Imperial College London

ICT Business Plan

Discussing investment in technology to realise
our digital ambitions across the College

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Executive Summary

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ICT's Response

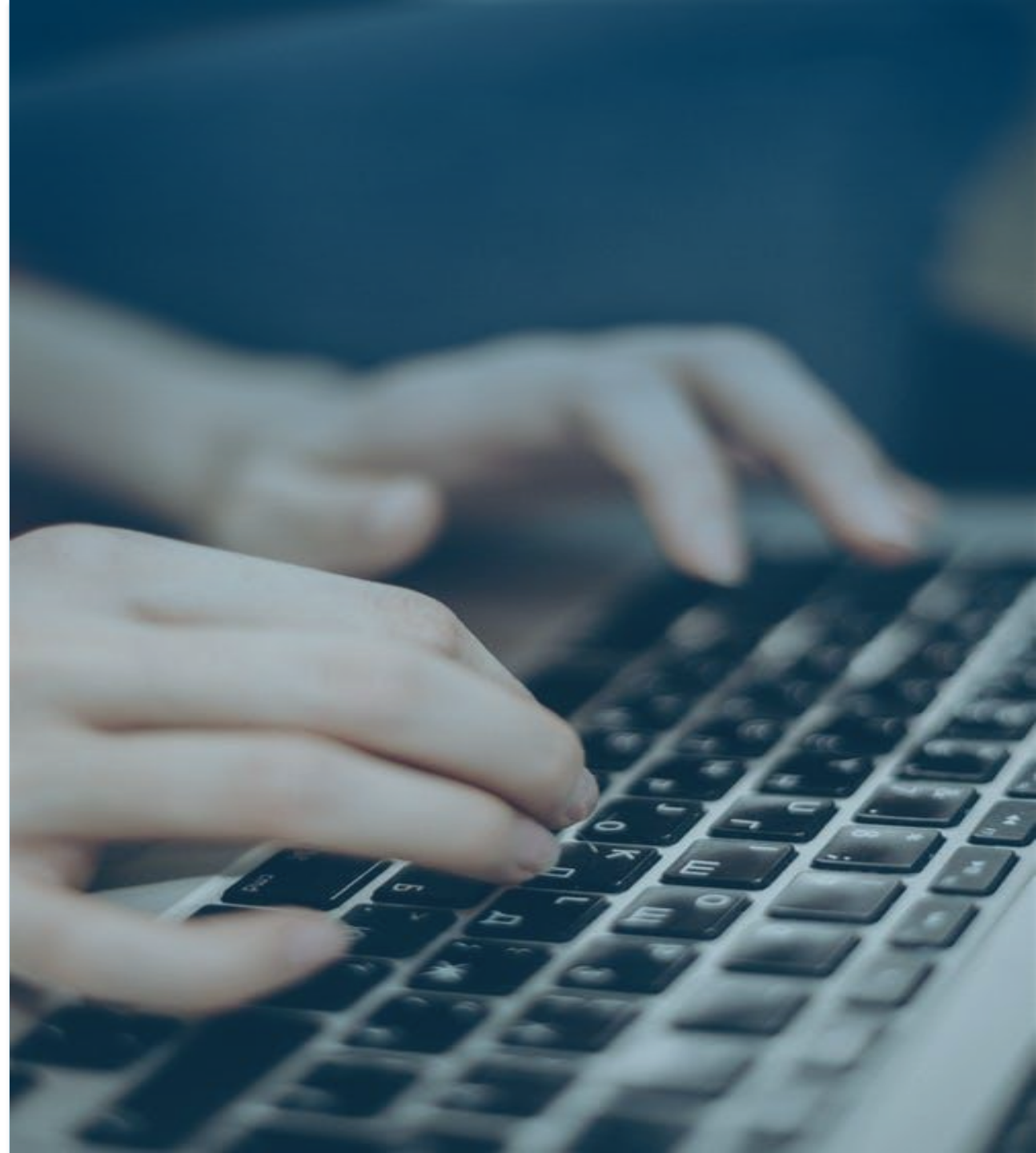Building a Reputation as a Digital Leader

Delivering Business Value

Priority Pillars

Underpinned by ICT that 'just works'

Enabling Digital Growth

Transformation Journey

Next Steps

Executive Summary

Digital technology is now part of all aspects of the College's activities. It is therefore increasingly important for ICT to become part of the fabric of the College. The intent of this document is to initiate this collaboration and consultation.

This document is a starting point to **engage with the wider College** on shaping ICT's 5-year business plan.

The College has amazing ambitions, with many of Imperial's strategies **extensively referring to digital goals.** These include interactive teaching techniques with cutting-edge online and digital technology, and for research to embrace the possibilities of data. These **ambitions lean on ICT enablers**.

In the last year ICT has **come together** with the College to **raise ambitions** and moved staff and students online successfully as the pandemic hit the UK.

ICT aims to continue to build on the recent successes and in partnership with the College, drive digital maturity and deliver **transformative work in 6 priority areas** and their respective enablers: the student journey; education; research; service & support; cybersecurity; ICT workforce.

Optimisation in these areas will **enable College strategies**, and contribute to enhanced agility and resilience; enrolment, retention, and employment; operational efficiency; innovation; and cost-reductions, with a one-off investment anticipated to result in **annual run cost savings** for the College.
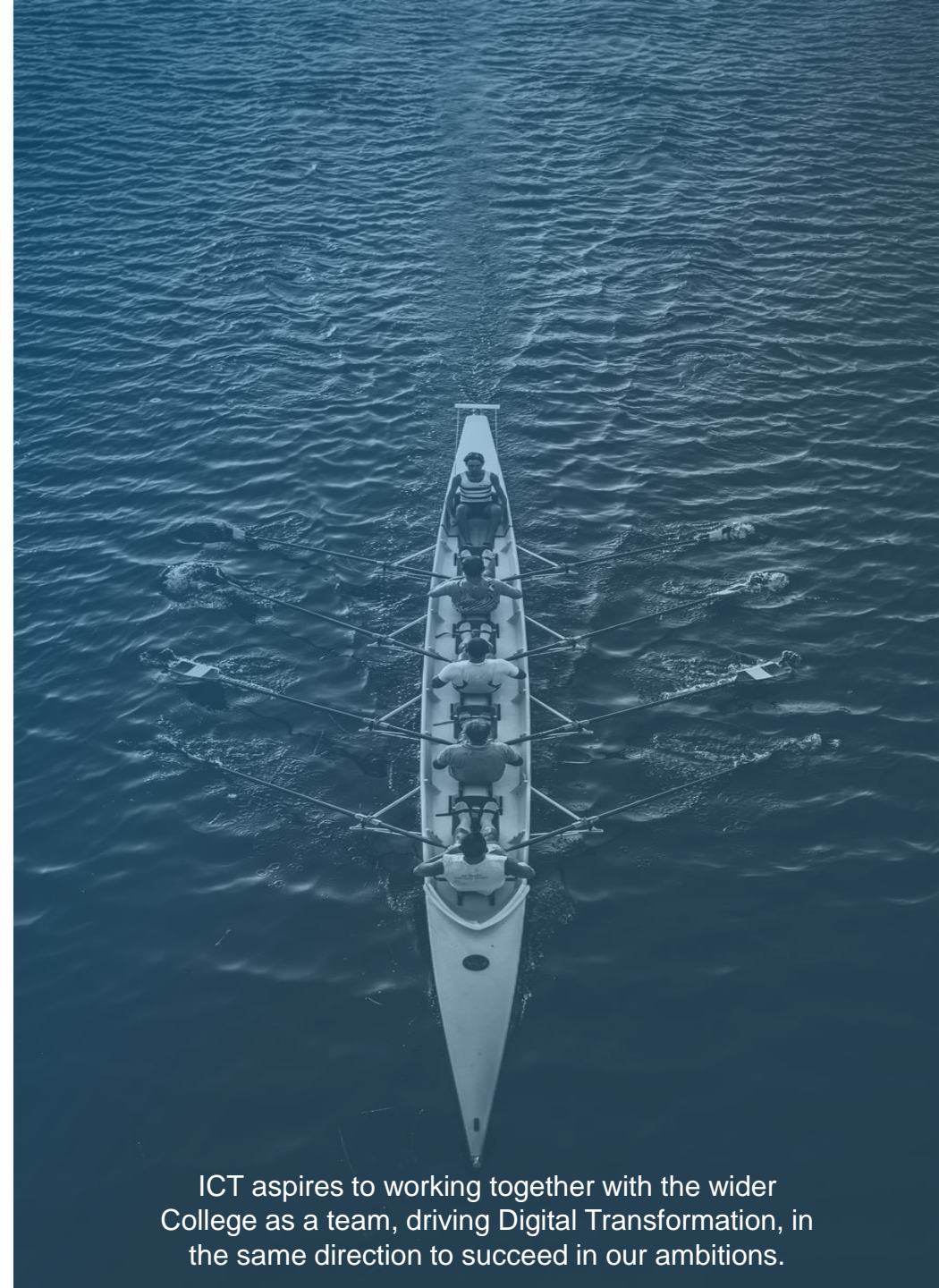
ICT aspires to working together with the wider College as a team, driving Digital Transformation, in the same direction to succeed in our ambitions.
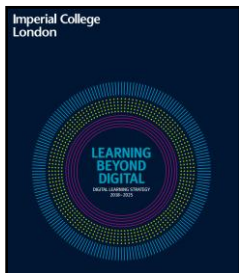
Ambitions across the College

Focused growth over next 5-10 years (indicative)

- Academic growth by 25% ~300 academics
- More students on credential programmes (~3,000)
- Growth in digital education / lifelong learning offering - e.g. MOOCs/Open content (+250,000), micro credentials (+10,000), ExecEd/CPD (+10,000)
- Build /invest in professional services that can enable academic mission
- Focus on improved efficiency and world class infrastructure – continuing to support renovation of existing estate

Sense of scale at this stage:
- space at WC to bring together faculty, business and stakeholders (e.g. 300 academics x 300 sq/m)
- additional teaching and support space at SK and WC (e.g. +3,600 students + support staff = 36,000 sq/m)

Imperial College London   June 2021

Future Planning – Academic Mission and Growth Strategy

HoDs Lunch

Increase online offerings with global reach

Be informed by statistics & embracing the possibilities of data

ACADEMIC STRATEGY 2020–2025

Enable 'smart society' discovery & development with AI, machine learning, statistics, data sciences

Imperial-X

Implement IoT & cyber-physical systems as "Natural home for research in the "Smart Society" theme of the academic strategy"

Digital and online technology to enhance collaboration and community on campus

Imperial College London

Innovative teaching for world class learning

Learning and Teaching Strategy

Interactive teaching techniques in innovative pedagogy with cutting-edge online and digital technology
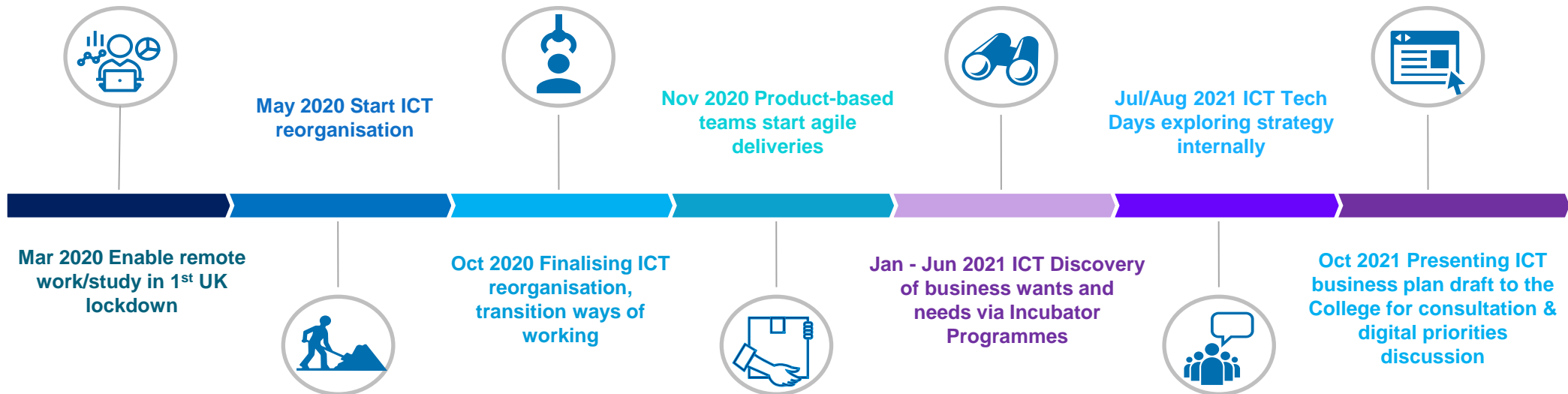
How ICT is Responding

To best support the College, ICT's efforts need to be **aligned with the College strategies**, fully understanding needs and requirements.

Striving for a more effective **customer-driven engagement**, **ICT moved to a product-focused delivery model** in 2020. This has proven effective during the Covid-19 response and was applauded when Imperial was awarded the Times' University of the Year 2022.

"When COVID-19 struck, students and staff did not just think about mitigation, they raised their ambitions."
- Professor Alice Gast, President

ICT continues to refine what we do and, in the summer of 2021, organised a series of **Tech Days to identify key priorities for Technology Themes** supporting the College.

Large scale digital transformation is required in the coming years to enable College strategies that lean on digital capabilities. There are **exciting, futuristic opportunities** in the digital space, as well as fundamentals that need to be enabled. This document serves to start aligning ICT with the College's digital priorities.

May 2020 Start ICT reorganisation

Nov 2020 Product-based teams start agile deliveries

Jul/Aug 2021 ICT Tech Days exploring strategy internally

Mar 2020 Enable remote work/study in 1st UK lockdown

Oct 2020 Finalising ICT reorganisation, transition ways of working

Jan - Jun 2021 ICT Discovery of business wants and needs via Incubator Programmes

Oct 2021 Presenting ICT business plan draft to the College for consultation & digital priorities discussion

Enabling the College to build its reputation as a Digital Leader and realise its world-leading ambitions

Over the past 2 years we have laid strong foundations; but to achieve the world-class ambitions set out in College strategies, there is more to be done to become a **'Digital Leader'**.

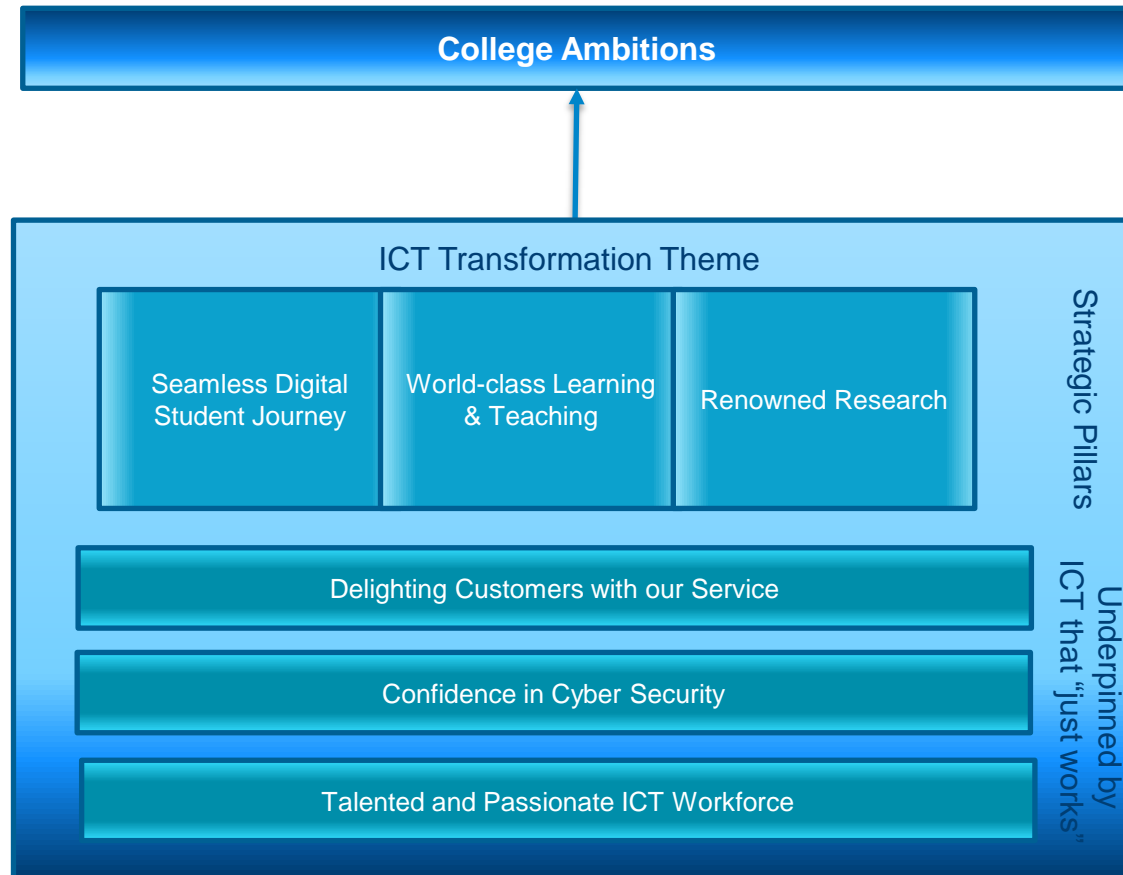| Digital Starter	Digitally Literate	Digital Performer	Digital Leader
Digital starter - Institution leaders will sometimes work on ad hoc digital innovation initiatives with IT leaders, for example, a CTO or CIO, but the collaboration does not include a target state for digital innovation at the institution.	Digitally literate - The institution recognizes the need for digital innovation and defines a roadmap, but schools, departments, or functions execute digital initiatives in silos.	Digital performer - The institution as a whole and IT leaders are building capabilities to manage digital innovation in an integrative way across departments.	Digital leader - Digital innovation is in place throughout the institution, and leaders see it as a key value driver. The institution outperforms its peers on key digital metrics.

Digital Maturity

TODAY — Future Vision

- **Disjointed customer engagement & delivery** approach results in prioritisation challenges
- **Fragmentation of data and systems** causes inconsistent user experience, duplication, and lack of single source of truth
- Underinvestment has left ICT with an **outdated estate,** behind on the technology adoption curve, negatively impacting service levels, support time and datacentre footprint
- **Mounting technical debt** adds to the College's **cyber security risk** exposure
- **Lack of ICT skills** to manage modern tech & ineffective governance result in underperformance

- **Meet changing expectations** about the learning experience on-site and on-line
- Become more **agile** as an organisation, and more **resilient** to external events like the pandemic
- **Increase consumption** of SaaS services & automation to enable focus on **digital innovation**
- Enhance enrolment, retention, and employment**; operational efficiency; innovation; and cost-reductions**

Digital Growth Supporting the Delivery of Business Value

College Ambitions

ICT Transformation Theme

| Seamless Digital Student Journey | World-class Learning & Teaching | Renowned Research |

Delighting Customers with our Service

Confidence in Cyber Security

Talented and Passionate ICT Workforce

Strategic Pillars

Underpinned by ICT that "just works"

Delivering value on user experiences and reputation of the university inevitably impacts growth.

- **Deliver on the College's Ambitions** and student and staff expectations through technology enablers for a future-ready, innovative institution

- **Maintain competitiveness** through embedding cutting-edge, emerging technology for great customer-experience, whilst **generating new revenue opportunities**

- **Minimise & mitigate Imperial Colleges' technology risks** and operational challenges through modernisation

- **Maximise cost effectiveness** and reduce cost sprawl and total cost of ownership for solutions across Imperial College

- **Improve agility and pace of delivery cycles** of ICT products and services

Outcomes for Strategic Pillars

A seamless, digital student journey from Outreach to Alumni

A world-class digital experience for students that aligns with the native digital behaviours expected

Delivering interactions and contents in all modes including remote, hybrid and mixed reality

The best tools and systems to facilitate world class teaching and

learning

Interactive learning environments to optimise the experience

Secure, reliable online learning platforms to support learning from any location

Students benefit from evidence- based teaching and learning

Robust and reliable technology and infrastructure underpinning renowned research

Modern High Performance Computing Platform and secure research data platform meeting the demands of world leading research

Secure data and IP developed by researchers with simple secure access regardless of location

Underpinned by ICT that "just works"

Delighted customers placed at the heart of the services and support delivered by ICT

A world-class experience across the College

Digital services being naturally interwoven into day-to-day activities of users and intuitive to use

Self service options available first, with reliable, understanding and fast support easily accessed

Access to College resources from anywhere, at anytime with confidence in cyber security

Modern security solutions by design that can seamlessly protect all our systems by default whilst providing a consistent user-friendly experience irrespective of location or access mechanism

Proactive systems monitoring that identify malicious activity and take action

The best technology talent working innovatively, collaboratively, and creatively in line with a world class institution

A culture prioritising customer focus and outcomes

Staff trained for the up-to-date skillsets they need in a constantly evolving environment

Working with industry to ensure we have access to cutting-edge technology

Working to Enable Digital Growth Across the College

Working collaboratively across the College to facilitate digital growth; capitalising on digital technology investments to enable goals and ambitions.

ICT needs to form part of the fabric of the College decision making process on technology requirements and adoption.

A joined-up and funded plan to transform student and staff experiences across the College is required.

A workforce trained in modern technology and working in partnership with industry leaders.

Maximising the value from investment in technology to enable the College achieve its ambitions.

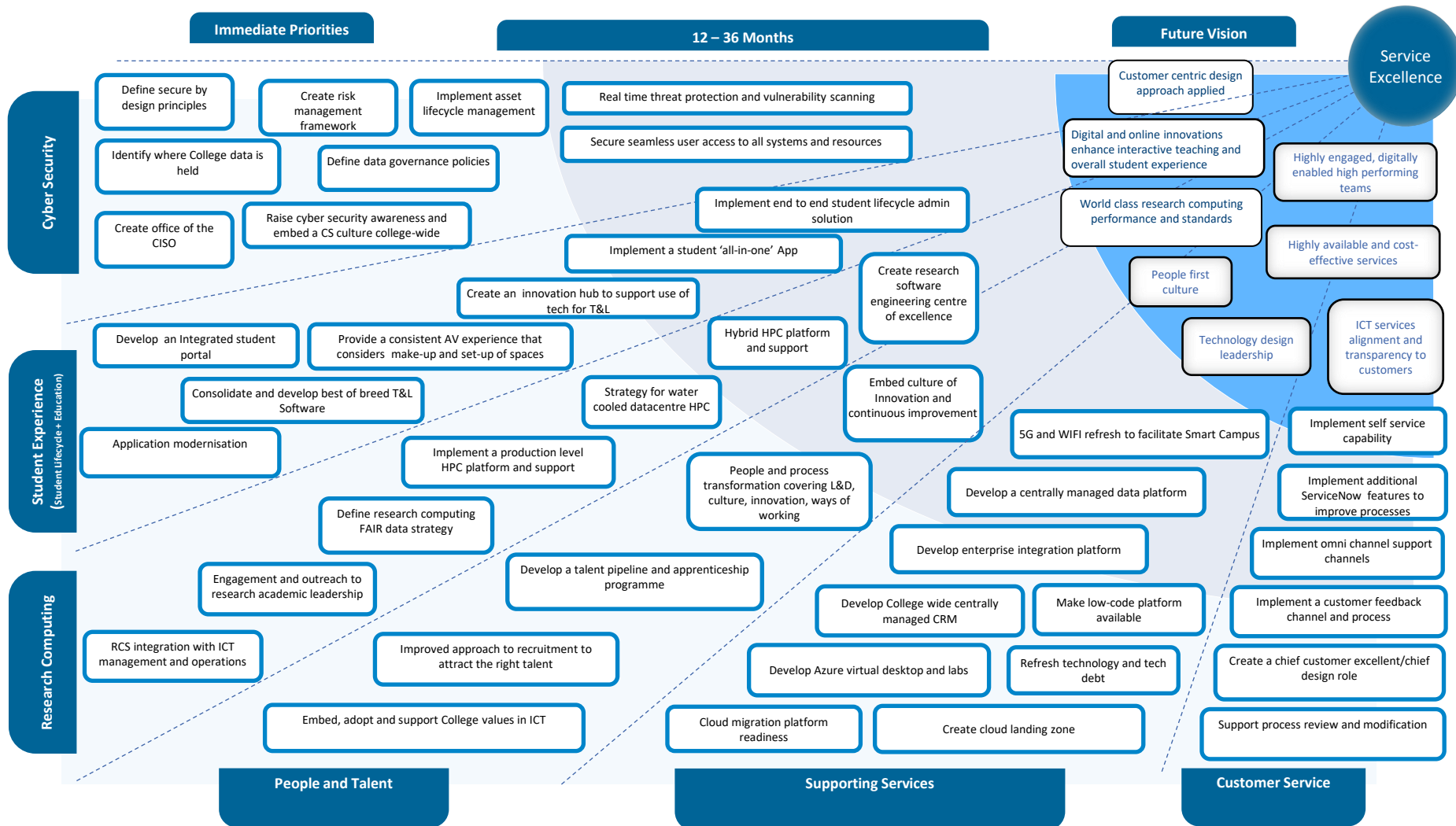# 5 Year Roadmap: Our Transformation Journey

Today - Current State
Preparation for digital journey: creating a shared understanding of requirements, priorities & dependencies of stakeholders.

12-18 Months - Interim State
Transition & technical debt focus: Preparing the infrastructure to enable the 'new world'; updating and modernising the estate.

18-60 Months - Target State
Transformation: Focus is on the future of transforming the student and staff experience to realise the College's ambitions.

Immediate Priorities

12 – 36 Months

Future Vision

Service Excellence

Cyber Security

- Define secure by design principles
- Create risk management framework
- Implement asset lifecycle management
- Real time threat protection and vulnerability scanning
- Identify where College data is held
- Define data governance policies
- Secure seamless user access to all systems and resources
- Create office of the CISO
- Raise cyber security awareness and embed a CS culture college-wide

- Customer centric design approach applied
- Digital and online innovations enhance interactive teaching and overall student experience
- Highly engaged, digitally enabled high performing teams
- World class research computing performance and standards
- Highly available and cost-effective services

Student Experience
(Student Lifecycle + Education)

- Implement end to end student lifecycle admin solution
- Implement a student 'all-in-one' App
- Create research software engineering centre of excellence
- People first culture
- Create an innovation hub to support use of tech for T&L
- Develop an Integrated student portal
- Provide a consistent AV experience that considers make-up and set-up of spaces
- Hybrid HPC platform and support
- Technology design leadership
- ICT services alignment and transparency to customers
- Consolidate and develop best of breed T&L Software
- Strategy for water cooled datacentre HPC
- Embed culture of Innovation and continuous improvement
- Application modernisation
- Implement a production level HPC platform and support
- 5G and WIFI refresh to facilitate Smart Campus
- Implement self service capability

Research Computing

- People and process transformation covering L&D, culture, innovation, ways of working
- Develop a centrally managed data platform
- Implement additional ServiceNow features to improve processes
- Define research computing FAIR data strategy
- Engagement and outreach to research academic leadership
- Develop a talent pipeline and apprenticeship programme
- Develop enterprise integration platform
- Implement omni channel support channels
- RCS integration with ICT management and operations
- Improved approach to recruitment to attract the right talent
- Develop College wide centrally managed CRM
- Make low-code platform available
- Implement a customer feedback channel and process
- Develop Azure virtual desktop and labs
- Refresh technology and tech debt
- Create a chief customer excellent/chief design role
- Embed, adopt and support College values in ICT
- Cloud migration platform readiness
- Create cloud landing zone
- Support process review and modification

People and Talent

Supporting Services

Customer Service

Next Steps

ICT aspires to provide great foundations for College faculties and departments to build on, create options and opportunities, and to help remove obstacles to support our expert colleagues and give them the means to do what they do best.

Agree priorities and requirements across the College via a dedicated business plan

Commence delivery on action plan in line with established priorities

| Oct 2021 | Nov 2021 | Nov/Dec 2021 | Jan 2022 |

Align and agree our direction of travel with senior leadership across the College

Collaborative discovery and planning for transition and transformation phases

Appendices: Details per Technology Theme

Seamless Digital Student Journey

World-class Learning & Teaching

Renowned Research

Delighting Service at the Heart of ICT Service

Confidence in Cyber Security

Talented and Passionate ICT Workforce

Enablers

These pages will show what the identified Technology Themes could look like – which is something ICT and its stakeholders are to engage and agree on.

Upgrading the Student Experience

- A seamless student experience from outreach through graduation and employment. Predictive analytics to inform personalised education, adapting methods based on rich data.

- Teaching made even more exciting with use of cutting-edge technology in classrooms providing a consistent user-friendly experience while hybrid studying continues to become easier to facilitate and integrate.

- A central student platform to access all resources and an app to help find your way around an immersive campus, notifying students of all they need to know.
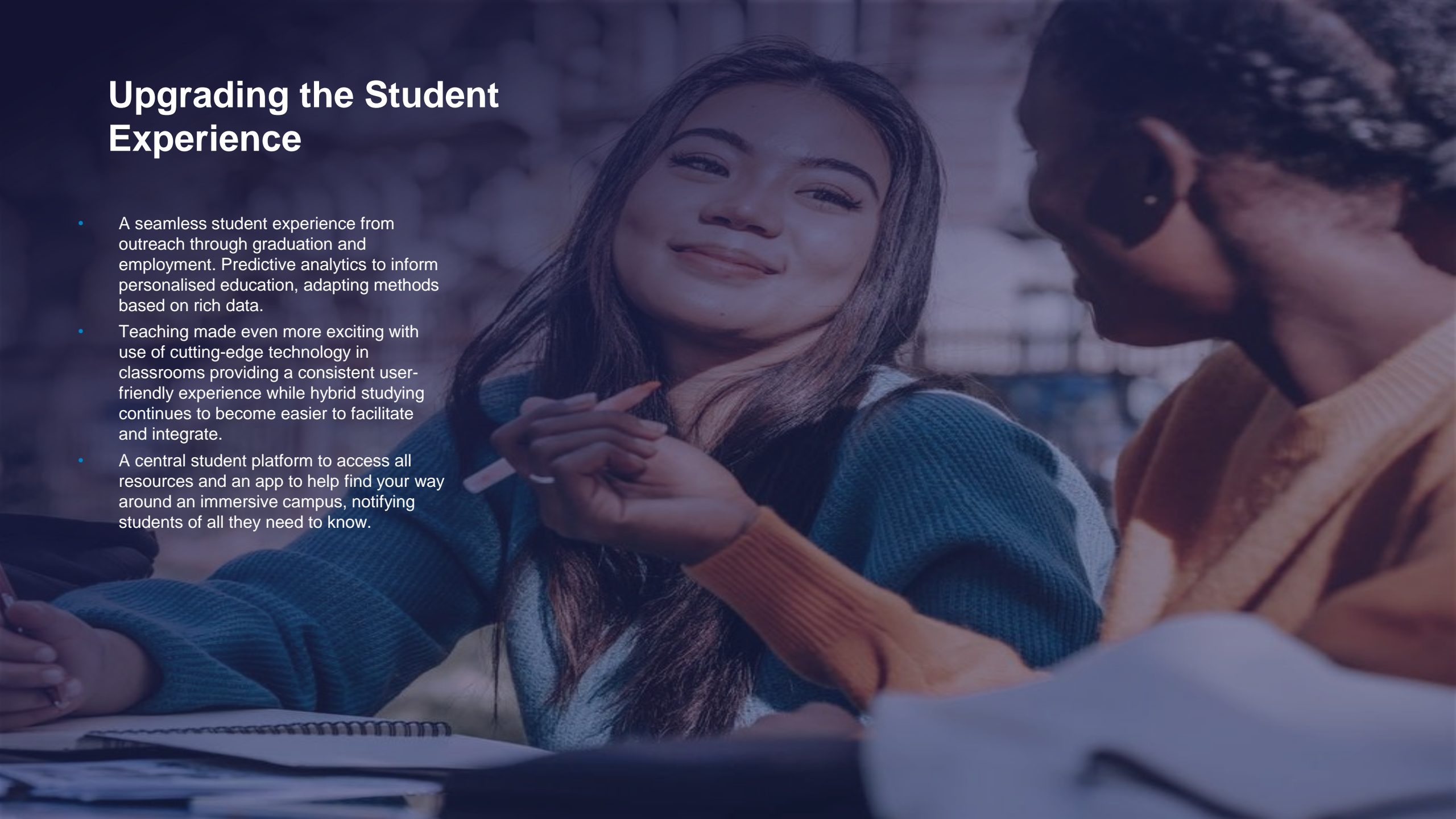
Our Current Challenges
Digitisation Driving Change in Higher Education

Digitisation of society has resulted in changing expectations around learning and the campus experience. **Students have become digital natives** working with technology to simplify, optimise, or gamify every aspect of their lives. Education is part of their digital lives.

However, **Imperial College has fallen behind on the technology adoption curve**, with outdated technology that is not intuitive nor meeting the pace required to accommodate student expectation.

The digital student experience does not meet expectations for the world-class university that Imperial College is on other ends. There is potential for the gap to grow into successful College activities like education and research if digital cannot support cutting-edge ambitions in those areas. Devotion to improvement is required to remain a top choice in education for the best students to share our future.

Higher education organisations that **have technology at their core** will be much more successful in meeting student expectations and delivering a simplified user-friendly student journey.

Delivering a better student experience will inevitably result in improved student outcomes and increasing returns against lower costs

A World-Class Student Experience

Outreach
- **Virtual Reality tours** allowing prospective students to explore Imperial remotely
- **Data-driven** targeted marketing and recruitment campaigns linked to a **single, College-wide CRM solution**

Application
- **Predictive analytics** identifying student needs for funding
- **Integrated student application portal** providing students real-time insight into loans, grants, scholarships

Admission & Enrolment
- **Single student system and CRM** for a most seamless, simple and intuitive experience throughout the student journey
- Seamless, simple module catalogue and administration **integrated in the student system, with reminder notifications**

Induction
- Simplified automated student onboarding, providing **College-access via biometrics based on role-based access (RBAC)** for IT accounts and Library Services
- **AR wayfinding app** instructing new starters where to go, from parking and classes, to available spaces in computer rooms

Study/ Educate
- **Automated notifications** for grading and reminders to register for resits
- **Apps for student life**; socialising and peer study groups in student halls and managing wellbeing and access to campus service
- **Seamless, secure access from anywhere on any device** to Imperial resources, studying remotely/hybrid or on an exchange year with a well-connected partner university
- **Secure data sharing** and access between guiding internship firms and the College

Graduation
- **Automated processes** for graduation through the single student portal, **integrated with relevant certification databases**
- **Simple student offboarding process**, through single view and **automated processes (RPA)** on outstanding payments, access removal via RBAC, etc.
- Use student **data to match them with jobs** setting them up to succeed

Advance-ment
- **Open engagement platform for Imperial Alumni** to (re)connect and interact with their peers, connected with LinkedIn
- **Student CRM** includes alumni, holding smart data for **targeted marketing campaigns** for events, additional learning and CDP, endowment, etc.

A seamless, digital student journey from Outreach to Alumni

Student Lifecycle

A world-class digital experience for students that aligns with a digital native experience expected

Delivering interactions and contents in all modes including remote, hybrid and mixed reality

In scope

| End-to-end student mgt system | Student 'all-in-one' App | Integrated Student Portal | Modernise Apps |

Dependencies

| Central CRM | Data platform | Integration Platform | Low Code Platform | Connectivity & Hosting |

Key Results

- Student survey results to improve by 10% p/y
- Ratio of content available in remote/hybrid and mixed reality mode increase by 10% and 5% p/y respectively
- Reduction in queries on how to use student system (50% over 3 years)
- All departments using a central service supported by ICT in 5 years.

Assumptions

Desire to streamline and replace the student management system across the College.

Dual running of systems during the transformation is expected.

Resource Requirements

User researcher

Business analyst

Solutions architect

Developers

Risks

Complete buy-in from stakeholders across the College may not be achievable.

Changing College processes to align with and end to end solution might be difficult to achieve.

Expected Investment

To be confirmed

Teaching with Tech

- Teaching is made fun. Administrative tasks are automated where possible, and there is a central platform for study activity, making it simple to engage with students.

- New tech and modules built on industry partnerships helps lecturers in supporting students achieve their best abilities, whilst data-driven predictive analytics help identify those students who need more guidance, and later on, to match them to jobs they are most likely to succeed in.

- Consistent secure technology allows hybrid learning integrating those who are remote with those on campus across all lecture theatres & labs

Our Current Challenges for
Inclusive and Evocative Education through Technology

Shifting from students as consumers of information, toward a meaningful learning experience in a team setting from any location

Another trend that strongly impacts the industry is **globalisation of society**, with Imperial's students joining from anywhere, not just physically, but also remotely. **Remote and hybrid studying** have additionally been fuelled by the pandemic whilst there is increased desire for inclusivity in today's education.

Yet, facilitating those needs has been, and is challenging, with the College struggling to **effectively deliver massive open online courses via online platforms** or assisting remote experiments at scale.

Scaling teaching activities and hybrid education also poses increasing challenges around data compliance and cyber security risks of dealing with increased attack surfaces.

In order to **deliver against their strategy, and securely capture the benefits of online education** and offer competition in this area to other universities, the College requires to invest in establishment of secure remote and hybrid education, for students to successfully participate and collaborate.
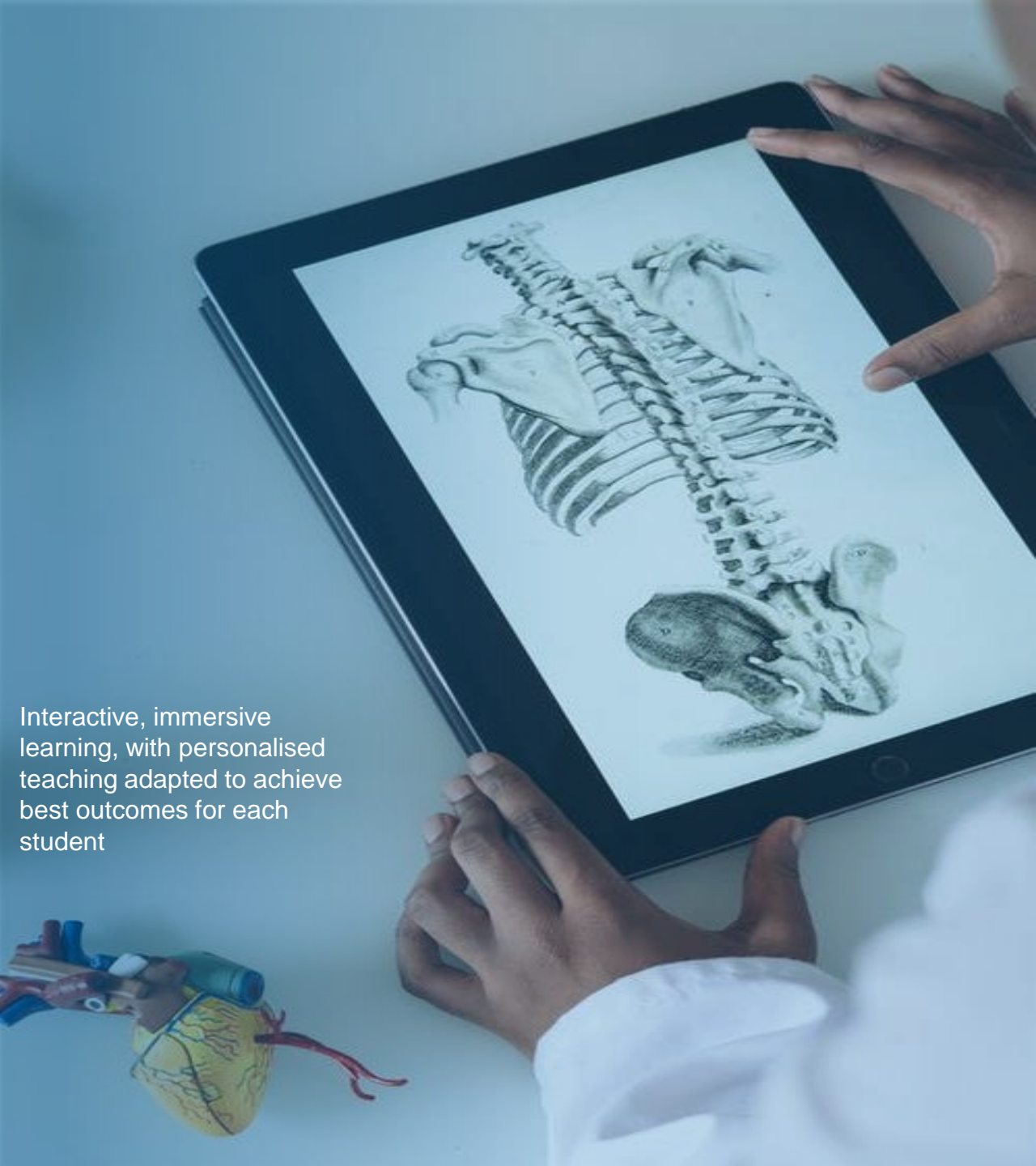
Interactive, immersive learning, with personalised teaching adapted to achieve best outcomes for each student

Teaching and Learning in a New, Personalised Educational Environment

Identify Needs
- **AI & Machine Learning** to identify students needs and which students are likely to benefit from tutoring, one-on-one guidance, or wellbeing support

Facilitate Adaptive Teaching
- **"Netflix of curriculum"**— allowing teachers to find on-demand content that matches standards and is relevant to individual students
- Ability to facilitate **remote teaching and examination**, with **hybrid, and mixed reality teaching**,
- **Consistent (AV) experience** in classrooms with holograms and 3D video/robots for remote students/lecturers

Education

The best tools & systems to facilitate world-class teaching and learning

Interactive learning environments to optimise the experience

Secure, reliable online learning platforms to support learning from any location

Students benefit from an evidence- based teaching and learning

In scope

Consistent AV Experience

Remote Learning & App Modernisation

Content "Netflix of curriculum"

Personalised Education

T&L Innovation Hub

Dependencies

Central CRM

Data platform

Integration Platform

Key Results

- Data-driven personalised education supported in ≥ 2 incubator programmes per faculty by Jul 2022
- Single, secure online learning platforms for learning from any location for students from Dec 2022

Assumptions

Less than 3 VLEs would meet requirements across the College.

Risks

The nature of the requirements could make consolidating VLEs difficult to achieve.

Resource Requirements

Business Analyst

User researcher

Solutions Architect

Developers

Expected Investment

To be confirmed

Renowned Research Ready to Tackle New Challenges

- **Enable world leading research through the secure and timely provision of appropriate compute environments, and integrated with the Research Office and the Library support the underpinning research process.**

- **Enable researchers to focus on developing new activities, tackling international challenging problems, and exploiting research data throughout its lifecycle in line with FAIR data principles.**

Our Current Challenges in
Optimising Research and Data Efficiencies

"Being informed by, and embracing the possibilities of data will result in better business outcomes for the university as a whole"
Juan Villamil CIO

The industry is under **increasing cost pressure**, with growing competition from universities from lower-income countries and online studies

At the same time, there is a **sprawling of costs** across the College through **duplication of services, siloed investment in dedicated infrastructure by grant outside of HPC** and a lack of overview in who uses what.

The **operational efficiency across the College can be significantly improved** to reduce the total cost of ownership of both activities and technology implemented across Imperial. It is essential to review options to ensure money is spent where it adds true value for the organisation, in sustainable manners.

Shared platforms and access to remote equipment for research and data reduces duplication and costs, whilst easily accessible information insights and process automation save time whilst aiding better outcomes.

Moreover, **partnering with ICT's customers across the estate** enables a better understanding user needs and odds of getting things right.

A Leading Research Reputation

Imperial is renowned for its reputation in research. High volumes and quality research output is underpinned by technology and data.

Recruit the Best Academics
- Support HR with **intelligent recruitment**, targeting the right people for the roles (e.g. predict students to roll into PhDs successfully)

Research Framing
- Use of **data mining** in defining study problem/hypothesis and plan, to gain a broad understanding of scope of available research foundations and assess alternative options or lenses

Securing Funding
- Create simple **Research Funding Landingzone** for researchers with **AI recommendations** on which grant applications are most likely to succeed with real-time insight in funding statuses across all studies
- **Create cost models** for research bids covering cloud & on-premise workloads

Collaborate
- Seamless collaboration with secure access to resources for and from partner system or data via a **collaboration platform with open APIs and open interfaces** allowing multi-disciplinary modelling and simulation, with the **ability to spin-up and down** instantly and validate usage & sizing
- **Machine translation, and multilingual information retrieval** to reduce barriers to collaboration around the globe
- **Telepresence** and virtual environments enabled by high speed networks

Experiment & Simulate
- Support **innovative workplace** with cutting-edge technology and infrastructure enabling new tech; IoT, AI, etc.
- Build **industry partnership** and/or in-house dev team with an innovation lab for holographic and VR capabilities, e.g. holographic engineering, medical surgeries with VR & hololenses
- **Remote instrumentation** and remote access to shared facilities (e.g. satellite sensors, research in the Antarctic) to generate more options

Data Collection & Observation
- **Self-service to set-up scalable research environments instantly**
- Single data platform with quick and secure access to **Data as a Service**, with standardised, normalised data to inform predictive analytics, AI, ML, etc.
- Move data batch processing to **iterative data processing**, with **automated classification** of large data bulks with high performance compute

Data Analysis
- **Automate manual tasks** for academics where possible with AI and RPA to allow them to focus on high value activities
- Building partnerships with the industry for **quantum computing capability** to process major datasets in seconds instead of weeks
- **Hyperscale compute and storage in public, private, or hybrid Cloud** where researchers can hook up their research and data
- **Low-code** simplified and quick app development

Publish & Disseminate
- **Digital library for data archive & access**, with tools to rapidly review summaries, visualizations, and other organizations of data
- **Interactive projects website** where researchers can share (e.g. podcasts) to disseminate research work and promote public engagement
- Develop technologies to **enhance the security of data** & prevent forgeries, false identities, and unauthorized changes to publications or data
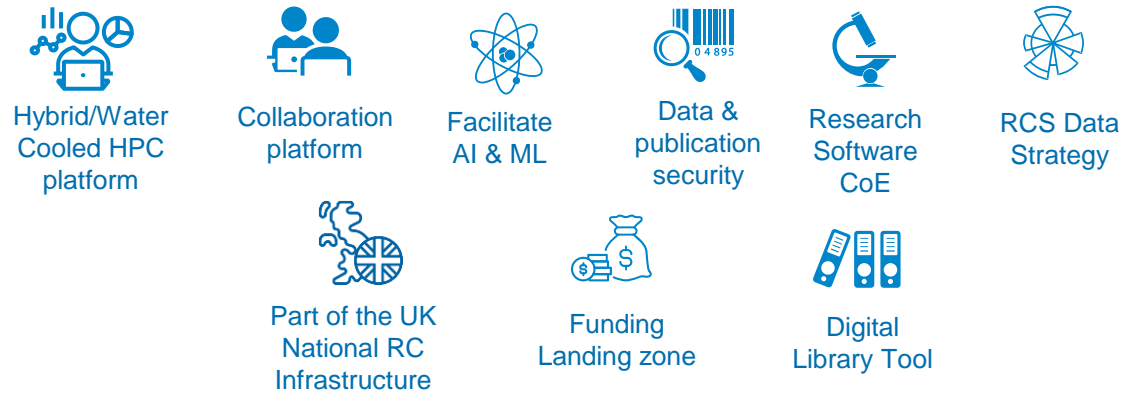
Research

Robust and reliable technology and infrastructure underpinning world leading research

Modern High Performance Computing Platform and secure research data platform meeting the demand of world leading research

Secure data and IP developed by researchers with simple secure access regardless of location

In scope

- Hybrid/Water Cooled HPC platform
- Collaboration platform
- Facilitate AI & ML
- Data & publication security
- Research Software CoE
- RCS Data Strategy
- Part of the UK National RC Infrastructure
- Funding Landing zone
- Digital Library Tool

Dependencies

- Connectivity & Hosting
- Data platform
- Integration platform
- Low Code platform
- Zero Trust Security Model

Key Results

- High Performance Computing Platform Modernised by Mar 2022 with NPS of ≥ 7 by Imperial academics
- Academics can set-up and scale up/down collaborative environments themselves from Jul 2022

Assumptions

Centrally managed platform and solutions can be mandated for College use.

An agreed cost-effective financial model to make central solutions attractive.

Risks

Non-ICT managed solutions might remain in use reducing the potential benefits of a centrally provided RCS services.

Resource Requirements

Business analyst

User researcher

Solutions architect

Developers

Expected Investment

To be confirmed

Delighting Customers

- An outstanding customer experience at the heart of the services delivered.

- Continually improved services based on customer feedback to truly understand user needs and expectations.

- A consistent and high quality omni-channel support experience for all users.
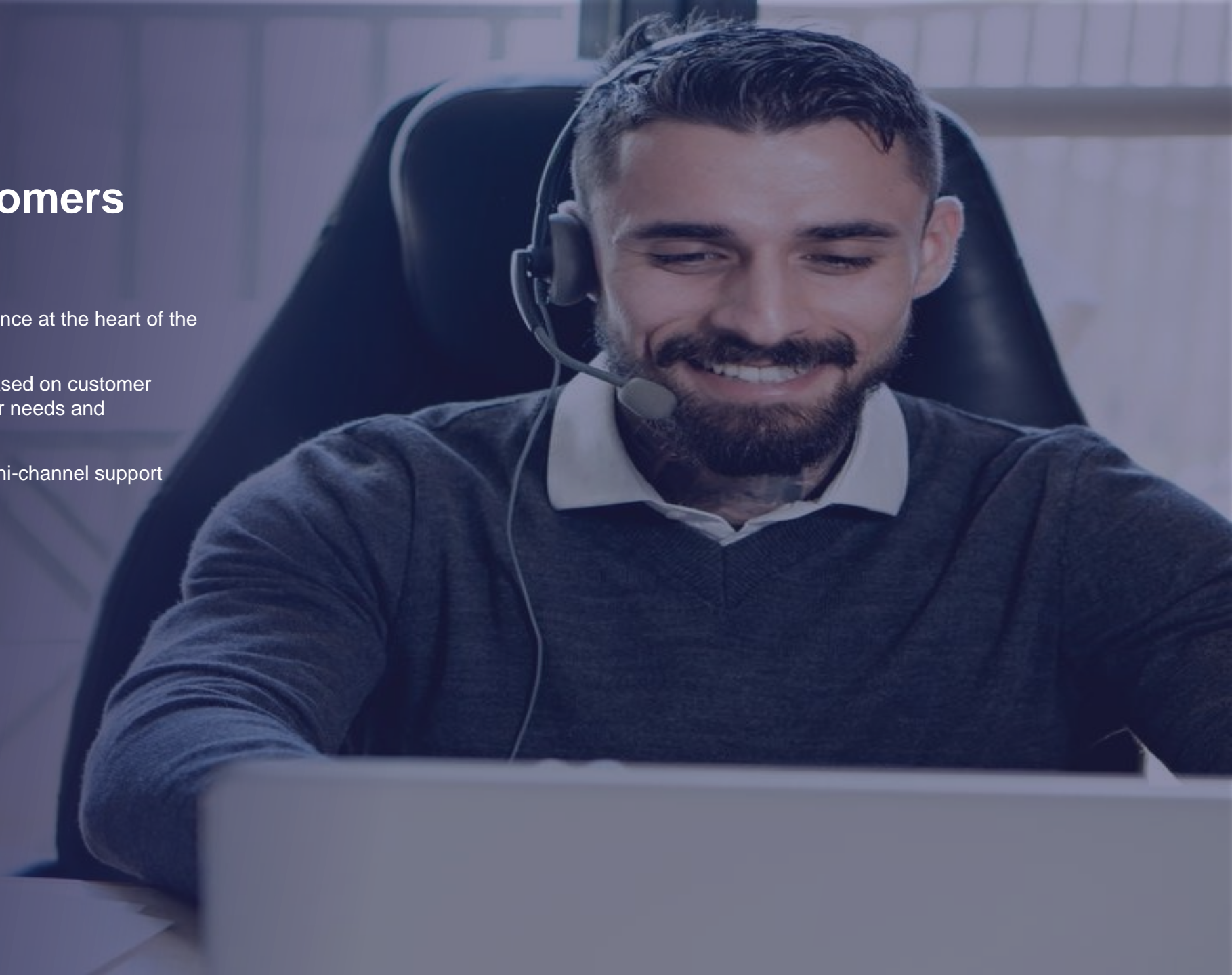
Our Current Challenges in Delivering
Outstanding Customer Experience and Service Support

ICT is not part of the College fabric. Decision making is siloed and the **approach to technology across the College is disjointed**.

Critical enabling service and underlying infrastructure are not effective or efficient.

ICTs expertise is required to enable a digital transformation strategy. Higher education institutions that have **technology at the core** will be that much more successful in a competitive global industry.

A joined-up strategy and vision will **support the College's ambition** whilst letting all departments maintain control and autonomy of their specific goals and objectives.

Higher education institutions that have technology at the core will be that much more successful

ICT Supporting a Reliable Service Delighting its Customers

To place customers at the centre of what we do, the ICT Product function is to be embed in the business over time, with Central ICT looking after fundamentals, whilst software development and configuration are happening with directly with customers for product management.

Quality of Service Provided

- Ethos on **customer centric design** for intuitive, simple and central solutions, e.g., 1 app for everything
- **Seamless integrations** for functions that "just work"
- Dedicated role to **identifying opportunities to improve the customer experiences** - creating a chief customer excellence / chief design officer
- Actively seek and use **customer feedback** on quality and responsiveness/timeliness of their services

Quantity of Support Required

- Creating a **self-service capability** where customers are stimulated and supported in managing their own queries where possible
- Introducing **chatbots** as an additional interaction channel to provide information on standard processes & tasks
- Creating and sharing **knowledge articles** in simple, widely understandable terminology accessible to users centrally
- Improved **root cause analysis** to not only fix issues and problems, but also understand common trends and incidents to run **pro-active campaigns** on
- Optimize all basic ICT **service support processes**

Service & Support

Delighted customers placed at the heart of the services and support delivered by ICT

A world-class experience across the College

Digital services being naturally interwoven into day-to-day activities of service users and intuitive to use

Self service options available first, with reliable, understanding and fast support easily available

In scope

- Customer & UX feedback
- Process Review & Modification
- Self-service Capability
- Chatbot
- Chief Customer Excellence

Dependencies

- Data platform
- Integration platform
- Reporting Service
- Cloud / Hybrid modular hosting
- Digital channel

Key Results

- High Performance Computing Platform Modernised by Mar 2022 with NPS of ≥ 7 by Imperial academics
- Academics can set-up and scale up/down collaborative environments themselves from Jul 2022
- New 'branded' service offering that enables consistent high levels of end to end support, across all of ICT, much like a communities of practice

Assumptions

More digital channels will be used by the College to interact with support teams.

An end to end support model is adopted by ICT.

A desire across the college to streamline the Service Catalogue and reduce demand into 1st line

Resource Requirements

Business Analyst

Service Architect

SIAM Specialist

Solutions Architect

Risks

IT skills across the College user base may deter users from adopting self service options

A new approach to service delivery might mean additional skill sets and talent may be required

Expected Investment

The investment in ServiceNow will need to be planned carefully, over the years, circa £400k pa.

£50k pa customer skills training (then develop internal capabilities) £250k portal dev Yr 1.

Protecting the Organisation with Cyber Security

- Modern security solutions that can seamlessly protect all systems by default.

- Proactively monitoring and acting on malicious activity.

Our Current Challenges around Confidence in College Cyber Security

Vulnerabilities and attacks are genuine threats to most global organisations.

The **complex nature of cyber threats** require a response that protects the institution's information and data but flexible enough not to hinder collaboration and remote access.
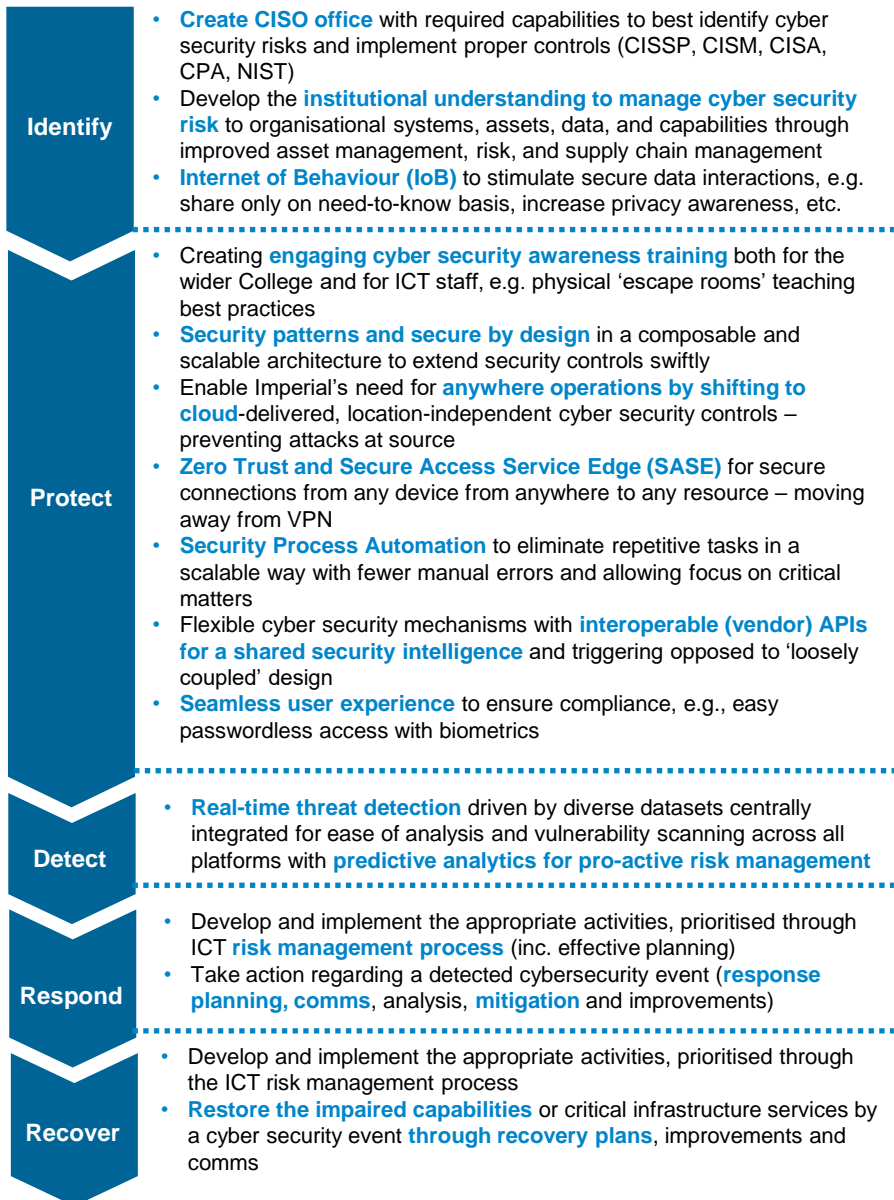
Underinvestment in ICT has left an **outdated estate** and a **vulnerable cyber security posture**.

Modern systems and cyber security principles are now required to protect the Colleges data, information and reputation.

The complex nature of cyber threats require a response based on modern systems and security principles

Secure & Resilient Imperial

Identify
- **Create CISO office** with required capabilities to best identify cyber security risks and implement proper controls (CISSP, CISM, CISA, CPA, NIST)
- Develop the **institutional understanding to manage cyber security risk** to organisational systems, assets, data, and capabilities through improved asset management, risk, and supply chain management
- **Internet of Behaviour (IoB)** to stimulate secure data interactions, e.g. share only on need-to-know basis, increase privacy awareness, etc.

Protect
- Creating **engaging cyber security awareness training** both for the wider College and for ICT staff, e.g. physical 'escape rooms' teaching best practices
- **Security patterns and secure by design** in a composable and scalable architecture to extend security controls swiftly
- Enable Imperial's need for **anywhere operations by shifting to cloud**-delivered, location-independent cyber security controls – preventing attacks at source
- **Zero Trust and Secure Access Service Edge (SASE)** for secure connections from any device from anywhere to any resource – moving away from VPN
- **Security Process Automation** to eliminate repetitive tasks in a scalable way with fewer manual errors and allowing focus on critical matters
- Flexible cyber security mechanisms with **interoperable (vendor) APIs for a shared security intelligence** and triggering opposed to 'loosely coupled' design
- **Seamless user experience** to ensure compliance, e.g., easy passwordless access with biometrics

Detect
- **Real-time threat detection** driven by diverse datasets centrally integrated for ease of analysis and vulnerability scanning across all platforms with **predictive analytics for pro-active risk management**

Respond
- Develop and implement the appropriate activities, prioritised through ICT **risk management process** (inc. effective planning)
- Take action regarding a detected cybersecurity event (**response planning, comms**, analysis, **mitigation** and improvements)

Recover
- Develop and implement the appropriate activities, prioritised through the ICT risk management process
- **Restore the impaired capabilities** or critical infrastructure services by a cyber security event **through recovery plans**, improvements and comms

Throughout the College access to secure data and collaboration is key. Ensuring security is built-in into design rather than to treat it as a bolt-on, ensures a stable and resilient environment, whilst protecting the College, its users and reputation, and meeting regulatory compliance.

Cyber Security

Secure access to College resources from anywhere, at anytime

Modern security solutions by design that can seamlessly protect all our systems by default whilst providing a consistent user friendly experience irrespective of location or access mechanism

Proactive systems monitoring that identify malicious activity and take action

In scope

Zero Trust Security Model

ID & Access Mgt

Create CISO office

Pro-active threat detection & vulnerability scanning

Raise CS awareness

CS policies and processes

Asset lifecycle mgt.

Dependencies

Zero Trust Access Solution

IAM and PAM solution

MFA solution

SaaS based monitoring and analysis tool

Key Results

- Maturity assessment before and after using recognised frameworks such as NCSC

- Risk based approach to security is applied.

Assumptions

A risk framework would be adopted across the College.

Risks

Users might perceive improved security as a restriction on what they can do with technology.

Resource Requirements

Business Analyst

Security Architect

Solutions Architect

Data Analyst

Expected Investment

To be confirmed

A Workforce that Partners with its Customers

- A workforce the prioritises customer obsession and outcomes.

- Investment in training to ensure our staff have the skills they need in a constantly evolving technology industry.

- Working with the market to ensure we have access to cutting-edge technology.

Our Current Challenges for
A Passionate and Skilled Workforce

Fast changing environments and Covid-19 pandemic has surfaced the **need for a resilient and knowledgeable workforce** that is able to respond and react to needs efficiently and quickly.

ICT is not able to be as **responsive to changes** as the existing processes and technology are not flexible. Critical enabling functions and underlying infrastructure are outdated or not available. The department is not able to attract the right expertise and talent to meet the everchanging needs of a global higher education institution.

The consequences can be seen in Imperial College **falling behind the technology adoption curve**, holdup in the ability to facilitate research and other academic activities and an underwhelming experience for students and staff.
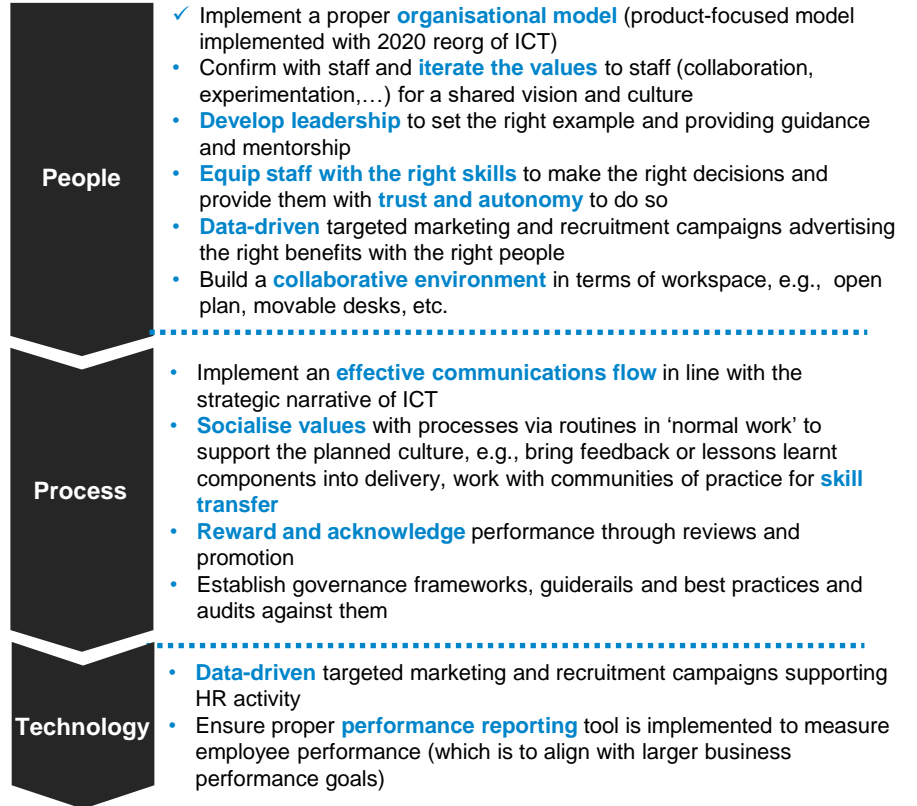
We need to invest in training our workforce in the latest modern technology. We need to invest in shared solutions and transition to ways of working that is flexible and meets the demands.

A resilient and knowledgeable workforce to meet the ever-changing needs of a global higher education institution
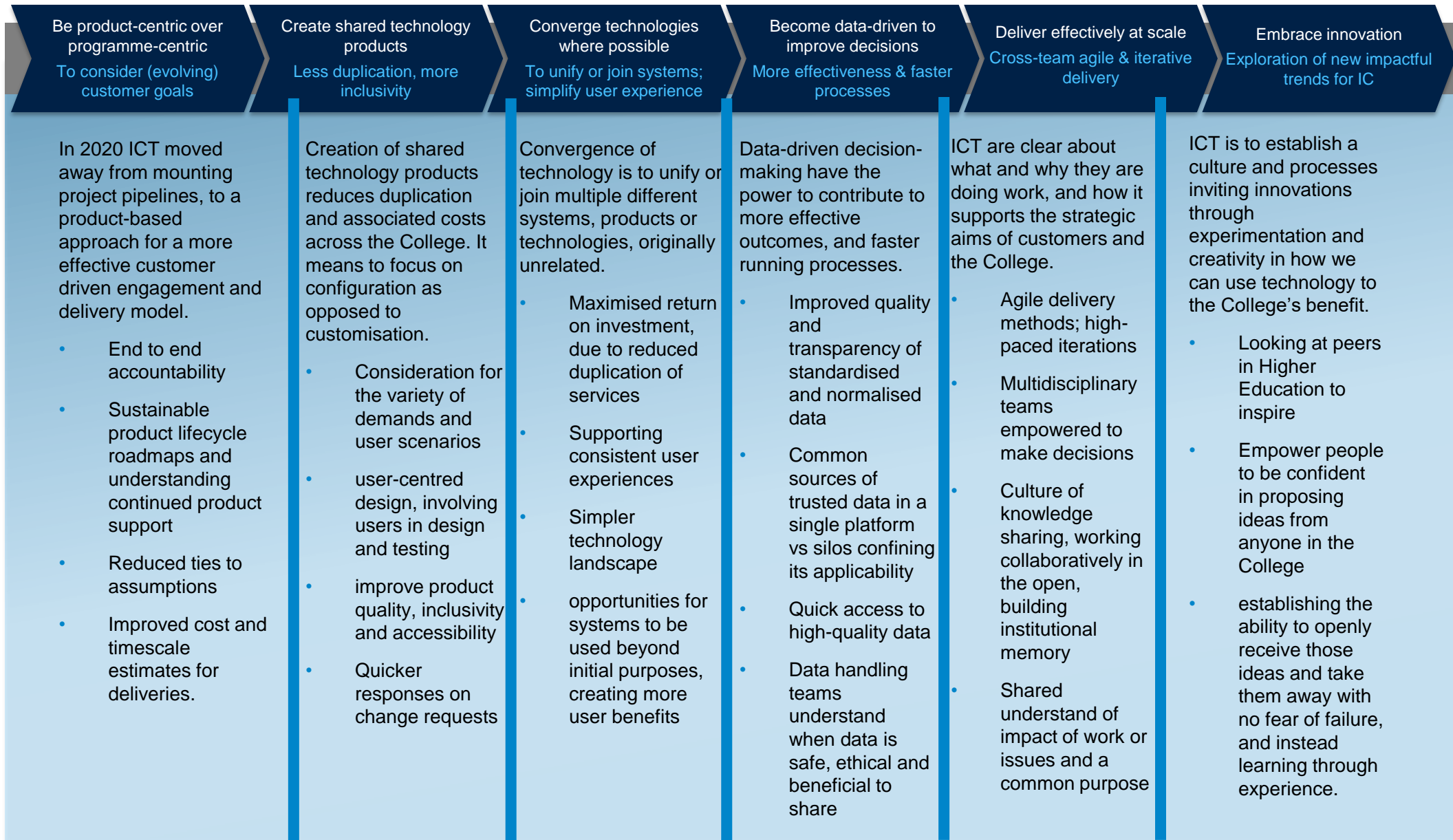
Workforce

People
- ✓ Implement a proper **organisational model** (product-focused model implemented with 2020 reorg of ICT)
- Confirm with staff and **iterate the values** to staff (collaboration, experimentation,…) for a shared vision and culture
- **Develop leadership** to set the right example and providing guidance and mentorship
- **Equip staff with the right skills** to make the right decisions and provide them with **trust and autonomy** to do so
- **Data-driven** targeted marketing and recruitment campaigns advertising the right benefits with the right people
- Build a **collaborative environment** in terms of workspace, e.g., open plan, movable desks, etc.

Process
- Implement an **effective communications flow** in line with the strategic narrative of ICT
- **Socialise values** with processes via routines in 'normal work' to support the planned culture, e.g., bring feedback or lessons learnt components into delivery, work with communities of practice for **skill transfer**
- **Reward and acknowledge** performance through reviews and promotion
- Establish governance frameworks, guiderails and best practices and audits against them

Technology
- **Data-driven** targeted marketing and recruitment campaigns supporting HR activity
- Ensure proper **performance reporting** tool is implemented to measure employee performance (which is to align with larger business performance goals)

ICT need competent people, support processes and an overall plan to best deploy Technology, underpinned by guiding strategic principles

ICT Guiding Principles

Be product-centric over programme-centric	Create shared technology products	Converge technologies where possible	Become data-driven to improve decisions	Deliver effectively at scale	Embrace innovation
To consider (evolving) customer goals	Less duplication, more inclusivity	To unify or join systems; simplify user experience	More effectiveness & faster processes	Cross-team agile & iterative delivery	Exploration of new impactful trends for IC

Be product-centric over programme-centric

In 2020 ICT moved away from mounting project pipelines, to a product-based approach for a more effective customer driven engagement and delivery model.

- End to end accountability
- Sustainable product lifecycle roadmaps and understanding continued product support
- Reduced ties to assumptions
- Improved cost and timescale estimates for deliveries.

Create shared technology products

Creation of shared technology products reduces duplication and associated costs across the College. It means to focus on configuration as opposed to customisation.

- Consideration for the variety of demands and user scenarios
- user-centred design, involving users in design and testing
- improve product quality, inclusivity and accessibility
- Quicker responses on change requests

Converge technologies where possible

Convergence of technology is to unify or join multiple different systems, products or technologies, originally unrelated.

- Maximised return on investment, due to reduced duplication of services
- Supporting consistent user experiences
- Simpler technology landscape
- opportunities for systems to be used beyond initial purposes, creating more user benefits

Become data-driven to improve decisions

Data-driven decision-making have the power to contribute to more effective outcomes, and faster running processes.

- Improved quality and transparency of standardised and normalised data
- Common sources of trusted data in a single platform vs silos confining its applicability
- Quick access to high-quality data
- Data handling teams understand when data is safe, ethical and beneficial to share

Deliver effectively at scale

ICT are clear about what and why they are doing work, and how it supports the strategic aims of customers and the College.

- Agile delivery methods; high-paced iterations
- Multidisciplinary teams empowered to make decisions
- Culture of knowledge sharing, working collaboratively in the open, building institutional memory
- Shared understand of impact of work or issues and a common purpose

Embrace innovation

ICT is to establish a culture and processes inviting innovations through experimentation and creativity in how we can use technology to the College's benefit.

- Looking at peers in Higher Education to inspire
- Empower people to be confident in proposing ideas from anyone in the College
- establishing the ability to openly receive those ideas and take them away with no fear of failure, and instead learning through experience.

The best technology talent working innovatively, collaboratively, and creatively in line with a world class institution

ICT Workforce

A culture prioritising customer obsession and outcomes

Staff trained for the up-to-date skillsets they need in a constantly evolving environment

We will work with the market to ensure we have access to cutting-edge technology

In scope

Staff Training

Revise HR foundations

Apprenticeship Programme

Updated Performance Reporting

Dependencies

Build ICT Values & Culture

Leading by Example

Overall benefit & renumeration package

Key Results

- Every member of legacy ICT staff (since June 2020 or earlier) completed ≥ 1 training
- Every ICT programme running from 2022 onwards has ≥ 3 business stakeholders involved
- Staff retention reflects a measurable improvement before and after

Assumptions

It is possible to work within the benefit and renumeration available to attract talent

Risks

The financial element of renumeration might reduce interest for advertised roles within ICT

Resource Requirements

Business Analyst

Learning and Development Specialist

Career Development Lead

Talent and Retention Specialist

Expected Investment

To be confirmed

Enablers: what's needed?

There is a sequence to what needs doing and there are critical enablers required to set foundations for ICT and College ambitions.

Dynamic Capacity Management
- Easy spin-up/scale-up/down environments
- Reduce data centre footprint

Resilience and safety
- Address know resilience risks
- Secure work/study from anywhere
- Improve stakeholder confidence

Great Experience & Responsiveness
- Provide consistent experience
- Enable partners/3rd parties to use our services
- React quickly to customer demand
- Enable innovation of services

Delivery at Pace
- Quick development cycles
- Focus on automation

Service Optimisation
- Strategy in service provisions
- Continuous improvement

Data driven processes & decisions
- Offer personalised experiences
- Identify opportunities faster & better

Simplify and reduce duplication
- Simplify times we hold data
- Reduce service & cost duplication

Network / Cloud
- undertaking associated migrations
- scale for what's needed only when needed

Security & Identity and Access
- Implement Zero Trust model
- Improve Identity and Access Mgt
- Threat and vulnerability scanning

Enterprise Integration Service
- Modern processing engines
- Modular API based services

DevOps / Coding
- Processes
- Resource aligned to DevOps cycle

Optimisation
- Products evolve with user needs
- Learning & institutionalised memory

Data, Insights & Reporting
- Investment in data capabilities & processing engines
- Reporting service

CRM
- Right-sizing the number of apps
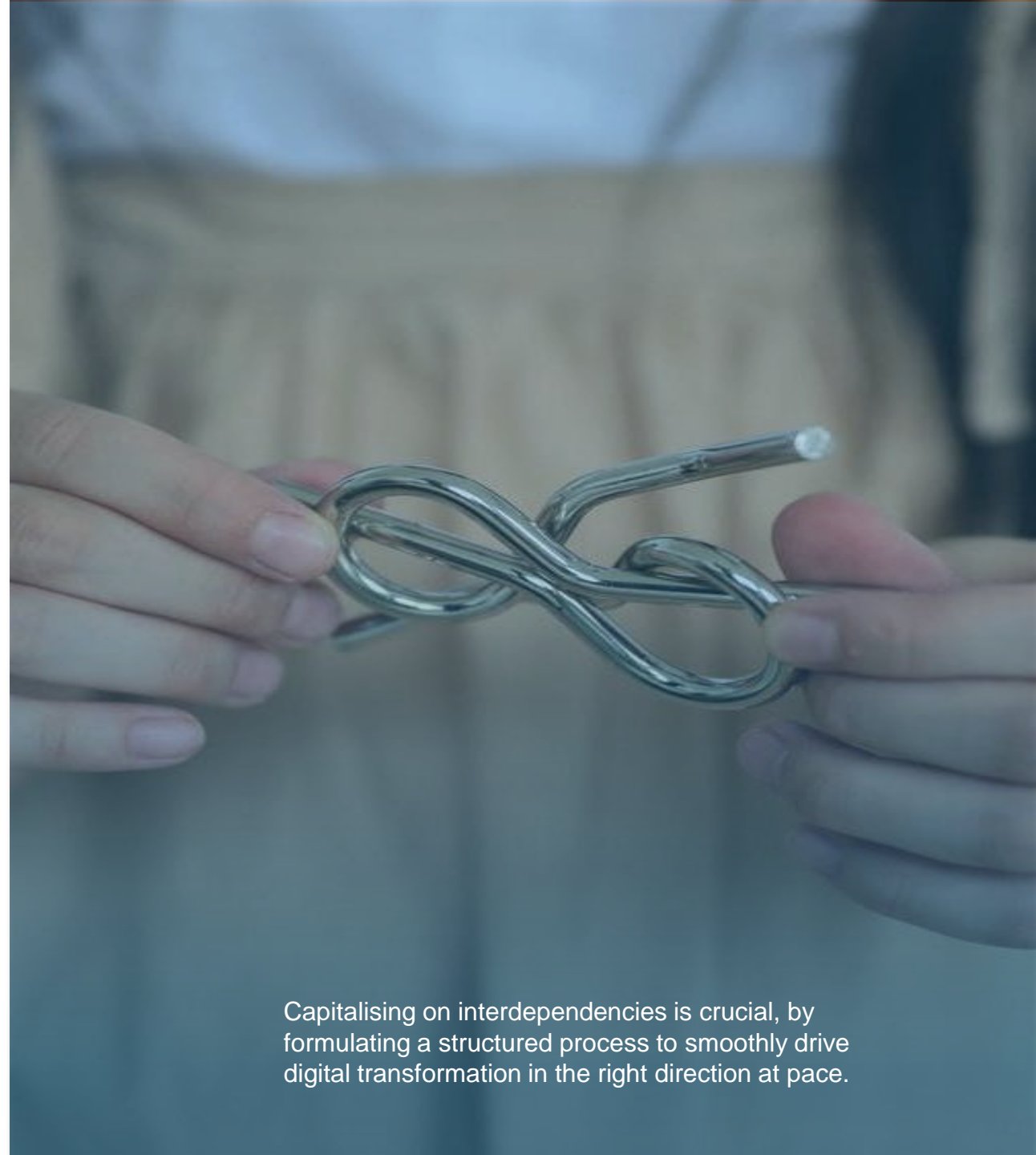
Capitalising on interdependencies is crucial, by formulating a structured process to smoothly drive digital transformation in the right direction at pace.

Front-end solutions lean on critical infrastructure, platforms and connections being available. Therefore, ICT need to set solid foundations first to be able to realise aspirational outcomes for the College.

Connectivity & Security Enablers

Network / Cloud Limitations

- Reliance on traditional hosted infrastructure primarily
- Perimeter base networks and security is outdated
- ICT has limited data centre footprint and visibility (+/-20%)

Impact
- Inflexible infrastructure, delays and challenges academics and other staff
- Technical debt incurs substantial cybersecurity risks
- Server costs are higher than need be in Cloud / hybrid

Security Limitations

- No network segmentation capability between user devices and datacentre servers and services (workloads)
- Limited threat & vulnerability management capability due to lack of integrations

Impact
- Working and studying remotely is not optimally secured
- Limited visibility on security
- If a cyber criminal attacks the College, potential impact and damage can be large

Identity & Access Limitations

- No separation between Standard Account and Administrator account
- Multiple Identity providers
- Too many admin accounts
- Weak network authentication

Impact
- Infrastructure Servers & Applications can be exposed and vulnerable
- Vulnerabilities for spoofing / changes, allowing malicious devices to gain access to network resources

Integration and Process Enablers

Impact
- Growing technology landscape and complexity driven by short term benefit realisation
- Limited ability to connect the College to new innovative 3rd party services

Integration Limitations
- Complex connection between vertically integrated applications and systems with limited re-use opportunities
- Dedicated solution per business area
- Limited API strategic services

Impact
- ICT is unable to deliver at the pace required by the business due to long development cycles
- Missing opportunities around automation and serving College needs

DevOps / Coding Limitations
- No established DevOps cycle and according resource cycle beyond support
- Lack of process automation capability and focus

Impact
- ICT products do not evolve with evolving customer needs
- Limited opportunities for ICT to learn (and do better) as an organisation

Optimisation Limitations
- Lack of strategy in service provisions and continuous improvement
- Limited ICT processes in place for service and support of customers
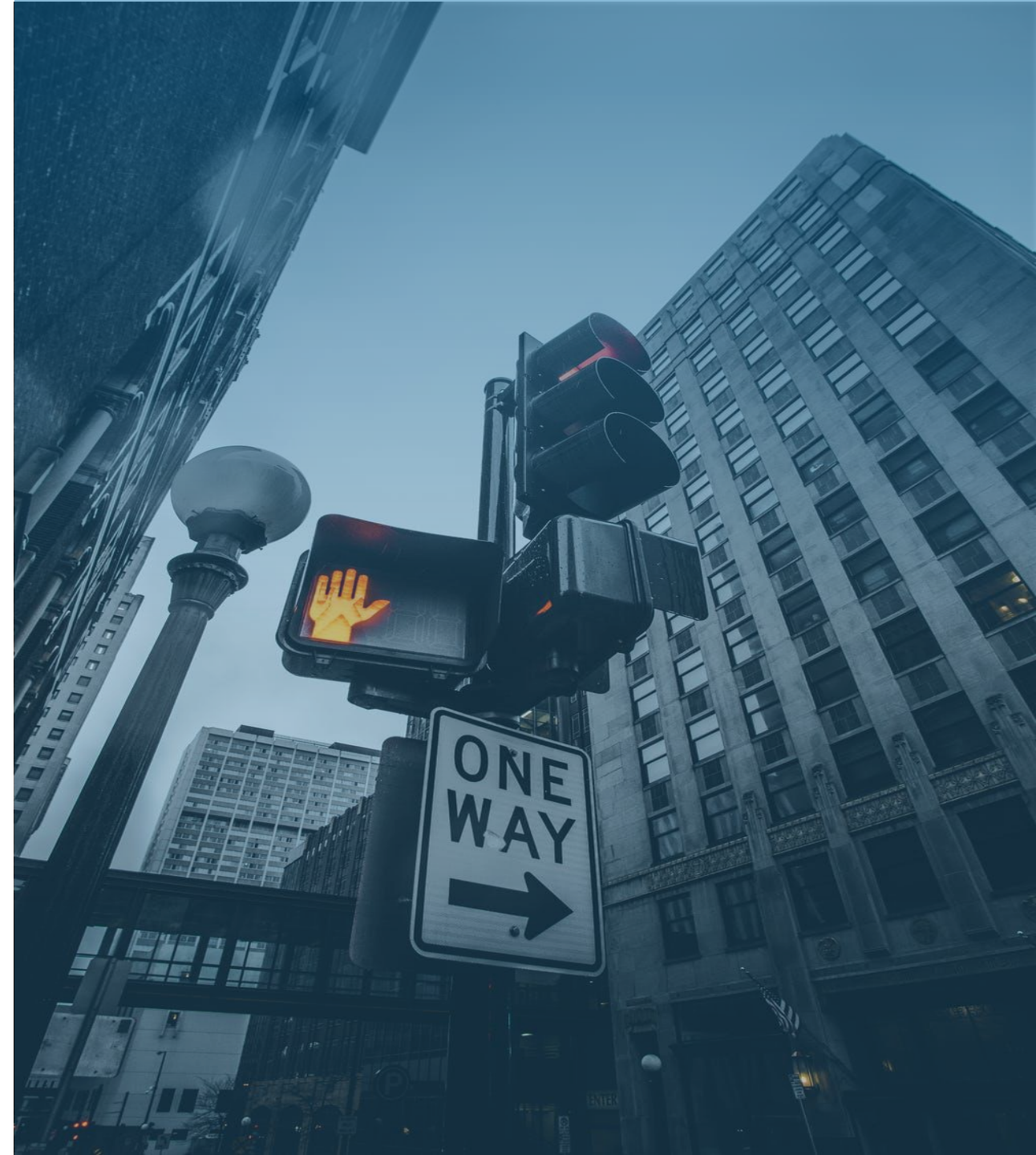
Centralised Data, Analytics and Reporting Enablers

Data & Insights Limitations

- Data is driven by department, not data model
- Capability cannot easily be shared

Impact

- Increased cost, risk and time driven by departments duplicating the same data over and over
- Slow to respond to, or predict (customer) student needs or business risks

CRM

- CRM is fragmented across the College with inconsistent user experience
- Lack of a complete understanding of College requirements on CRM and Case Management Systems

Impact

- No central customer relationship management possible, meaning re-asking for and re-sending information to customers
- Increased total cost of ownership for CRM contracts College- wide

Reporting Limitations

- Analytics limitations
- No reporting systems beyond PowerBI that is aligned with data and integration

Impact

- Limited ability to support better student outcomes across the College in form of personalised learning
- Missed opportunities on generating insights and saving time for wider staff

Dynamic Capacity Management and Instantly Scalable Research Environments from Anywhere

Enabler: Move to the Cloud

Easy spin-up/scale-up/down environments for users across the College, including academics collaborating externally.

Reduced data centre footprint, maintenance and costs.

In scope

Cloud/ Hybrid Platform Build

Migration of Workloads

Azure virtual desktop & labs

Dependencies

Identification of workloads

Secure connectivity

Cloud Landing zone

Cost effective financial Cloud model

Key Results

- [e.g., identification of workloads for migration or the "8 R's" (e.g. replatform), or # workload migrations]
- Reduction of on-premise footprint by 10% a year.
- Increase uptake by non-ICT services by 20% per year.
- Optimised consumption of cloud service. We only pay for what we use.

Assumptions

Users of non-ICT managed workload will be willing to move the cloud platform

Risks

Some benefit of adopting cloud hosting service might be reduced if non ICT managed workloads are not cloud ready.

Resource Requirements

Cloud architects

Solution architects

Developers

Network and Security Engineer

Expected Investment

To be confirmed

IT that "just works"

Simple access to data and systems that every user needs, secure and fast.

Flawless connectivity from any location.

In scope

- Central CRM
- Data platform
- Integration Platform
- Low Code platform
- Connectivity & Hosting

- Reporting Service
- Optimised processes
- Refresh Infrastructure & Technical Debt
- Cloud Landing Zone
- 5G and Wi-Fi refresh

Key Results

- A reduction in manual intervention, man hours, support (example 50% over 3 years)
- Streamlining of platforms, tools and process (example 40% over 3 years)

Enabler: Shared Services

Assumptions

There is a desire to use shared ICT service across various areas of the College

Risks

Risks

Resource Requirements

Business Analyst

Solutions Architect

Technical Architect

Developers

Testers

Expected Investment

To be confirmed

In-Scope Items: What do we mean?

End-to-end student mgt system
- Reimagine the student admin management system
- Create an integrated, end-to-end solution for student administration

Integrated Student Portal
- A web portal that ensures students have a single view of all services required

Student 'all-in-one' App
- May converge with the integrated student portal over time
- Provides a single application for student to access all relevant information and services

App Modernisation (e.g. e-Halls)
- Upgrade and modernise applications that support the student experience. Examples include the Apex applications and e-Halls

Consistent AV Experience
- The same experience of using AV regardless of space
- Aligns the online and in-person experience

Remote Learning & VLEs
- Consolidate and upgrade applications the facilitate remote and virtual learning

Personalised Education
- Ability to use data and technology to support specific learning and teaching needs of students

Content "Netflix of curriculum"
- Technology that facilitates finding on-demand content that matches the right standard and is relevant to students

T&L Innovation Hub
- A space where ICT supports innovation and trialling of new technology to improve the learning and teaching experience

Student Lifecycle and Education

In-Scope Items: What do we mean?

Hybrid/Water Cooled HPC platform
- A production level hybrid High Performance Computing platform
- Includes a datacentre water cooled HPC

RCS Data Strategy
- RCS FAIR Data Strategy to underpin data security, sharing and archiving

Collaboration platform
- Technology to securely collaborate on research projects within the College and with external parties

Part of the UK National RC Infrastructure
- The College research platform becomes part of the UK national research computing Infrastructure

Facilitate AI & ML
- Technology to facilitate research using Artificial Intelligence and Machine Learning

Funding Landing zone
- Research funding landing zone with technology that support grant applications
- Provides real-time insight into funding statuses across all studies

Data & publication security
- Technology to enhance the security of data, prevent forgeries, false identities, and unauthorized changes to publications

Digital Library Tool
- Technology that rapidly reviews summaries, visualizations, and other organisation of data

Research Software CoE
- A research software Centre of Excellence to facilitate state of the art product development and support

Research

In-Scope Items: What do we mean?

Customer & UX feedback
- Actively seeking customer and user experience feedback
- Acting on feedback provided

Chief Customer Excellence
- A role dedicated to identifying opportunities to improve the customer experience

Process Review & Modification
- Ensure processes align with the service and support provided by ICT to the College

Digital Channel
- Enable more digital channels to support interactions when using services

Self-service Capability
- Increase the ability for users to self serve wherever possible when they interact with ICT services

Chatbot
- Chatbots as part of an omni-channel response to provide users with information on standard processes and tasks

Service and Support

In-Scope Items: What do we mean?

Zero Trust Security Model
- Principles that provide a solution that secures access to applications and environments from any device, user or location

CS policies and processes
- Consistent and up-to-date cyber security policies and processes

ID & Access Mgt
- Principles and technology that ensures the right users have correct and appropriate access to the right technology resources

Raise CS awareness
- Activities to raise cyber security awareness across the College

Pro-active threat detection & vulnerability scanning
- Technology and solutions that are used to monitor and manage cyber threats

Asset lifecycle mgt.
- Processes and solutions to manage the lifecycle of the College's ICT assets

Create CISO office
- Office of a Chief Information Security Officer (CISO) responsible for information and cyber security across the College

Cyber Security

In-Scope Items: What do we mean?

Staff Training
- Provide ongoing learning and development activities including training and mentoring opportunities

Updated Performance Reporting
- Update performance review approach

Revise HR foundations
- Review and revise all people processes to support ICT workforce

Apprenticeship Programme
- Develop a talent pipeline and an apprenticeship programme within ICT

ICT Workforce

Dependency Items: What do we mean?

Central CRM
- A centrally managed CRM solution that meets the needs across the College

Data platform
- A centrally managed data platform to facilitate and underpin a wide range of service provided to the College

Integration Platform
- A service that allows for various platforms and solutions to be integrated and share information and data where appropriate

Reporting Service
- Ability to provide and facilitate reporting requirements across the College.

Low Code platform
- A flexible solution and platform that supports easy development of applications.

Optimised processes
- Optimise ICT processes to align with the services and support provided

Connectivity & Hosting
- Cloud platforms for developing and hosting technology products and services.
- Reliable network connections to all hosted services

Refresh Infrastructure & Technical Debt
- Updating and modernising underlying technology infrastructure
- This would form the basis of providing customers with a better experience of using ICT services

Cloud Landing zone
- A service and environment that has the right infrastructure, policies and best practice to facilitate the use of public cloud offerings

Secure connectivity
- Connections made by users and devices into and across the network are secure

Dependency Items: What do we mean?

Cost effective financial Cloud model
- Develop a financial model that means it is cheaper and more efficient to use centrally managed cloud platforms

IAM and PAM solutions
- Technology used for Identity and Access Management (IAM) and
- Technology used for Privilege Access Management

Identification of workloads
- A process of identifying applications and service that can be migrated to a cloud platform

MFA solution
- Technology used for Multi Factor Authentication

Zero Trust Access Solution
- Technology that supports the implementation of Zero Trust network principles

SaaS based monitoring and analysis tool
- Technology hosted in the cloud that facilitate the monitoring and analysis of cyber security threats and vulnerabilities

Build ICT Values & Culture
- Agree the values and culture of ICT
- This should reflect the values of the College

Leading by Example
- The ICT Leadership Team demonstrating the values and culture in their day to day activities

Overall benefit & renumeration package
- The renumeration required to attract and retain talent in ICT