism levels have the potential to drive material gains in project performance in the form of cost savings, time delay reductions, enhanced site supervision and quality of project delivery outcomes

Actions to professionalise

Given the imperative to professionalise the Industry, Government has devised and/or is currently carrying out a series of targeted measures.

Enhancing Government project management capabilities

In its 2016 Policy Address, Government flagged the need to strengthen cost control for capital works projects and subsequently established a dedicated office in DEVB, named the PCMO. The PCMO was established to review existing works requirements and policies, scrutinise project estimates and enhance capital works project management to achieve improved cost management and drive cultural change within the Industry.[58] Since its establishment in 2016, PCMO has achieved cost savings of HK$27 billion, or about 10% of the total original estimated project costs of HK$260 billion, through rigorous scrutiny of the cost estimates of approximately 130 capital works projects.

In addition, PCMO is presently embarking on a 3-tier structured project management training programme to equip relevant civil servants with contemporary project management skills to tackle the evolving challenges of capital works projects, as well as motivating them to adopt more cost-effective solutions. The three tiers are as follows:

Tier 1 – Training designed for senior project leaders, named the "Major Project Leaders Colloquium", was completed in November 2016. The colloquium was conducted by world renowned experts and attended by approximately 100 senior directorates.

Tier 2 – A "Project Leaders Workshop" for approximately 150 directorate grade professionals was conducted in November 2017 and led by world renowned experts.

Tier 3 – A "Project Capability Building" programme tailored for approximately 3,000 graduate professionals up to chief professionals is being undertaken to enhance the performance and delivery capability of capital works projects. The programme commenced in March 2018 and will be completed by the end of 2018.

Uplifting project governance and leadership

In 2012, the UK Government established a Major Projects Leadership Academy (MPLA) to enhance leadership levels amongst civil servants tasked with leading major projects. The objective behind this academy was to create a workforce of CEO-like leaders that could plan and deliver major projects in a commercially focused and strategic manner.

Since its establishment, the performance of major construction projects has improved dramatically – approximately 85% of Government funded major projects have been delivered on time and on budget since the establishment of MPLA, against a success rate of 30% in 2012.[59]

58. Legislative Council (2017), Background brief on the Project Cost Management Office.
59. Global Focus Magazine (2014). Major Projects Leadership Academy.

In recognition of the success of this academy, Government has recently commenced a study to explore the merits of and options available to develop a similar initiative for Hong Kong civil service major projects leaders. This could also include leadership development and training for Government officials and if considered appropriate, be extended to those that work in a senior projects capacity for other public authorities or corporations as well as possibly being made available to Government consultants and other interest groups from the private sector that are highly connected with the planning and delivery of major projects in Hong Kong.

Should this initiative proceed, it is anticipated it could have a significant positive impact on the project management and leadership landscape for infrastructure and construction in Hong Kong.

Enhancing professional skills of workforce

Established in 2018, the Hong Kong Institute of Construction (HKIC) was developed by the CIC with the objective of revamping current courses and placing greater emphasis on site-based learning. Through the provision of diploma and higher-diploma courses under the Qualification Framework,[60] course graduates are able to meet industrial needs and receive extensive training and job opportunities. The new Tai Po multi-storey campus has also allowed advanced technological programmes such as BIM and drone technology to be possible, enhancing the productivity and status of the Industry.[61]

Aside from full-time diploma courses, HKIC also provides multiple part-time skill enhancement courses with specific topics such as machinery operation, waterworks and safety training. Upon graduating from these courses, graduates can be recognised as a registered sub-contractor or even a Technically Competent Persons (T1 TCP)[62] individual by the Buildings Department.[63] HKIC also provides training allowances up to HK$3,600 per month for students and provides assistance to them in applying for subsidies for future career progression courses.

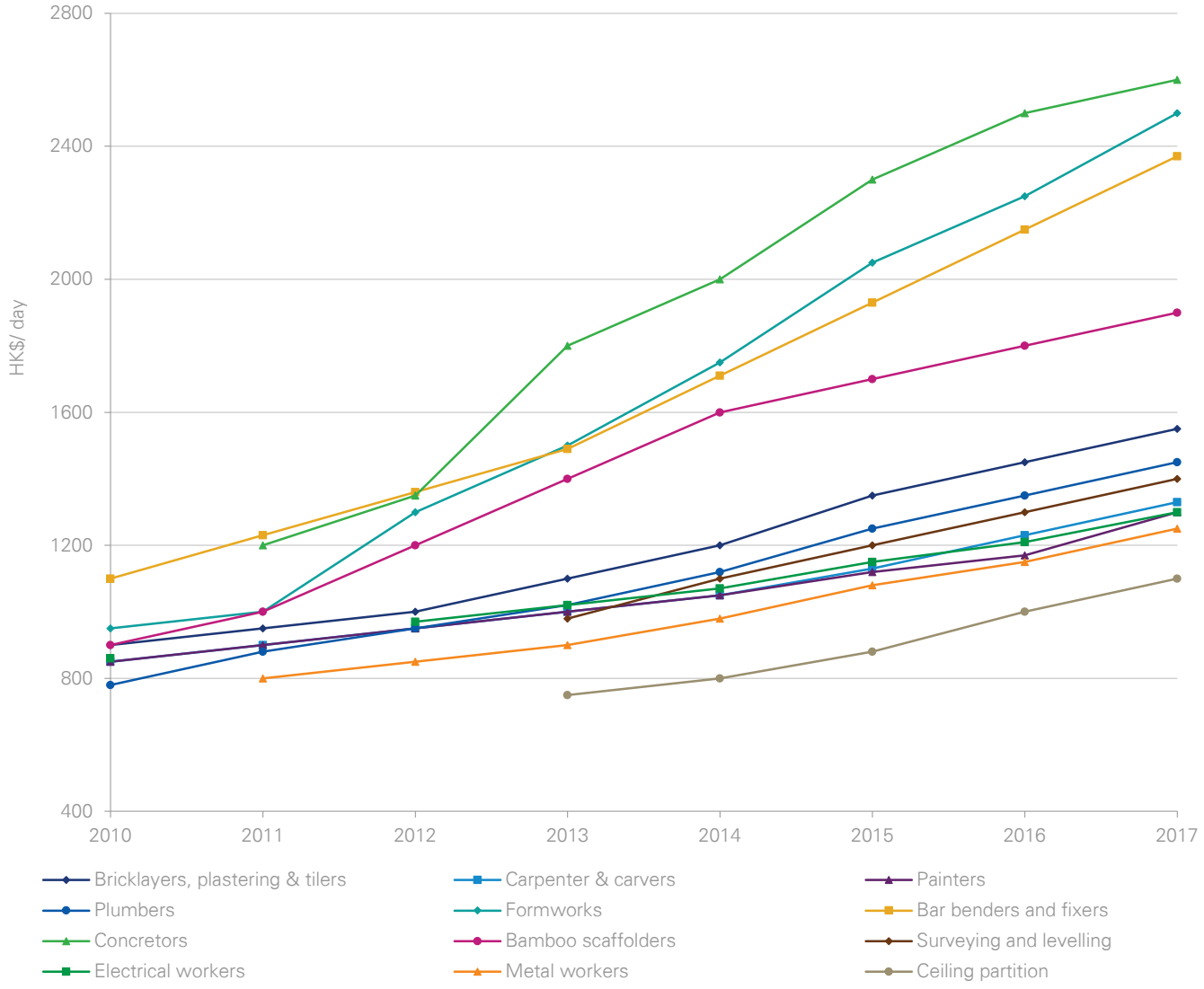
Workers' monthly wages

In Hong Kong, it is typical for the delivery of on-site construction related services to be structured through fixed fee arrangements. These arrangements commonly occur throughout the sub-contractor and construction supply chain. Whilst these practices provide price certainty to contract counterparties, they also encourage employers to pay workers on a fixed fee per job basis. In turn, fixed fee base worker arrangements encourage workers to perform their services on an expedient basis so they can quickly move to the next fee paying assignment. Unfortunately, these behaviours have the potential to negatively impact construction quality levels – from both finished product and procedural perspectives. An avenue that may assist in reducing the prevalence of these practices is a move towards monthly worker wages structures. It is believed that this approach could lead to a greater focus on quality and service delivery pride amongst the workforce.

60. The Qualification Framework in Hong Kong is a seven-level hierarchy covering qualifications in the academic, vocational and professional sectors to promote and support lifelong learning with a view to continuously enhance quality, professionalism and competitiveness of Hong Kong's workforce in an increasingly globalised and knowledge-based economy. Qualifications recognised under the Framework are quality assured and level-rated in accordance with objective and well-defined standards. Sourced from Hong Kong Qualifications Framework, https://www.hkqf.gov.hk/en/overview/index.html.
61. Hong Kong Institute of Construction (2018), Directors' Message.
62. Technically Competent Persons means an individual whose academic or professional qualifications or experience of building works or street works satisfy the requirements set out in the Technical Memorandum and the code of Practice for a particular type of site supervision or management tasks. There are five grades as defined in the Technical Memorandum. Sourced from Buildings Department (2009), Technical Memorandum for Supervision Plans.
63. Hong Kong Institute of Construction (2018), Career Progression.

In addition to the structure of workers' wages, it is also worthwhile understanding the underlying wage levels of the workforce. According to the Hong Kong Construction Industry Employees' General Union, the daily wages of concretors more than doubled from HK$1,200 in 2012 to HK$2,600 in 2017. Consistent with this, the daily wages of over half of all construction trades have experienced a more than 50% increase from 2012 to 2017. The three highest paid construction trades are concretors (HK$2,600), formworkers (HK$2,500) and bar benders and fixers (HK$2,370)[64] as illustrated in Figure 10.

Figure 10 – Daily payroll of construction works by trade



Source: Hong Kong Construction Industry Employee's General Union

Due to the diversity of size and the frequency of works packages, it is not uncommon for construction workers to be idle between projects, whilst being in very high demand during other periods when multiple capital works projects and large private sector developments are occurring simultaneously.

To address the reality of variable workload, it is important that workers are compensated adequately when they are idle and not generating income. At a broad level, greater consideration needs to be given to addressing this workload income dynamic to ensure the Industry is considered a stable and attractive work environment for current and future generations of workforce talent.

64. Hong Kong Construction Industry Employees General Union (2017), 2017 Construction Industry Salary Press Conference.

Improving site safety

Site safety is an element that needs to be at the core of any future strategy or action plan for the improvement and upgrading of the Industry. In this respect, Government is carrying out a series of important initiatives to improve safety in the workforce, some of which include:

Study on Workers Behaviour – a study being undertaken to identify the types of behaviour that causes accidents to occur, to study potential factors affecting workers' behaviour, and most importantly, identify ways to prevent workers from taking risks that would more likely lead to accidents.

Safety Training – to provide real-life and Virtual Reality (VR) safety training in locations such as the CIC Kwai Chung Training Centre. Only individuals that have been trained in basic safety and hold valid certificates are allowed to be employed for constructional work.

Design for Safety – in 2016, a Design for Safety Initiative was implemented by DEVB to raise awareness of the potential hazards and risks to each project in the design stage, and to better enable subsequent planning and asset operation to incorporate safety measures in preventing hazards from materialising.[65] As part of this, Government has published guidance materials aimed at:

- Providing greater clarity on the demarcation of roles and responsibilities;
- Identifying risks and key impacts during the process of construction. maintenance and asset operations;
- Proposing methods to avoid, reduce and control risks; and
- Proposing health and safety plans to enhance asset operation, maintenance and management.

Whilst it is recognised that these measures are positive developments in addressing the issue of site safety, it doesn't end there. Continuous development of safety approaches, practices and initiatives to ensure performance improvements need to be pursued and that the issue of safety needs to remain at the top of the Industry agenda. In this respect, Industry feedback as to new and innovative ideas that should be considered for the future is welcome.

Collaboration with international counterparts

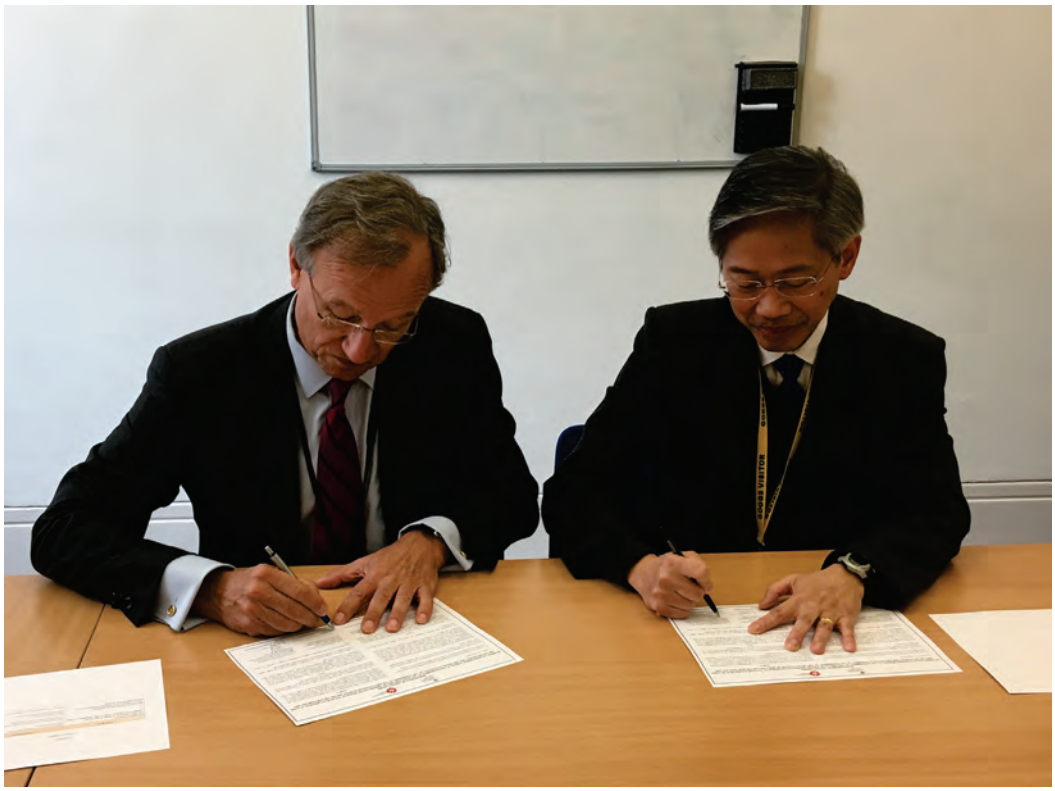
On 7 March 2018,[66] DEVB signed a Memorandum of Understanding (MoU) with the UK's Infrastructure & Projects Authority (IPA), as shown in Figure 11. Through this arrangement, DEVB aims to:

- Increase the productivity and performance of the Industry.
- Improve the quality, time and cost management of infrastructure projects; and
- Enhance the project delivery capability of the public sector by enhancing knowledge levels of project leaders.

In addition to this important partnership, Government is exploring international collaboration opportunities with other world-class public and private partners to ensure the civil service is continually learning and adapting to changes in the global construction industry.

65. Development Bureau, Guidance Notes of Design For Safety.
66. Development Bureau (2018), Press Release: Hong Kong signs MOU with UK on expertise and experience exchange in implementing infrastructure projects.

Figure 11 – Signing of the MOU with the UK's IPA



Professionalism of subcontractors

In order to build a larger pool of professional subcontractors with specialised skills and high ethical standards, DEVB initiated the Voluntary Subcontractor Registration Scheme (VSRS) which was first introduced in 2003[67] and subsequently updated and renamed to the Subcontractor Registration Scheme (SRS) in 2013.[68] This scheme caters to both first-tier subcontractors and specialised trade subcontractors. It allows registered subcontractors to be eligible to undertake contracts on certain capital works projects. As a result of their registered status, these individuals receive enhanced recognition across the Industry. Future developments of the scheme will be aimed at growing the number of registered sub-contractors in the private sector and raising overall standards of safety and specialised technical skills.[69]

A more recent initiative designed to improve professionalism levels of subcontractors is the "Designated Workers for Designated Skills" (DWDS) initiative.[70] Introduced in April 2017, this initiative prohibits workers from carrying out designated trades, unless they are a registered skilled or semi-skilled worker. Workers can only work on specific job trades after they have received adequate training from reputable trainers and are registered with the CIC. DWDS lays the ground rules for subcontractors employing workers for specific trades and is aimed at enhancing the quality of construction works through education, assessment and certification of worker skill levels. It also integrates reliable labour data for the Industry and recognises the professional status of workers.[71]

67. Development Bureau (2003), Press Release: Voluntary Subcontractor Registration Scheme Launched.
68. Construction Industry Council (2013), Rules and Procedures for the Primary Register of Subcontractor Registration Scheme.
69. Construction Industry Council, Subcontractor Registration Scheme Leaflet.
70. Chapter 583 of the Construction Workers Registration Ordinance.
71. Construction Industry Council, Designated Workers for designated skills booklet.

Pillar 3: Revitalisation

The vision: Reinvigorating the appeal and benefits of joining the Industry to attract and nurture growing numbers of young and energetic talent to the workforce and increasing the agility at the individual, organisational and Industry levels.

What is the revitalisation of the Industry?

Revitalisation is directed at transforming external perceptions of the Industry as being a "3D" industry, which stands for dirty, dangerous and dull. It is about changing the Industry into one that provides an appealing career proposition to future generations of skilled talent and workers whilst offering a safe, clean and supportive environment that fosters continuous learning, development and knowledge sharing within the workforce.

Why does the Industry need to revitalise?

The earlier analysis highlighted selected constraints being experienced by the Industry workforce including projected talent shortfalls and the ageing workforce profile. By transforming the Industry through higher levels of energy, innovation and professionalism, it increases the prospects of addressing these constraints, and creates the potential to:

Address labour shortfalls – Attract greater numbers of individuals willing to work and contribute to the construction and development activities in Hong Kong. A more stable and deeper workforce will generate greater certainty around schedule planning and reduce project and site risks associated with labour shortages.

Attract enhanced levels of talent – Attract greater numbers of highly talented design, construction and commercial professionals capable of introducing new ideas, innovation and enhancing overall professionalism levels. This also creates the potential to improve overall project performance across the key dimensions of time, cost and quality.

Stimulate continued knowledge transfer – Create an environment where young professionals are nurtured and developed by Industry seniors to promote the concept of continuous knowledge transfer for the long term benefit of the Industry ecosystem.

Lift the Industry's impact on Hong Kong – Establish a deeper, more innovative and professional industry workforce with enhanced benefits to Hong Kong in the form of economic activity, social impact and overall quality of life for citizens.

How can the Industry revitalise?

Revitalisation of the Industry is closely linked with the first two pillars of Innovation and Professionalisation – ensuring the vision for these two initiatives is achieved is considered critical in enhancing the appeal of the Industry. Below is a sample of areas currently under exploration or considered to be worthy of further investigation to revitalise the Industry.

Commercial mind-set

Innovation is not just about new technologies, it also extends to a mind-set focused on new ideas, flexible approaches towards tasks and being adaptable to change. An element of this relates to shifting the Industry mind-set from one that is heavily focused on technical, rules-based decision making to one that takes into account a broader commercial range of considerations in a real-time environment.

An example of this relates to Project Management Information Systems (PMIS) on projects.

For many project owners and contractors, project governance, risk and controls remain static, manual and paper-based activities that are treated as tick-box exercises that feed information to decision makers after the fact. Over time, these controls have tended to become ever more complex, information and task heavy and lead to more challenging day to day responsibilities for project managers in making sense of data and information. These information intensive, manual based project management practices can often limit creative thinking and decision making based on commercial principles.

Linked heavily to this is the use of modern and commercial approaches to procurement and contracting such as collaborative, partnering and risk sharing based approaches set out in the NEC4. These forms of contract seek to encourage a commercial mind-set where project vision and performance during operations is treated as very important, rather than placing an excessive reliance on regulation and technical circulars.

The adoption of more innovative approaches towards prominent Industry activities is also expected to foster higher levels of appeal and demand from young generations to join the workforce. If this can be combined with a commercial mind-set shift and greater focus on the 'big-picture', the Industry may be able to tap into new pockets of talent otherwise not interested in joining the Industry.

Whilst these outcomes remain desirable, as discussed throughout this publication, there are significant barriers to be overcome. Because of the scale and complexity of these challenges, only by working together can the Industry achieve these aims – as such, it is incumbent on all of us to work together to devise a clear-cut plan for change.

What is a commercial mind-set?
Throughout this publication, the concept of 'commercial mind-set' has been referred to as important for the future direction of the Industry.
In this respect, a commercial mind-set refers to an approach that considers the wider commercial implications of a certain decision, approach or solution in addressing a task or complex situation. It is not decision making based solely on financial imperatives at the expense of all other factors such as regulatory compliance, social impact, environmental considerations and others. In other words, it is a mind-set that considers these factors (and others as relevant), including commercial matters, to make decisions that are balanced and achieve outcomes that are aligned with the critical success factors of the project in question.

Promotion and awareness of the Industry

An important element of revitalisation is the promotion and awareness of positive Industry activities and events held by stakeholder groups in order to build a greater sense of community within the Industry. They provide opportunities for Industry stakeholders to come together for social experiences and take part in charitable and other community focused initiatives.

In recent times, DEVB and other groups have been active in promoting the Industry to potential future generations of talent including university students, school leavers and others. These include hosting events related to recruitment, community & recreation and volunteering. A sample of these and other events is highlighted below.

Construction Industry Sports Day and Charity Fun Day

CIC set up the Construction Industry Sports and Volunteering Programme (CISVP) in 2016 to encourage a healthy life-style and to instill a caring culture amongst construction practitioners. Under CISVP, CIC has organised the Construction Industry Sports Day and Charity Fun Day (shown in Figure 12) since 2016 to promote the benefits of sports and exercise whilst encouraging a sense of connectivity among Industry practitioners. This has since come to be considered an annual signature event for the Industry.

In terms of social impact, the 400m Charity Run contributes to the Construction Care Fund, which encourages charitable acts and donations within the industry. This year's event is to be held at Shing Mun Valley Sports Ground on the 21st October 2018.

Figure 12 – Construction Industry Sports Day and Charity Fun Day

Dragon Boat Race – CIC Lo Pan Cup

The CIC Lo Pan Cup, another event organised under the CISVP, encourages Industry professionals to come together and attend as fans or participants in the traditional Hong Kong sport of dragon boating during the Tuen Ng festival. Last year's event was held at Shing Mun River (shown in Figure 13).

Figure 13 – CIC Lo Pan Cup

International Conference on MiC

On 24 April 2018, the International Conference on MiC was held, having been organised by DEVB and CIC.

The conference (shown in Figure 14) was aimed at raising awareness levels within the Industry as to global trends in MiC adoption, as well as providing a platform for local and international academics, professionals and practitioners to share experiences and knowledge.

World Sustainable Built Environment Conference 2017 Hong Kong

The CIC and the Hong Kong Green Building Council (HKGBC) jointly organised the World Sustainable Built Environment Conference 2017 Hong Kong which was held on 5-7 June 2017 in Hong Kong.

Themed "Transforming Our Built Environment through Innovation and Integration: Putting Ideas into Action", the conference (shown in Figure 15) brought together 1,800 green building advocates, policy-makers, academics and industry practitioners from across the globe to inspire and stimulate discussion "Putting Ideas into Action" to transform the world's built environment.

The conference celebrated the continued efforts and achievements of different groups across the world in terms of actions focused on enhancing the sustainability of the global built environment, including a particular focus on urban neighbourhoods and buildings.

Figure 14 – International Conference on MiC

Figure 15 – World Sustainable Built Environment Conference 2017 Hong Kong

Recruitment and nurturing of young talent

To attract future leaders of Industry and to retain and nurture long-term talent, consideration needs to be given to the latest trends that are drawing people to other industries and career pursuits.

Start-up and people-first mind set	One of the latest trends impacting the global economy is the rapid growth of the start-up and tech industries. By promoting attractive employment opportunities through a wide range of diverse concepts such as entrepreneurism, innovation, humanitarian development and social enterprise to name a few, these industries have exploded in popularity. Many companies in these industries adopt a 'people-first' approach to managing their businesses whether in the form of employment benefits, enhanced workforce environments, flexible working arrangements or other benefits. It is no surprise that these initiatives are leading to greater number of high-potential young talent pouring into these industries.
Safety	Safety is a major concern for people when considering whether they will take up employment in the Industry. As mentioned earlier, the Industry still has some way to go to improve safety performance as well as delivering the message to the public that various measures are underway that are aimed at dramatically improving safety performance. Through continuous improvement in site and worker safety, not only will young and talented people become more interested in joining the Industry, they will also receive more support and approval from their families and peers, which is often a deciding factor when choosing their career paths.
Mentorship	An older-than-average workforce could be a deterrent in and of itself if the younger generation do not believe they can fit-in or if their voices will not be heard. Potential mitigants to this dynamic are to increase the quality and range of training programmes offered to young talent whilst also educating, encouraging and rewarding older segments of the workforce to collaborate, mentor and develop younger workers.
Long-term career prospects	To attract greater numbers of young talent the Industry needs to provide a clearer picture of the long-term career pathways available to them. This includes offering channels to improve their skills and knowledge to be able to climb the career ladder, rotate into different positions within varying construction sectors, companies and projects at various stages of their career as well as being able to pursue management and senior management responsibilities through high quality training, on-the job exposure and through the passing-down of knowledge from others in the Industry. If the Industry is only viewed as a stepping stone into other industries or employment opportunities it will limit the Industry's ability to retain talent, knowledge and expertise.

System re-engineering

As mentioned in other sections of this publication, a prominent feature of the Industry is the high number of Technical Circulars (Works) and practice notes that guide Industry practice and approvals, and the level of frequency with which they are updated and adapted. The trend of continuous amendment and update is thought to encourage individuals to rely heavily on regulation and process, rather than adopting a broader management or commercial mind-set towards decision making and approvals. This practice is considered a potentially major constraint on innovation and creativity. In recognition of this, Government is working towards the identification and promulgation of the removal of many outdated requirements and overlapping regulations.

Strategic procurement

The selection of a project's procurement model, for example Design and Build, Design-Build-Operate (DBO), Design-Build-Finance-Maintain-Operate (DBFMO) and its underlying features is a critical step that heavily influences the prospects for project success. As outlined earlier, the traditional approach towards procurement model selection in Hong Kong has often been based around recent precedents. However, the time has come to move towards a bespoke approach that considers the vision for each project and how maximum outcomes can be delivered across all major dimensions: design, construction, funding, operations and overall commerciality.

In recent years Hong Kong has introduced a more innovative contract form, the NEC. This has recently been updated to NEC4 which incorporates BIM support mechanisms and promotes ECI and a DBO option in addition to a series of options in NEC3 (options A-F). In short, the NEC is a contract form that promotes a more collaborative way of working, along with clarity, simplicity, prescribed project management and the incorporation of multiple options that allow the different approaches to be selected based upon the individual works, albeit based around a clear contractual structure. For example, a priced contract with activity schedule (Option A), target contract with bill of quantities (Option D) and cost-reimbursable contract (Option E).

In addition to NEC, other forms of target cost contacts - for example, cost plus/cost reimbursable contracts - have also been integrated into the Industry.

Cost plus/Cost Reimbursable – these contracts have the benefit of ease of cost calculation (based on incurred cost plus margin) and reduce the risk exposure for contractors. These contract forms are commonly employed when the design and/or construction works scope is undefined at the commencement of the work.

Target Cost – target cost contracts drive contractors to achieve good performance and beat the target cost and schedule by using pain/gain mechanisms that incentivise over performance and penalise under performance. Concerns can be raised in relation to imposing financial pressure to over achieve on cost and schedule to the potential detriment of quality. A simple way to combat this risk is to use a scale method that imposes penalties for beating the target by too greater percentage.

Whilst the adoption of the models highlighted above represent a positive step forward, there is still room for further improvement. In the future, enhanced outcomes can be achieved through an approach that allows greater flexibility and diversity of choice in procurement/contract model selection and assessment based on the individual needs of each project. This includes consideration of innovative procurement models being used in other jurisdictions such as public private partnerships as well as new commercial models that come to market.

The way forward

Measuring future performance

To implement Construction 2.0, the following and other achievable and measureable performance targets should be considered.

Innovation

- **MiC/DfMA –** set targets and measure the floor area completed of agreed projects.
- **Innovative procurement and contract forms –** set targets and measure the number of projects/contracts adopted.
- **Adoption of BIM technology –** uplift the utilisation rate of BIM technology.
- **Productivity –** establish indices to measure productivity across different sectors of the Industry.
- **Buildability** – uplift the utilisation rate of BES.

Professionalisation

- **Professional development –** targets based around the number of professionals that complete agreed leadership, project management, technical training and development programmes.
- **Worker training output –** objectives based on the level of training hours completed by new and experienced workers in certain priority areas along with regular assessments of the volume and adequacy of those programmes.
- **Safety performance –** setting more stringent safety targets for the Industry.
- **Subcontractor management –** targets linked to increased levels of registered subcontractors.
- **Monthly wages –** targets focused on increasing the proportion of workers paid on a monthly basis.

Revitalisation

- **Attracting young talent –** targets based on the number of young talent that join and are retained by the workforce.
- **Nurturing young talent –** targets based on the number of mentorship schemes and training programmes offered to young talent.
- **Industry perceptions –** regular surveys directed at measuring public perceptions of the Industry.
- **Skilled workers –** targets focused on lowering the median age of skilled workers over a defined period of time.
- **Community and recreational activities –** targets based on the number of Industry related community and recreational activities held.
- **Industry agility –** targets based on reducing unnecessary requirements and achieving alignment with international best practice.

Additional initiatives to explore

This publication highlights a series of approaches to upgrade and move the Industry forward. To ensure the sustainability of the Industry and its ongoing position as a meaningful contributor to Hong Kong, there is still much more to do.

However, before committing to certain targets and initiatives, it is sensible to ensure the Industry is collectively allocating its resources to actions that will have a lasting and positive impact. In this respect, to stimulate further Industry discussion, below are a series of other initiatives and concepts for further consideration.

Project Management Information Systems

The increasing technical complexity of many modern day projects creates increasing challenges in controlling risk given the availability of existing governance, process and technology models and tools. Hard learnt lessons through project failures have shown that irrespective of governance, policies and procedures, there is a 'human element' in construction projects that needs to be carefully considered in project planning – in other words, a governance framework, policy or procedure is only as good as the person administering it.

That said, there are systems that can help improve project performance with the right balance of people and technology – these are referred to as Project Management Information Systems (PMIS). PMIS, if used correctly has the potential to offer significant benefits to contractors and project owners through end-to-end project reporting that is customised to the requirements of a project/portfolio based on its risk profile, control drivers, critical success factors, organisational KPI's and overall information requirements.

PMIS should be designed to sit across the day-to-day IT systems used for construction delivery with the ability to extract up-to-date/live project information from existing systems without significant requirements for additional project control manpower.

Whilst the full integration of PMIS into project planning and delivery can bring benefits to projects, there is an interim solution to yield more immediate results – improved use of data and analytics, as described below.

Digitalisation of site management

Construction projects generate vast amounts of data. Given that data and analytics is receiving significant global attention as a tool to help business and decision making, the Industry should also consider how to better make use of this concept to enhance performance. Construction project data can be vast and disparate in nature, and this can be compounded by complex supply chains in modern day management contracting approaches, meaning data transparency for a project owner is often unsatisfactory. Despite this, there are field/site data capturing technologies available in relation to site surveying, issue management, progress monitoring, snagging, non-conformances checking, Inspection and Test Plan (ITP) processes, and health and safety. The correct application of these technologies provides a means of improving project information management by offering a clear demonstration of the 'live status' of a project, enabling timely and accurate decisions to be made, which can ultimately lead to reduced cost and schedule if used correctly.

Systems/technologies becoming more readily available include:

Holistic project visibility – Five-dimensional (5D) BIM should represent an aspirational approach for major project delivery organisations, so as to allow cost and schedule metrics to be added to more commonly used three-dimensional (3D) BIM design capabilities, enabling proactive and more accurate risk identification, mitigation and management;

Site Surveying – Global Positioning System (GPS), LiDAR[72] and unmanned aerial vehicles (UAVs) to which LiDAR as well as digital recording technology can be mounted;

72. LiDAR is a remote sensing technology which uses the pulse from a laser to collect measurements which can then be used to create 3D models and maps of objects and environments. It is an acronym of Light Detection and Ranging. Sourced from https://www.3dlasermapping.com/what-is-lidar-and-how-does-it-work/

IoT – the creation of a construction site where plant, machinery and equipment have a 'voice' and work in unison. Retrospective application of sensors and near field communication or Radio-Frequency Identification (RFID) devices to existing plant as well as built-in systems in new plant can enable effective productivity assessment, fault detection, fuel consumption data and related performance monitoring and safety monitoring.

Exoskeleton (and other similar) tools

'Exoskeleton' tools, or external human skeletal assistance systems help those who are on-site to perform tasks that previously relied upon heavy lifting equipment. If used correctly they can have a direct and material impact on productivity, worker safety and longevity. In Hong Kong, whilst there are some construction groups employing this technology, it is not currently adopted at an Industry wide-level.

Whilst it is recognised that construction delivery in Hong Kong is largely carried out by the private sector, for innovative technologies such as this to achieve wider adoption, it is critical that Government support this progression with research and development opportunities that aid, encourage and enable the private sector to invest in the next wave of technology.

Robotics & other enhanced productivity technologies

Technologies that are able to reduce the amount of on-site labour and/or increase worker productivity should be treated as positive initiatives. For example, 3D printing technology allows the fabrication of parts on-site in remote places, rather than having to wait weeks for unplanned manufacture and delivery, modular methodologies and off-site construction.

As robotic technologies become more affordable, they may also offer significant benefits to the Industry. For example bricklaying robots, welders or other automated processes, could have the potential to achieve increased production output along with fewer errors. Importantly, these and other technologies shouldn't be viewed as replacing jobs, but as initiatives that can assist in extending the working lives of workers and helping them increase the quality and lower the cost of their services.

Augmented Reality/Virtual Reality

Technological advances such as Augmented Reality (AR) and VR can be used in design engineering for large construction projects and also in identifying the most suitable execution/construction delivery methods. The ability to link these tools with BIM also has the potential to enable asset management and maintenance to leap forward and positively impact the Industry.

Strategic collaboration opportunities

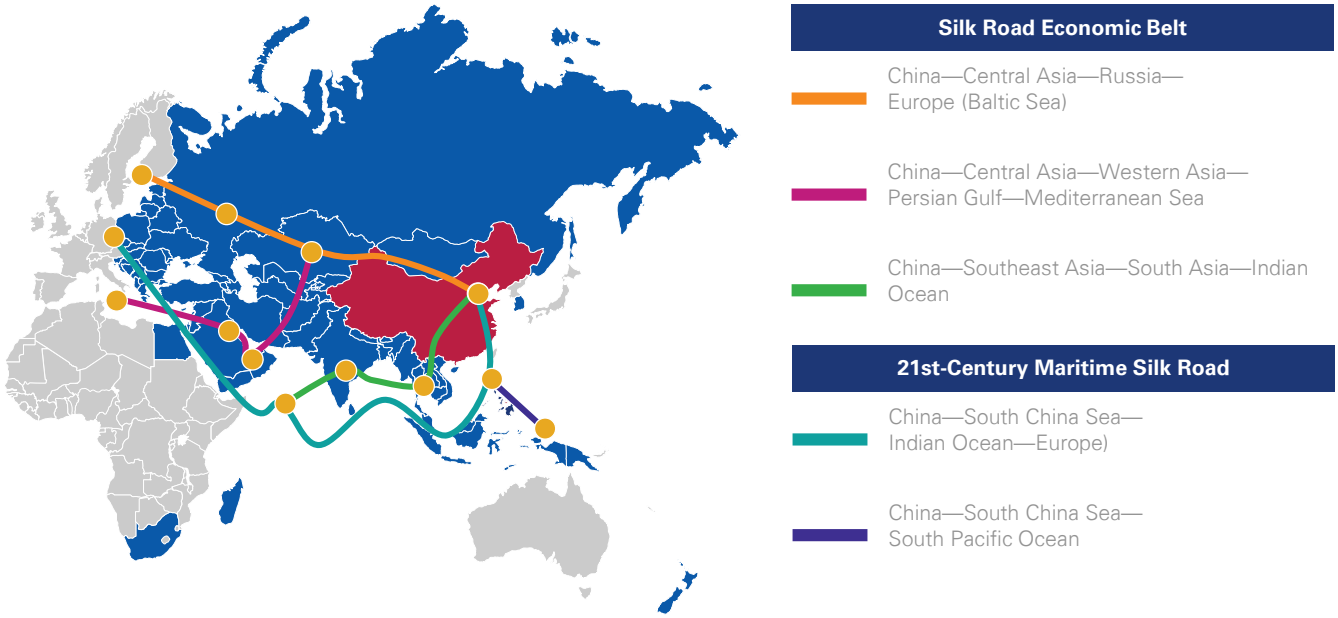
Looking to the future, it is worthwhile considering the broader macro-policy initiatives that could benefit the Industry and/or those in which the Industry can support and add value.

The Belt and Road Initiative

The Belt and Road Initiative (BRI) represents a key policy initiative of the People's Republic of China (PRC). Originally proposed by PRC President Xi Jinping in 2013, the BRI involves two physical routes – the 21st–Century Maritime Silk Road and the Silk Road Economic Belt – that connect more than 70 countries across the globe, as illustrated in Figure 16. A major goal of the BRI is facilities connectivity – this includes the prioritisation of construction needs to support the improved flow of people and goods across BRI markets and involves the removal of barriers to transport connectivity through the development of new infrastructure and improvements to existing links.

But the BRI is intended to go much further than enhancements to transport links across these markets – it is intended to lead to dramatic improvements in emerging markets infrastructure across the full spectrum of power, social infrastructure, telecoms, real estate and other physical assets. Due to its sheer scale and ambition, in due course, the BRI may prove to be the biggest construction and infrastructure development initiative of the modern era.

Figure 16 – The Belt and Road Initiative



Given its potential scale and the emphasis placed on the BRI by China, it represents an attractive opportunity for Hong Kong and the Industry to participate in a meaningful way. In particular, the Industry can offer a wide range of services from management contracting, specialist trades, project management, risk management, professional design services, legal and financial advisory expertise and a range of other skills in which Hong Kong is a global leader. For this to happen, the Industry needs to work together to position and promote its strengths to relevant project stakeholders including Mainland Chinese investors and project participants, local project owners/governments and of course, the lead Hong Kong Government bodies driving the promotion of Hong Kong's efforts, such as the Commerce and Economic Development Bureau (CEDB) and the Hong Kong Trade Development Council (HKTDC). By taking a 'Hong Kong Construction Inc.' approach to the BRI, the Industry stands a dramatically better chance of succeeding than individuals and companies going alone. So the natural question is, how can the Industry better collaborate for success along the Belt and Road?

The Greater Bay Area

The GBA represents a national development strategy to economically integrate nine cities in Guangdong Province, as well as Hong Kong and Macau (shown in Figure 17) to create a world-class city cluster rivalling the world's leading bay areas. As part of this development strategy, significant infrastructure and construction activities are expected to occur, leading to greater levels of physical connectivity. In addition to the HZMB, significant investment has and is being deployed on the Express Rail Link (XRL) linking Hong Kong with Shenzhen and Guangzhou as well as a series of other bridge, road and inter-city rail projects occurring now and into the future right across the GBA.

Figure 17 – The Greater Bay Area

It is also expected there will be dramatic levels of construction and development in the health, housing, sports, entertainment, hospitality, industrial and commercial real estate sectors as a result of the GBA. Given all of this current and projected activity, an attractive opportunity exists for the Industry to export services and knowledge into the other 10 cities of the GBA. For this to happen, existing barriers that currently preclude or limit the ability of the Industry groups to work across borders need to be addressed. Industry stakeholder feedback on these challenges and how they can be resolved in a productive and mutually beneficial manner will be well received.

Hong Kong as an infrastructure finance hub

Related to the BRI and GBA is Hong Kong's target positioning as a regional and global Infrastructure Finance Hub. The Hong Kong Monetary Authority (HKMA) is leading the way on this front through the establishment of its Infrastructure Finance Facilitation Office, which is a platform intended to facilitate infrastructure investments and financing out of Hong Kong. Given this target positioning is directly related to a core product of the Industry, the development of infrastructure, the Industry also stands to benefit if this ambition can be realised. Although the majority of groups in the Industry ecosystem are not lenders or investors, Industry knowledge of risk and opportunity when it comes to design, construction and operation of infrastructure should be viewed as valuable to potential local and international providers of capital for infrastructure. As such, for the long term benefit of the Industry, as organisations and individuals the Industry has an obligation to consider how it can participate in ensuring this ambition can be realised and the role it can play now and in the future.

Working together

This publication offers views on the challenges, actions to address and potential methods of measuring performance improvement of the Industry. This is intended to encourage stakeholders to provide feedback as to how the Industry can be positively developed in a sustainable manner. Government will take the lead in implementing Construction 2.0 by introducing pilot projects. Examples are detailed in Table 3.

Table 3 – Selected construction 2.0 pilot projects[73]

Selected construction 2.0 pilot projects	Responsible delivery parties
Expansion of Sha Tau Kok STW Phase 1	Drainage Services Department
Disciplined Services Quarters for the Fire Services Department at Pak Shing Kok, Tseung Kwan O	Architectural Services Department
Proposed Office Development of Hong Kong Airport Authority	Hong Kong Airport Authority

The key message of Construction 2.0 is that it is *Time to Change*. We hope that all stakeholders can collectively contribute to Construction 2.0 and take the Industry to the next level and beyond.

73. Projects identified by DEVB.

How to provide feedback

Feedback on this publication can be sent to the following:

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