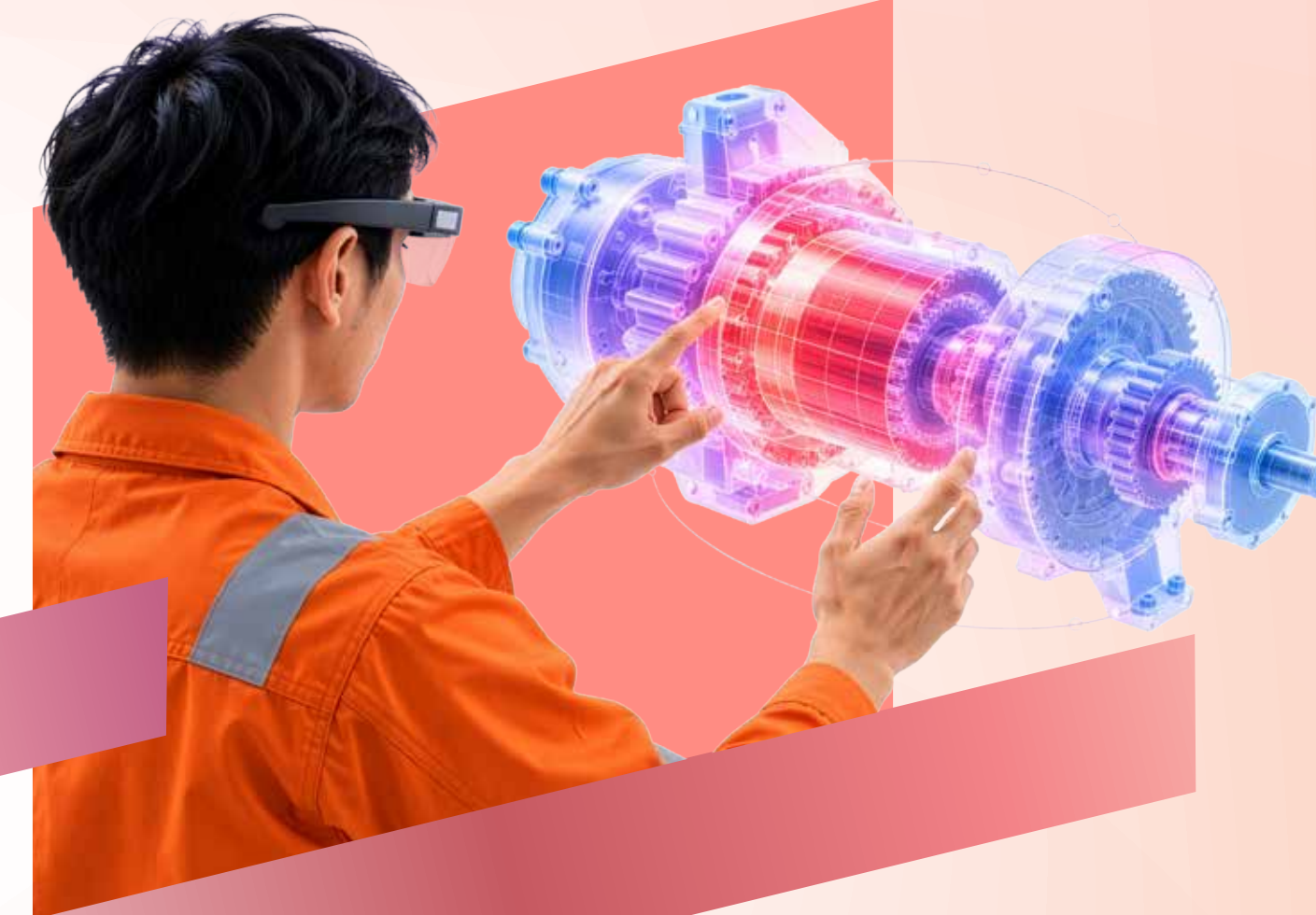


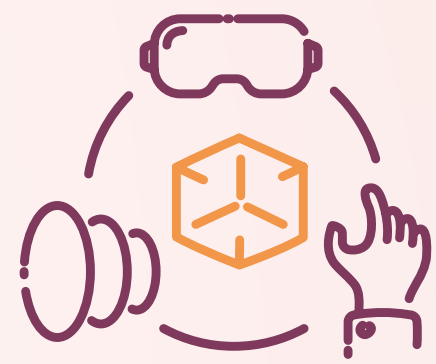
AI-ENHANCED EXTENDED REALITY: TRANSFORMING ENTERPRISE WORKFLOWS

Playbook for Enterprises



EXECUTIVE SUMMARY

Extended Reality (XR), increasingly enhanced by Artificial Intelligence (AI), is opening new ways for enterprises to interact with digital information and the physical world. It can enable users to visualise products or environments before they physically exist, access information and guidance while performing work, and practise tasks in realistic digital environments.



XR is particularly relevant in changing how users see, access and interact with information, materially improving the way a task is performed. For example, this could mean:

- **seeing a proposed design at full scale before it is built;**
- **receiving information directly alongside the equipment being worked on;**
- **practising a hazardous task without being exposed to the actual risk.**

The opportunity should therefore start with the workflow and what needs to be improved, rather than with the technology itself. XR will not be the right solution for every workflow, and enterprises should first establish whether it provides a meaningful advantage over simpler digital approaches and whether the potential business value justifies the investment.

Across enterprises, opportunities are emerging around three common workflows: Product Development and Sales, Operations and Maintenance, and Training. As these opportunities cut across sectors, enterprises should focus on the workflow, user need and problem to solve, rather than replicate use cases from elsewhere.

This playbook is designed to take enterprises from understanding to action: understand what XR + AI can do, see where it could create value in businesses and workflow processes, assess whether it is the right solution and whether there is a clear case for implementation, and then move from implementation to scale. Practical resource tools are provided along the way to help enterprises apply the guidance to their own business context.

At every stage, the focus remains on the business need – **start with the problem, prove the value, and scale what works.**

SECTION

1

**UNDERSTAND
XR + AI**

- 1.1 What Makes Up An XR Solution?
- 1.2 What is Augmented Reality, Mixed Reality & Virtual Reality?
- 1.3 How does AI Enhance XR?
- 1.4 How XR Solution Components Come Together for Different Use Cases

SECTION

2

SEE THE OPPORTUNITY

- 2.1 What Business Workflows can XR Support?
 - (a) Product Development & Sales
 - (b) Operations & Maintenance
 - (c) Training
- 2.2 Case Studies
 - (a) Crestar Enterprise Pte Ltd.
 - (b) Salmon Thrust Pte Ltd
- 2.3 XR Use Cases Across Sectors

SECTION

3

**ASSESS YOUR
XR + AI USE CASE**

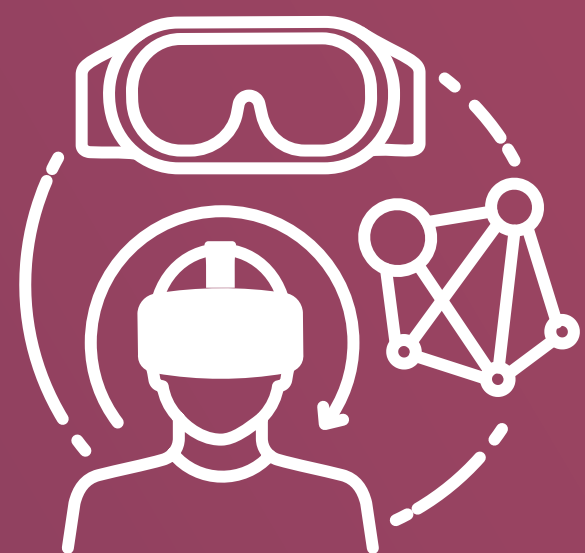
- 3.1 Does Your Business Workflow Warrant XR?
- 3.2 Assess the Strength of Your XR Opportunity

SECTION

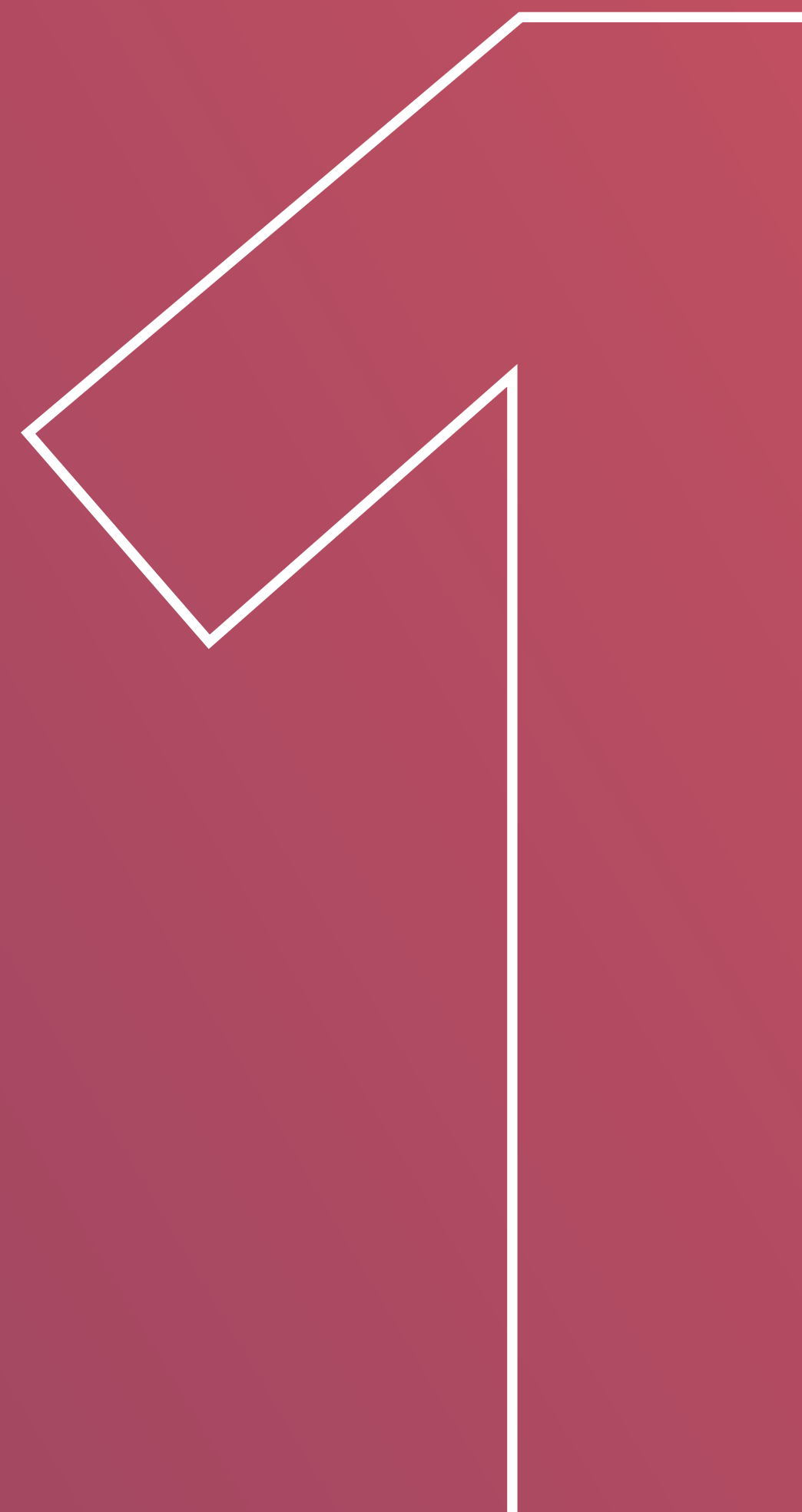
4

IMPLEMENT & SCALE

- 4.1 Map Your Workflow
- 4.2 Define How XR + AI Will Transform the Workflow
- 4.3 Buy, Configure, or Build?
- 4.4 Advancing From Pilot to Scalable Deployment



UNDERSTAND XR + AI



1.1

WHAT MAKES UP AN XR SOLUTION?

Extended Reality (XR) is an umbrella term for technologies that enhance how users experience and interact with digital content and the physical world.

XR enables digital information and experiences to be overlaid onto, integrated with, or experienced independently of the physical environment – creating new ways to visualise information, interact with digital content and perform work.

At its core, an XR solution brings together four common technology layers:

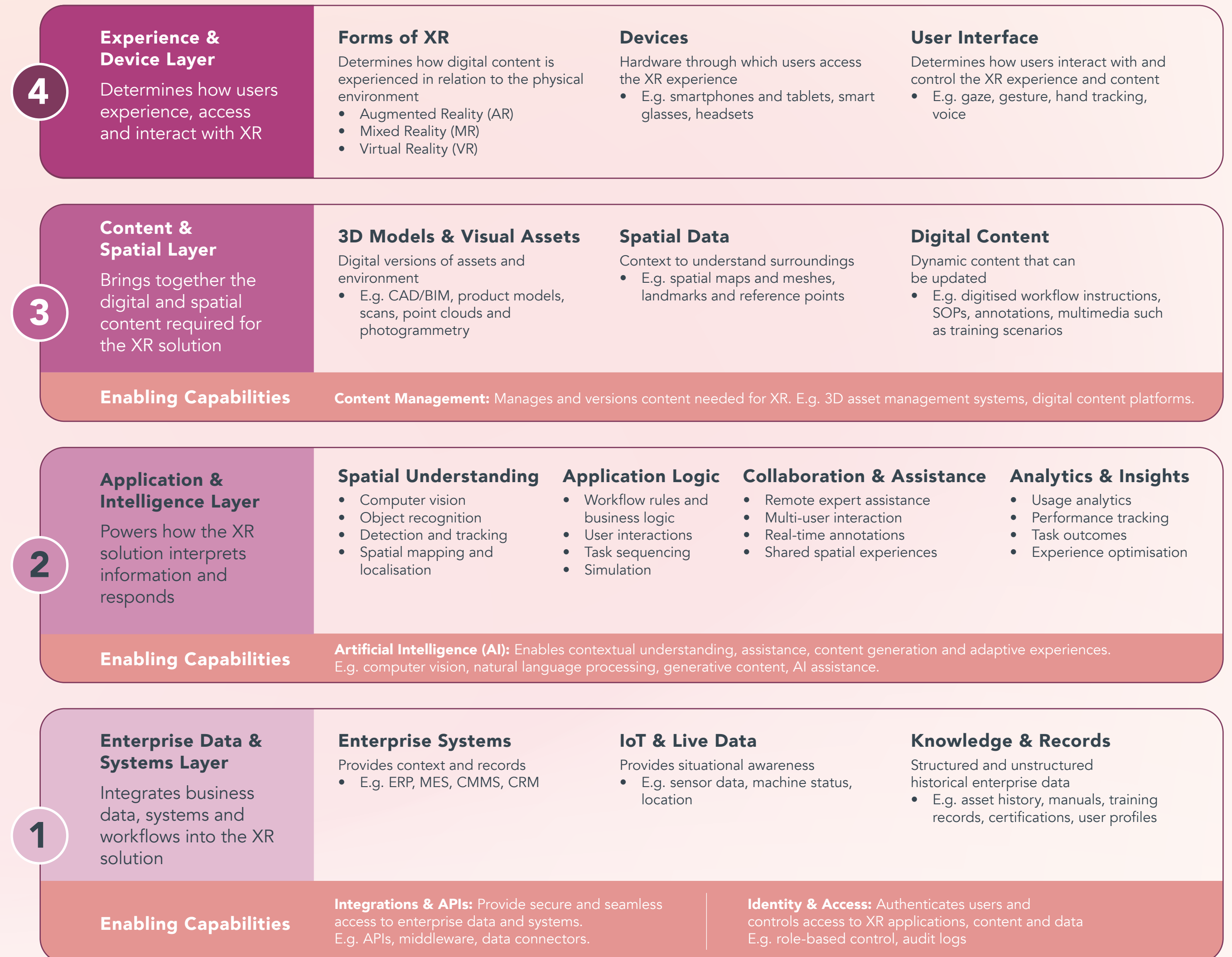
- **Enterprise Data & Systems**
Integrates business data, systems and workflows into the XR solution
- **Application & Intelligence**
Powers how the experience works and responds
- **Content & Spatial**
Brings together the digital content and spatial context required for the experience
- **Experience & Device**
Determines how users access and interact with these underlying capabilities. Depending on the use case and the level of connection and interaction required with the physical environment, XR can take three main forms:

Augmented Reality (AR)

Mixed Reality (MR)

Virtual Reality (VR)

XR – Solution Components



1.2 WHAT IS AUGMENTED REALITY, MIXED REALITY & VIRTUAL REALITY?

XR experiences differ in how digital content relates to the physical environment and how users interact with it. **Augmented Reality (AR)**, **Mixed Reality (MR)** and **Virtual Reality (VR)** range from adding digital content to the physical world to creating a fully virtual environment. They are not maturity levels; the appropriate modality depends on the business need, task and level of physical interaction required.

Extended Reality (XR)

Augmented Reality (AR)



Augment

Mixed Reality (MR)



Integrate

Virtual Reality (VR)



Immerse

Core Concept

Adds digital content to physical environment

Anchors digital content to physical environment

Users operate in a digitally created environment

Physical Environment

Visible and central

Visible, with digital content spatially integrated

Not part of experience

Digital Content

Overlaid onto users' view

Anchored to physical objects and surfaces

Forms the user's surrounding environment

User Interaction

View or access digital information

Interact with digital and physical elements

Interact primarily within virtual environment

1.3 HOW DOES AI ENHANCE XR?

AI is expanding the capabilities of XR, making experiences more contextual, responsive and adaptive. Unlike traditional XR applications that rely on predefined content and workflows, AI-enhanced XR can interpret context, draw on relevant enterprise knowledge and respond dynamically to users and changing conditions.



Traditional XR Experiences

Fixed Content

Pre-created information and assets

Rule-based Workflows

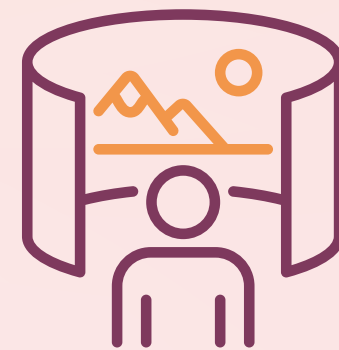
Predefined rules and pathways

Predefined Context

Understands predefined conditions

Standardised Experience

Limited adaptation to users or circumstances



AI-enhanced XR Experiences

Understand Context

Interprets environment, user actions and task

Access & Generate Relevant Content

Retrieves relevant enterprise information and generates content for the user's task and context

Respond Dynamically

Responds to user questions or actions, or provides guidance in real time

Adapt and Personalise

Adjusts guidance and content to user context or performance

In Practice: AI-enhanced XR Experiences

The following three examples illustrate how AI can enhance XR experiences across different enterprise workflows



Equipment Inspection

- **Interpret equipment condition** - analyses sensor and maintenance data
- **Provide conversational assistance** - natural-language questions and responses
- **Generate contextual guidance** - recommends checks and next actions



Design Review

- **Identify potential design issues** - flags conflicts and constraints
- **Answer design questions** - uses specifications and technical documentation
- **Summarise review inputs** - consolidates comments and follow-up actions



Safety Training

- **Create dynamic scenarios** - adapts scenarios to training objectives
- **Personalise training feedback** - adjusts guidance to learner performance

1.4

HOW XR SOLUTION COMPONENTS COME TOGETHER FOR DIFFERENT USE CASES

XR solutions draw on common components, but the specific form, devices, content, capabilities, data and systems vary by use case. The examples below show how these components come together for different use cases.

USE CASE	 EQUIPMENT INSPECTION Assess equipment condition and access information at the point of work	 DESIGN REVIEW Visualise and assess a proposed design in its intended physical environment	 SAFETY TRAINING Practise hazardous scenarios in simulation before facing them in the real world
EXPERIENCE & DEVICE What the user experiences	• Potential Form of XR: AR • Device: Smart glasses or tablet • User Interface: Gaze to direct attention; gesture or touch to navigate; voice for hands-free control and questions	• Potential Form of XR: MR • Device: Headset – to enable users to see and interact with digital designs within the physical environment • User Interface: Hand tracking and gestures to select and manipulate 3D designs; voice for commands, queries and annotations	• Potential Form of XR: VR • Device: Headset – to immerse users in a simulated environment • User Interface: Hand tracking to guide and perform tasks, gaze to direct attention or select; voice to respond and communicate
CONTENT & SPATIAL What the user sees and interacts with	• Equipment information – asset and operating data • Work instruction – procedures and checklists	• 3D models – proposed design • Spatial Data – physical layout and reference points • Design information – specifications, requirements and annotations	• Virtual environment – digital workplace and surroundings • Equipment models – virtual representation of relevant equipment used during hazardous training • Training scenarios – digital situations and tasks to practice
APPLICATION & INTELLIGENCE How the solution works and responds	• Asset identification – identifies equipment • Contextual information – surfaces relevant data and guidance • AI-enhanced capabilities – interpret information and answer queries	• Spatial Understanding – maps space and anchors design • Application Logic – enables design placement, configuration and interaction with the design • Collaboration & Assistance – supports shared review and annotations • AI-enhanced capabilities – retrieves and queries design information	• Scenario simulation – controls scenarios and responds to learner actions • Learner assistance – provides guidance and feedback • Performance assessment – analytics to track actions, behaviour and evaluate outcomes • AI-enhanced capabilities – adapts scenarios and personalises feedback
ENTERPRISE DATA & SYSTEMS What the solution draws on	• Enterprise Systems (e.g. CMMS) – asset records, maintenance history and work orders • IoT & Live Data – equipment status and sensor readings • Knowledge & Records – SOPs and inspection procedures	• Enterprise System – Product Lifecycle Management (PLM) design and product information • Knowledge & Records – design requirements and technical documentation	• Learner management systems – learner profiles and assigned training • Training records – competency and certification



**SEE THE
OPPORTUNITY**



2.1

WHAT BUSINESS WORKFLOWS CAN XR SUPPORT?

XR can create value in many ways, but research and enterprise engagements reveal a consistent pattern: interest rarely starts with the technology – it starts with a business constraint. These constraints map to three enterprise use cases: **Product Development and Sales, Operations and Maintenance, and Training**. Each addresses a need to visualise before committing, act with better information, or practise before doing. This playbook uses these three use cases as a practical lens to identify where XR creates business value.



Visualise before committing

Experience products, designs or environments before they are built, configured or purchased.

Product Development & Sales



Guide work in context

Bring instructions, asset information and remote expertise to the point where physical work happens.

Operations & Maintenance



Practise before doing

Simulate tasks or scenarios that may be costly, hazardous, rare or disruptive to reproduce physically.

Training

The following sections explore the three workflows in greater detail, showing where XR and AI can add value and which XR forms (i.e. AR, MR or VR) may be applicable. These recommendations serve as a guide rather than a prescription, as the appropriate XR form depends on the specific use case and the level of physical context, interaction and immersion required.

2.1A PRODUCT DEVELOPMENT & SALES

(i) Accelerating the Journey from Concept to Production

XR enables product teams and customers to visualise, validate and review designs before physical products are built. AI can further enhance selected stages of the workflow by generating design options, identifying potential design conflicts and issues, and surfacing relevant information to support design decisions.

Traditional Approach

Physical, sequential and time-intensive

- ❌ Limited 3D visualisation before build
- ❌ Costly physical prototyping
- ❌ Multiple revision cycles
- ❌ In-person collaboration required

Weeks to months per iteration

1 Concept 2D sketches and mood boards



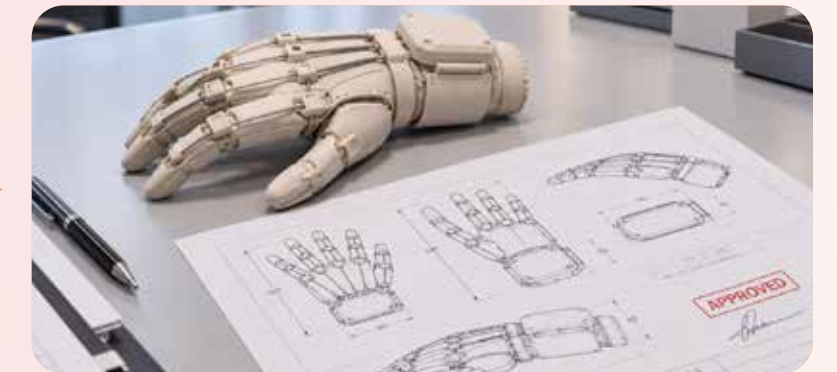
2 Prototype Build physical prototype



3 Design Review In-person review of physical prototype



4 Sign-off Based on 2D drawings or physical prototype



Review and revise

XR + AI Approach

Digital, collaborative and faster to iterate

- ✅ Visualise designs at full scale before build
- ✅ Validate digitally before physical prototyping
- ✅ Iterate without physical rebuilds
- ✅ Collaborate remotely in a shared virtual space

Days to weeks per iteration



XR Explore and present designs in 3D

AI Generate design options



XR Explore and validate digital prototype before physical build

AI Identify potential design issues against technical requirements



XR Remote, immersive, and collaborative design review with real-time iteration

AI Retrieve information, answer design questions and summarise feedback



XR Full-scale final design in an interactive environment

Possible XR Forms:

VR: Detailed early-stage design exploration at full scale before build

MR: Review and refinement in intended physical environment

AR: Confirmation of final fit, placement and appearance



Business Impact

Bring better products to market, faster with lower cost and higher confidence

Faster time to market

Lower prototyping cost and material waste

More design iterations at lower cost

Earlier stakeholder alignment with fewer review rounds

Better-informed decisions before material commitment

2.1A PRODUCT DEVELOPMENT & SALES

(ii) Accelerating Sales Conversion

XR shifts the sales experience from simply showing and describing a product to enabling customers to experience, customise and evaluate it before making a purchase decision—helping them understand what the product will look like (Present), how it can meet their needs (Customise), and which option works best for them (Evaluate). AI can further enhance this experience by personalising recommendations and guiding customers towards options that best match their needs and preferences.

Traditional Approach

Physical, sequential and time-intensive

- ❌ Limited visualisation
- ❌ Reliance on physical samples
- ❌ Time-consuming
- ❌ Risk of wrong choice

Weeks to months per sales cycle

XR + AI Approach

Digital, collaborative and faster to iterate

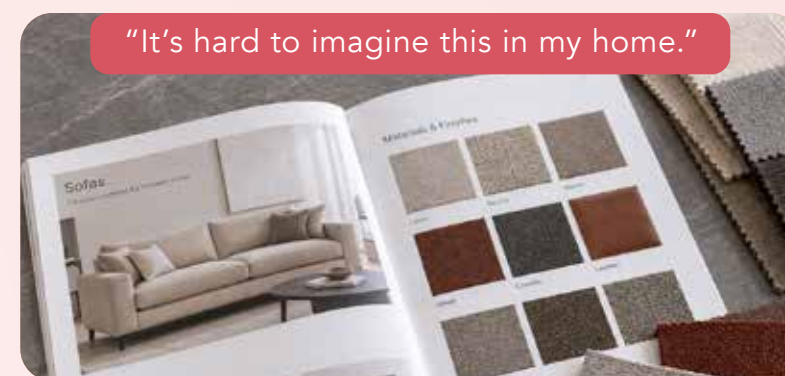
- ✅ Experience products in context
- ✅ Customise in real time
- ✅ Compare and evaluate easily
- ✅ Personalised guidance and recommendations

Days to weeks per sales cycle

1 Present

Show what's possible

Brochures, catalogues, 2D images and physical samples



2 Customise

Tailor to customer needs

Product options shown through samples, drawings or updated visuals



3 Evaluate

Compare and gain confidence

Compare specifications and options across meetings



4 Decide

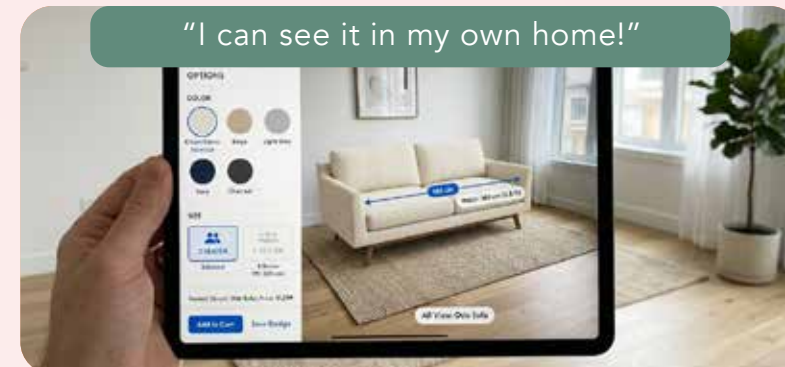
Make the purchase

Based on drawings, samples or specifications



1 Experience in your own space

"I can see it in my own home!"



XR

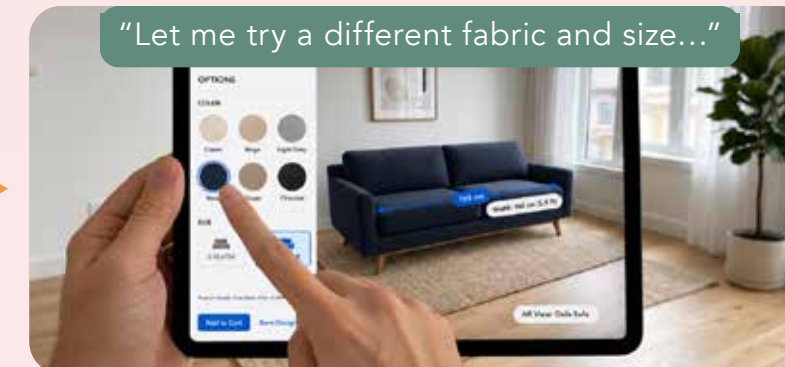
View 3D models at scale in actual space

AI

Recommendations based on customer preferences

2 Customise in real time

"Let me try a different fabric and size..."



XR

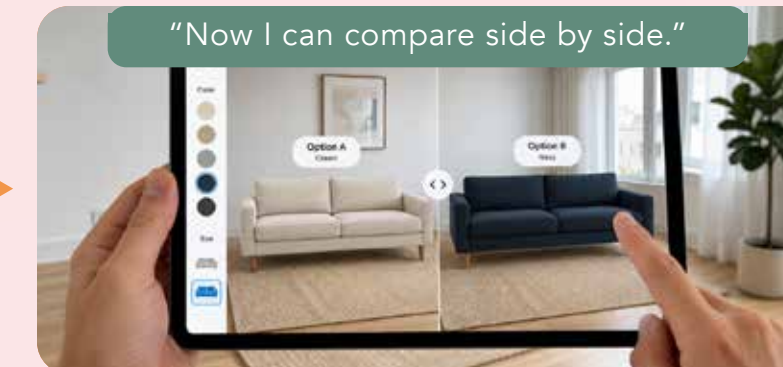
Configure product options in real time

AI

Suggest suitable configurations based on style, budget and preferences

3 Evaluate side by side

"Now I can compare side by side."



XR

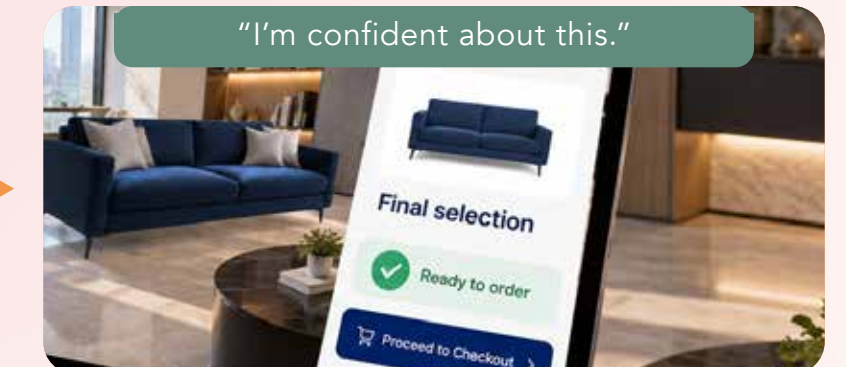
Compare product options side by side

AI

Identify best options based on customer needs

4 Decide with confidence

"I'm confident about this."



XR

Validate at scale in own space before purchase

AI

Generate final recommendations, summary and next steps

Possible XR Forms:

AR / VR

In-context product visualisation

AR / VR

Real-time customisation

AR / VR

Side-by-side comparison

AR / VR

Final preview and placement



Business Impact

Shorter sales cycles, higher conversion and happier customers.

Faster sales cycle

- Reduce time to purchase by 30-70%
- Fewer showroom visits

Higher conversion rates

- More confident customers
- Fewer drop-offs from uncertainty

More personalised experiences

- Better fit to customer needs
- Higher customer satisfaction

Scalable and efficient sales

- Shared digital assets across markets
- Expand reach through remote selling

2.1B OPERATIONS & MAINTENANCE

Increasing Uptime and Operational Efficiency

XR provides field workers with real-time, hands-on guidance and information while performing physical tasks – helping them inspect, diagnose, fix and verify issues more effectively. AI can further enhance this experience by surfacing relevant information, recommending next steps and enabling faster issue resolution.

Traditional Approach

Work stops to search for answers

- ❌ Scattered information
- ❌ Reliance on manuals and off-site experts
- ❌ Delays and downtime
- ❌ Inconsistent execution

Longer issue resolution time

1 Inspect

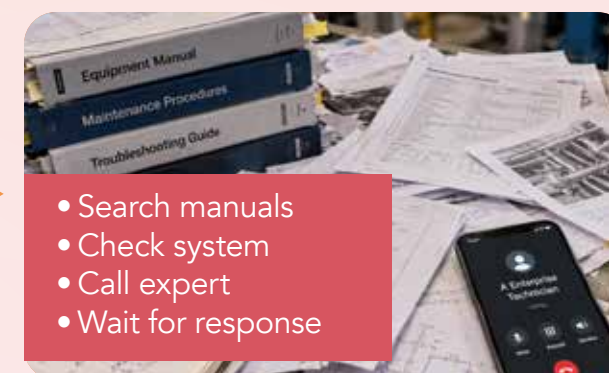
Inspect and identify issue

"Something looks off..."



2 Stop & search

Search manuals, records or contact an expert



3 Diagnose

Manually analyse multiple sources to identify cause

"Is this the issue?"



4 Perform repair

Follow written or verbal guidance

"Hope this is correct..."



5 Verify & record

Verify resolution and update records

"Log completion"



Repeat if unresolved

Repeated back-and-forth increases delays, downtime and costs

1 Inspect

See asset information overlaid in real time



XR

Overlay asset data, specifications and inspection points

AI

Detect anomalies from visual and sensor data

2 Diagnose

Get AI-enhanced insights in context



XR

Visualise components and maintenance information in context

AI

Analyse asset history and sensor data to identify likely causes and next steps

3 Perform

Receive step-by-step guidance at point of work



XR

Provide step-by-step guidance at the point of work

AI

Adapt guidance and flag safety risks

4 Verify

Confirm completion in real time



XR

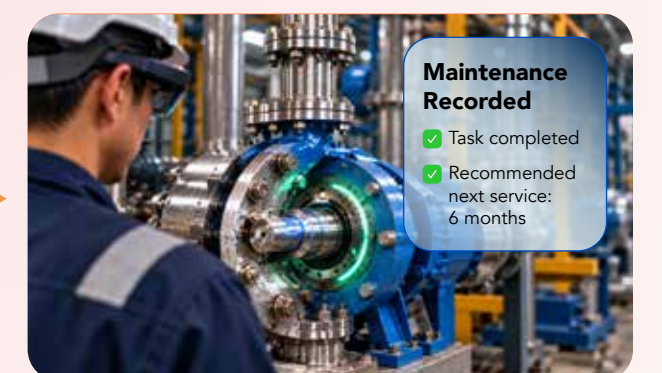
Guide checks and capture evidence

AI

Verify results, update records and recommend next steps

5 Learn & Improve

Capture knowledge for the future



XR

Capture completed work in context

AI

Identify recurring issues and recommend preventive actions

Possible XR Forms:

AR: Asset information overlay

AR/MR: Contextual inspection for AR and Spatial/3D inspection for MR

AR/MR: Visual step-by-step guidance for AR; spatially anchored 3D guidance for MR

AR: Checks and results overlay

AR/MR: Procedural overlays and spatial guidance



Business Impact

Real operational outcomes for a more resilient and efficient business.

Reduce unplanned downtime

- Faster issue resolution
- Earlier detection of potential issues

Lower maintenance costs

- Fewer repeat visits
- Better first-time fix rates

Improve asset reliability

- More consistent maintenance
- Fewer recurring issues

Build workforce capability

- Reduce knowledge gaps
- Capture and build a knowledge base

2.1C TRAINING

**Build Skills with Confidence
Before the Real Task**

XR creates safe, repeatable practice environments so learners can build competence before working with live equipment. AI can further personalise scenarios, provide instant feedback and surface capability gaps earlier.

Traditional Approach

Limited by instructor and equipment availability

- ❌ Instructor-led training and manuals
- ❌ Limited hands-on practice
- ❌ Delayed, subjective feedback
- ❌ Limited personalisation

Longer time to competency

XR + AI Approach

Immersive, flexible and data-informed

- ✅ Realistic, risk-free training
- ✅ Repeatable practice
- ✅ Personalised guidance and feedback
- ✅ Progress and skill gap tracking

Shorter time to competency

1 Instruct

Theory-based learning without safe rehearsal of high-risk scenarios



Passive Instruction

Immersive, contextual learning



XR

Immersive modules set context and adapt content to role or prior knowledge

AI

Adapts pathway and pace to learner profile

2 Demonstrate

One-time live demonstration that cannot be paused or repeated, or safely viewed on hazardous equipment



One-time demonstration

Self-paced exploration



XR

3D demonstrations can be repeated, slowed down and viewed from any angle

AI

Recommend content based on learner gaps

3 Practise

Limited practice on live equipment due to hazardous environments, time and operational constraints



Limited and high risk

Safe, repeatable practice



XR

Practise realistic scenarios repeatedly in risk-free environments

AI

Adjust difficulty and track learner performance

4 Feedback & Assessment

Subjective, incomplete feedback without objective evidence of competency



Manual and delayed

Personalised, data-informed assessment



XR

Performance is captured, scored and reviewed with clear evidence of readiness gaps

AI

Identify gaps and errors, suggest corrective actions

Possible XR Forms:

MR/VR: Immersive simulations or digital guidance with real equipment

MR/VR: Safe simulation of procedures and rare events in controlled settings

MR/VR: Assessment of performance and outcomes captured in simulation



Business Impact

A more capable, safer and more productive workforce.

Shorter time to competency

- Reduce training time
- More targeted skill development

Safer operations

- Fewer on-the-job incidents
- Practise high-risk scenarios safely

Lower training & operating costs

- Standardised training across sites and shifts
- Objective, data-driven assessments

Stronger knowledge retention

- Learn by doing
- Continuous learning and upskilling at scale

2.2A ACCELERATING B2B SALES WITH XR

CASE STUDY 1



Crestar Enterprise leverages VR to help B2B clients visualise, customise and compare fan designs in an immersive environment, accelerating the sales conversion process and reducing the need to create and transport physical products.

Before

B2B sales relied on catalogues, product visuals and physical ceiling fans



Logistics and Physical Constraints With Over 1,000 Variations

- Clients are exposed to limited fan models;
- Transporting physical products is cumbersome

Slow Iteration and Escalating Costs

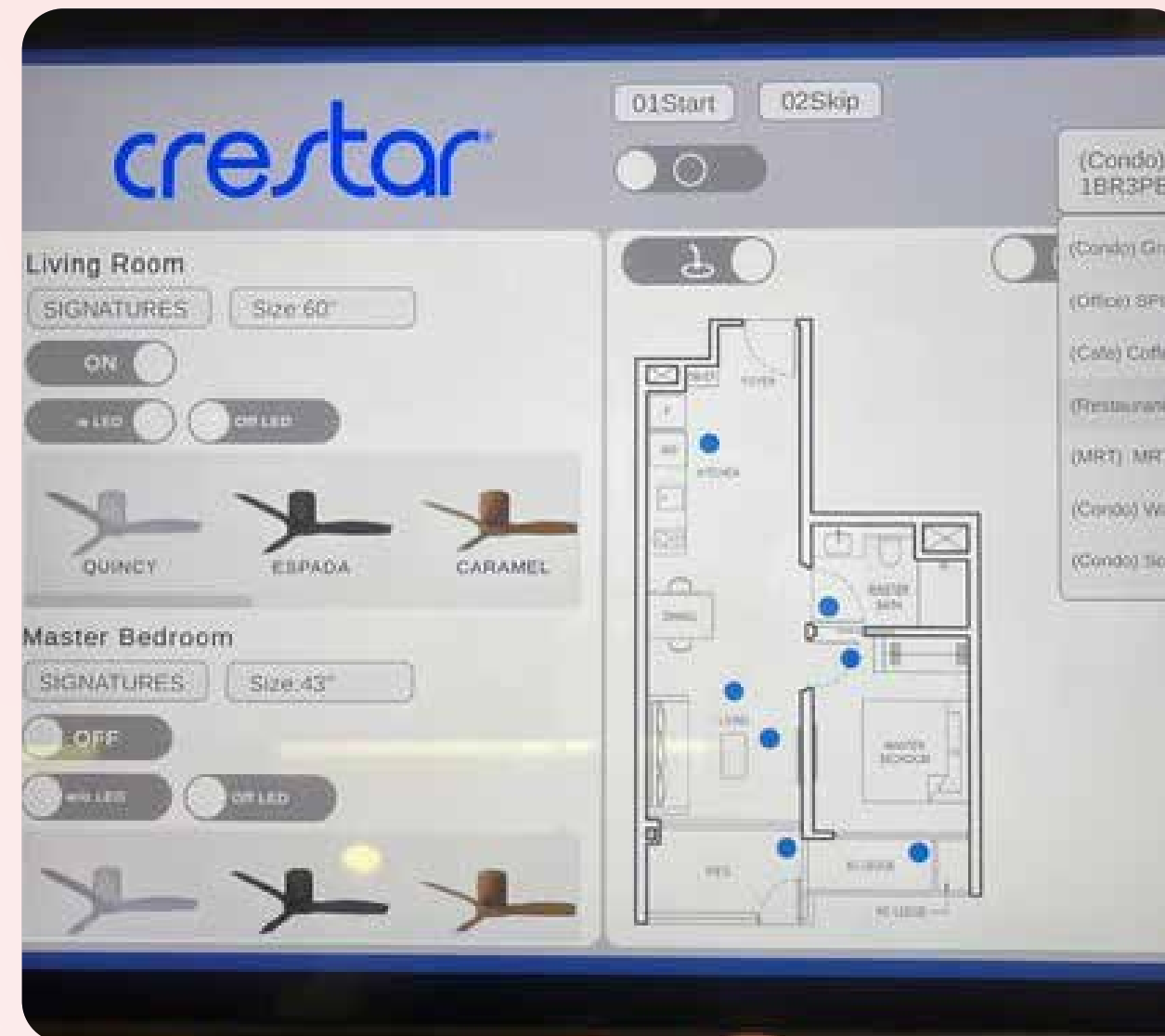
- Clients have limited options to physically view and compare different product configurations
- Increasing costs and reducing margins for Crestar.

Limited Visualisation and Customisation

- Clients had to imagine how different designs and configurations would look in their projects
- Reliance on similar designs for client visualisation

The VR Solution

Visualise and customise fan designs in an immersive environment



Immersive Visualisation

Clients can experience fan designs in their own environment

Real-Time Customisation

Built-in **XR Configurator** to allow clients to change models, parts, colours, finishes and configurations in real time

Instant Evaluation

Compare different product and design options without waiting for revised physical prototypes



Upcoming AI Enhancement (XR Configurator)

Provide personalised recommendations and configurations and automate quote generation

Scale

Expanded the VR solution to overseas trade shows



Product Showcase No Longer Limited by Space

Potential clients can explore multiple fan models and components

Reduce Product Logistics Burden

Lower transportation costs and operational complexity at overseas events

“ XR is helping us move beyond simply selling products to designing experiences. By bringing our products and possibilities to life, we can help customers visualise, explore and make decisions faster — creating more meaningful conversations and greater value throughout the customer journey. ”
— **Shawn Lee, COO, Crestar**



Business Impact

3x more engaging client discussions
50% increase in sales opportunities

Reduce prototype costs
Cut physical prototypes by 50%

Reduced logistics costs
Logistics cost savings (e.g. shipping) by 45%

Scalable Investment
One XR solution, multiple business applications

2.2B

CASE STUDY 2

TRANSFORMING FINANCIAL SERVICES TRAINING WITH GEN AI-ENHANCED XR



Salmon Thrust leverages Gen AI-enhanced VR to deliver adaptive training simulations to banking and finance professionals—replacing some passive content delivery with immersive, personalised experiences that compress development timelines and accelerate time-to-competency.

Before

Reliance on traditional, passive training tools created significant operational constraints



Passive Delivery

Slides and videos offered no ability to adapt to varying seniority—low engagement and poor retention.

One-Size-Fits-All

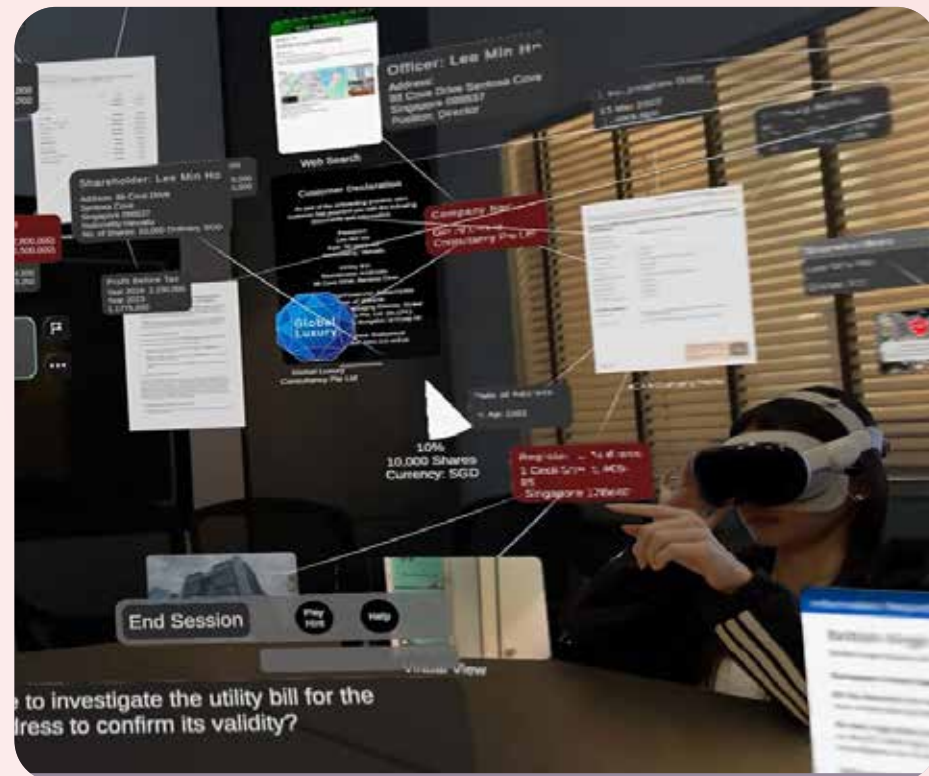
Rigid content delivery made adaptation difficult, and manual course development required at least 12 months.

Limited Practice

Scripted classroom roleplay offered limited realism with no ability to repeat without disrupting the group.

The XR Solution

XR replaces static content with immersive, adaptive training experiences



Immersive

AI-driven XR platform places trainees in lifelike interview environments with dynamic simulations.

Adaptability

Content and scenarios adapt to proficiency level; each trainee receives appropriately scaled experiences from one platform.

Continuous Assessment

Platform continuously monitors individual performance, providing personalised, real-time responses and feedback.

Scale

Same platform extends across courses, topics and financial domains



One Platform, Many Courses

Reusable components can be adapted across financial topics and seniority levels without being rebuilt from scratch.

Reduced Costs for New Courses

Modular architecture means resources are focused on content, reducing development time and manpower costs.

Scalable Beyond Initial Deployment

Platform scales to accommodate new product lines, learning domains, and training programmes.

“ We rely a lot on scripted roleplays and classroom sessions—training that trainees sit through rather than experience. By incorporating XR and AI, we see improved confidence and readiness in our trainees, and it has opened possibilities and opportunities we wouldn’t have considered before. — **Ng Lye Heng, Founder and CEO, Salmon Thrust** ”



Business Impact

4x Content Productivity

30% faster course development, from 12 months to 8 months

2x Assessment Productivity

Doubled productivity in assessment development

20% Faster Time-to-Market

Target reduction achieved through productivity gains

30% Revenue Growth

Projected increase - attendance from 30 to 40

30% Talent Development

Efficiency gain: less time on content administration, more on developing talent

2.3

XR USE CASES ACROSS SECTORS

IMDA’s engagements with early-adopter enterprises, XR solution providers and technology leaders have highlighted several sectors where XR may be particularly relevant, given the nature of their workflows and operating environments. The examples below illustrate the types of business challenges and opportunities observed across these sectors.

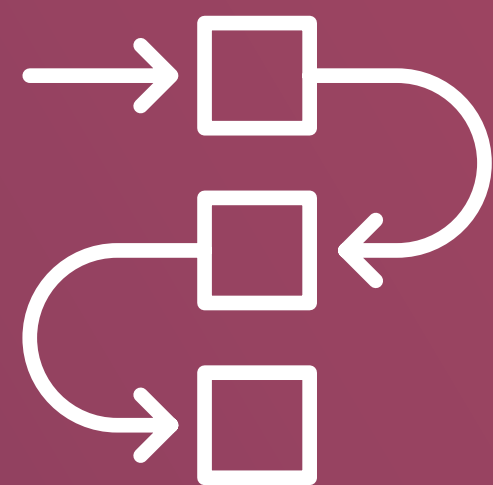
SECTOR	COMMON WORKFLOW PROBLEM	PRODUCT DEVELOPMENT & SALES	OPERATIONS & MAINTENANCE	TRAINING
MANUFACTURING	Complex product variants, downtime and inconsistent servicing across plants.	MRVR Digital factory & product fit review Validate layouts, equipment reach and operator access before purchase or deployment.	ARMR Guided machine servicing Overlay SOPs, part locations and expert guidance during repair or changeover.	MRVR Operator certification Practise lock-out and tag-out, setup and emergency responses without stopping production.
BUILT ENVIRONMENT & CONSTRUCTION	Design issues, site coordination gaps and safety risks are often found late on site.	MRVR Spatial design review Review BIM models at scale for clashes, finishes and layout decisions	ARMR Facility inspection & handover Overlay asset data, defects and checklist items onto rooms, plant rooms and M&E equipment.	VR Site safety rehearsal Simulate height, confined-space, crane and traffic hazards before workers enter site.
RETAIL & REAL ESTATE	Customers struggle to visualise spaces and products; staff sales and service knowledge varies.	ARVR Virtual product & property experience Visualise furniture, fit-outs, show units and unbuilt spaces before purchase.	ARMR Store & property maintenance Guide fixture checks, inspections, issue capture and remote FM support.	ARVR Frontline sales onboarding Rehearse customer scenarios, demos and visual merchandising standards.
LOGISTICS & WAREHOUSING	Large facilities create picking errors, slow onboarding and equipment handling risks.	MRVR Warehouse solution demonstration Show proposed layouts, automation zones and customer-specific fulfilment flows before build-out.	ARMR Visual picking & fleet checks Guide picking, item verification, MHE checks and remote troubleshooting.	VR Forklift & MHE training Practise manoeuvres, hazard awareness and operating routes in a safe simulation.
HEALTHCARE	Procedures, equipment and patient-facing workflows require high accuracy, confidence and repeatable practice.	MRVR Clinical space & device demonstration Review ward layouts, procedure-room setups and device use with stakeholders.	ARMR Biomedical equipment support Guide calibration and maintenance with remote specialist support.	MRVR Clinical simulation Rehearse rare events, procedures and team responses without patient risk.
OTHER HIGH-RISK INDUSTRIES	Hazardous sites make real-world practice costly, risky or operationally disruptive.	MRVR Hazardous-site planning Rehearse plant changes, emergency routes and offshore or utility work before execution.	ARMR Remote field intervention Support inspections, shutdown tasks and fault response with hands-free guidance and expert view-sharing.	VR Emergency & safety drills Simulate fire, chemical, electrical and confined-space hazards without exposing staff to danger.

Possible XR forms:

AR

MR

VR



**ASSESS YOUR
XR + AI USE CASE**



3.1

DOES YOUR BUSINESS WORKFLOW WARRANT XR?

By now, you may recognise a similar workflow in your own business. But that does not automatically mean you need XR. Before investing, determine whether XR solves a problem that existing digital solutions (e.g. screen-based tools, digital workflows or AI) cannot address as effectively. Use the questions below to guide that judgement.

 Ask Yourself	 Consider XR When	 XR May Not be Necessary When
Does physical or spatial context matter?	Size, position, movement, layout or surroundings affect how users perform the task or make decisions.	The information can be understood through text, images, video or a standard screen.
Does the workflow require information to be accessed during physical work?	Users need digital information or guidance while observing, moving around or working with the physical environment.	Users can refer to a PC, phone or tablet without disrupting the task.
Is the real environment difficult to access?	The asset, equipment, environment or situation is unavailable, remote, hazardous or expensive to recreate.	The real environment can be accessed safely, readily and economically.
Is experiential practice important?	Users need repeated hands-on physical or spatial practice, not knowledge acquisition alone.	Documents, video, e-learning or conventional digital tools can achieve the learning outcome.
Does the experience need to respond to the user or context?	The solution needs to interpret what users see or do, generate guidance or content, or adapt in real time.	AI alone may suffice for generating, analysing, retrieving or personalising information without spatial interaction or immersion.
 If your answers fall mostly left, explore XR further. If they fall mostly right, assess whether a simpler technology can achieve the same outcome.		

3.2

ASSESS THE STRENGTH OF YOUR XR OPPORTUNITY

Once you have established that your workflow could benefit from XR, assess whether the opportunity is worth pursuing. Start with business value, then assess the operational factors needed for viability, recognising that some gaps can be addressed over time.



1 BUSINESS VALUE

Should we pursue this?

DIMENSION	KEY QUESTIONS	INDICATIVE EXAMPLES	WHY IT MATTERS
1. Financial & Business Impact	- What business outcomes will XR help achieve - How can the value be measured? - Is the expected impact meaningful?	- Reduce equipment downtime - Increase sales or conversion - Lower training or operational costs - Improve quality or reduce errors	Ensures the solution creates tangible value that justifies the investment.
2. Scalability Opportunity	- Can the solution be applied beyond the initial use case? - Can it integrate with existing systems and data? - Will benefits grow over time?	- Roll out to multiple sites or markets - Reuse of content across teams or functions - Integration with enterprise systems - Potential for new revenue streams or services	A scalable solution delivers greater long-term value and better return on investment.
3. Content & Data Readiness	- Can the XR content be created within reasonable time, cost and disruption? - Do you have existing assets (e.g. 3D models, CAD/BIM, photos, videos) that can be reused? - If new content is needed, is it feasible to capture or develop it without excessive cost or disruption?	- Use existing 3D models or CAD/BIM files - Capture content using available tools (e.g. 360° photos, LiDAR, photogrammetry) - Create simple content (e.g. 3D scans, product models, process walkthroughs) that can be produced within budget	XR should be considered when content can be created or obtained at reasonable cost and effort, making the solution economically viable.



CHECKPOINT

Is there a compelling business case?



If the answers are mostly “no”, reconsider the opportunity.



If the answers are mostly “yes”, proceed to assess operational potential.



2 OPERATIONAL POTENTIAL

Can we make it work?

DIMENSION	KEY QUESTIONS	INDICATIVE EXAMPLES	WHY IT MATTERS
1. Ownership & Governance	- Is there a clear business owner and sponsor? - Are roles and responsibilities defined? - Is there organisational support to drive implementation?	- Executive sponsor identified - Dedicated project owner and team - Clear decision-making and governance structure	Strong ownership and governance help maintain momentum through implementation and adoption.
2. Employee Readiness	- Are users ready and willing to adopt the solution? - Do they have the necessary skills and support? - Are there constraints to day-to-day use?	- Familiarity with XR devices - Training and change management plan - Suitable work environment (e.g. safety, space, devices) - Ongoing support when needed	User adoption is critical to realising value and can be built through training, support and change management.



NEXT STEPS



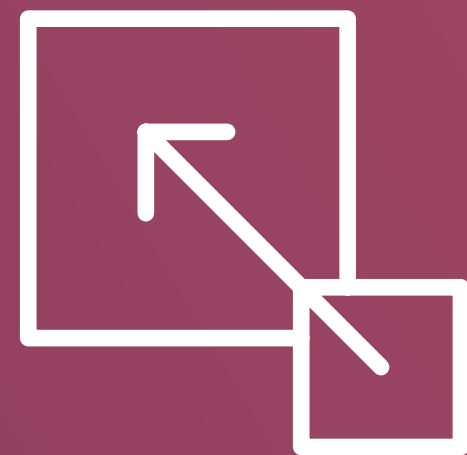
If business value is compelling

Assess operational potential and identify any gaps.



Develop an action plan

Address operational gaps through planning, capability building or external support, then move to solution design (refer to Section 4)

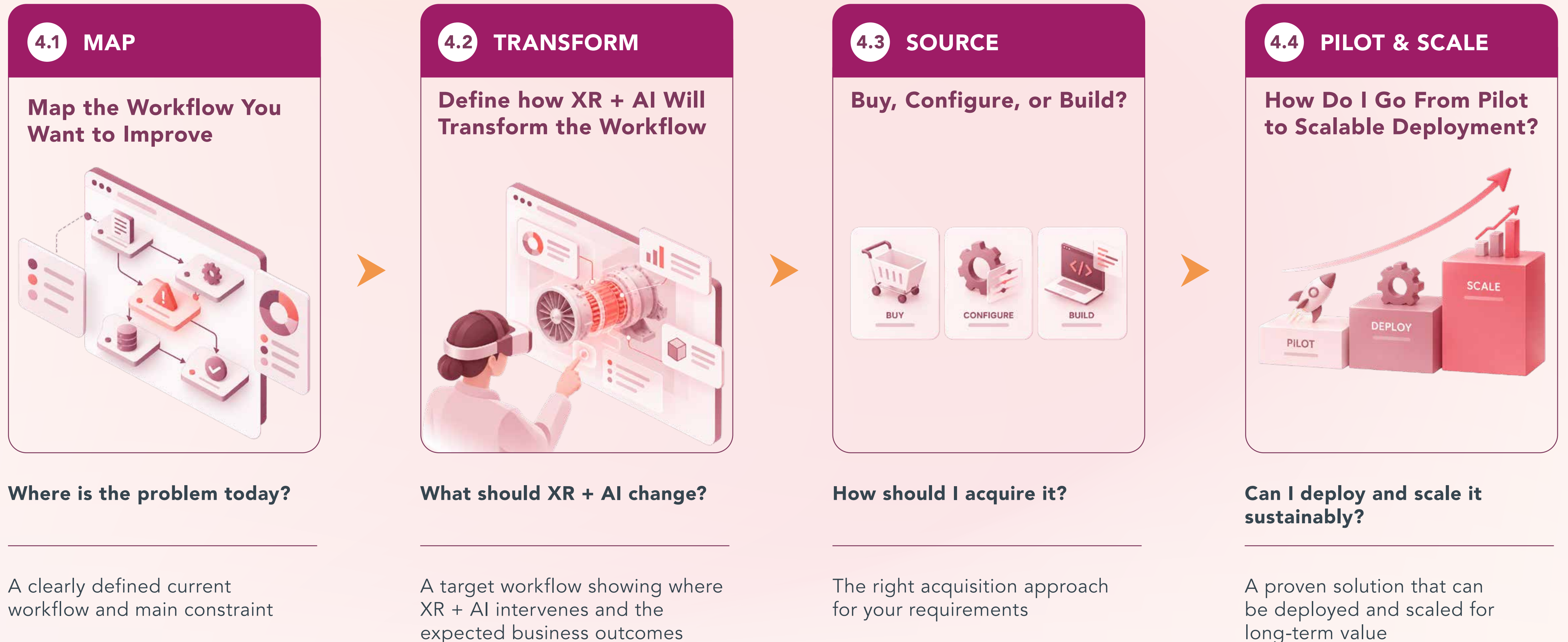


IMPLEMENT & SCALE



FROM BUSINESS CHALLENGE TO SCALABLE IMPACT

By now, you have identified and validated an XR use case. This section takes you through the practical decisions needed to turn that use case into a solution that can be piloted, deployed and scaled.



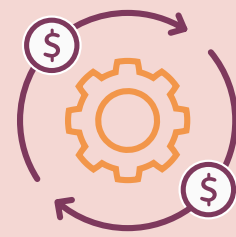
4.1 MAP YOUR WORKFLOW

By now, you have established that XR is relevant to your use case. Before deciding what the solution should look like, pinpoint the specific workflow you want to improve using the following steps:

1

Choose your workflow

Select the workflow that best reflects the business activity you want to improve.



Product Development & Sales



Operations & Maintenance

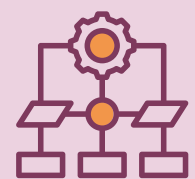


Training

2

Map how the workflow works today

Break down the activity you want to improve and identify the main constraint.



Map the steps

- What happens from start to finish?
- Who does what?
- Which systems, tools or information are used?



Find the friction

- Where is time, cost, or effort being lost?
- At which points do users wait, search, travel or repeat work?
- What other pain points do users face?



Understand the cause

- Why does the problem occur today?
- Is there a lack of information, expertise, physical access or experience?
- Are there process or system limitations?



Establish the baseline

- How do you currently measure performance (e.g. time, cost, errors, output or conversion)?
- What is the current frequency or impact?



A resource tool is provided on **page 24** to help enterprises map the current workflow, identify key friction points and their underlying causes, and establish a baseline for measuring improvement.

Example: Operations & Maintenance – Equipment troubleshooting (Current workflow)

Fault occurs → Inspect equipment → Search for information → Diagnose → Perform intervention → Record outcome



Main constraint: Technician loses time searching for the right information



Output

A clearly defined current workflow, its main constraint and the business metric you want to improve.
This forms the basis for designing how XR + AI can transform the workflow.

4.1

RESOURCE TOOL 1/2: MAP YOUR CURRENT WORKFLOW

Now that you understand how to map a workflow, apply the approach to your own use case. Choose the business activity you want to improve, map how it works today, identify the main friction and its underlying cause, and establish the baseline for measuring improvement.

1 Your specific workflow / business activity Start with the business activity you want to improve.

Workflow / business activity (e.g. equipment troubleshooting)

Owner / team (who performs or owns it?)

Desired outcome (what should improve?)

Example workflows (choose one or specify another): Product Development & Sales | Operations & Maintenance | Training | Other (please specify):

2 Map the current workflow Break down the key steps, actors and systems involved.

Step 1

- What happens?
- Who / system?

Step 2

- What happens?
- Who / system?

Step 3

- What happens?
- Who / system?

Step 4

- What happens?
- Who / system?

Step 5

- What happens?
- Who / system?

**MAIN FRICTION**
Where is time, cost, effort, risk or quality being lost?

3 Understand the cause Identify the underlying cause of the main friction.

Information / data

- ☐ Hard to access
- ☐ Fragmented / outdated
- ☐ Other (specify):

People / expertise

- ☐ Expertise unavailable
- ☐ Skills / experience gap
- ☐ High staff turnover
- ☐ Other (specify):

Process / systems

- ☐ Manual / repetitive
- ☐ Tool or system limitation
- ☐ Siloed departments
- ☐ Other (specify):

Physical / access

- ☐ Remote / hazardous
- ☐ Costly or impractical access
- ☐ Environment constraints
- ☐ Other (specify):

**ROOT CAUSE**
What is the underlying cause of the main friction?

4 Establish the baseline Record current performance so improvement can be measured.

#	Metric (e.g. time, cost, error rate, output)	Current baseline (e.g. 30 minutes)	Notes (if any)
1	Time per inspection	30 minutes	Varies by technician
2			
3			

**Output (Page 1)**

A clear view of the current workflow, main friction points and baseline performance. This will form the basis for designing how XR + AI can transform the workflow.

**Next: Resource Tool 2/2**

Use your insights from this resource tool to design where and how XR + AI can help, and define the expected outcomes.

4.2 DEFINE HOW XR + AI WILL TRANSFORM YOUR WORKFLOW

With the current workflow and its main constraint defined in 4.1, determine where XR + AI can intervene. Identify if the user needs to see, understand, do or capture, and choose the relevant interventions. Then, redesign the workflow and define the business outcomes expected to improve.

1 Decide how XR + AI should intervene For each step, consider the user’s need and select the relevant interventions below.

**See**
Bring information into context

Choose this when users:

- need to visualise something difficult to understand from 2D documents
- need to see real-world conditions or spatial information
- need to explore or compare options

Example: Inspect equipment (from 4.1)
At this stage, choose See: AR overlays (XR) to show equipment information in real time (e.g. highlight parts, show status).

**Understand**
Retrieve and interpret information

Choose this when users:

- need to access information from multiple sources (e.g. manuals, SOPs, data)
- need to interpret complex information or identify issues
- need answers or recommendations based on context

Example: Diagnose issue (from 4.1)
At this stage, choose Understand: AI searches maintenance records and summarises possible causes, shown in the XR interface.

**Do**
Guide, assist or enable interaction

Choose this when users:

- need step-by-step guidance
- need hands-free support while performing a task
- need to interact with systems or equipment
- need to practise or simulate before doing it in the real world

Example: Perform intervention (from 4.1)
At this stage, choose Do: XR provides step-by-step guidance and an AI assistant answers questions hands-free.

**Capture**
Record and learn from the interaction

Choose this when users:

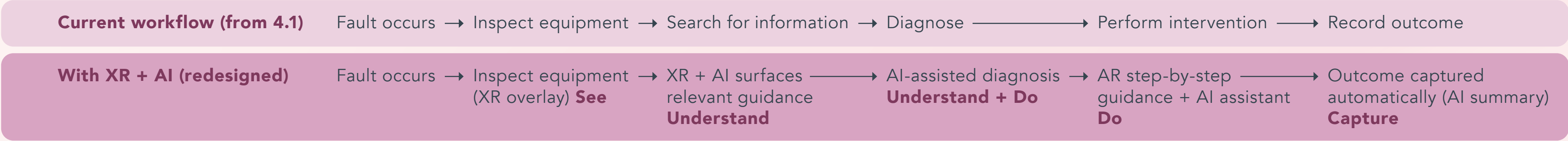
- want to automatically capture data from their actions or the environment
- want to generate reports, summaries or insights
- want to feed data back to the systems or build institutional knowledge

Example: Record outcome (from 4.1)
At this stage, choose Capture: Photos and sensor data are captured automatically, and AI generates a summary report and feeds it to the maintenance system.



A resource tool is provided on **page 26** to help enterprises explore and select relevant XR + AI interventions, redesign the workflow and define the intended business outcomes.

2 Redesign the target workflow Apply the selected interventions, focusing on the key differences.



- Things to consider:**
- Which steps will be different, faster or removed?
 - Where will XR, AI or both be used?
 - What information or content will be provided?
 - How will this integrate with existing systems?
 - What support, training or change management is needed?
 - What will be the impact on the user’s experience?

3 Define the intended outcome Identify the key business metrics and expected improvements

**Time to complete** ↓

**First-time-fix rate** ↑

**User satisfaction** ↑

**Expert escalation** ↓

**Output**

A target workflow showing where XR + AI intervenes and the intended outcome
This will inform how you acquire the solution and who should deliver it in the next steps.

4.2 RESOURCE TOOL 2/2: DESIGN & DEFINE YOUR XR + AI WORKFLOW

With your current workflow, friction points and baseline established, use this resource tool to design how XR + AI could improve your use case. For each relevant step, identify what the user needs to see, understand, do or capture, select the appropriate interventions, and define the intended changes and business outcomes.

1 Decide where XR + AI should intervene For each step or pain point, identify the user need and select the relevant XR and AI interventions.

**See**
Bring information into context

XR – Visualise and present

- ☐ XR visualisation / 3D overlay (e.g. data, 3D models)
- ☐ AR display (e.g. labels, highlights, guidance)
- ☐ VR immersive experience (e.g. virtual walkthrough)
- ☐ Other: _____

AI – Enhance what users see

- ☐ Search and retrieval (e.g. SOPs, manuals)
- ☐ Summarisation and explanation (e.g. simplify technical information)
- ☐ Analysis and insights (e.g. identify anomalies, suggest causes)
- ☐ Generate visual content (e.g. render options, scenarios)
- ☐ Other: _____

**Understand**
Retrieve and interpret information

XR – Enable exploration

- ☐ AR exploration (e.g. manipulate 3D models, explore options)
- ☐ VR scenarios (e.g. simulate processes, test options)
- ☐ XR with AI insights (e.g. analysis overlaid on equipment or environment)
- ☐ Other: _____

AI – Analyse and make sense

- ☐ Analysis and detection (e.g. patterns, anomalies)
- ☐ Summarisation and comparison (e.g. compare options, highlight differences)
- ☐ Forecasting / predictions (e.g. outcomes, risks)
- ☐ Recommendations (e.g. next best action, options)
- ☐ Other: _____

**Do**
Guide, assist or enable interaction

XR – Guide and enable

- ☐ AR step-by-step guidance (e.g. visual instructions, highlights)
- ☐ VR simulation / training (e.g. practise procedures)
- ☐ XR hands-on practice (e.g. simulated environment)
- ☐ Other: _____

AI – Assist and recommend

- ☐ Assistant (e.g. voice or text)
- ☐ Recommendations (e.g. next best action)
- ☐ Generate content on the fly (e.g. checklists, instructions)
- ☐ Adapt to user context (e.g. personalised guidance)
- ☐ Other: _____

**Capture**
Record and learn from the interaction

XR – Capture and record

- ☐ Photo / video / sensor capture (e.g. condition, activity)
- ☐ 3D scanning / spatial capture (e.g. site, equipment, environment)
- ☐ XR user interaction capture (e.g. training performance)
- ☐ Other: _____

AI – Process and learn

- ☐ Transcription and summarisation (e.g. voice notes to reports)
- ☐ Analysis of captured data (e.g. trends, insights)
- ☐ Auto-generate reports (e.g. inspection reports)
- ☐ Data integration to systems (e.g. CMMS, PLM)
- ☐ Other: _____

2 Redesign the target workflow Show how the workflow will change with the selected XR + AI interventions.

#	Current step (from Resource Tool 1)	Main friction (from Resource Tool 1)	User needs (See / Understand / Do / Capture)	Selected XR interventions (you may select more than one)	Selected AI features (you may select more than one)	What changed in the new workflow? (e.g. how the step is now performed)
1	Inspect equipment	Time spent finding information	See, Understand	☐ VR simulation	☐ AI search and retrieval	AI can retrieve relevant equipment information as questions arise during inspection practice in a virtual environment
2				☐ AR overlay	☐ AI recommendations	AI overlays guidance on equipment and recommends checks based on maintenance history and observed issues
3						

3 Define the intended outcome Identify the key business metrics and expected improvements.

#	Metric (e.g. time, cost, error rate, output, user satisfaction)	Current baseline (e.g. 30 mins)	Target / expected improvement (e.g. 50% faster)	How will it be measured? (e.g. system data, user feedback)	Notes (if any)
1					
2					

 **Output (Page 2)**

A redesigned workflow showing where XR + AI intervenes and the business outcomes it is expected to achieve.



Next Steps

- ☐ Validate with internal team
- ☐ Discuss with IMDA or solution providers
- ☐ Prioritise 1-2 high-value steps to pilot

From Possibility to Progress

4.3 SHOULD I BUY, CONFIGURE OR BUILD?

Once you know what the target workflow needs to achieve, decide the simplest way to acquire the solution. Determine whether an existing solution can meet your requirements, be configured to fit, or whether your needs are sufficiently unique to justify building a bespoke solution.



Do not build what you can configure, or configure what you can buy. Consider customisation when it creates measurable business value.

Selecting the right technology partner for configuring or building

Use these questions to assess whether potential partners have the capabilities, experience and approach to deliver a successful and sustainable solution.

Relevant experience

- ☐ Have they delivered similar use cases in your industry or operating environment?
- ☐ Can they share references or case studies?
- ☐ Do they understand XR and AI (if applicable) and their relevance to your business?

Technical and integration capability

- ☐ Can they integrate with your existing systems (e.g. ERP, CMMS, PLM, LMS, APIs)?
- ☐ Do they have in-house capabilities or trusted partners for content creation (3D, AI models, simulations)?
- ☐ Can they support the required hardware, devices and network?

Delivery and support

- ☐ What are their project methodology, timeline and key milestones?
- ☐ Is there a dedicated project team and point of contact?
- ☐ Do they provide training, change management and post-deployment support?

Governance, security and commercial terms

- ☐ Who owns the IP, source code, 3D assets and data?
- ☐ How do they ensure data security and regulatory compliance (e.g. PDPA, cybersecurity)?
- ☐ Are the commercial terms clear, including costs, maintenance and upgrade plans?

4.4

ADVANCING FROM PILOT TO SCALABLE DEPLOYMENT

With the solution and delivery approach defined, test whether it works reliably and delivers the intended business value. Prepare the necessary content, systems and users, run the pilot in representative conditions, and use the results to identify what needs to change before wider deployment.

1

PREPARE

Are the foundations in place for a meaningful pilot?

Define what you are testing

- What is the business problem and expected outcome?
- Which use case, sites or user groups will be included?
- What does success look like?

Get your people, content and data ready

- Do users have the right content, data and training materials?
- Is data accurate, accessible and up to date?
- Are there security, privacy or governance considerations?

Ensure the technology and environment are ready

- What hardware, software or devices are needed?
- Can it integrate with existing systems?
- Is the test environment ready (e.g. network, space, permissions)?

Example

A retailer prepares product 3D models and training content, sets up standalone VR headsets and integrates with its inventory system for a pilot in one store.

2

PILOT & MEASURE

Does it work to deliver the intended value?

Run the pilot

- Deploy solution in controlled setting (e.g. one site or team)
- Ensure users are supported and workflow is followed
- Capture quantitative and qualitative feedback

Measure the results

- Compare pilot results against baseline using the same metrics
- Assess improvements in key areas, such as:
 - Time to complete tasks
 - Output or throughput
 - Resource effort
 - Error or rework rate
 - Cost per task
 - Quality or user satisfaction

Gather feedback

- What worked well and what did not?
- What do users need for broader adoption?
- What changes are needed before scaling?

Example

An aviation maintenance firm pilots AR work instructions with technicians, resulting in faster task completion, fewer errors and positive user feedback.

3

DEPLOY & SCALE

Can we operate and extend it sustainably?

Refine the solution

- Incorporate learnings from pilot (e.g. content, workflows, integrations)
- Address technical, operational or user gaps
- Validate that solution is stable and ready for wider use

Operationalise and roll out

- Put in place ownership and governance
- Develop training and change management plans
- Integrate with existing systems and processes
- Roll out in phases across more sites, teams or use cases

Monitor and continuously improve

- Track performance and user adoption
- Review business value regularly
- Update content, process or systems as needed

Example

After a successful pilot, the retailer rolls out XR training to all stores, establishes central content management and tracks usage and business impact.



Make the decision

Is the business value sufficient to scale, refine or stop?

SCALE

- ☐ Meets or exceeds target business outcomes
- ☐ Solution is reliable and usable
- ☐ Economics work (positive ROI or acceptable payback)
- ☐ Ready to deploy to more sites, users or business functions

REFINE

- ☐ Some value demonstrated, but below target
- ☐ Specific constraints identified (e.g. content, integration, adoption)
- ☐ Address gaps and run another pilot
- ☐ Reassess with updated results

STOP

- ☐ Minimal or no improvement in key outcomes
- ☐ High cost with limited benefits
- ☐ Significant technical or operational barriers
- ☐ Reassess use case, scope or approach

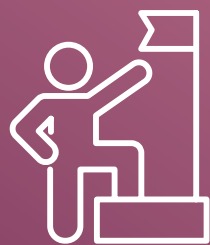
How Can IMDA Support Your XR Journey?

IMDA supports enterprises in starting and sustaining their XR journey through the following areas:

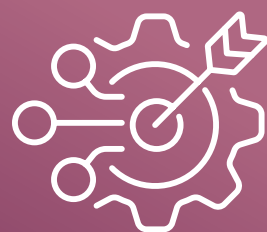
KEY PILLARS



Uplift Leadership Mindset
Coach leadership bench to imbue knowledge and equip with know-how



Instil Confidence to Design & Delivery Projects
Leverage expertise of tech providers to help co-develop impactful projects and impart new capabilities



Build Self-Sustaining Competencies
Invest in digital core and develop in-house digital capabilities for sustainable transformation

KEY AREAS OF SUPPORT

- Tech discovery process
- Development of resource materials such as Playbooks and Guides

- Extended Reality project scoping and implementation support with tech solution providers:
- Customised XR solutions with scalable scope and minimised risk
 - Knowledge and technical advisory
 - Detailed solution scoping with Digital Leaders
 - Project implementation
 - Capability transfer
 - Advisory and guidance on AI best practices

- Set up an in-house digital technology team to sustain and scale XR deployment and drive enterprise-level digital transformation
- Supported through the [Digital Leaders Programme](#) and [Digital Leaders Accelerator Bootcamp \(DLAB\)](#)

BUILD LIBRARY OF SUCCESS STORIES AND USE CASES FOR SHARING WITH THE DIGITAL LEADERS COMMUNITY

REACH OUT TO US TO GET STARTED WITH XR!

Learn how IMDA can help your company in leveraging XR solutions to support your digital transformation journey.



CONNECT WITH US



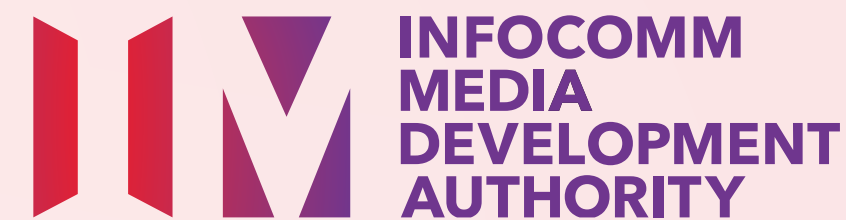


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ABOUT IMDA

The Infocomm Media Development Authority (IMDA) leads Singapore's digital transformation with infocomm media. To do this, IMDA will develop a dynamic digital economy and a cohesive digital society, driven by an exceptional infocomm media (ICM) ecosystem — by developing talent, strengthening business capabilities, and enhancing Singapore's ICM infrastructure. IMDA also regulates the telecommunications and media sectors to safeguard consumer interests while fostering a pro-business environment and enhances Singapore's data protection regime through the Personal Data Protection Commission.

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