Singapore Institute of Building Limited

BUILD NEWS

SIBL Newsletter

APRIL 2022

TABLE OF CONTENTS

CHANGE MANAGEMENT DURING DIGITAL TRANSFORMATION OF CONSTRUCTION

Industry Organizations

The construction industry undergoes rapid digital transformation. While technological management is vital for digital transformation, one of the challenges is the change management process. The digital transformation process requires to undergo main three phases. Those phases are digitization, digitalization and digital transformation.
There are strategic imperatives such as digital resources, organizational structure, growth strategy and change management that affect this transformation. Therefore, a construction organization that undergoes digital transformation needs to pay attention to these strategic inputs to make it successful.

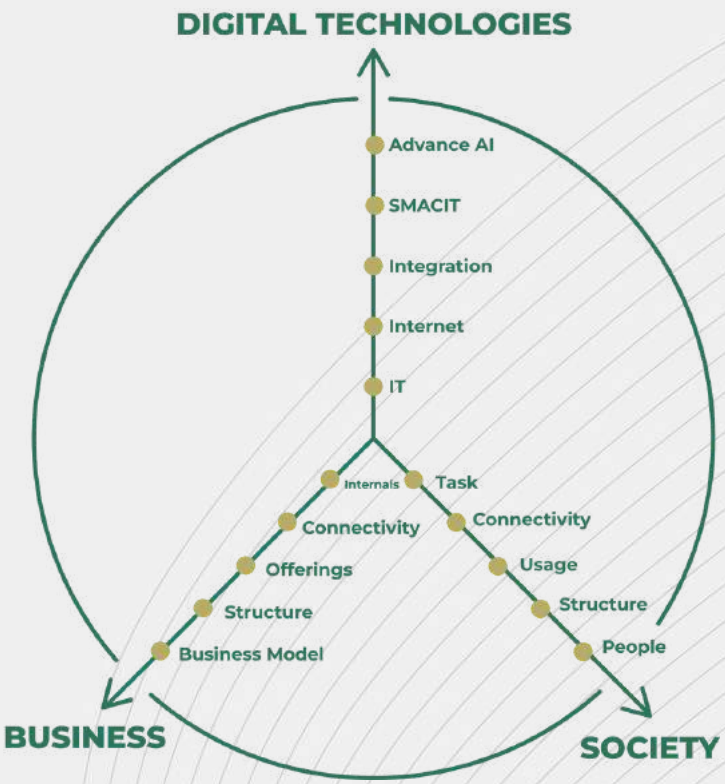
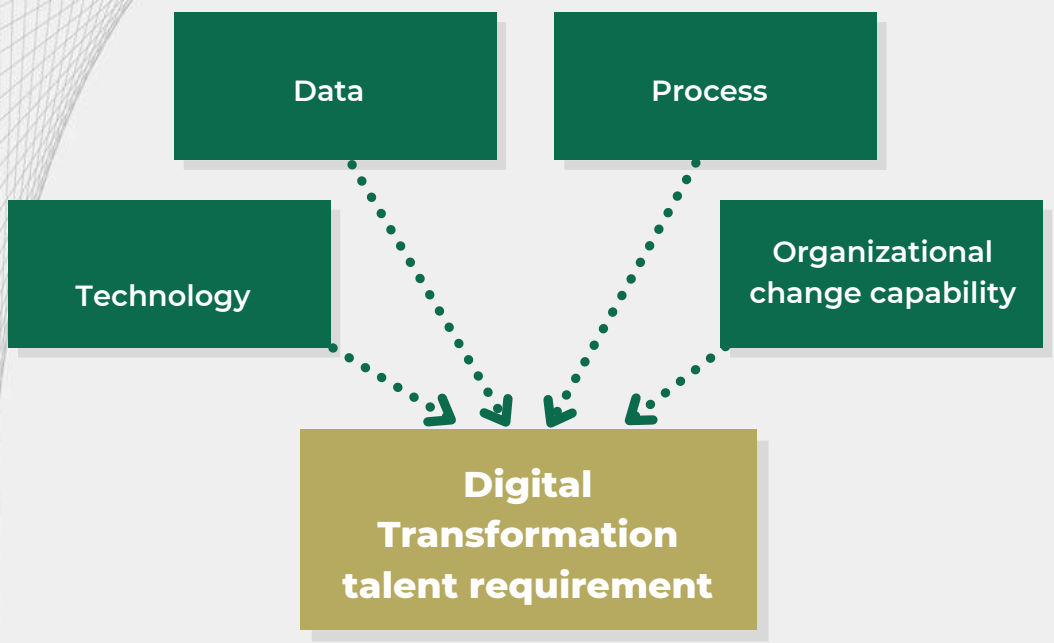


Image reference and credits: Digital transformation framework by Veldhoven, Z.V., vanthienen, J. (2019). Designing a Comprehensive Understanding of Digital Transformation and its Impact. 32nd Bled Econference.

Digital Transformation Talent Requirement

Digital transformation requires talent in four different domains which are technology, data, process and organizational change capability. Therefore, an organization that focuses on having the right people who demonstrate skills in these four domains in their digital transformation team may get benefits.



Change Management Process

As shown in the above figure, organizational change capability is one of the domains to focus on during the digital transformation. When an organization transits from a current state to another desired state, then an organizational change occurs. Therefore, effective management of this change is vital. Such organizational change management includes the planning and implementation of the change in a way that minimizes employee resistance and costs while maximizing the effectiveness of change management efforts.

Nowadays, a mixed approach of bottom-up change management and top-bottom approach is widely used by organizations. However, the change management process includes,

- Correct understanding of the change organization
- Correct understanding of the people in the change
- Effective realization of the change
- Understanding of the change dynamics

Therefore, organizational culture influences the change. The way people work, their attitudes and norms affect the change.

Lewin's Change Theory

Implementing and managing change in an organization is a difficult task. Therefore, it is vital to implement change management strategies for a successful change in digital transformation. Although, there are several change management theories and models available , Lewin's Change theory is one of the widely used change management theories by organizations.

Therefore,below is some basic details on how a construction industry organization can utilize Lewin's theory to support change management during digital transformation. Kurt Lewin's change theory includes three steps that are unfreezing, change and refreezing.

Unfreeze

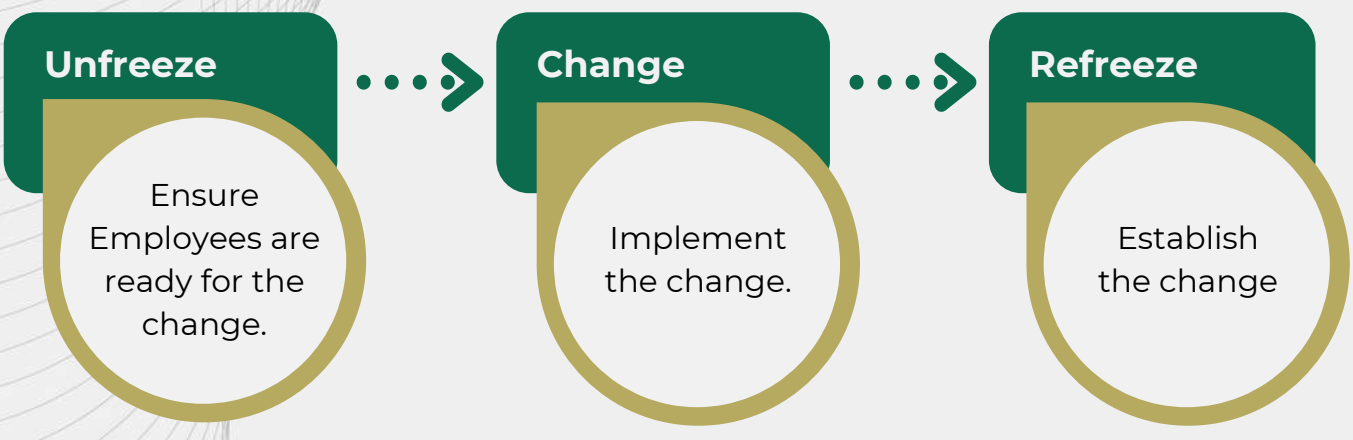
This stage includes the preparation of the people for the change. Things such as liaising with the upper management, conducting a survey and making aware of the people of the organization help people to get ready for the change.

Change

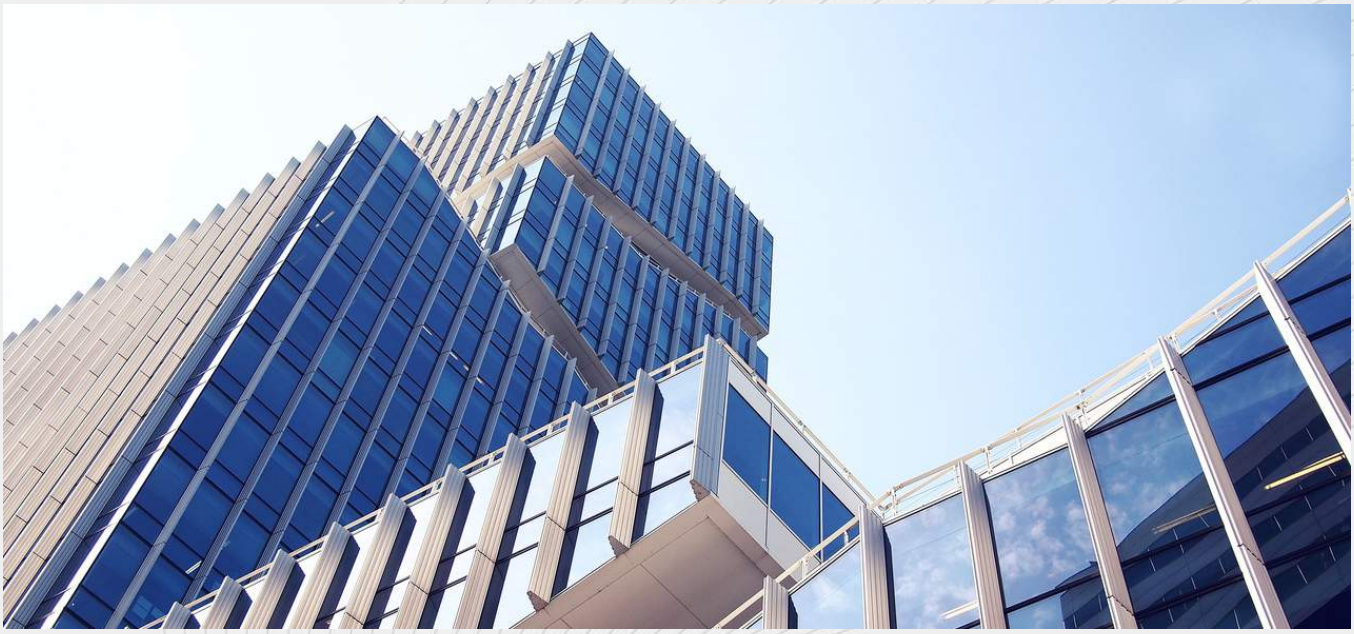
This is the stage to implement the necessary change. Leadership is vital in this stage as initiating change and transition can be difficult. Challenge, command, educate and restructuring are some of the strategies to implement during this stage to support the change and the transition.

Refreeze

At the end of the change process, the next step is to refreeze. The goal of refreezing stage is to establish change. At this stage, people are in a "change shock" state. Therefore, people will work at a low level of efficiency and effectiveness as they expect a subsequent change. It is important for an organization to understand this stage and refreeze effectively to improve the productivity with new changes. An organization should consider frequent training for their employees at this stage.



While successful digital transformation in the construction sector requires strategically planned change management, there are pitfalls that exist. According to recent researches, typical pitfalls during the change management process include lack of problem awareness, lack of communication, lack of analysis in operative and strategic challenges, unprofessional use of the change management process methods and lack of control. Therefore, even in the construction industry, these pitfalls can occur during the digital transformation process. It is the responsibility of the managers who handle change management to avoid these pitfalls.



When a company implement successful change management,it is easy to overcome some of the possible challenges of digital transformation.

Disclaimer : This article is created by referring to a seminar paper written by the author as part of her PhD studies. It is recently published at International Journal of Progressive Sciences and Technologies Vol 30, No 1 (2021). You can read the full paper and the references here:
https://www.researchgate.net/publication/357636341_Study_of_Challenges_in_Implementing_Digital_Transformation_in_Construction_Projects

Author Bio

Amila Gamage, Sihela Consultants
Amila Gamage is the founder and contracts manager of Sihela Consultants where she offers quantity surveying services, consultancy, and training solutions for her clients in Singapore and overseas. As an ACLP certified trainer and a lecturer for different educational institutes and organizations, she helps learners to gain industry knowledge on relevant topics including Contract Management and Facilities Management. Connect with her in LinkedIn : *https://www.linkedin.com/in/amilakg/*

GREENING OUR EXISTING BUILDING STOCK

In 2007, American architect and preservation specialist Carl Elefante coined the phrase 'the greenest building is the one that already exists'. This rule-of-thumb has stayed relevant as we stand at the precipice of a climate freefall.
90 per cent of buildings that exist today, will still be here in 2050 – a major checkpoint in the global climate fight. How we manage our existing stock of buildings will hence impact the sustainability and resilience of our society. In this age of rapid urbanisation, climate emergency, pandemics and threats to public security, our buildings will be challenged to operate more efficiently, be pandemic-ready, adapt to physical climate risks, be more circular, offer flexibility in their use over a lifetime and - get smarter.

Future-proofing our building stock will take more than incremental upgrades common in standard building retrofits. This opens up a window of opportunity for us to consider the type of major or deep retrofits, needed for a deep-gut transformation that will meet with the urgent challenges of our time.

Today, regional variations exist in the definition of what a major or deep retrofit is. The word 'retrofit' is widely used in North America and is typically geared towards achieving cost savings from vast improvements in energy efficiency performance. Sometimes by more than 50 per cent over a whole-building analysis, as given by the Rocky Mountain Institute (RMI). In Europe, the term 'deep renovation', as opposed to shallow renovation, is more common. Apart from very high energy performance, 'deep renovation' emphasises the use of renewable energy to meet remaining energy needs and aims to deliver an optimal level of Indoor Environmental Quality for building occupants (BPIE 2021).

In Singapore, a major retrofit refers to 'major energy use change' as defined under Part IIIB of the Building Control Act 2012 and Building Control (Environmental Sustainability Measures for Existing Buildings) Regulations. These include the installation or replacement of water-cooled or air-cooled air conditioning systems, which are primary energy hogs in our tropical climate, making up as much as 50 per cent of a building's total energy consumption.

As we know it, current rates of retrofitting across the globe fall short of what is needed to meet net zero. According to IEA, achieving a net zero energy scenario requires retrofitting rates of 2.5 per cent and 2 per cent per year to 2050, in advanced and developing economies, respectively (IEA 2021b). The latest Intergovernmental Panel on Climate Change 6th Assessment Report Working Group III (IPCC AR6 WGIII) report on mitigation reviewed studies that suggest a deep retrofitting rate as high as 10 per cent per annum. Although programmes to encourage energy efficiency improvements in existing buildings have operated for decades, even the best programmes in Europe result in upgrades of only 1–2 per cent of eligible buildings each year. In some regions, energy retrofitting is virtually absent (EC 2020).

In the European Union (EU) including United Kingdom (UK), the average rate of deep renovation rate stands at only 0.2% currently. If the EU is to achieve both its 2030 climate target and climate neutrality by 2050, this figure must drastically increase (by a factor of 15) to reach 3 per cent by 2030 and be maintained up to 2050. By 2030, 70 per cent of renovations taking place in Europe should be 'deep' (BPIE 2021).
Despite space constraints and a heavy reliance on indoor cooling, Singapore has rolled out measures in support of major retrofits under the Green Building Masterplan 2021 and in this year's budget 2022. With effect from 2022 this year, buildings undergoing major retrofit in Singapore will have to be 40 per cent more energy-efficient than 2005 levels post-renovation - up from 25 per cent under current rules.

To lower upfront capital cost of energy efficiency retrofits, the Building and Construction Authority (BCA) rolled out the enhanced Green Mark Incentive Scheme for Existing Buildings 2.0 (GMIS-EB 2.0) as an outcome-based scheme to encourage building owners to achieve higher energy performance standards (Platinum, Super Low Energy, and Zero Energy) for their buildings. The scheme will be available in 2Q 2022.

According to BCA, 49% of buildings have been greened in Singapore as at end-2021, with best-in-class buildings being able to achieve more than 65% improvement in energy efficiency over 2005 levels. BCA aims to raise this figure to 80% by 2030 through the enhanced Green Buildings Innovation Cluster programme (GBIC 2.0), which aims to advance research in key areas of alternative cooling technologies, data driven smart building solutions and next generation building ventilation.

For the sizable portion of non-certified green mark buildings existing today, there is room to improve performance level as the government continues to green the building stock towards its target of 80 per cent by 2030. At the end of 2020, 57 per cent of buildings in Singapore remain non green mark and had an average age of 26 years - some possibly built before the building code of 2005 (The Straits Times 2021). Of these, a third are non-residential buildings; two-thirds are residential buildings which would require significant estate management and home owners' involvement.

Although the orientation of an existing building can be a limiting factor for performance, other solutions can be explored when retrofitting. Deep energy retrofitting includes a combination of improving the building envelope to reduce the need for heating and cooling, changing the building services (cooling, ventilation, hot water, electricity, pumps) to carbon-free systems, and networking our buildings with district cooling, even for brownfield developments.

From empirical cases, adding insulation, plugging leaks, and upgrading heating and cooling equipment could reduce these buildings' energy use significantly, sometimes by more than 50 per cent (Bloomberg 2021). While the IPCC AR6 WGIII report notes that low-cost deep retrofits will not be universally applicable in all cases, the cost reduction for technologies such as biomass boilers, heat pumps, ventilation, air-conditioning, thermal storages, electricity storages, solar PVs and solar thermal systems continue to reduce significantly.

Along with state support, it is critical to steer industry with clear policy direction. After publishing its strategy "A Renovation Wave for Europe – Greening our buildings, creating jobs, improving lives" to boost renovation in the European Union to address energy povery, decarbonisation and heating & cooling performance, EC proposed the introduction of minimum energy performance standards for the worst performing 15 per cent of buildings in Europe, by 2027 for non-residential buildings and by 2030 for residential buildings. In this age of supply chain disruption, renovations tend to pay off earlier in their lifetime when the cost of construction materials are managed. In Singapore, under GreenGov.SG initiative, the Government will take the lead in bringing Super Low Energy buildings into the mainstream. All new and existing buildings (upon major retrofit) will work to achieve Green Mark Platinum Super Low Energy standards or equivalent, where feasible.

To ensure successful outcomes, retrofitting must also embrace social and cultural dimensions to consider how users interact with technologies such as smart controls. A sound tax system is also key to scaling up retrofit. In the UK, the standard 20 per cent value-added tax is charged across the country on most repair and maintenance work, while much demolition and new-build, including housing, attracts a zero rate. This could tilt choices further against retrofitting.

Retrofitting works are generally labour-intensive and can create jobs and investments rooted in local supply chains (Maby & Owen 2015). Retrofitting at scale can also generate demand for energy and resource-efficient equipment, stimulating broader manufacturing supply chains. In the EU for example, it is anticipated that by 2030 an additional 160,000 green jobs could be created in the construction sector through retrofitting at scale (EC 2019). In parts of the world where gas boilers are still used for heating, the International Energy Agency (IEA) has recommended they be banned from 2025 completely if the world is to achieve net-zero emissions by 2050. This may potentially drive up sales of electric heat pumps drawing on renewable green hydrogen (IEA 2021).

In Singapore, retrofitting at scale is not without challenges. Space constraints, gaps in technological know-how, building ownership structure and the need to align varying timescales of different building system layers with the evolving needs of a dynamic city-state, to name a few. Apart from government grants, green loans, leasing and energy performance contracting programmes have sprung up to manage the burden of the risks of undertaking a deep retrofit. From the 2018 BCA energy benchmarking report, commercial buildings in Singapore have demonstrated a 14 percent improvement in energy efficiency compared with 2008, translating to $200 million saved a year (Straits Times 2021). This provides an encouraging sign that retrofitting can pay itself back in the form of energy savings.

While we maximise the strength and durability of our building structures which can stand for well over 100 years, we should also rapidly seek out innovations for our building services and interior finishes which have a much shorter lifespan. This will yield us better carbon, health and thermal comfort performance across the whole life cycle of a building.
Accelerating retrofitting at scale will only be achieved if the unit cost of delivery and the risks to clients and building occupants are reduced (Wade & Visscher 2021).

Author Bio

Nora Tan is an SIBL Associate Director with close to 10 years of sustainability experience spanning the private and non-profit sectors. Her expertise lies in ESG reporting and stakeholder engagement. She is currently Sustainability Manager at GYP Properties Limited, a Singapore-listed property developer, where she supports the Group to realise its sustainability goals.

References

- (2020). A renovation wave of Europe - Greening our buildings, creating jobs, improving lives. European Commission (EC). European Commission. Retrieved from https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en
- Building and Construction Authority. (September, 2021). Code on Environmental Sustainability Measures for Existing Buildings, Edition 3.0. Retrieved 16 April, 2022, from Building and Construction Authority.
- Building and Construction Authority. (n.d.). Green Building Masterplans. Retrieved 16 April, 2022
- Building and Construction Authority. (n.d.). Green Mark Incentive Schemes for Existing Buildings (GMIS-EB 2.0) . Retrieved 16 April, 2022
- Cabeza, L. F., Bai, Q., Bertoldi, P., Kihila, J., Lucena, A. F., Mata, É., . . . Wanemark, J. (2022). IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge UK, New York USA: Cambridge University Press. Retrieved 16 April, 2022, from https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_Chapter09.pdf
- Champion, M. (20 October, 2021). Retrofitting Buildings is the Unsexy Climate Fix the World Needs, Marc Champion, 20 October 2021,. Retrieved from Bloomberg: https://www.bloomberg.com/news/articles/2021-10-20/climate-change-insulation-hvac-are-construction-solutions-to-emissions
- International Energy Agency. (May 2021). Net Zero by 2050: A Roadmap for the Global Energy Sector. France: International Energy Agency.
- Kurmayer, N. J. (29 March, 2022). Renovation takes centre stage as buildings' energy use fuels Russia war effort. Retrieved 16 April, 2022, from Euroactiv: https://www.euractiv.com/section/energy-environment/news/renovation-takes-centre-stage-as-buildings-energy-use-fuels-russian-war-effort/
- Maby, C., & Owen, A. (2015). Installer Power. The key to unlocking low carbon retrofit in private housing. Retrieved from https://www.usablebuildings.co.uk/UsableBuildings/Unprotected/InstallerPowerRepo
- McGrath, M. (18 May, 2021). Climate change: ban new gas boilers from 2025 to reach net-zero. BBC News. Retrieved 16 April, 2022
- Ning, T. S. (15 August, 2021). Green buildings: why the benefits of retrofitting outweigh the costs. Retrieved 16 April, 2022, from The Straits Times: https://www.straitstimes.com/singapore/environment/green-buildings-why-the-benefits-of-retrofitting-outweigh-the-costs
- Sibileau, Hélène ; Broer, Rutger ; Dravecký, Lukáš; Fabbri, Mariangiola ; Álvarez, Xerome Fernández; Kockat, Judit; Jankovic, Ivan;. (2021). Deep Renovation: Shifting from exception to standard practice in EU Policy. Buildings Performance Institute Europe (BPIE). Brussels, Berlin: Buildings Performance Institute Europe (BPIE). Retrieved 16 April, 2022, from https://www.bpie.eu/wp-content/uploads/2021/11/BPIE_Deep-Renovation-Briefing_Final.pdf
- Wade, F., & Visscher, H. (2021). Retrofit at scale: accelerating capabilities for domestic building stocks. Buildings and Cities, 2(1), 2(1), 800–811. doi:DOI: http://doi.org/10.5334/bc.158

Singapore Institute of Building Limited

Have something to tell us? We'd love to hear from you!

Write us at admin@sibl.com.sg