National Industry
Innovation Network (NIIN)
Research White Paper

How Digital Collaboration is shaping the future of Healthcare and Education

2020

OPTUS | CISCO | LA TROBE UNIVERSITY | Curtin University

Foreword

Technology companies and universities have an important role in helping industry and government in their digital transformations; from the development and retraining of workforces through to developing the insights and technologies that will drive value in these organisations.

The National Industry Innovation Network (NIIN) was established to build industry-university collaboration, and through this collaboration we are better positioned to respond to industry and government demand in digital transformation, but also to position these organisations for future success.

The Digital Collaboration project, the first for the NIIN, is aimed at helping companies and government to make more informed decisions about deploying collaboration technologies that are fit for purpose in a safe and scalable way. This has never been more important as we face the challenges of the COVID-19 pandemic and the need to continue doing business safely and living our lives as normally as possible.

I commend the work of the NIIN and look forward to further industry-university collaboration through the NIIN.

Professor Chris Moran
Deputy Vice-Chancellor, Research, Curtin University

Foreword

The global pandemic has forced us to work differently, with much of our workforce working from home or conducting work activity remotely. It has brought to the fore the vital role technology plays in our work practices. We have seen how technology can break down the barriers of distance and increase collaboration. Global location and physical ability are no longer barriers to communication or knowledge sharing.

In the higher education sector, leading institutions are moving resources online, increasing access to remote learning and teamwork. In the future, universities will need to take this further, using technology to connect with collaborators and end users outside of their organisational boundaries: with the community, industry partners and other institutions across the world.

Investment in technology for our healthcare sector will advance the progress already made in telehealth and aftercare activities for patients. Technology can also improve team collaboration efficiency among our healthcare practitioners.

The National Industry Innovation Network (NIIN) has been established in partnership with Cisco, Optus, Curtin University and La Trobe University. The network brings together industry and universities to accelerate Australia's digital transformation. The Adoption of Collaborative Technologies in Higher Education and Health projects aim to assist organisations in adopting fit-for-purpose collaboration technologies, while ensuring each organisation's workforce is prepared to implement the changes.

I hope this document will deepen understanding of the benefits of collaboration technologies in the higher education and healthcare sectors. I commend the work of the NIIN and endorse this paper.

Professor Susan Dodds
Deputy Vice-Chancellor,
Research and Industry Engagement,
La Trobe University

Table of contents

What does the future of work look like?	**7**
Adoption factors of collaborative technology	**15**
Barriers with adopting collaborative platforms	**23**
Comparing the use of collaborative technology in higher education and healthcare	**24**
Enablers and best practices: What can organisations do to get the most out of collaborative technology?	**25**
Future development needs for collaborative platforms	**29**
Conclusion: Collaborative technology and future work	**31**

Co-authors

Dr Zitong Sheng, Dr Keyao Li, Professor Mark Griffin
from the Future of Work Institute, Curtin University

Erik van Vulpen and **Professor Aniruddha Desai**
from the Centre for Technology Infusion, La Trobe University

The nature of work is changing rapidly. New technology is transforming fundamental work tasks and creating new methods for communication, decision making, and productivity.

Advances in data analytics and sensor technology are enabling automation, not only of mechanical and repetitive tasks, but also automating more complex and creative human activities.

This change is accelerated by the unprecedented COVID-19 pandemic. A "new normal" seems possible as social distancing and extensive lockdowns mean many people are experience flexible and remote working practices. Many leading companies are considering their adaptive responses to the future of work.

Amazon and Facebook offer their employees the option to work from home through the end of 2020. The Twitter CEO even announced the decision that their employees could work remotely even permanently after the pandemic.

A recent study conducted by Cisco revealed a great increase in the shift to working from home:

"Before 2020, about 22% of employees worked remotely. That figure jumped to 53% earlier this year and it currently sits at 46%. Our study shows that about 42% of office workers will continue to work remotely even after they are invited to return to the workplace, and 40% of office workers will maintain their working from home capabilities into the future." – Cisco Blogs Article

Collaborative technology is bridging the future of work by creating future workspaces that transform traditional siloed organisational structures to horizontally integrated networks. All these force us to reconsider: what does the future of work look like?

Global tech companies like Microsoft, Google and Facebook, all renowned for office designs that stimulate wellbeing and collaboration, now advocate a blended approach.

"We firmly believe that in-person, being together, having a sense of community is super important when you have to solve hard problems and create something new so we don't see that changing. But we do think we need to create more flexibility and more hybrid models." – Google CEO Pichai

Global technology and telecommunications leaders, Cisco and Optus, have partnered with world-class universities, La Trobe University and Curtin University, to establish the National Industry Innovation Network (NIIN).

The new network serves as an important move for industries and academia to collaborate for the acceleration of Australia's digital transformation and for the nation's long-term digital economic resilience.

The NIIN pools resources like research chairs, innovation centres, supply chains, partner networks and specialist expertise together to solve both short-term and long-term challenges.

This white paper serves as one of the first initiatives of the NIIN. It examines the higher education and healthcare sectors which have started to make the shift towards adopting collaborative technology to increase work efficiency and to facilitate collaboration.

This white paper aims to answer the following questions:

- What is the role of collaborative technology in the transformation of work?
- What are the opportunities, challenges, and best practices?
- What are the recommendations for scaling and promotion of collaborative technology to enhance future work in the areas of healthcare and higher education?

To meet this goal, we reviewed information available from collaborative platform providers, assessed research conducted by the global consultancies about collaborative platforms, and interviewed 25 senior experts and practitioners in higher education and healthcare sectors.

The interviews explored views about future of work in higher education or healthcare, their experiences with collaborative platforms to date and the role and requirements of collaborative platforms across use cases.

The interviews took generally up to 40 minutes each throughout June and July 2020 with a semi-structured guideline. Interviews were conducted using collaborative platforms, transcribed, and thematically analysed.

What does the future of work look like?

Digital transformation is a pervasive promise in all forecasts of future work. As illustrated by a recent Cisco report, hybrid working has become the next normal, and collaboration will become the dominant activity within the workplace, indicating that technology will play an even more critical role in benefiting the health and productivity of Australians.

The experts in our study speak highly of the way technology might enhance work in future health and education environments.

"Collaborative techniques will help bring people together internationally and will assist us in our work."

The new mode of future work sees new ways of interaction among people and more productive interaction between people and technology. The growing maturity of communication technology is enabling collaboration on a scale previously available only to large organisations.

Collaborative technology enables the ability to engage across traditional boundaries with non-routine solutions to problems via collaborative innovation both within and across sectors. Access to knowledge and skills is more available from diverse sources across previously disparate areas of work.

The potential to shift from vertically integrated structures to horizontally integrated networks promises new ways of working and solving problems.

The future of work requires "true collaboration", and this true collaboration requires a lot of people input to be able to use collaborative technology to maximise its value to work.

"True collaboration is not just things like partnership theatre or transactional interactions, but collaboration that starts to blur the lines of which organisation you are in and not in."

Risks are also foreseen in a disrupted future of work. Automation is not only replacing repetitive physical tasks, but also changing cognitive and creative roles in many industries.

The participants in our study identified multiple risks during transitions to future ways of working. Most strongly, poor implementation of technology might not only fail to achieve anticipated outcomes, but also diminish the quality of current practices.

Risks will also be greater if the implementation does not address new processes of learning and skill development for employees as they engage in new forms of work.

What does the future of higher education look like?

McKinsey's Global Institute predicts that the world for graduates of 2030 "will be vastly different from anything previous generations have experienced". The skills required for future work roles will be higher-level cognitive skills in areas such as problem solving, critical thinking and creativity.

"Collaborative technology supports multiple processes with multiple people without leaving lots of ambiguity, yet supporting that human need for community and friendship."

Our participants foresee an ever-accelerating diffusion of collaboration technology. Leading education institutions are now moving resources online, potentially changing education more rapidly than at any other time in recent history.

Collaboration platforms will need to engage with a future where the walls around universities are more porous and allow much greater opportunities for collaboration with communities and industries.

As universities strive to connect more closely with external partners, organisational boundaries will be less clear and opportunities for movement across boundaries will become more important. Collaborative platforms that help span institutional boundaries and connect collaborating partners will grow in importance.

"The future of education is going to be more like 'work', so the difference in the way staff use the platforms and how students use them is getting smaller. Education will provide a real hands-on experience, mimicking industry."

"Collaboration tools point to a future where the walls around the university are much more porous... deep collaboration starts to blur the lines of organisational boundaries."

More diverse paths for accessing education across working life is a common expectation of future education. Collaboration platforms will need to support interaction with individuals who have more diverse learning needs and preferences than ever before.

Integrating and building in artificial intelligence and machine learning to help people along that path means that collaborative technology will start to become more and more embedded into the strategies to improve the future of learning outcomes.

"We will see a much stronger focus and a shift towards online delivery – some will be temporary and some will be permanent. Before COVID-19, most of the city universities in Australia offered little or no online courses, and I think that's going to be significantly changed. It's going to be a very big testing time for universities."

How does collaborative technology transform higher education?

Knowledge delivery

The use of collaboration platforms is changing the way of teaching, and learning is being conducted within and beyond university boundaries.

"The traditional physical setting of a large lecture theatre filled with lots of students in that space would be connected and made available to an even larger group of people learning remotely, whether they're learning from home, whether on the train or even might be connecting multiple learning spaces together."

Experts noted boundaries around university and higher education are breaking down such that learners can access online courses via multiple channels and without the limitation of geographical barriers.

Collaborative technology can reduce the challenges of access for groups such as people with disabilities or students in remote locations. A shared view among experts is that collaboration technology makes knowledge sharing much easier and available to a much larger audience.

Collaborative technology can also improve interactivity and quality of knowledge delivery in a large lecture format.

Aids such as attention monitoring, real-time polls, and interactive Q&A are also available. Besides, lectures could be recorded with collaborative technology which can provide the basis for continual improvement of the dynamics of learning.

Research collaboration

In addition to knowledge delivery, collaborative technology creates more opportunities for collaboration between educators and researchers across the world.

"We use a combination of video conferencing, desktop sharing and document co-writing, where documents are open and being edited simultaneously, as well as conversations. Collaborative technologies just make it easier."

Collaborative technology builds a virtual space where educators and researchers communicate with and learn from each other, develop project agendas, and manage progress both synchronously and asynchronously.

"When managing collaboration across a relatively large team with different roles, it's pretty hard to keep all that communication straight. So, having a way of structuring communication, the ability to gather all of it at the same time is important."

Collaborative technology can create a broader community, where educators and researchers work together and share a diversity of experiences that serve the learning needs and preferences of a more diverse population of learners. When connecting geographically distributed knowledge, virtual collaboration helps to build consensus, inspire innovation, and enhance educational leadership,

Industry engagement

Industry engagement is an increasingly important part of strategic operations in the higher education sector. Higher levels of engagement support the job relevance of learning, the application of research innovations, and the overall levels of collaboration across the economy. Collaboration technology can support a culture of industry engagement across research and teaching activities.

Collaborative technology creates the space for universities to understand better the industry needs, also for industry bodies to contribute to work-integrated learning. When the collaboration between universities and industries are developed with more interactive and seamless communication, the delivery of education outcomes can have more practical value.

Well connected universities have the capacity to boost tales of innovation and create world-class talents. Collaborative technology has the potential to support universities and industry to find more creative ways to work together. With a better and deeper understanding of industry problems, universities are better positioned to amplify research output in broader circles that will shape the future.

"As universities deepen relationships with industry, high-quality collaboration starts to blur the lines of organisational boundaries and motivates movement through different business units with the common aim to achieve a mutually beneficial win-win."

In addition, collaborative technology provides opportunities for students to engage with industry environments more closely. Virtual co-working spaces created by collaborative technology enable students to interact with industry practitioners, participate in industry projects, and receive real-time feedback. Overall, training and collaboration opportunities improve the employability outcomes of students.

"Collaborative technology creates more chances for 'true internship', access to business leaders as industry mentors and valuable networks within the business community. These all lead to better graduate employment outcomes."

Education

	Future directions	Opportunity/ challenge	Role of collaborative platforms
1. Access to knowledge	Less emphasis on facts and theory, and more emphasis on experience and various forms of dialogue. Shift from lecture theatre and traditional ways of interaction to digital education.	**Opportunity:** Delivery of digital education with multiple channels of communications. **Challenge:** Requires a new, specific skill set.	Provide an immersive experience through multiple channels. Enable knowledge management.
2. Problem solving and innovation	Greater use of small group collaborative learning in applied settings.	**Opportunity:** Easier to bring small groups together. **Challenge:** Workload pressures increase from small batch education: New Business Model.	Enable meeting environment for deep exploration and collaboration. Facilitate content creation and project and student management.
3. Employability	More emphasis on skills essential to future employment including networking, presentation, adaptive thinking, and professionalism.	**Opportunity:** Greater diversity of communication opportunities, collaborative platform literacy will be requirement in itself. **Challenge:** will need to be complemented with live, person to person experiences.	Exposure to multiple employment pathways and situations with monitoring and mentoring opportunities.
4. Personal development	Students look for or impact through leadership, teamwork, and social skills within an ethical framework.	**Opportunity:** Greater personalisation and privacy. **Challenge:** Normally acquired "on the job" through participation and in "less controlled" environments.	Provide virtual learning experiences with more social interaction.
5. Location and sense of belonging	Students still look for life-stage experience: cohesion and shared culture in city and regional locations and encompassing international students.	**Opportunity:** Better regional service and international student delivery. Smart campus, integrated experience. **Challenge:** Building points of brand differentiation.	Bridge distances and provide access to high quality education everywhere. Provide opportunity to differentiate and create online university culture of belonging.
6. Research and development	Greater role for collaboration networks across locations and disciplines. More need for innovation and integration of automation in research and development (R&D).	**Opportunity:** Access to complex data and networks, transcend distance. **Challenge:** Managing team dynamics, discipline and project management.	Facilitate team coordination, collaboration, project management. Broaden connections and networks of relationships. Integrate data and analytics.
7. Industry engagement	Priority for industry collaboration that is more "Real" beyond just partnerships (i.e. blurred lines of organisational boundaries with shared goal). Better integration of career development for students within industry.	**Opportunity:** Integrate different perspectives and mindsets; facilitates academic independence. **Challenge:** True integrated/ extended ways of working.	Timely and simultaneous knowledge sharing.

Platform requirements

Data security

- Given, cannot compromise user experience

Integration

- Integrate with bottom up social platforms
- Integrate with student management workflow

Usability

- Reliable: always works
- Easy to create content and an immersive experience
- Channel/team management: avoid complexity
- Meeting space that's conducive for unstructured meetings, co-creation space
- Easy note taking/ whiteboarding
- Integrated but non-obtrusive messaging
- Professional suite of applications also used by industry
- Allow groups to form and for social interaction to happen, including teachers and industry specialists
- Social content management in order to manage abuse
- Real-time feedback about engagement with content; what 'sticks'?
- Allow customised/ personalised digital experiences. Work with universities to reflect teaching and interaction philosophy in the product

Knowledge management

- AI provided content management for educator and student
- AI provided student engagement feedback

What does the future of healthcare look like?

The predominant theme in the future of healthcare is characterised by a shift towards virtual care and a focus on the individual user, with preventative resources driven by data and artificial intelligence.

End-user attitudes are changing with people being more active and willing to inform themselves of the services and choices that are available. The experts we interviewed describe the "consumer push" in driving this trend.

"It's not going back. COVID-19 has changed expectations from consumers and now that Medicare pays for it, a lot of people would rather wait at home than in a waiting room. COVID-19 is not the only infectious disease... people would rather do a tele-consult, if their issue allows that."

Healthcare will shift in focus, partly as a result of the above trend, but also because of the growing maturity levels of technology. Healthcare services are expected to become more customised and data-driven, requiring a fundamental shift in the way healthcare is organised. For example:

"We don't deal particularly well with chronic presentations... we are set up for episodic acute moments, but the burden of disease is shifting, and chronic diseases are becoming something to worry a lot more about. We're being encouraged to think about configuration of spaces, technology platforms and modes of interaction that can be specifically reconfigured to meet the needs of people with our particular kinds of health needs on an individual level."

Despite the advances to date, there is potential for more services to be delivered via collaborative platforms. Recent examples show people can successfully interact online to participate in exercise classes, group wellness activities, and mass choirs.

The capacity to engage in these diverse activities suggests greater scope for health-related services involving interaction between patients and providers.

How does collaborative technology transform healthcare?

We noted above the key areas in which healthcare will likely change in the future. Collaborative platforms will play a role in supporting and accelerating change. Preventative healthcare and aftercare are examples of changes that first require the sector to reorganise themselves before that service can truly be delivered.

In contrast, two core elements of the healthcare system, "the first interface" with the system and "diagnoses" already have been facilitated by telehealth. Collaborative platforms improve the proficiency of healthcare decision making.

"When I, as a general doctor, need specialist input, I would be able to call in specialists when I am meeting the patient, I will be able to screen share and share all the data. That's what is needed with multiple specialties, so then we have the patients at the centre of attention. It will take less time to actually see the patient and give an opinion. So we will be giving people back their time."

Perhaps a less obvious application where collaborative platforms can assist in the short term is in training and mentoring. With collaborative platforms, it is easier for a mentor to look over your shoulder, and vice versa.

"With collaboration platforms, in the future we'll be able to have access to the mentorship experience, depending on their lifespan. No matter the mentees are in primary school, high school, tertiary or they are entering the workforce and need specialised mentorship to integrate in their work environment. So if the collaboration platform has some ability to assign a mentor, we need to have a trustable platform to be able to answer and a certified platform to be able to achieve this."

Many types of care, especially care for chronic diseases, call for team collaboration among health practitioners of different expertise. Virtual care and collaborative technology not only improve team collaboration efficiency but also enable a fundamental new model of healthcare.

"The future will be a much more structured way to deliver healthcare that allows us to not only have cost benefits or travel benefits for the patient, but also to be able to include a more team approach to people's care, for young people, but more importantly for senior care. For young people in some cases one-on-one care is fine, but if you have chronic diseases, serious conditions or aged care, then you usually have a team of people looking after you, but you only ever see them one to one whereas the collaborative technologies and virtual care will be able to change that model. That's where healthcare needs to go – we've seen that start now – but that is fundamentally based on collaborative and communications technologies and being able to do that."

Lastly, visitations to hospitals and social connections are important functions in the healthcare system. And collaborative platforms are making that easier as well.

"So that's the future of the occupation – technology. I (patient's) can see your (doctor's) face on the screen while you are providing a consultation and all the information. The beauty is, you're doing this as well as I can hear you. You can see me, see my body language, you can see how I react and interrupt. And that's the difference in what we're doing for phone calls."

Healthcare

	Future directions	Opportunity/ challenge	Role of collaborative platforms
1. Wellness and prevention	Healthcare model is moving away from episodic towards chronic, consumer-directed care with data-driven monitoring and preventative approaches.	**Opportunity:** Delivery of data driven, preventative healthcare, in increasingly intuitive form (e.g. voice activated). **Challenge:** Privacy, security and interoperability vs purchasing departments not committing to one brand of system.	Human – machine mediated care with visual interaction linked to health data.
2. First interface with healthcare system	Low barrier access to personalised healthcare that can still pick up unintended health cues from patients (e.g. physical and mental health) which may not always be the same GP.	**Opportunity:** Personalised and remote access to health system. **Challenge:** Added workload and digital divide for access – data standards, sharing and interoperability.	Timely consultation that funnels patients to different services based on severity and type of symptom.
3. Diagnoses	Data driven diagnosis, personalised diagnosis. More focus on education: Consumer directed diagnosis. Improved access to specialists (regional vs urban or international) via telehealth diagnosis.	**Opportunity:** Speed to first diagnosis with easier access to multiple clinicians. **Challenge:** Risk of error by not seeing the whole person. Requires accepted standards and boundaries for virtual diagnosis.	Enable easier access and/or access to right specialist in selected circumstances.
4. Treatment	Need to reduce high demand on acute and emergency care, increase of individualised treatment plans, long-term monitoring and preventative health treatment for chronic patients.	**Opportunity:** Treat right-place-right-time, focus on top of the clinician's licence. Less invasive for patients, overall time savings. **Challenge:** Risk of error.	Visual communication with multiple services that have access to integrated health data.
5. Visitation/ patient support	Prevent mental health issues, enhance wellbeing as remedy.	**Opportunity:** Reduce social isolation and depression. **Challenge:** Implementation in busy wards.	Cover distance, bring relatives and friends close.
6. Research and development	Greater role for collaboration networks across locations and disciplines. More need for innovation and integration of automation in R&D.	**Opportunity:** Access to complex data and networks, transcend distance. **Challenge:** Managing team dynamics, discipline and project management.	Facilitate team coordination, collaboration, project management. Broaden connections and networks of relationships. Integrate data and analytics.
7. Education/ training	Increased role of distance learning (in order to expose to right variety cases) and Virtual Reality/Augmented Reality.	**Opportunity:** Easier access to broader variety of cases in '3D' manner. **Challenge:** No replacement for hands-on experience.	Delivery of targeted interactive training activities, monitoring of progress, and feedback about learning progress.
8. Aftercare	Increased role for patient self-monitoring of health progress with timely communication from health professionals as needed.	**Opportunity:** low barrier, no distance. **Challenge:** Patient lack of knowledge and awareness, and insufficient resources to provide immediate care if needed.	Remote access to integrated medical resources that provide personalised care.

Platform requirements

Data security
- Private communication
- Secure health data

Integration
- Interoperability with health data systems
- Integrated workflows
- Medical device integration (e.g. share home scan results)

Usability
- Patient intake
- Data capture
- Patient log access
- Booking, queuing, meeting
- Visual interface
- Document sharing
- Billing
- Follow up
- Referral system

Penetration
- Critical mass: 100% reach of the whole ecosystem

Access
- Device independent
- Emergency access (e.g. without data plan)

Knowledge management
- Integration of AI
- Data collection and storage
- Interactive 3D capability for training

Adoption factors of collaborative technology

In line with the Centre for Technology Infusion's (CTI) Technology Adoption Model, three factors can be used to evaluate the status of technology adoption.

Below, we elaborate on these three factors to evaluate: whether collaborative technology will go back to where it was before COVID-19, or will it thrive and enable a permanent change of working going forward? These three factors are:

1. The importance and urgency of the underlying need.

High levels of importance and urgency create the so-called "burning platform" that drives change, unlocks budgets, secures swift approvals, etc.

2. The attitude of the people that are required to change.

Are they reluctant or eager to change – and do they have the knowledge of the tools that can help them change?

3. The cost and effort weighed against the benefit of the technology that facilitates change.

Does the technology deliver clear benefits at relatively low cost and effort? This factor also includes an evaluation of collaborative platform performance.

1. Importance and urgency

Collaborative technology platforms are considered greatly important for the type of work involved in higher education and healthcare, especially with the impact of COVID-19. It has sped up the process of working in the virtual space in a two-month period, before which the importance of collaborative platforms was not recognised as highly as it is right now.

Reformation of work is already happening, faster and to a larger extent in healthcare than higher education. With governments around the world grappling with aging populations and a rise of lifestyle-related illnesses, for the healthcare sector change is paramount, and hence many care institutions are reforming.

"[The hospital] has just approved a major tech to roll out, a major population health or wellness initiative. The issue for them is twofold. One is people turning out to the emergency services with something that's not an emergency. The second thing is, they also understand that about 15% of the population that they service covers 80% to 85% of the costs that come through the hospital. That could be somebody who's dealing with chronic conditions, but a lot of that has to do with the social determinants of health and the environments that they're living in, these conditions keep coming back out. So the idea, is to spend a little bit more time looking out into that population and managing the conditions that living from a social determinants of health point of view, with which they can slow down the continuous rate we can see these repeat offenders in hospital. Those wellness initiatives are really moving forward, more quickly. And it's because people are starting to think beyond the old system."

With work becoming increasingly global, collaborative technology makes global collaboration more cost effective and efficient. Asynchronous, international collaborations might not happen without collaborative tools.

For healthcare, collaborative technology is the key to providing a low-barrier access point and a low-cost manner to allow preventative check-ups and aftercare – outside the hospital or GP's clinic.

"Have some digital connectivity into those communities, get some visibility around those targeted at-risk population. To monitor and manage the social determinants, but also to give people their own health education for them to understand their own conditions in their own agency. We are in the emergence of healthcare beginning to look at new models. Because telehealth has made that jump where people are thinking, they'll be just beginning to open their minds up to new ways."

For higher education, collaborative technology contributes to work efficiency and cost effectiveness for collaboration across geographical boundaries.

"A lot of opportunities. I'm on a research committee, we meet several times a year in Melbourne. That means I must fly to Melbourne, spend a night in Melbourne, go to the meeting, fly home. That's expensive, and it's also expensive in terms of my time, and it's tiring. Now I can run that meeting effectively from here. It's far more efficient."

The experts we interviewed generally agree that urgency is relatively low in terms of a need to change the tools themselves. Tools were viewed to perform quite well.

"On the other hand, it is commonly identified that the importance and positive impact of collaborative platforms are limited by the level of adoption. If collaborative tools are not used for 'anything that is significantly different if we had no collaboration tools', when the urgency of COVID-19 response is reduced, for example by discovery of an effective vaccine, then the role of collaborative tools will diminish if adoption is superficial rather than systemic. The potential is a lot greater than what is there now. It is better, but it's marginal."

"In all honesty, ever since Skype came along, there wasn't really anything that has made a substantial difference."

"Because of COVID-19, people got more used to using collaboration tools. My personal belief is that people will quickly forget that and will go back to most meetings being face-to-face. Not having that direct human interaction is still not good."

When working with collaborative technology, fundamental capabilities, such as good pedagogical principles and effective communication, remain essential. In other words, the extent to which collaborative technology could play an important role for future collaboration depends on the integration of the "human" element.

"In terms of education, student interactions and learnings, [collaborative technology] creates a lot of opportunities, but not all students want to learn online or be in an online environment. So how do you create a positive learning experience? That's a bit more challenging because it involves pedagogy, it involves professional development and training to help your academics create that space, and you're drawing on a larger cast because then you could be working with learning designers and developers."

Some noted an urgent need to change the way different parties work together, as well as how to work more effectively with collaborative technology.

Relatedly, experts generally mention that support for using collaborative technology for higher education is urgently needed.

"It doesn't just happen and, we've seen a really huge bunch of very smart people that universities grapple with using tools for education and still flounder. Because there just isn't a lot of attention to educating people about it."

Assistance, learning, teaching and helping people to develop experience and to utilise collaborative technology better all seem basic, but are all important and are not always available in higher education at the moment. We expand on this when we discuss recommendations to make the most out of collaborative technology.

2. Attitude and awareness

Collaborative platforms have been around for quite some time. Despite ongoing changes in work, platforms were not widely considered as a key means to deliver services. A lack of experience drove an attitude of indifference and scepticism.

Pre-COVID-19, attitudes in higher education were largely negative with professionals describing collaborative technology as a chore. Universities might often teach and make sessions available online for people who could not attend face-to-face sessions, but the online experience was not central.

"I think initially it was very negative. Especially people who are very good at teaching in a theatre, they hate to do that online teaching. The primary reason of people's resistance of online teaching is because of the extra work that needs to go into that."

Acceptance of new technology often starts with some scepticism because nothing "ever seems to work" before users become more familiar with the experience and potential benefits.

In healthcare, there is even more scepticism because it is coupled with risk avoidance. Both medical practitioner and patient felt that a face-to-face doctor's visit is required to avoid missing symptoms or drawing the wrong conclusions.

"From a leadership meeting point of view, I would say people are very positive about it. But in terms of clinical use in clinical applications, the patients [are] probably less positive, very sceptical because of lack of exposure. But the fact is that it is much easier than they suspected."

At the moment, pre-diagnosis and treatment follow-up are the focus of the healthcare system. In very specific cases – for instance looking at facial movements immediately after a cardiac arrest – collaborative platforms are now accepted if the distance to a specialist is a barrier.

In overcoming the scepticism, sometimes seeing is believing. COVID-19 forced people to endure initial frustration and persist with collaborative technology, therefore exposing them to the possibility of what can be done with these tools.

In a matter of weeks, awareness and attitudes changed significantly in both education and healthcare; from "there's no substitute for face-to-face" to "online seems to work well". The field of higher education now in general has a positive attitude towards collaborative technology.

"COVID-19 has had a lot of positive influence on people's awareness of the existence of collaborative tools within a short time. Until then there have been struggles for years getting people in higher education to embrace it or even just to give it a proper try."

Even so, many higher education experts recognised that the high levels of awareness of such collaborative tools, has not translated into a good understanding of these platforms. End users, in general, have a good knowledge of what collaborative tools are available, what they can do or cannot do.

However, the fragmentation of the product market introduces barriers to more fully realise the potential of any specific collaborative technology. Knowledge about collaborative platforms is only skin deep.

The lack of deep understanding – beyond the surface features to the collaboration possibilities and how to leverage them – impedes the benefits that users can extract.

"Collaborative technology is capable of so much more than they're being used for. Because the market seems fragmented, you don't spend the time with any one platform long enough to really get to know what else it can do."

In healthcare, a lack of digital literacy has slowed down the rate of adoption of collaborative platforms.

"In terms of awareness? About 50/50, 50% are aware and the other 50% are not aware and don't use it at all. It's probably used, but not integrated yet into normal operations."

Although some of the world's most advanced technology is developed and applied in healthcare, for instance remote robotic operations, the healthcare sector has been notoriously slow in digitisation overall.

"The importance? Yes, but is there the knowledge and awareness? Absolutely not. The healthcare system services and people very, very digitally illiterate. Every organisation I go in has a million different systems and processes in place. Paper still exists, faxes still exist, Excel is a nice advancement. After that, they're a million miles behind other industries."

Despite the generally positive attitude towards collaborative technology, social connections remained a major concern for end-users.

Although collaborative technology allows people to maintain connections when meeting in-person is not possible, the shared view among our experts is that the virtual environment does not provide sufficient feedback compared to in-person meetings.

The degree to which a platform facilitates social interaction could become an important driver of people's adoption attitude. We further elaborate this point when we discuss important factors users consider when adopting collaborative technology.

"At the end of the [virtual] meeting, a lot of people feel tired because they have really had to pay attention. I hear quite a few colleagues say that they are 'Facetimed-out', or 'Collaborated-out'."

3. Performance (Cost and efforts versus benefits)

The initial benefits of collaborative platforms have been easy to capture, and many of which have been mentioned above: Collaborative platforms are easy to start, saving travel time and overcoming distances.

Experts generally agree that investment in collaborative technology is not only expected by students and patients alike, it is also worthwhile, and that failing to explore these opportunities risk successful adaption to future work requirements.

The benefits need to be understood by decision makers in an organisation in light of costs and resources that are needed for the adoption of collaborative technology. Without top-down investment, benefits and opportunities would be limited.

"Organisations could roll out tools and say to people 'this is the tool'. But if people don't see the advantage of collaborating, if they don't have the right mindset on how to approach a session, they'll never use the tool. So effort devoted to changing the mindset has to come first. You've got to really put an effort on encouraging staff to go to those [tools] and say, this is going to be our way forward. If the CEO was going to make this a fundamental to how we operate, he would be going to people: 'This is how we're going to operate, this is going to be the future way of our working, so these are the tools that everyone needs to be proficient in.'"

Opinions are divided about how much effort is needed to use collaborative technology when used by professionals with different levels of knowledge and experience, or who are using it for different purposes. It is generally agreed initiating the use of technology does not require a lot of effort, such as researchers having virtual meetings or a general kind of administrative use.

On the other hand, the effort required for the change management process, as well as the training and upskilling associated with it, is much higher than the efforts required for technology itself. As one technology expert commented, once the technology is up and running, additional effort required can be quite small, but the beginning can require a lot of effort.

"We're focusing on the first three months; we've called it our change management plan. The first three months is training, education and simulation, and change management. We are devoting three months of our team's time to getting in the organisation."

It is even more challenging on the education side for lecturers to build a positive learning experience, not simply replicating the classroom experience in the virtual space, but also going beyond it.

The creation of a positive learning experience in a virtual environment requires a great deal of effort from lecturers and goes beyond using technology to include developing new pedagogy and creative ways to promote student engagement.

So far, most lecturers are not using collaborative technology in a way that is substantially different from how classes are delivered in a physical setting.

"They see the online environment as a representation of the physical. So what they've done largely is to make PDFs available online to students, using online discussion boards, it's a very passive environment. And then they'll do a video of themselves giving a lecture and post that up. So the package really is the video and the PDFs. And quality then becomes a major issue as does the student experience, more importantly, because it's not so dynamic. In other cases, you see some (very few) really good examples of people who've been working for some time in the online environment, they have integrated a raft of different pedagogies to initiate and sustain interaction through the various applications, and they can do this synchronously or asynchronously, and they seem to have a lot of success."

Because the end goal of collaborative technology is to ease work for people, reliability and stability of platforms are essential. Avoiding connections dropping out and experiencing good quality sound and visuals, are important because they contribute greatly to an enjoyable and productive user experience. Ease of use also was mentioned repeatedly by experts as a key factor in driving adoption.

"For all other consumers and staff, it has to make the job that they're doing easier in the long run. Make it solid, faster, easier, better. It has to make them do it".

Under current academic workload systems, lecturers report that they do not have enough time or support to proficiently and confidently redesign learning in any substantial way.

Professional development support is available to make their learning process less time consuming. Collaborative platforms that can integrate tools with which end users are already familiar are relatively better adopted.

Collaboration in higher education and healthcare often involves complex tasks and dynamic interactions, making ease of use an essential criterion. In addition, users are more likely to experiment with new collaborative tools that are intuitive and easy.

"Document sharing, being able to share sound, and understanding how to share the document and share sound if you need to... some of that is quite complex. It's a problem if someone is the host for a meeting and they don't know how to enable the security function to let everyone share a document, and someone wants to share a document. That can become a problem because you can't really run the meeting."

"There are basically two ways to get people to do something, create an incentive, or reduce the frictional costs, at least make it no harder for them. And that's the challenge with the use of collaborative technologies for GPs. Really coaching has got to be made no harder for them than just opening the door and seeing the next person in their waiting room. And I think that's part of that policy problem."

Fundamental factors such as security and privacy issues are noted as important factors to consider. To some extent, the security of the platform is a signal about the security of the organisation using the platform.

The “human” component is a highly valued aspect of collaboration within the higher education sector. Because of the relatively lower risks and concerns with security compared to healthcare, many higher education experts noted a willingness to sacrifice security and safety features for a better group interaction experience.

“I know there all are sorts of security issues and other things that are negative about [Name of Platform], but actually the layout of the screen works well for virtual groups. It’s just that it works so much better in a group situation and the group display is more important than I ever thought it having spent so much time on it now.”

Barriers with adopting collaborative platforms

Given the fact that people in general report a positive attitude towards collaborative platforms, as well as high importance and urgency to change. Why do we still see barriers in adoption? Below we summarise some barriers that emerged from our interviews.

High standards to meet: Quality and safety

In the healthcare sector, quality and safety are critically important. Thus, a high standard of reliability is expected before a technology is endorsed by users. All of the experts agree that the reliability and interconnectivity of the platforms should be:

"... for a solution to be 100% endorsed, it will need to work 100% of the time. Sound, vision, downloads, internet speed, all these factors need to be taken into account so that these platforms can be become as reliable as the telephone line."

Data integration, security and interoperability

Data privacy and data security are essential requirements. The potential for digital technologies to support a holistic approach to healthcare is limited because data are not shared sufficiently, and in many cases because the various institutions have not agreed on a shared data standard.

"... the kind of technologies, collaborative technologies that are going to be deployed in healthcare are going to need very high standards of information security, and to meet privacy concerns."

Privacy and governance

When collaborative platforms are being promoted across universities to conduct online teaching, privacy, surveillance and associated governance issues raise many questions that need to be addressed:

"When the university promotes a collaborative platform, is there a requirement to moderate student interaction and behaviour? What are the university's responsibilities and obligations in there to keep students safe? Where does the responsibility of the university start and stop? There's a whole bunch of questions for universities to consider..."

Integrated workflow

The healthcare sector also identifies that platforms need to be integrated within existing workflows if they are to be effective. The lack of workflow integration not only limits its potential benefits, but also creates extra work.

"It's actually more work for doctors, when we are doing this teleconference we are really focusing on the patient, so we do need to spend extra time after to make sure that we read all the notes and everything's documented. We don't want to be put in a spot where we can miss something."

Comparing the use of collaborative technology in higher education and healthcare

The nature of the work involved in higher education and healthcare differ in ways that have implications for the applications and opportunities of collaborative technology.

1. Higher risk and security concerns in healthcare

Through our interviews, healthcare experts expressed much higher concern about data security issues in adopting collaborative technology, compared to higher education experts.

Healthcare involves the transmission of patient data and information between different parties, creating higher risks of information leakage compared to delivering education content online. In contrast, experts in higher education commented that with platforms better for facilitating social interaction, a group setting would be preferred regardless of their reputation for security and privacy.

"... Information security and privacy is going to worry a lot of system players in healthcare..."

2. Higher need for a focus on the "human" component in higher education

The value of higher education goes beyond knowledge sharing to include student engagement through a vibrant campus life, connections outside of class, and personal development opportunities. Tools have been widely used to move classes online, but the missing part of "human" experience is still limited.

"The really valuable education is around the interactions of humans."

Because students can readily access information through multiple channels, including print and online media, added value of higher education comes from tacit knowledge acquired through various forms of interpersonal interaction.

Education experts shared a high level of concern that collaboration technology might reduce the opportunity to learn through interaction. Healthcare experts in comparison – even though placing a high value on "face-to-face" interaction for diagnoses or treatment – saw multiple ways that personalised care could be improved through virtual communication and integrated medical resources.

3. More potential for data-driven benefits in healthcare

Many healthcare functions benefit from data-driven decision making provided through technology applications. A recent MIT Technology review article calls for a data infrastructure that allows for new ways of delivering care in the post-COVID-19 era.

Technology that allows collection and analysis of data to reveal new patterns and insights can greatly benefit clinical services. In comparison, although the administration of higher education relies on multiple data sources, learning itself is associated with human-human interaction.

In this regard, technology's contribution to higher education is more dependent on how to make human-human interaction more efficient.

Enablers and best practices: What can organisations do to get the most out of collaborative technology?

In general, the experts in our interviews described the market of collaborative platforms to be homogeneous, with any one platform unlikely to have features or functionalities fundamentally different from another.

Advocates for one platform over another often relied on small differences about user experience to influence platform adoption. Users are also likely to rely on one or two familiar functions to evaluate a platform.

From our interviews, we identified five key messages for organisations to consider when implementing collaborative platforms.

1. Clarify the goals of collaboration

Our first recommendation will seem self-evident if not redundant: collaboration technologies should support collaboration. Yet the requirements for collaboration are evolving rapidly and any platform will need to enhance the capacity of people to interact with each other and with other technologies. As our interviewed experts emphasised, "true collaboration" is fundamentally a question about how people work together.

"There is no one size fits all... we can actually use technology in all kinds of scenarios... but we can't do technology for technology's sake."

The ultimate value of a collaboration platform will derive from the extent to which it enables better communication and understanding in an increasingly networked world. The need to match the technology with the teaching strategies should be considered.

"It is very hard to say how collaborative technology could help in the education sector. If we haven't decided how we want to teach... then how can we decide how to leverage the appropriate collaborative technology?"

The imperative to match technology to intrinsic collaboration needs means that end-users should be actively involved in adoption decisions and clarifying the objectives of collaboration.

2. Manage change, not just technology

Myriad stories of technological failure in past decades highlight the problems of implementation rather than the technology itself. Our participants, too, warned that important lessons should be learned from previous failures of implementation. The change management process – communication, training, responding to problems – is much harder than technology itself. Implementing collaboration technology, as with any transformational change, can trigger misunderstanding, unrealistic expectations, and resistance.

"If we do not get the order right, we might very well have the top collaborative tools in the market, but still struggle with collaboration."

Defining all the factors that are important for change implementation is beyond the scope of this study. However, some factors are critical. Senior management should prioritise their role in championing this change, not only as technological change, but as a new way of working and a significant culture shift.

"You roll out the tools, you say to people this is the tool, but if they don't see the advantage of collaborating, if they don't have the right mindset on how to approach a collaboration session, they'll never use the tool."

Participants highlighted the importance of employee perceptions and attitudes towards technology, captured in the notion of "mindsets".

"The change process starts from transforming higher education professionals' mindset to think differently regarding the end goal of education and pedagogy to create a positive learning experience."

The change plan must support the skills and mindsets that are critical to successful implementation. Appropriate training and development need to be integrated into the implementation process:

"It doesn't just happen and, we've seen a really huge bunch of very smart people in universities grapple with using tools for education and still flounder."

3. Customise the platform for individuals, teamwork, and workflows

A consistent theme throughout our interviews was the need for platforms to reflect the needs of users. User needs can be considered at the level of the individual interacting with technology, the team level at which people interact with each other, and the overall design of work systems.

More individualised services are central to our participants' view of the future for both education and healthcare. The growing expectation that technology will be more adaptive has major implications for the role of collaborative technology.

The integration of new AI applications with platforms is increasing the capacity to customise the experience. This capacity will likely increase over time, so implementation plans should take account of new opportunities not currently available.

"The thing that's missing right now is that there is no computational AI in any of those processes. So the big shift that's going to occur is when AI and computational resources get added to the mix."

"Most organisations approach the introduction of the platform wrong. They provide training that explains all the functionality, whereas users will only remember and start using a few of the things that have been presented. The better way to introduce it is to customise the platform to the needs of the use case and teach specifically what people need to know to deliver that use case."

For individuals, successful implementation depends on how easily and efficiently core tasks are supported. If simple activities can be managed more easily through technology support, participants will then see the platform as providing more opportunity to deal with more complex and interesting tasks.

"Whether you're a nurse or a doctor, using this platform is going to make it easier for you... able to focus on those things that are of relatively higher value, a comparative advantage... and that's good for you because that's where you get your challenge and highest personal rewards."

Teams are the heart of platform operations, so it is important that technology enhances key collaborative and communication tasks to a certain work team or organisation.

"Where I've seen the most successful adoption is when organisations have taken a step back and looked at what are the key activities that the bulk of their employees do. Is it that I need to have a meaningful integration? I need to be able to easily set up meetings? I need to be able to create team spaces? I need to be able to pull people in really quickly? And then create the adoption around that – not how do I use this tool, it's got these big features, etc. I think if organisations started looking at usage-based models in terms of adoption, the adoption would be quickly taken up because it would be – I really do need to know how to do that."

Collaboration platforms should be embedded in workflows that are essential to health and education processes. Platforms that can adapt to the optimal workflow will be more useful and effective.

"With human decisions integrated into the workflow to a higher extent, one can more easily identify areas where the person can add the most value and find the most rewards."

Finally, we note that adopting platforms solely as a cost reduction strategy is likely to work against the goal of customising. Participants commented that a cost strategy tended to increase the reach of the platform, but reduced the ability to customise experience.

4. Maintain ongoing security and privacy

Data security is an immediate priority for any collaborative platform. The capacity to protect data requires early and ongoing vigilance for security challenges arising from technical features of the platform as well as user behaviours that might create vulnerabilities in secure systems.

As discussed earlier, health and higher education sectors differ in the levels of current security expectations. To some extent, the type of data will determine the level of risk. Where sensitive personal information is communicated, then vulnerabilities should be evaluated rigorously and continuously to maintain a very high level of security.

In addition, the perceived risks associated with different types of data are likely to change over time in response to growing awareness of the value and consequences of data sharing.

For example, "knowledge leaks" of proprietary information is likely to be of greater risk as more people share information across networks, and students will likely become more aware of how collaboration through platforms generates personal data that can be recorded, stored and shared.

"My face has been on a lot of calls, what could happen to those data? My voice is left on everything that I've done, and it's somewhere in a cloud to be found by someone... That's all evidence of who I am, who I have been or who I was."

An important goal of collaboration platforms is to enhance communication and decision making. Increasingly, this goal will be supported by the integration and analysis of multiple sources of data.

As new forms of data are integrated into communication, new vulnerabilities will arise, and risk perceptions are likely to change. Ongoing risk evaluation is therefore a critical recommendation for implementing collaborative platforms.

5. Explore new opportunities for skills and work design

We recommend actively exploring the new opportunities created by collaborative platforms. The rapid uptake of these platforms during the pandemic might not translate to sustainable change without attention to the possibilities for change they entail. Platforms will be...

"limited if people only use them for what they typically do by themselves or not used anything that is significantly different if we had no collaboration tools."

New skills might be needed to make the most effective use of platform potential. These skills go beyond the technical requirements of a specific platform and extend to the skills for delivering better services in health and education. The ability to deliver a positive learning experience or respond to changing patient needs.

Take the higher education sector as an example, new skills are required to not only replicate the classroom experience in the virtual space, but also going beyond it. Not all students want to learn online or be in an online environment. The creation of a positive learning experience in a virtual environment requires a lot of effort from lecturers, which goes beyond merely using technology, but also developing new pedagogy.

"[A university student] not only enjoys the lectures but also all the things that go with a university, like the discussions with people outside of it, meeting new people, etc. When universities switch to online presentations, and they've done really well, but students easily become disengaged because it's such an isolating experience, people not contributing. I think we fool ourselves if we think educational experiences are just what goes on in a lecture theatre, it's much different to that. An educational experience involves a whole range of other indirect interactions, rather than having someone impart information to you in the lecture."

Future development needs for collaborative platforms

1. Richness of human interaction

Looking to the future of collaborative technology, one that indeed integrates the human component into designing and adoption, opportunities can be exponentially enlarged. Platform needs to be integrated into the current workflow to be able to exert its maximised influence.

Artificial Intelligence (AI) can be ingrained to improve multiple aspects of collaboration, depending on clearly defined needs and end goals. For example, it can be attained by machine learning to generate reports based on observing groups of learners to know how well or bad the collaboration pattern is and to provide feedback.

"The thing that's missing right now is that there is no computational AI in any of those processes. So [a] big shift that is going to occur is when AI and computational resources get added to the mix."

A commonly raised issue with using collaborative tools is the lack of social cues, that it does not help people connect as much as in person.

"So that we are in that virtual room, they feel connected to the teacher, the teacher feels connected to the students and the students feel connected to each other. And I think certainly technology is going to have a role to play. But I think the method of interacting with both the student and staff member must adapt, how much of it is what you can't really do it like that online, what doesn't work."

During in-person meetings, one can look at the body language of one another and intuit from the body language, obtaining feedback such as whether they are engaging with the conversation or inferring their mood.

As a result, attendees can adjust their communication to benefit the message they collected. In an online environment, it is much more difficult to learn how to do, as well as for listeners to convey that they are actively listening to someone. As collaborative technology utilises more sophisticated platforms in the use of AI, algorithms could run in the background capturing information to provide social feedback.

There are also risks associated with people being excluded from using virtual collaborative tools, especially as group size gets bigger.

"When someone who does not contribute very much, in the current setting their face never pops up, it's very easy to forget that person is there. That's a potential issue."

If technology can, for example, notify the meeting host to encourage Person X to contribute, social interaction dynamics can be facilitated.

In conclusion, collaboration is in the end based on human-human interaction, therefore, collaborative tools are effective to the extent they factor in the "human" component when designing features. Collaborative tools that proactively consider user needs can potentially make a big difference in driving adoption.

"It needs to be efficient, quick, intuitive and easy. How does it integrate with every user case? So can the collaboration platform be used with somebody's own personal device and allow them the security, not use their data, and particularly use it simply, and we still allow insurance? And that would be the best way for us because it's not limited."

2. Intuitive, integrated and smart

One of the challenges is to develop technologies to be intent based, more adaptable and individualised, so that the use of collaborative technology better satisfies the needs and expectations of end-users. Customising collaborative technologies and integrating it into workflows to better reflect – "how stuff actually gets done" – is the ultimate goal. For example, one healthcare practitioner we interviewed mentioned the challenge of conducting home care:

"When we talked about our vision in the past that we want to go home care at home. Now, how can I link your appointment to my hospital records? And that's the problem. So, if we're having a consult, and you're talking to me about my condition, how do you link the consult? How do you time the duration and how do you charge for? That's a challenge."

"What hasn't happened in health is that they haven't taken this up before and integrated all those component technologies in a vertical that's suitable for this particular way. So, we are in the emergence of healthcare beginning to look at new models. Because telehealth has made that jump way where people are thinking, they'll be just beginning to open their minds up to new ways."

3. Ubiquitous interoperability and understanding

Another aspect that collaborative tools can further develop into, is to create a ubiquitous and universal understanding of the platforms, bringing awareness to the general population and incorporate the culture shifts into normal practice.

There is a complicated and rich ecosystem around collaborative technologies and all it can be used for. But many people do not have a good understanding of what the full potential is and what that capability allows. This could potentially create a digital divide. The pandemic has surely created awareness:

"What's different today from 10 years ago, is the ubiquity of the service. It's becoming ubiquitous and it's becoming a standard part of life. It's less of a psychological jump to those. That's probably the difference in the population attitude more generally. Still, large cohorts are not familiar enough. But because it's now funded, and people will be forced to do it. There's again telehealth is not going away, but we're not there yet."

Conclusion: Collaborative technology and future work

In summary, to some extent, COVID-19 forced people to embrace the benefits of collaborative technology. There is much more awareness in higher education and healthcare that collaborative technology can deepen the potential and expand the horizon, and experts in these two domains generally expect the role of collaboration technologies to grow incredibly in the future. On the other hand, we also have observed much room for improvement.

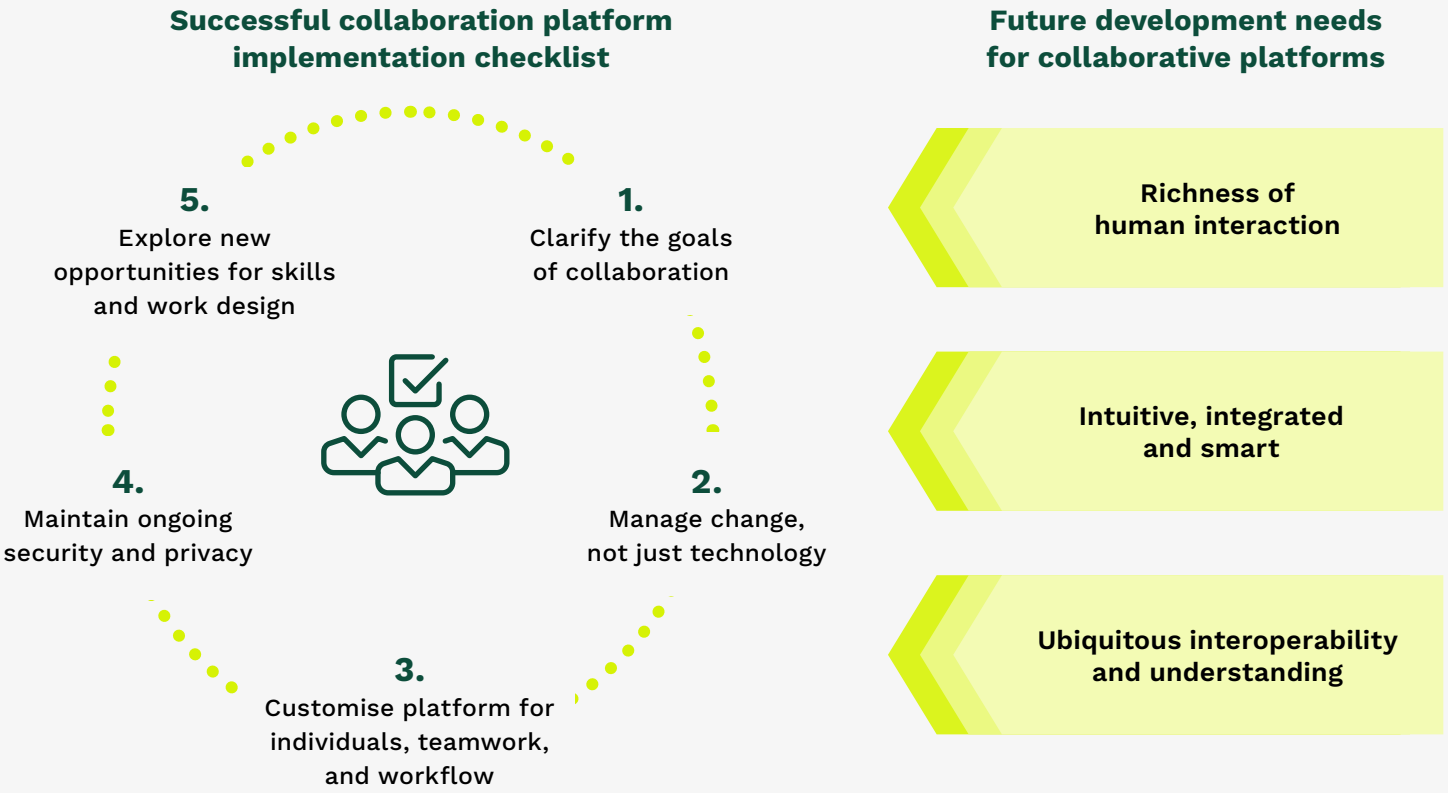
The future of collaborative technology depends more on, and requires more effort devoted to, the "human" factor than the technology factor. The change process would start from transforming end-users' mindset to think differently regarding the end goal of collaboration, then defining the pedagogy and process (i.e. how to get there) at a high level to clarify what collaboration means and what the key objectives are.

Getting the mindset and process right serves the basis for, and informs the adoption and development of, collaborative technology. If we do not get the order right, one might very well have the best collaborative tools in the market, but still struggle with collaboration.

"You roll out the tools, you say to people this is the tool, but if they don't see the advantage of collaborating, if they don't have the right mindset on how to approach a collaboration session, they'll never use the tool. So mindset has to come first, if we don't have that right mindset at the start, it'll never work."

"That's where technology needs to 'take a step back', enable the human element... because there is no one size fits all. And I do think we can actually use technology in all kinds of scenarios to give us new opportunities, but we can't do technology for technology's sake."

Summarised recommendation checklist



To find out more,
visit **optus.com.au/enterprise**
or call us today.

1800 555 937

optus.com.au/enterprise

@optusenterprise

yesopt.us/blog

OPTUS | CISCO | LA TROBE UNIVERSITY | Curtin University