HUMAN REALITY INFRASTRUCTURE

From AI Intent to Accepted Reality—and the Next URL

HSIMC GLOBAL FOUNDATION WHITE PAPER 1.0

HSIMC builds the missing infrastructure between AI intent and accepted reality.

Every accepted reality remains addressable, improvable and manufacturable through its next URL.

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HSIMC Global Foundation White Paper 1.0

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Platform and Product Architecture

Role	Identity	Primary publication route
Corporate Master	HSIMC	Corporate route pending
Corporate Category	Human Reality Infrastructure	This publication family
Core Platform	InstantReady	instantready.live
Entry Product	TapPort	tapport.live
Commercial Wedge	AfterMake	aftermake.live
Technical and Partner Specifications	AfterMake Tech	aftermake.tech
Spatial Execution Platform	InstantSpace	instantspace.live
Physical Subscriber Network	HSIMC MakeCells / MakeHere	makehere.tech
Learning and Human Capability	TapPort Learning	tapport.live/learn
Perception Capability	InnoSpire Smart Glasses	Provider-owned routes
Experimental Runtime Namespace	Homelinked	*.homelinked.tech

Publication Boundary

This document is a global foundation white paper, a corporate and platform thesis, a proposed architec - tural model, an evidence-bounded account of selected historical and current practice, and a framework for separately versioned product, technical, market and deployment publications.

This document is not a technical standard, a certification scheme, a regulatory approval, an investment prospectus, legal or professional advice, or a declaration that every proposed component is already opera - tional.

CONTENTS

Founding, Corporate and Operating Attribution

One Company, One Core Platform, One Entry Product and One Commercial Wedge

This white paper is issued under one corporate thesis:

> **HSIMC is the Human Reality Infrastructure Company.**

HSIMC is the corporate, industrial and responsibility-bearing entity behind the Human Reality Infrastructure thesis. It provides the common frame for product engineering, standards discipline, manufacturing responsibility, platform governance, Evidence, physical execution and long-term institutional development.

The architecture does not describe a loose collection of unrelated websites or independent start-ups. It defines an endorsed platform structure in which each public product has a distinct role while sharing a common operating foundation:

- **InstantReady** is the core Reality Operating Platform.
- **TapPort** is the low-friction entry into a Product, Scene, Journey or real-world Route.
- **AfterMake** is the Commercial Wedge for post-delivery innovation and continuing Artifact identity.
- **InstantSpace** provides the spatial execution model.
- **MakeHere** is the public network entry for HSIMC MakeCells and qualified Physical Subscribers.
- **TapPort Learning** provides the Learning Mission, Kit, student, teacher and human-capability layer.
- **InnoSpire Smart Glasses** are a reference perception Capability and an important current implementation boundary.

The preferred endorsement pattern is:

> **TapPort — An HSIMC Product — Powered by InstantReady**

> **AfterMake — An HSIMC Product — Powered by InstantReady**

Consumer-facing pages should not place every brand on the first screen. Corporate, legal, product and technical identities should remain visible where needed, without requiring the user to understand the whole architecture before completing a useful action.

Responsibility Boundary

HSIMC does not claim ownership of every Capability that may participate in the infrastructure. A university, start-up, professional, local manufacturer, Space operator or technology provider may contribute a qualified Capability while retaining its own corporate identity, intellectual property and professional responsibility.

A TapPort Scene does not automatically belong to HSIMC. A MakeCell operator remains responsible for its declared processes and physical work. A Space operator remains responsible for the actual site and its local constraints. A professional remains responsible for work requiring professional Authority. An AI Provider does not become the final human Authority merely because it generated an interpretation. An accepted Artifact does not become public property merely because it has a URL.

Domain and Trademark Boundary

A domain is an operational and publication asset. Domain ownership does not by itself establish trademark clearance, exclusive category ownership, regulatory recognition, product maturity, certification, or legal permission to operate in every jurisdiction.

spaceguide.live is treated as a retired or migration-stage research identity. The current learning and human-capability work proceeds under TapPort Learning. visiongo.tech remains a legacy or experimental com - puter-vision namespace and is not part of the primary public-brand architecture.

Publication Status, Version Identity and Recommended Citation

This Global Foundation Edition defines the corporate thesis, the canonical Intent-to-Reality model, the role of the InstantReady Core Platform, the relationship among TapPort, InstantSpace, MakeHere, HSIMC MakeCells and AfterMake, the principle of Accepted Reality and continuing product identity, and the Evidence and Human Agency boundaries within which the architecture is intended to develop.

Future publications may include the InstantReady Core Platform Architecture, TapPort Entry and Field Guide, InstantSpace Spatial Architecture, AfterMake Technical and Partner Specifications, MakeHere and HSIMC MakeCell Network Guide, TapPort Learning Programme and Kit Guides, Sector Packs, Jurisdictional and Local Market Packs, and Deployment, Pilot and Evidence Packs.

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Version Rule

A later version must not erase the existence of an earlier reality. Corrections may amend factual errors, clarify interpretations, deprecate proposed architecture, replace a roadmap, add Evidence, or narrow or withdraw a Claim. They should not silently rewrite the historical record.

The publication history should preserve what changed, why it changed, who authorized the change, which Evidence changed, which Claims were affected, and whether a prior implementation remains in use.

Claim–Evidence Boundary and Use Notice

The Discipline of Saying What Is Real

Human Reality Infrastructure is built around a simple discipline:

> **A persuasive statement is not yet Evidence. Evidence is not yet universal truth. A completed action is not yet an accepted result.**

This white paper distinguishes six publication states.

1. Documented Historical Fact

A past event, role, publication, product, conference appearance or implementation supported by a registered source. The surviving conference material records a 2015 presentation by Liao Yan titled Machine Vision and Industry 4.0 at the Second Global Sensor Summit and China Internet of Things Application Summit [HIST-01].

2. Documented Current or Recent Implementation

A Capability shown by an implementation record, interface, test, public profile or deployment artifact. The smart-glasses demonstration shows one unique URL per pair of glasses, device connection status, photographs captured from the glasses, an API-generated description, and human-controlled Save and Delete actions [IMPL-01].

3. Technical Interpretation

A reasoned explanation of what a documented implementation may mean architecturally. A dedicated URL for a physical pair of glasses can be interpreted as an early form of an addressable Viewpoint Host. That interpretation is broader than the interface itself and should not be confused with proof that the complete Host architecture has already been implemented.

4. Proposed Architecture

A defined component, contract or relationship proposed for development. Examples include the Accepted Reality Graph, Artifact Hosts with governed version branches, a federated Physical Subscriber Network, full TapPort Locker and Journey infrastructure, and interoperable MakeCell Capability Manifests.

5. Research Hypothesis

A proposition requiring observation, testing or comparison. Examples include whether a human-first TapPort interaction improves understanding, whether post-delivery Reality Delta data can reduce avoidable waste, whether a distributed MakeCell network can make low-volume physical innovation more affordable, and whether a Next URL increases useful product continuity.

6. Roadmap or Commercial Hypothesis

A future operating, market or capital thesis, including AfterMake as a Commercial Wedge for Reality Commerce, TapPort as a general entry product, and HSIMC MakeCells as a replicable Physical Subscriber network.

No Silent Upgrade

A Claim must not be silently upgraded from one state to another.

- A prototype is not a qualified release.
- A public demonstration is not a public procurement.
- A funded project is not universal regulatory approval.
- An AI description is not a verified product fact.

- A saved image is not automatically shared.
- A shared image is not automatically public.
- A View Event is not a Make Command.
- An AI proposal is not Job Authorization.
- A manufactured Output is not accepted until a responsible person or authorized organization accepts it against stated criteria.
- A URL does not make an object public.

Accepted Reality Is Bounded

Accepted Reality does not mean absolute truth or universal agreement. It means that a defined result has been examined and accepted by an identified responsible person or authorized organization, within a declared scope, against stated criteria, with sufficient Evidence for the intended use.

Acceptance may be personal, contractual, technical, organizational, educational, commercial, professional or regulatory. One form of Acceptance does not automatically imply all others.

Use Notice

This white paper should not be used to bypass product-safety requirements, avoid professional review, restrict a lawful return or refusal, convert personal data into an unrestricted asset, treat an AI Output as Authority, imply environmental benefit without Evidence, imply that local manufacturing is automatically sustainable, claim certification without an applicable certificate and scope, or imply that every idea should be manufactured.

Historical Source and Attribution Notice

No single prior document proves the full Human Reality Infrastructure architecture. This white paper synthesizes several lines of practice: product engineering and manufacturing; standards and test discipline; object identity and physical Touchpoints; machine vision and IoT; smart glasses and assistive technology; URL-addressable Runtime; spatial measurement and execution; evidence-based Handoff; post-delivery innovation; and local and distributed production.

The selected registered source base includes:

1. A 2015 conference record documenting Machine Vision and Industry 4.0 [HIST-01].
2. City University of Hong Kong's HK Tech 300 profile, which describes InnoSpire as an HKSTP incubatee, describes its WeVoice glasses as using "Hybrid AI+Human" computer vision and records HK Tech 300 Angel Fund support in 2022 [EXT-01].
3. A Hong Kong Government release dated 13 April 2026, which records a Smart Traffic Fund-supported private-enterprise project using AI computer vision to assist visually impaired persons [GOV-01].
4. Smart-glasses demonstration material showing unique URLs, device connection, image capture, API description, Save and Delete [IMPL-01].
5. Prototype research describing 2D and 3D indoor image measurement through smart glasses or camera input [IMPL-02].
6. A Socket Cable Estimator prototype describing recognition of wall sockets and estimation of required cable length [IMPL-03].
7. An InnoSpire product overview connecting smart glasses, hosted Runtime, NFC/RFID activation, design output, public URLs and evidence-based delivery through an Order–Build–Handoff sequence [IMPL-04].

These sources support selected events and implementation boundaries. They do not prove that the complete Human Reality Infrastructure architecture is already deployed at commercial scale.

Founder’s Note

From Testable Products to Human Reality Infrastructure

I did not arrive at Human Reality Infrastructure by beginning with artificial intelligence.

I arrived at it by working for years at the boundary where an idea is required to become a real product, a real installation, a real test or a real responsibility.

The physical world is not persuaded by elegant language. A cable must connect correctly. A material must behave as expected. A component must fit. A user must understand the product. A test must pass. A failure must be visible. A responsible person must decide whether the result is acceptable.

This discipline changes how one sees artificial intelligence.

GenAI can generate an extraordinary range of answers, images, code, product concepts, instructions and business proposals. It can make an incomplete idea sound complete. It can make a product that does not yet exist appear highly finished. It can describe a future before the tools, materials, permissions or operators required for that future have been assembled.

That Capability is powerful. It is also incomplete.

The central question is no longer only:

> What can AI generate?

The more consequential question is:

> What must exist between an AI-generated intention and a result that a human being can safely use, inspect, accept and continue?

My earlier work repeatedly returned to this boundary. Product engineering taught me that definitions and interfaces matter. Standards work taught me that a Claim must be connected to a Test. Manufacturing taught me that a design is only one component of reality. Machine vision taught me that seeing an object is not the same as understanding the human purpose around it. IoT and object identity taught me that phys - ical things can have persistent digital relationships. Space research taught me that Execution always occurs somewhere, under local conditions. Smart glasses made the human viewpoint itself addressable.

The documented 2015 presentation Machine Vision and Industry 4.0 asked how machines might under - stand and participate in industrial reality [HIST-01].

A later smart-glasses prototype introduced a deceptively simple Capability: one link for one pair of glasses. The system could create a dedicated URL, show whether the glasses were connected, receive an image, generate an API description, and allow a human being to Save or Delete the result [IMPL-01].

That was a small implementation, but it opened a much larger question. A physical viewpoint could have an address.

If one pair of glasses could have a URL, that URL did not need to end as a photo page. It could become a governed entrance to Context, translation, a remote human, an AI Runtime, a private Journey, a product record, a repair Route, a manufacturing Job, an Acceptance event and a next version.

When several pairs of glasses were connected locally, the significance became clearer. Different people could be in different positions, see different things and bring those views into one shared environment. The computer was no longer merely collecting photographs. It was receiving several partial human worlds.

This insight led to TapPort.

TapPort is not defined by travel, although travel is one of its most intuitive starting points. A visitor sees many objects, hears many explanations and takes many photographs. Soon afterwards, the reasons behind those photographs are lost. A shopkeeper explains a product, but the explanation is separated from the object. A Guide explains a place, but the relationship ends when the group leaves.

TapPort proposes a simple entry:

> **One tap opens a real-world Route.**

That Route may begin with a QR code, an NFC card, a charging cable, a smart-glasses capture, a Product, a shop, an exhibition, a Learning Mission or a spatial node.

But an entrance is not enough. A real outcome requires a platform that can establish Identity, Context, Authority, Runtime, routing, Evidence and Acceptance. That is the role of InstantReady. A real outcome also requires a place, tools, materials and qualified people. That is where InstantSpace, MakeHere and HSIMC MakeCells become necessary.

Then another gap appears.

Traditional commerce and manufacturing usually treat delivery as the end. Once the object has been handed over, the buyer may keep it, rate it, complain, return it or forget it. The manufacturer receives fragmented feedback, often disconnected from the actual unit, version, use Context and next possible change.

But delivery is not where reality ends.

Delivery is where reality begins.

A product page describes a promise. The delivered object enters heat, dust, distance, human habits, unexpected uses, disabilities, cultural differences and physical constraints. Only then does the product meet reality.

This led to AfterMake.

AfterMake begins with a principle that anchors this white paper:

> **Manufacturing does not end with delivery. It creates the next URL.**

The Next URL is not merely another marketing page. It is a continuing identity through which the actual Artifact can receive a user observation, a problem report, a repair, a replacement component, a new configuration, a Branch, a POC, a comparative Test, a next accepted version, a return or Retirement Route.

This changes the meaning of criticism. A review is not necessarily a verdict. It may be the beginning of a testable Branch.

A user who says that a cable is too long, a package is wasteful, a button is difficult to press or a manual is difficult to read is not automatically correct about every future user. But that person is reporting a real experience. GenAI can help translate that experience into a structured candidate change. Engineering and manufacturing can then decide whether the change is safe, feasible and worth testing.

The result may be a repair, a variant, a rejected proposal or a better next version.

This is where I believe GenAI may create its strongest production value. Its greatest value may not be the first impressive answer. Its greatest value may be lowering the cost of the next reality.

A person who does not know CAD, a BOM structure, manufacturing terminology or testing language may still possess valuable knowledge from real use. Human Reality Infrastructure should allow that person to originate a structured next Intent without pretending that every suggestion is automatically safe or manufacturable.

This white paper does not claim that the complete infrastructure already exists. It distinguishes present implementations from proposed architecture. It preserves the need for human Authority, qualified work, Evidence and explicit Acceptance. It treats privacy, return rights, safety and refusal as first-class Routes.

The ambition is nevertheless substantial:

> To make human Perception, Intent, Execution, Acceptance and continuing physical innovation part of one governed reality lifecycle.

HSIMC is not proposing another AI application. It is proposing the missing infrastructure after AI generates an intention—and after the first physical result has been delivered.

Liao Yan · 廖炎
Founder
HSIMC

Foreword

Why Intelligence Abundance Creates a New Reality Scarcity

The defining condition of the GenAI era is not simply that machines have become more intelligent. It is that plausible intelligence has become abundant.

A person can now produce a report, design direction, software prototype, product rendering, training programme, market analysis or operating plan in minutes. The apparent distance between an idea and a finished result has collapsed on the screen.

The physical distance has not.

A generated product image does not establish that the material exists. A generated installation guide does not establish that the site has been surveyed. A generated medical explanation does not create professional Authority. A generated manufacturing drawing does not establish that the tolerances, interfaces, materials and Tests are correct. A generated business plan does not establish that a customer will accept the outcome.

The apparent completeness of the digital answer can conceal the incompleteness of the physical system.

This produces a new scarcity.

The scarce resource is no longer only information. The scarce resource is the coordinated ability to make a bounded Intent real.

That ability depends on elements that GenAI does not automatically supply:

> Context · Authority · Space · tools · materials · operators · interfaces · Tests · Acceptance · Evidence · maintenance · a next version

These elements are commonly distributed across different organizations and systems. Identity sits in one system. Payment sits in another. The physical device has a serial number that is not connected to the user's actual Intent. The Space has no machine-readable Capability map. The factory receives a purchase order but not the full use Context. The product is delivered, but the feedback returns as a star rating rather than an engineering input. The repair network does not know the precise version. The next designer cannot see what was learned.

The chain repeatedly breaks.

Human Reality Infrastructure proposes that this chain should become addressable.

The term infrastructure is deliberate. An application performs a defined task. Infrastructure enables many tasks to happen repeatedly, under declared rules, across different people, Providers, places and products.

Human Reality Infrastructure is therefore not one device, one AI model, one factory, one website or one industry. It is the technical, physical, organizational and evidentiary layer through which:

1. a human or machine Perception enters a bounded Context;
2. an Intent is stated or formed;
3. relevant Capabilities are discovered;
4. Authority and limits are established;
5. a Runtime coordinates Execution;
6. a digital or physical Output is produced;
7. the Output is tested;
8. a responsible person or authorized organization accepts, rejects or redirects it;
9. Evidence records what occurred;
10. the Artifact remains addressable for use, repair, improvement or Retirement.

The architecture has two loops.

The First Loop: From Intent to Accepted Reality

> Perceive → Understand → Intend → Authorize → Execute → Test → Accept → Evidence

This is the InstantReady problem. It requires Identity, Session, Context, Capability routing, Runtime, Authority, Execution, Acceptance and Evidence. It also requires real capacity. InstantSpace addresses the spatial side of that capacity. MakeHere and HSIMC MakeCells address the physical Execution side.

The Second Loop: From Accepted Reality to the Next Reality

> Use → Observe → Report → Compare → Repair or Branch → Make Again → Test Again → Accept Again

This is the AfterMake problem.

A Product should not lose its Identity at delivery. The delivered Artifact should be able to receive the reality of use without turning every disagreement into an unstructured public argument.

A user's experience can become a Reality Delta. That Delta may lead to clarification, configuration, a replacement part, repair, adaptation, a new variant, a POC, return, recovery or Retirement.

The purpose is not to prevent every return. The purpose is to give reality a responsible Route forward.

The phrase Human Reality Infrastructure also declares a boundary. The purpose is not to create an autonomous machine layer that observes, judges and acts upon people without meaningful control.

The human being must retain the ability to understand what is happening, know which Capability is acting, correct an interpretation, refuse an action, stop a Session, restrict sharing, Delete content where applicable, return a Product, reject an Output, accept a bounded result and originate a next Branch.

AI may assist with Perception, translation, compilation, configuration, comparison and coordination. It must not silently convert its own inference into human Authority.

The unit of progress in this architecture is not generated content. It is Accepted Reality.

An Accepted Reality is bounded. It has a defined purpose, responsible Principal, stated Evidence and known limits. A prototype may be accepted as a prototype. A Learning Mission may be accepted as a learning outcome. A repair may be accepted as restoring one function. A Product release may require a much stronger Evidence and qualification threshold.

The Next URL is the continuity object. It expresses the idea that a real Product, Space, Journey or accepted result should not become digitally silent after the first transaction.

The URL may remain private. It may resolve through a neutral Registry. It may change its public presentation without losing its underlying identity. It may Route to instructions, Evidence, maintenance, repair, reordering, a Learning Mission, a Product Branch, a return Route, a local MakeCell or a later version.

The Next URL is therefore not merely a web address. It is a governed promise of continuity.

About the Founder

Liao Yan • 廖炎

Standards, Products, Machine Vision, Space and Governed Physical Execution

Liao Yan, also known as Benny Liao, is the founder behind the Human Reality Infrastructure thesis and the initiating founder of HSIMC's present platform architecture.

His practice has developed across domains that are usually separated: physical product engineering; manufacturing and supply chains; standards drafting and Test discipline; object identification; machine vision; IoT; smart glasses; NFC and physical Touchpoints; cloud and local Runtime; spatial Execution; evidence-based delivery; and post-delivery product continuity.

The significance of this history is not the number of technologies involved. It is the repeated movement across the boundary between a digital description and a physical result.

The documented conference record shows Liao Yan presenting Machine Vision and Industry 4.0 in 2015 [HIST-01]. That work framed machine vision not merely as image processing, but as part of a wider industrial system.

The current Human Reality Infrastructure thesis extends that question:

> How can Perception, Context, Authority, Space, manufacturing, Acceptance and Evidence become one governable reality lifecycle?

The founder's recent work has used small, real implementation units rather than waiting for an entire platform to be completed in theory. Examples include one dedicated URL for one pair of smart glasses; image capture and AI description; human-controlled Save and Delete; NFC and QR physical Touchpoints; public Runtime URLs; image-based measurement prototypes; cable-length estimation; spatial reference environments; documented Order–Build–Handoff; MakeCell and Physical Subscriber concepts; Artifact Identity and the Next URL.

The broader practice environment also includes externally documented work by InnoSpire. City University of Hong Kong's HK Tech 300 profile describes InnoSpire as an HKSTP incubatee and its smart glasses as using "Hybrid AI+Human" computer vision to assist visually impaired persons and workers [EXT-01]. A 2026 Hong Kong Government release separately records a Smart Traffic Fund-supported smart-glasses project intended to help visually impaired persons identify obstacles, bus stops, roads and footpaths and obtain navigation assistance [GOV-01].

These references do not prove the whole Human Reality Infrastructure model. They demonstrate that the architecture grows from practical work involving Perception, human need, public Context and real-world Execution.

The founder's operating principle is:

> **One small complete success is more valuable than one large unfinished architecture.**

Every Product, Session, MakeCell, Learning cycle and deployment should eventually be reducible to a bounded, testable and Handoff-ready result.

Selected Practice Timeline

Period	Practice development	Publication status	Contribution to the thesis
1997–2014	Product engineering, manufacturing, standards-related practice, supply chains, physical interfaces and object identity	Founder-supplied practice summary; detailed source registration required before final freeze	Established the disciplines of fit, material reality, testing, Claims and manufacturing responsibility
2015	Machine Vision and Industry 4.0 presentation	Documented conference material [HIST-01]	Connected machine Perception with industrial Execution
2020–2022	InnoSpire smart-glasses and "Hybrid AI+Human" computer-vision work; HK Tech 300 Angel Fund support recorded in 2022	Externally documented by CityU HK Tech 300 [EXT-01]	Established a reference Perception and accessibility Capability
2026	Smart Traffic Fund-supported smart-glasses work presented in a public transport and accessibility Context	Externally documented in a Hong Kong Government release [GOV-01]	Connected computer vision, public-service Context and human mobility

Period	Practice development	Publication status	Contribution to the thesis
2026	Smart-glasses interface with one unique URL per pair, connection state, image capture, API de - scription, Save and Delete	Documented implementation [IMPL-01]	Demonstrated an early address - able device-to-URL pattern and human-controlled media lifecycle
2026	Smart-glasses and camera-based 2D/3D indoor image measurement research	POC documentation [IMPL-02]	Connected Perception to meas - urable spatial Context
2026	Socket Cable Estimator using im - age input to identify a wall socket and estimate required cable length	POC documentation [IMPL-03]	Connected Perception to candid - ate physical configuration
2026	Product architecture connects smart glasses, hosted Runtime, NFC/RFID, design output and evidence-based delivery	Product material [IMPL-04]	Demonstrated early convergence of Perception, Runtime, Touch - point, design and Handoff
2026	Consolidation of HSIMC, Instan - tReady, TapPort, AfterMake, In - stantSpace and MakeHere	Proposed corporate and platform architecture	Defines the full Intent-to-Reality and post-delivery continuity model

Executive Summary

Human Reality Infrastructure

The Problem after AI

GenAI has made intelligence-like Outputs abundant. A person can generate a plan, image, interface, Product concept, instruction, quotation draft, training programme or software prototype at very low marginal cost.

But a generated Intent is not yet a real outcome.

Between the Intent and the outcome remain the most difficult elements of reality:

> Context · Authority · Space · tools · materials · operators · interfaces · Tests · Acceptance · Evidence · maintenance · the next version

These elements determine whether a proposed action is relevant, safe, legal, technically feasible, economically justified, understandable and accepted.

Most current systems address only a portion of this chain. An AI system may generate an answer but not control the physical conditions of Execution. A commerce platform may deliver a Product but lose structured contact with the actual Product after Handoff. A factory may receive specifications without the complete use Context. A Space may contain tools and people but have no machine-readable Capability model. A review system may collect opinions but fail to turn them into testable Product Branches. A digital Product identifier may provide information without enabling repair, adaptation, local manufacturing or the next accepted version.

The missing layer is not another chatbot.

It is Human Reality Infrastructure.

The Proposed Category

Human Reality Infrastructure is the proposed technical, physical, organizational and evidentiary layer through which human Intent can become authorized Execution, Accepted Reality and continuing Capability.

Its operating purpose is twofold:

1. Make reality happen.
2. Allow reality to continue.

Cycle One • Intent to Accepted Reality

> Perception → Context → Intent → Capability Discovery → Authority → Runtime → Execution → Test → Acceptance → Evidence → Handoff

Cycle Two • Accepted Reality to the Next Reality

> Use → Observation → Reality Delta → Clarify / Repair / Adapt / Fork / Return → Make Again → Test Again → Accept Again → Next URL

These cycles do not assume that every Intent should be executed or that every delivered Product should be modified. They establish Routes through which an Intent can be evaluated, accepted, refused, redirected, repaired, returned, manufactured or retired.

Corporate and Platform Architecture

HSIMC is the Corporate Master and reality-responsibility boundary. InstantReady is the Core Platform. TapPort is the Entry Product. AfterMake is the Commercial Wedge. InstantSpace and MakeHere provide two different Execution layers. HSIMC MakeCells and qualified partners perform physical work.

The architecture can be summarized as:

> **TapPort obtains reality. InstantReady operates reality. HSIMC makes reality. AfterMake keeps reality moving.**

TapPort Opens

TapPort creates a low-friction entry into a real-world Route. The entry may be a QR code, NFC card, NFC-enabled cable, Product, shop, Scene, Journey, smart-glasses capture, Learning Mission or spatial node. TapPort is intended to support Scene, Product Card, Journey, Touchpoint, temporary private Locker, human explanation, AI translation, Save, Delete and a next Route.

It is not defined as a public social network. A user should not need to create a permanent public identity before receiving value.

InstantReady Operates

InstantReady provides the common Reality Operating Platform. Its proposed responsibilities include Identity, Registry, Resolver, Session, Context, consent, Authority, Runtime, Bot, Capability routing, payment, Evidence, Acceptance, version and Retirement.

InstantReady does not itself replace the Product Provider, manufacturer, Space operator or responsible professional. It establishes the contracts through which those Capabilities can be discovered, bounded, invoked, recorded and accepted.

InstantSpace Enables

InstantSpace treats Space as governed Execution capacity. A Space is more than a location. It may contain surfaces, zones, tools, machines, materials, sensors, people, local edge computing, Workcells, permissions and time-dependent states.

InstantSpace asks:

> What can happen here, under which conditions, at this time, under whose Authority?

MakeHere Routes

MakeHere is the public network entry for HSIMC MakeCells and qualified Physical Subscribers. A Physical Subscriber may be a printer, binding station, NFC programming cell, cable assembly and Test cell, pack - aging workbench, repair technician, local studio, 3D-printing unit, community workshop or qualified factory.

Each Capability should declare what it can do, what it cannot do, accepted inputs, materials, dimensions, tolerances, quantity range, operator requirements, Tests, Evidence Output, lead time, repair and recovery Route.

HSIMC MakeCells Make, Test and Hand Off

HSIMC operates reference MakeCells to prove process contracts, product engineering, Safe-to-Make boundaries, material and BOM discipline, testing, Evidence, Human Acceptance, Handoff, repair and Re - tirement.

The intended scale model is:

> Owned Reference Cells prove the method. Qualified Partner Cells replicate the Capability.

AfterMake Continues

AfterMake begins where traditional commerce and manufacturing usually stop.

Its central proposition is:

> **Delivery is where reality begins.**

A Product page sells a promise. The delivered Artifact enters actual use. The difference among the promise, the buyer's Intent, the delivered unit and the actual experience becomes a Reality Delta.

AfterMake provides a Route through which a reported experience may become a clarified issue, reproduced issue, repair, component request, configuration, adaptation, POC Branch, comparative Test, Accepted Variant or qualified release.

The core continuity object is the Artifact Host. An Artifact Host represents a particular physical unit, configuration, batch, Kit or accepted result and may carry Identity, version, configuration, production Evidence, instructions, maintenance, repair, a Reality Delta, a Branch, a return Route and a next accepted version.

> **Manufacturing does not end with delivery. It creates the Next URL.**

The Accepted Reality Graph

The proposed long-term data asset is not a mass archive of raw photographs, personal behaviour or unrestricted AI Prompts. It is the Accepted Reality Graph.

The Graph connects permissioned and evidence-bounded relationships among person or responsible Principal, Scene, object, Space, Perception, Intent, Authority, Runtime, Capability, Execution, Test, Acceptance, Artifact, Reality Delta, version and Retirement.

A raw photograph does not automatically become a Graph fact. An AI description does not automatically become truth. A proposed manufacturing change does not automatically become an authorized Job. An action does not become accepted merely because it completed.

Current Implementation Boundary

Current materials document:

- one unique URL per pair of glasses;
- connection status;
- images received from the glasses;
- API-generated descriptions;
- human-controlled Save and Delete [IMPL-01].

Product material also presents smart glasses, hosted Python Runtime, NFC/RFID activation, design output, evidence-based delivery, and Order–Build–Handoff [IMPL-04]. External records establish that InnoSpire has been identified as an HKSTP incubatee and HK Tech 300 Angel Fund start-up and that its WeVoice glasses use a "Hybrid AI+Human" computer-vision approach [EXT-01]. The Hong Kong Government has separately documented a Smart Traffic Fund-supported smart-glasses project intended to assist visually impaired persons [GOV-01]. Research prototypes demonstrate image-based indoor measurement [IMPL-02] and image-to-cable-length estimation [IMPL-03].

The following remain proposed architecture, active research or development direction rather than completed global infrastructure: a production-scale Accepted Reality Graph; federated global MakeCell network; complete Artifact Host interoperability; universal Product version lineage; cross-jurisdictional Authority routing; full TapPort Locker and Journey service; automated but governed Reality Delta compilation; large-scale local manufacturing routing; global Next URL resolution; and complete sector qualification and certification programmes.

Human Agency and Safety

Human Reality Infrastructure should expand human Capability without reducing human ownership of Perception, decision and Acceptance.

The system should preserve the right to know, understand, correct, refuse, stop, restrict sharing, Delete where applicable, return, reject an Output, accept a bounded result and originate a next Branch.

Several distinctions are mandatory:

> Perception is not Authorization. AI interpretation is not human consent. Save is not Share. Share is not Publish. Publish is not permission to manufacture. A View Event is not a Make Command. A proposal is not a qualified release. Completion is not Acceptance.

For smart glasses and public-space sensing, the preferred initial discipline is:

> **Object First · Private First · Temporary First**

Economic Thesis

The architecture has one Platform, one principal Entry Product, one Commercial Wedge and two Execution networks:

Function	Product or network
Core Platform	InstantReady
Entry Product	TapPort
Commercial Wedge	AfterMake
Spatial Execution	InstantSpace
Physical Execution	MakeHere and HSIMC MakeCells

TapPort lowers the cost of entering a real Context. AfterMake captures value after delivery through Artifact identity, repair, adaptation, replacement components, POC Branches, local manufacturing, comparative testing, next versions and partner APIs. InstantReady provides the reusable Platform layer. InstantSpace and MakeHere provide Execution capacity that cannot be replaced by a purely digital interface.

The potential defensibility lies in three connected assets: the Accepted Reality Graph, the Physical Subscriber Network, and Standards and Evidence Discipline.

Social and Environmental Thesis

Potential routes include improving accessibility; enabling local participation; making small POCs more affordable; extending Product life; replacing a component instead of returning or discarding a full Product; reusing an existing Space rather than rebuilding; producing against accepted demand rather than speculative inventory; creating bounded, trainable MakeCell work; enabling students and local partners to complete small, accepted Outputs; and preserving repair, return and Retirement Routes.

Local production is not automatically sustainable. Recycled content is not automatically certified. A digital passport is not automatically a circular economy. Environmental and social Claims require material, process and outcome Evidence.

One-Page Thesis

THE HUMAN REALITY INFRASTRUCTURE THESIS

GenAI has made answers, images, code and proposals abundant. It has not made reality abundant.

A generated Intent still lacks the Context, Authority, Space, tools, materials, operators, Tests, Acceptance, Evidence, maintenance and next version required for a useful real-world outcome.

Human Reality Infrastructure is the missing layer. It is the technical, physical, organizational and evidentiary infrastructure through which a human Intent can become authorized Execution, Accepted Reality and continuing Capability.

The unit of progress is not generated content. The unit of progress is **Accepted Reality**.

An Accepted Reality is a bounded result that a responsible person or authorized organization accepts against stated criteria and Evidence for a declared purpose. Acceptance does not mean universal truth. A prototype can be accepted as a prototype. A repair can be accepted for a specific function. A learning outcome can be accepted without becoming professional certification.

The architecture has two loops.

> **Perception → Context → Intent → Capability → Authority → Runtime → Execution → Test → Acceptance → Evidence**

> **Use → Observation → Reality Delta → Repair / Adapt / Fork / Return → Make Again → Compare → Accept Again → Next URL**

HSIMC is the corporate and responsibility-bearing entity. InstantReady is the Core Platform for Identity, Session, Authority, Runtime, routing, Evidence, Acceptance, version and Retirement. TapPort is the Entry Product. InstantSpace makes physical Space measurable, observable, configurable and capable of supporting bounded Execution. MakeHere connects an accepted physical Intent to a qualified Physical Subscriber. HSIMC MakeCells and qualified partners print, bind, assemble, program, test, repair, personalize and manufacture. AfterMake begins at delivery.

> **Manufacturing does not end with delivery. It creates the Next URL.**

Human Reality Infrastructure is human-first. AI may perceive, translate, compile, compare and propose. It must not silently turn its interpretation into human Authority.

The architecture does not promise that every idea will be made. It promises that a real observation may obtain a structured Route into evaluation. A proposal remains a proposal until it is safely configured, authorized, made, tested and accepted.

The long-term data asset is the Accepted Reality Graph: a permissioned and evidence-bounded Graph connecting person, Context, Intent, Authority, Execution, Test, Acceptance, Artifact and version. Its purpose is not to harvest every Perception. Its purpose is to preserve the relationships required for accountable reality.

HSIMC is therefore not another AI company. It builds what remains missing after AI generates an Intent—and what remains missing after the first physical result is delivered.

> **The world is not finished. Every Accepted Reality may become the beginning of the next.**

Visual Thesis

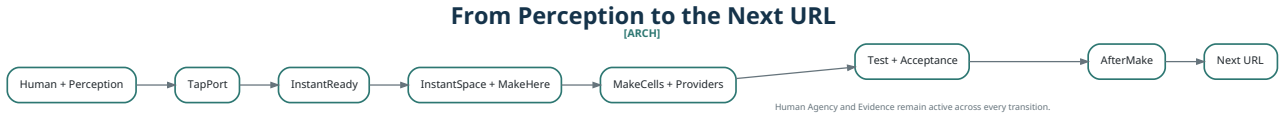


Figure — From Perception to the Next URL. [ARCH] Original HRI diagram. TapPort opens a real-world Route. InstantReady identifies, authorizes and operates it. InstantSpace and MakeHere provide qualified Execution capacity. HSIMC MakeCells and partners make, Test and hand off. Acceptance establishes the bounded result. AfterMake keeps the Artifact addressable, improvable and manufacturable through its Next URL.

Two Continuous Rails

Human Agency

> know · understand · consent · correct · refuse · stop · accept · Delete where applicable · return · originate the next Branch

Evidence and Claims

> source · scope · Authority · Test · Acceptance · version · correction · Retirement

Neither rail is optional. Without Human Agency, the infrastructure becomes an automated control system over people. Without Evidence discipline, it becomes a persuasive but unreliable story.

How to Read This White Paper

Reader	Recommended route
Investors and strategic partners	Executive Summary; Parts I, III, IV, VIII, IX and XII
Manufacturers and Product companies	Parts III, VII, VIII, IX and XI
Software and Platform architects	Parts III and IV; Appendices C–K
Space operators and facility teams	Parts VI and VII
Retail, travel and visitor-experience teams	Parts V, VIII and IX
Schools, teachers and learning partners	Parts V and X
Accessibility and assistive-technology partners	Parts II, V, X and XI
Government and public institutions	Parts I, III, XI and XII
Researchers	Parts II, III, IX and XII
Local MakeCell and Physical Subscriber partners	Parts VII and VIII; Appendices H, I and K

Readers should continually ask whether a statement is a documented fact, documented implementation, technical interpretation, proposed architecture, research hypothesis, or roadmap/commercial hypothesis.

The principal public names are different operating surfaces over one Human Reality Infrastructure model:

> TapPort — entry
> InstantReady — core operation
> InstantSpace — spatial capacity
> MakeHere — physical Capability routing
> HSIMC MakeCells — physical Execution
> AfterMake — post-delivery continuation

The Appendices are short contracts, not decorative background. Detailed APIs, deployment scripts, legal analyses and complete Evidence Packs remain separately versioned digital publications.

Core Terms and Foundational Distinctions

This Front Matter provides a selective primer. Appendix A contains the complete canonical glossary.

Term	Short definition
Human Reality Infrastructure	The infrastructure through which human Intent becomes authorized Execution, Accepted Reality and continuing Capability
Intent	A desired outcome; not an Execution instruction
Context	The conditions that give an Intent or Perception meaning
Capability	A bounded ability to act under stated conditions
Authority	Legitimate permission and responsibility to allow an action
Runtime	The bounded environment in which a Capability is invoked
Execution	An authorized digital or physical attempt to change state
Test	A declared examination against criteria
Acceptance	An explicit responsible decision that a bounded result is acceptable for a declared purpose
Evidence	A sourced record supporting, limiting or challenging a Claim
Accepted Reality	An executed, examined, accepted and Evidence-closed bounded result
Artifact Host	The continuing digital Host for an Accepted Artifact
Reality Delta	A structured difference among representation, Intent, delivery and use
Next URL	A governed continuity Route for an Accepted Reality or Artifact

> Perception ≠ Authorization
> Intent ≠ Command
> Capability ≠ Authority
> Runtime ≠ Provider
> Completion ≠ Acceptance
> Evidence ≠ Claim
> Save ≠ Share ≠ Publish ≠ Make
> Product Card ≠ Artifact Host
> View Event ≠ Make Command
> Retirement ≠ necessarily Deletion

Part I — Intelligence Abundance, Reality Scarcity

Governing question: Why does physical Execution become more scarce as generation becomes more abundant?

> **When the cost of generating an Intent falls faster than the cost of making it real, reality becomes the new bottleneck.**

1 • After Intelligence Abundance

Chapter Question

What changes when plausible intellectual Output becomes inexpensive, immediate and widely available—but physical Execution remains constrained?

Core Argument

GenAI has reduced the marginal cost of representing an Intent much faster than it has reduced the cost of contextualizing, authorizing, executing, testing and accepting that Intent. The result is not the disappearance of scarcity. It is the relocation of scarcity from representation to reality.

1.1 The End of Output Scarcity

The phrase **intelligence abundance** requires care. It does not mean that wisdom, trustworthy expertise, professional judgement or correct decisions have become universally abundant. It means that the cost of producing many forms of intelligence-like Output has fallen dramatically.

These Outputs include explanations, summaries, plans, software, visual concepts, Product descriptions, simulations, translations, operating procedures, candidate designs and structured proposals.

Before GenAI, creating such an Output often required access to a person with specialized training, familiarity with technical tools or substantial time. Now the first draft may be produced in moments.

This is a genuine productivity shift. It allows a student to express a concept without mastering every professional tool. It allows a small company to explore alternatives that once required a larger team. It allows a user to describe a practical problem in ordinary language and receive a structured candidate response.

But the Output is still a representation.

A drawing represents a Product. A plan represents a sequence of actions. A sentence represents an Intent. A model represents selected conditions. A generated answer does not itself create the conditions required for the answer to become real.

The distinction is easy to overlook because the generated Output may look complete. A Product may appear professionally rendered. A report may use the language of certainty. A software interface may respond convincingly. A manufacturing proposal may contain dimensions, materials and process names.

Apparent completeness is not operational completeness.

1.2 Representation Has Become Cheap; Consequence Has Not

A digital representation can be copied at near-zero marginal cost. A physical consequence cannot.

To manufacture one more object may require material, energy, labour, machine time, inspection, packaging, transport and responsibility for failure.

To change an occupied Space may require access, measurement, consent, electrical or structural knowledge, safety controls, interruption of normal use and restoration if the change fails.

To assist a person in a mobility Context may require current environmental information, reliable sensing, communication, accessibility, trust and a Route to recover when the system is uncertain.

A model can describe all these requirements. It cannot remove them merely by describing them well.

The cost divergence can be stated as:

> **Cost of generating a plausible proposal: falling rapidly**
> **Cost of establishing real-world fitness, Authority, Execution and Acceptance: falling slowly, unevenly or not at all**

This divergence creates a new form of economic and operational pressure. More ideas reach the edge of reality. More proposed Products appear buildable. More people expect immediate Execution. More organizations face a growing queue of partially specified, insufficiently governed or physically unsupported Intent.

The system becomes rich in beginnings and poor in accepted endings.

1.3 The Difference between an Answer and a Result

A generated answer is evaluated primarily through language or interface. A real result is evaluated through consequence.

A proposed cable may sound appropriate. The real cable must connect the intended devices, support the required electrical and communication conditions, fit the physical Route and remain safe in use.

A generated Learning Mission may sound engaging. The real activity must be understandable to the children, manageable by the teacher, physically safe and suitable for the stated age group.

A generated accessibility description may be grammatically correct. The actual user must be able to understand it at the correct time and use it without being placed at greater risk.

A generated production instruction may be internally consistent. The actual process must use available materials, compatible tooling and an operator who is authorized and capable of performing it.

The difference can be expressed as:

> **Answer** — a representation that appears responsive
> **Result** — a change that actually occurred
> **Accepted Result** — a bounded change examined and accepted by a responsible person or authorized organization for a stated purpose

GenAI strongly improves the first category. It may assist the second. It cannot independently establish the third in every Context.

1.4 Why Reality Resists Compression

Digital systems compress. They reduce complex conditions to data structures, Prompts, categories and models. This is necessary. No system can represent all of reality.

But the omitted conditions are often where physical failure occurs.

A Product specification may omit the actual hand strength of an older user. A spatial model may omit a temporary obstruction. A visual system may detect a chair but not understand why it has been placed in a corridor. A Product image may show an attractive surface but not represent its behaviour after repeated use. A Route recommendation may be geometrically valid but socially, legally or operationally unavailable.

Reality is not merely more detailed than the model. It is changing, local, embodied, contested, historically accumulated, governed by different Authorities and experienced differently by different people.

The model can help identify what must be checked. It cannot justify skipping the check.

1.5 The New Bottleneck Is Coordinated Acceptance

When generation was expensive, the proposal itself was often the bottleneck. When generation becomes inexpensive, the bottleneck moves.

The difficult questions become:

- What is the real Context?
- Who has Authority?
- Which Capability can act?
- Where will the action occur?
- What materials and tools are available?
- What must be tested?
- Who bears responsibility?
- Who decides that the result is acceptable?
- What Evidence remains?
- What happens after delivery?

These questions are not obstacles to innovation. They are the conditions that distinguish useful innovation from persuasive fiction.

The next productivity infrastructure must therefore optimize more than generation speed. It must reduce the cost of moving from a plausible proposal to an Accepted Result without hiding uncertainty or removing human responsibility.

Figure 1.1 — From information scarcity to reality scarcity. [ARCH] Original HRI diagram. This is a con - ceptual architecture figure, not an empirical cost chart.

1.6 The Productivity Paradox after Generation

A company may generate ten Product directions where it previously generated one. That does not mean it can qualify ten Products.

A designer may generate one hundred visual variants. That does not mean the supply chain can provide one hundred validated material and process combinations.

A public institution may generate many service concepts. That does not mean it can establish the Authority, procurement, safety and operational support for each concept.

A user may generate a technically detailed improvement idea. That does not mean the idea is ready to enter manufacturing.

Without corresponding Execution infrastructure, generation abundance can create more incomplete projects, more unverified Claims, more design–production disconnect, more unused software, more unsuitable physical Products, more pressure on already scarce technical and operational teams, and more disappointment when digital speed is confused with physical readiness.

The purpose of Human Reality Infrastructure is not to slow generation until the old scarcity returns. It is to make the new abundance governable.

Boundary

This chapter does not claim that every form of intelligence is abundant, that GenAI Output is always low-cost, that physical production costs are universally rising, that AI cannot participate in Execution, that human judgement is automatically correct, or that every physical process must remain slow.

The narrower Claim is that the cost of generating many plausible representations has fallen faster than the cost of establishing their real-world validity, Authority and Acceptance.

2 • The Intent-to-Reality Gap

Chapter Question

What exactly is missing between an expressed Intent and a result that can be responsibly used and accepted?

Core Argument

The Intent-to-Reality Gap is not one missing software function. It is a layered discontinuity across Context, specification, Authority, Capability, Space, materials, Execution, Test, Acceptance, Evidence and post-delivery continuity.

2.1 Intent Is Not Yet an Instruction

Human Intent is often incomplete.

A person may say:

> “I need a shorter cable.”

That statement does not yet specify which devices must be connected, what connector types are required, whether power, data or both must be supported, required current or voltage, preferred length, bending conditions, installation environment, applicable safety requirements, or whether the request is for one prototype or a qualified Product.

The Intent is real. The manufacturing instruction is not yet complete.

An AI system may help ask the missing questions and generate a candidate configuration. But until the purpose, constraints and Authority are established, the Output remains a proposal.

This distinction applies beyond manufacturing.

“I need help getting to the bus stop” is a real human Intent. It is not yet a complete mobility instruction because the correct Route depends on location, obstacles, current conditions, user preference and the reliability of available assistance.

“Make this room more capable” is a real Intent. It is not yet permission to move equipment, modify electrical infrastructure or install sensors.

The first Gap is therefore semantic and contextual:

> What does the person actually need, under the real conditions that apply now?

2.2 Reality Is Not Merely the Final Output

Reality includes the actual person, object, place, time, material, version, operator, Authority, result and consequences.

A digital Output may be part of reality, but a file alone does not establish the full physical or organizational result.

A completed manufacturing Job may produce an Output, but the Output may not satisfy the intended use. A repair may restore one function but create another problem. A visual description may identify the Scene but arrive too late to be useful. A Product may meet the supplier specification but fail the user's actual Context.

The infrastructure must connect the Output to its intended human and operational purpose.

2.3 The Layers of the Gap

Gap	Core question	Typical failure
Context Gap	What is happening, where, for whom and under which conditions?	The system answers the wrong problem correctly
Intent Gap	What does the person actually want to achieve?	A vague preference is treated as a precise Command
Specification Gap	What measurable conditions define the desired result?	Interfaces, dimensions or performance requirements are omitted
Authority Gap	Who may authorize the action and bear responsibility?	Technical Capability is mistaken for permission
Capability Gap	Which person, tool, Runtime or Workcell can perform the task?	The Provider cannot reliably produce the required result
Spatial and Material Gap	Where will Execution occur, and what resources exist?	The plan assumes unavailable Space, materials, power or tooling
Execution Gap	How will the action be coordinated and completed?	Handoffs fail or processes stop halfway
Test Gap	How will the result be examined?	Completion is reported without meaningful verification
Acceptance Gap	Who decides whether the result is acceptable?	A system declares success without responsible Acceptance
Evidence Gap	What remains to support the Claim?	Later users cannot distinguish assertion from fact
Continuity Gap	What happens after delivery?	The Product loses Context, service history and improvement Route

These Gaps are cumulative. A well-specified Product without Authority cannot proceed responsibly. An authorized Job without Capability cannot be executed. A completed Job without testing cannot support a strong performance Claim. A tested result without Acceptance may still fail its intended user. An accepted result without continuity becomes difficult to maintain, repair or improve.

2.4 Why Existing Systems Stop at Different Boundaries

AI systems can interpret, generate, classify and propose. They often lack verified local Context, physical access, human Authority, persistent Product responsibility, guaranteed Execution and Acceptance rights.

IoT systems can sense and control devices. They may know that a temperature changed or a machine is online. They do not automatically know why the human cares, whether a proposed action is desirable, whether the observed state authorizes intervention, or who accepts the outcome.

Workflow systems can assign tasks and record Completion. A completed task may still produce an unacceptable result. The workflow can say “done” while the user says “not usable.”

Commerce platforms can connect listings, payment and logistics. They often optimize the transaction before delivery. After delivery, complex experience may be compressed into a rating, review, return or dispute. The Product’s actual version, use Context and possible next Branch may be lost.

Manufacturing systems can produce against a specification. They may not receive the full human reason behind the specification. They may also end the digital relationship at Handoff.

Digital twins and Product records may represent an asset or system. They do not automatically establish Authority to change it, a qualified Execution Provider, an Accepted Result, or a Route for a human to originate the next Intent.

Human Reality Infrastructure is not intended to replace these systems. It is intended to connect their boundaries.

2.5 A Simple Example: From “I Need a Cable” to Accepted Reality

Consider the request:

> “I need a cable from this wall socket to the device on the desk.”

A language model can propose an answer. It may estimate a typical length or recommend a common cable type.

A real result may require:

> Observe the socket and device → identify the connection need → measure or estimate the Route → confirm power and data requirements → confirm connector and protocol → select materials and construction → check production Capability → authorize quantity and cost → make the cable → Test function and applicable performance → install or hand off → accept or reject the result

The Socket Cable Estimator explores one part of this chain. It identifies a wall socket from a photograph or live camera input and estimates cable length to a target device. Its visual instructions state that it uses template matching and depends on controlled camera orientation and a vertical wall and floor [IMPL-03].

That is a useful Perception-to-configuration experiment. It is not proof that a complete, qualified cable-production lifecycle has been implemented.

The POC narrows one part of the Gap. It does not erase the rest.

2.6 The Gap Is Organizational as Well as Technical

A technically correct proposal can fail because responsibility is fragmented.

One party may own the device. Another owns the Space. A third supplies the material. A fourth performs the work. A fifth pays. A sixth uses the result. A seventh may be required to approve it.

Without an explicit responsibility model, each party may assume that another checked the missing condition. The result is a chain of technically plausible actions with no complete Acceptance owner.

Human Reality Infrastructure must therefore include organizational and evidentiary elements. A purely technical architecture cannot answer who may consent, authorize expenditure, alter the Space, accept a safety-related result, retain Evidence, or remain responsible after Handoff.

2.7 The Gap after Delivery

The Intent-to-Reality Gap does not end when the object is delivered.

The delivered Product enters a new environment. The user may discover the wrong fit, unclear instruction, difficult interface, inaccessible control, replaceable-component need, unexpected use or improvement idea.

Traditional systems often treat these discoveries as post-sale noise. A review may be published, hidden, disputed or forgotten. A return may move the Product backwards without moving knowledge forwards.

Delivery closes a transaction. It does not close the reality lifecycle.

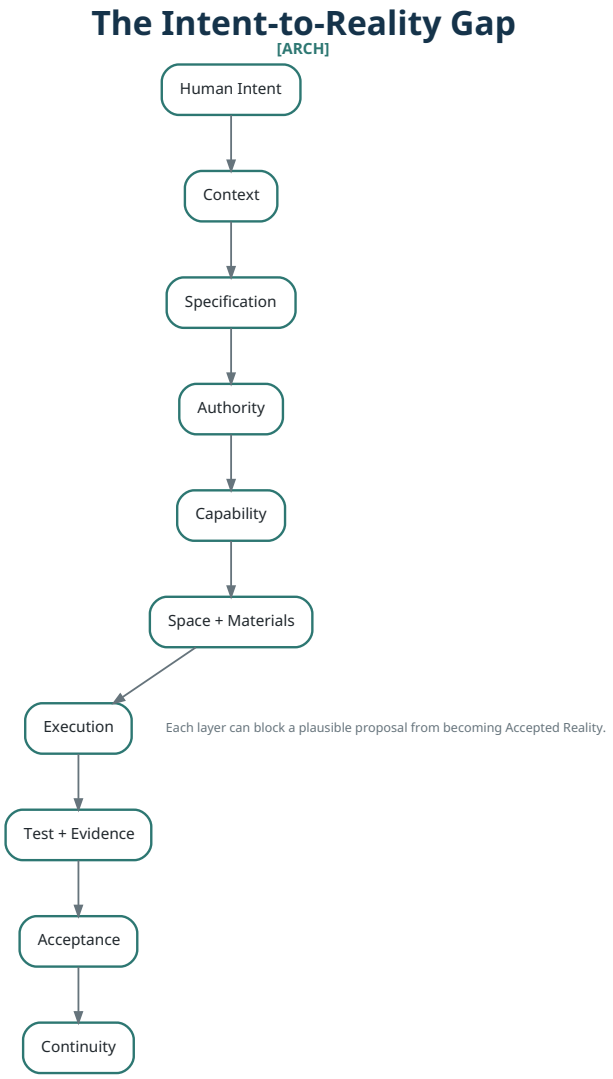


Figure 2.1 — The Intent-to-Reality Gap. [ARCH] Original HRI diagram. The Gap is a sequence of neces - sary boundaries rather than one missing feature.

3 • Human Reality Infrastructure

Chapter Question

Why should the missing layer between AI Intent and Accepted Reality be treated as infrastructure rather than as a Product feature or industry-specific application?

Core Argument

The problem is infrastructural because it recurs across sectors, requires shared identities and contracts, coordinates independent Providers, persists beyond one Session and must remain governable when Products, people, Spaces and technologies change.

3.1 Category Definition

Human Reality Infrastructure is:

> **The technical, physical, organizational and evidentiary infrastructure through which human Intent can become authorized Execution, Accepted Reality and continuing Capability.**

Each word defines part of the boundary.

Human means the system begins with human purpose and preserves Human Agency. It accounts for individual need, embodied experience, consent, refusal, responsibility, correction, Acceptance and the right to originate a new Branch. It does not mean that machines cannot act. It means machine action remains related to human purpose and Authority rather than becoming its own sufficient justification.

Reality means the system is concerned with actual conditions and consequences: the local environment, physical object, current state, available materials, specific version, responsible operator and result experienced by the user. It does not exclude digital Outputs. It requires digital Outputs to be connected to their operational meaning.

Infrastructure means the system supports many applications rather than one fixed experience. It provides persistent identities, common boundaries, reusable contracts, shared routing, interoperable Evidence, repeatable Acceptance and continuity across different Providers.

3.2 The Infrastructure Test

A proposed system approaches infrastructure when it supports more than one use case; survives a change of Provider; distinguishes access from ownership; produces bounded Evidence; allows rejection and Retirement; and preserves continuity.

The same underlying Identity, Authority, Evidence and Acceptance concepts should apply across accessibility, learning, Product manufacturing, repair, spatial Execution, field service, travel, retail and public service, even though the exact requirements differ.

A user’s Artifact Identity should not disappear merely because the AI Provider, manufacturer or public interface changes.

A person may access a Product record without owning the Product. A manufacturer may execute a Job without owning the user’s personal data. A public URL may describe an Artifact without revealing private history.

The system records what happened, by whom, under what Authority and with what result. It does not merely display a success message.

It represents failure, refusal, expiration, replacement, Deletion where applicable and Retirement. A system that represents only successful forward movement is a demonstration, not a complete operating layer.

3.3 Four Connected Layers

Human Reality Infrastructure spans four layers that are often separated.

1. **Cognitive Layer** — human Perception, machine Perception, language, AI interpretation, Intent formation and candidate planning.
2. **Operating Layer** — Identity, Session, Authority, Runtime, Capability routing, state and Evidence.

3. **Physical Layer** — Space, tools, materials, devices, people, Workcells, production, installation and repair.
4. **Continuity Layer** — Handoff, Acceptance, Artifact Identity, maintenance, feedback, Change Branch, return, Retirement and next version.

A sophisticated AI without the physical layer produces proposals. A factory without the cognitive and con - textual layers produces against incomplete demand. A Product Identity without the continuity layer be - comes a static record. A workflow without Acceptance can complete the wrong result efficiently.

3.4 What Human Reality Infrastructure Is Not

Adjacent category	Common contribution	HRI addition
Chatbot or AI Assistant	Interpretation and generation	Authority, Execution, Acceptance, Evidence and continuity
IoT Platform	Device sensing and control	Human Intent, bounded Authority and accepted outcomes
Workflow System	Task routing and Completion	Reality Tests, responsible Acceptance and Artifact continuity
Digital Twin	Representation of an asset or environment	Governed human Intent and Execution Routes
Commerce Platform	Listing, payment and fulfilment	Delivered-unit Identity, Reality Delta and next-version Routes
Manufacturing Platform	Production planning and Execution	Human Context, cross-Provider Authority and post-delivery continuity
Product Passport	Persistent information and identifiers	Actionable routing into repair, adaptation, Acceptance and next reality
Social Platform	Sharing and public interaction	Purpose-bounded, private-first continuity without public Identity as default

HRI may integrate with each category. It does not need to replace them.

3.5 Two Continuous Reality Loops

The infrastructure has two principal loops.

> **Loop One — Perceive → Understand → Intend → Authorize → Execute → Test → Accept → Evidence**

> **Loop Two — Use → Observe → Report → Clarify / Repair / Adapt / Branch → Make Again → Test Again → Accept Again**

The first loop addresses the current Execution Gap. The second addresses post-delivery continuity.

3.6 Why HSIMC Uses This Category

HSIMC’ s corporate thesis is:

> **HSIMC builds the missing infrastructure between AI Intent and Accepted Reality.**

The thesis does not mean that HSIMC currently operates every layer at global scale. It identifies the com - mon direction of standards discipline, physical Product engineering, machine vision, smart glasses, object Identity, public and private URLs, Runtime, spatial Capability, manufacturing, Evidence and post-delivery continuity.

InstantReady, TapPort, InstantSpace, MakeHere, HSIMC MakeCells and AfterMake are different operating surfaces within the same infrastructure. They are not Evidence that every layer has already reached commercial maturity.

3.7 A Category Must Carry Its Own Limits

A new category is not useful merely because it combines many technologies. It must define what it refuses to combine.

Human Reality Infrastructure refuses the silent transitions:

> Perception → Authorization
> Prediction → Fact
> Proposal → Command
> Completion → Acceptance
> Sharing → Publication
> Publication → Manufacturing Right
> Delivery → Finality

Each transition requires an explicit boundary. Without those boundaries, “connecting AI to reality” could mean unlimited sensing, automated intervention or unaccountable physical action.

3.8 Proposed Category Test

A Product, deployment or network should not be described as HRI merely because it uses AI and hardware. The description becomes credible when the system can answer:

- What real human purpose is being served?
- What object, Space or Context is identified?
- What Authority allows the action?
- What Capability performs it?
- What limits apply?
- What Evidence is produced?
- Who accepts the result?
- What happens if the result is rejected?
- How does the Artifact continue?
- How can it be retired?

A system unable to answer those questions may still be valuable. It is not yet a complete HRI implementation.

Part II — Documented Practice and GenAI Convergence

Governing question: How does the HRI thesis grow from sustained physical and technical practice rather than retrospective AI branding?

> **The architecture is new. The operating discipline is not.**

4 • Standards, Product Engineering and Testable Reality

Chapter Question

What disciplines are required when a persuasive concept must become a Product or result that can be tested, used and accepted?

Core Argument

Human Reality Infrastructure inherits its most important discipline not from conversational AI, but from standards and Product engineering: scope must be defined, interfaces controlled, Claims testable and Completion distinct from Acceptance.

4.1 The Physical World Requires Definitions

A digital concept can remain useful while some terms are ambiguous. A physical Product often cannot.

A connector either fits or it does not. A cable either supports the required function or it does not. A com - ponent may operate at one condition and fail at another. A material Claim may apply to one component but not the complete Product. A Product may be suitable for an internal prototype but not for sale.

The first role of engineering discipline is not to add detail for its own sake. It is to make the boundary of the Claim visible.

A useful specification states what is included, what is excluded, under which conditions the Claim applies, how the Claim will be examined and who is responsible for the result.

This same discipline is required when GenAI produces a candidate answer.

4.2 Scope before Scale

Technology narratives often move quickly from one successful demonstration to universal possibility.

Standards and Product engineering move in the opposite direction. They ask:

> Which Product? Which version? Which interface? Which operating condition? Which user? Which Test? Which Evidence? Which market? Which Authority?

Only after scope is clear does scale become meaningful.

A system may correctly identify one type of object under controlled lighting. That does not establish reliable recognition in every environment. A cable prototype may function with one device. That does not establish universal protocol compatibility. A smart-glasses demonstration may deliver a useful description. That does not establish suitability for every accessibility or mobility Context. A local Runtime may operate successfully. That does not establish federated global infrastructure.

The absence of this discipline creates Claim inflation: language grows faster than Evidence.

4.3 Interface Control as a Reality Discipline

Physical systems fail at interfaces. An interface may be mechanical, electrical, digital, spatial, organizational, legal or human.

A Product can be correct in isolation and still fail at the boundary. The cable may be well made but incompatible with the device. The software may run but lack access to the required sensor. The AI may provide a correct description but in a language or timing unsuitable for the user. The manufacturing process may be available, but the operator may not be qualified for the specific Job. The Space may contain the required tool, but the tool may not be available during the Session.

HRI must treat interfaces as first-class objects across Identity, Context, Authority, Capability, Runtime, Execution, Acceptance and Evidence.

4.4 Claim Ladder

The following distinctions form the Claim ladder:

> Founder Experience ≠ Current Product Qualification
> Supplier Availability ≠ Integrated Capability
> Component Specification ≠ Tested System Performance
> Prototype ≠ Safe-to-Test
> Safe-to-Test ≠ Safe-to-Make
> Safe-to-Make ≠ Market Ready
> Output Produced ≠ Output Accepted
> One Accepted Pilot ≠ Universal Conformance

These distinctions are not intended to weaken innovation. They allow innovation to progress without converting uncertainty into an unsupported Claim.

4.5 Test before Trust

In the physical world, trust should follow an appropriate Test.

For a paper Learning tool, early Tests may include edge safety, clarity of instruction, whether a child can use the object with adult supervision, and whether the activity produces the intended observation behaviour.

For a cable, Tests may involve continuity, connector fit, protocol behaviour, temperature, mechanical durability and labelling.

For a smart-glasses interface, early Tests may include device binding, image transfer, description latency, Save and Delete, failure recovery, and whether an unauthorized person can access the result.

The Test must correspond to the Claim. A successful image upload does not prove navigation safety. A correct object description does not prove continuous field reliability. A successful Field Trial does not prove mass-production quality.

4.6 Evidence before Generalization

Evidence supports a bounded statement. It should preserve source, date, version, Test conditions, responsible party, result and limitations.

A screenshot may prove that an interface existed at a given time. It may not prove continuous availability. A public profile may prove that an organization made a stated Claim or received a specified award. It may not independently prove every technical performance statement in that profile. A government release may document a funded project and intended function. It does not automatically constitute certification.

This publication separates Evidence source from architectural meaning.

4.7 Documented Historical Anchor

A surviving 2015 conference record identifies a presentation by Liao Yan titled Machine Vision and Industry 4.0 at the Second Global Sensor Summit and China Internet of Things Application Summit in Beijing [HIST-01].

This supports a specific historical statement: machine vision and its relationship to industrial systems formed part of the founder’ s documented work by 2015.

It does not by itself prove the present architecture. The historical significance is interpretive. The current thesis extends the earlier question—from how machines perceive industrial reality to how human Perception, AI interpretation, Authority, Execution and Acceptance may be connected.

4.8 Handoff Is Part of the Product

Engineering work is not complete when the builder stops working. The next person must understand what was done, what was not done, what passed, what failed, what remains uncertain and what should happen next.

An InnoSpire Product overview describes its engagement sequence as:

> **Order → Build → Handoff**

The Handoff is described as documenting what is done, what is not and what comes next [IMPL-04]. The same overview connects smart glasses, hosted Runtime, NFC/RFID activation, design Output, public URLs and evidence-based delivery.

This is not yet the full HRI lifecycle. It is a documented operating discipline that naturally points toward it.

5 • From Object Identity to Machine-Readable Reality

Chapter Question

What changes when a physical object is no longer represented only by a label or Product page, but becomes an addressable participant in a governed digital–physical lifecycle?

Core Argument

Object Identity becomes infrastructural when it is connected not only to information, but also to version, state, Capability, Authority, Evidence and continuity.

5.1 From Marking to Addressability

Physical objects have long carried identifiers: names, part numbers, serial numbers, labels, barcodes, RFID tags, QR codes and NFC payloads.

These identifiers answer:

> Which object or object class is this?

A URL adds another possibility:

> Where can the current relationship to this object be resolved?

That relationship may include Product information, instructions, service, configuration, Evidence, maintenance, repair, a Runtime, a private user Route or a next version.

The URL becomes more than a label. It becomes a governed entry point.

5.2 Identity Is Not State

A persistent object Identity must be separated from current state.

The same object may be manufactured, in transit, delivered, installed, in use, damaged, under repair, modified, returned or retired.

If Identity changes every time state changes, continuity is lost. If state is treated as permanent, the system becomes inaccurate.

The infrastructure requires stable Identity plus time-dependent state.

5.3 Identity Is Not Capability

Knowing what an object is does not establish what it can do now.

A smart-glasses frame may have a camera, but the device may be disconnected. An NFC-enabled cable may have a Touchpoint, but no authorized Runtime action may be available. A printer may exist in a room but lack the required material. A Workcell may support one process but not another.

A machine-readable system must separate:

> Identity — What is it?
> State — What condition is it in?
> Capability — What can it do under declared conditions?
> Authority — What is it permitted to do now?
> Evidence — What supports those statements?

5.4 One Pair of Glasses, One URL

The current smart-glasses demonstration provides a small but important implementation reference.

Its administrative interface states “One link per pair of glasses.” The visual interface supports creation of a new link, a unique URL for each entry, Copy, Unbind, Delete, connection status and photo count. The user-facing layout shows device or URL status, a photograph taken from the glasses, a description from an API, Save, and deletion of the image and description [IMPL-01].

This supports a bounded implementation Claim:

> A physical pair of glasses can be associated with a dedicated URL through which device state, captured media, AI description and human retention decisions are presented.

It does not yet establish a complete Viewpoint Host standard, federated Identity, universal privacy controls, cross-Provider interoperability, or a complete Journey or Artifact lifecycle.

5.5 A URL Is Not Necessarily Public

An addressable object does not need to be publicly visible.

A URL may resolve only for the owner, an authorized group, a temporary Session, a service operator or a qualified Provider.

The more accurate principle is:

> **One object may have one canonical Identity and many controlled Routes.**

The public Route may show only selected information. A private Route may allow configuration. A service Route may expose diagnostics. A temporary Route may expire. The underlying Identity remains stable even when presentation and access change.

5.6 Physical Touchpoints as Controlled Entrances

QR and NFC can make an object directly accessible to a person or device. But the Touchpoint itself is not Authority.

A scan may identify the intended Route. It should not automatically authorize payment, AI processing, public sharing, manufacturing or physical actuation.

Early Runtime records illustrate this distinction by separating prepared activation links, defined access keys, validated access and actual Provider Execution. The architectural discipline is that preparation, validation, Execution and Acceptance remain different states.

5.7 From Object Data to Machine-Readable Reality

A Product page usually presents information to a person. Machine-readable reality requires more structured relationships:

Question	Canonical object
Which object or class?	Object Identity
Which design, configuration or batch?	Version
What is happening now?	State
Where and for what purpose?	Context
What actions are possible?	Capability
Who may authorize which action?	Authority
What supports the state or Claim?	Evidence
What happened before and what may happen next?	Lifecycle

The goal is not to place every detail on a blockchain, public database or permanent cloud record. The goal is to make the necessary relationships explicit and resolvable.

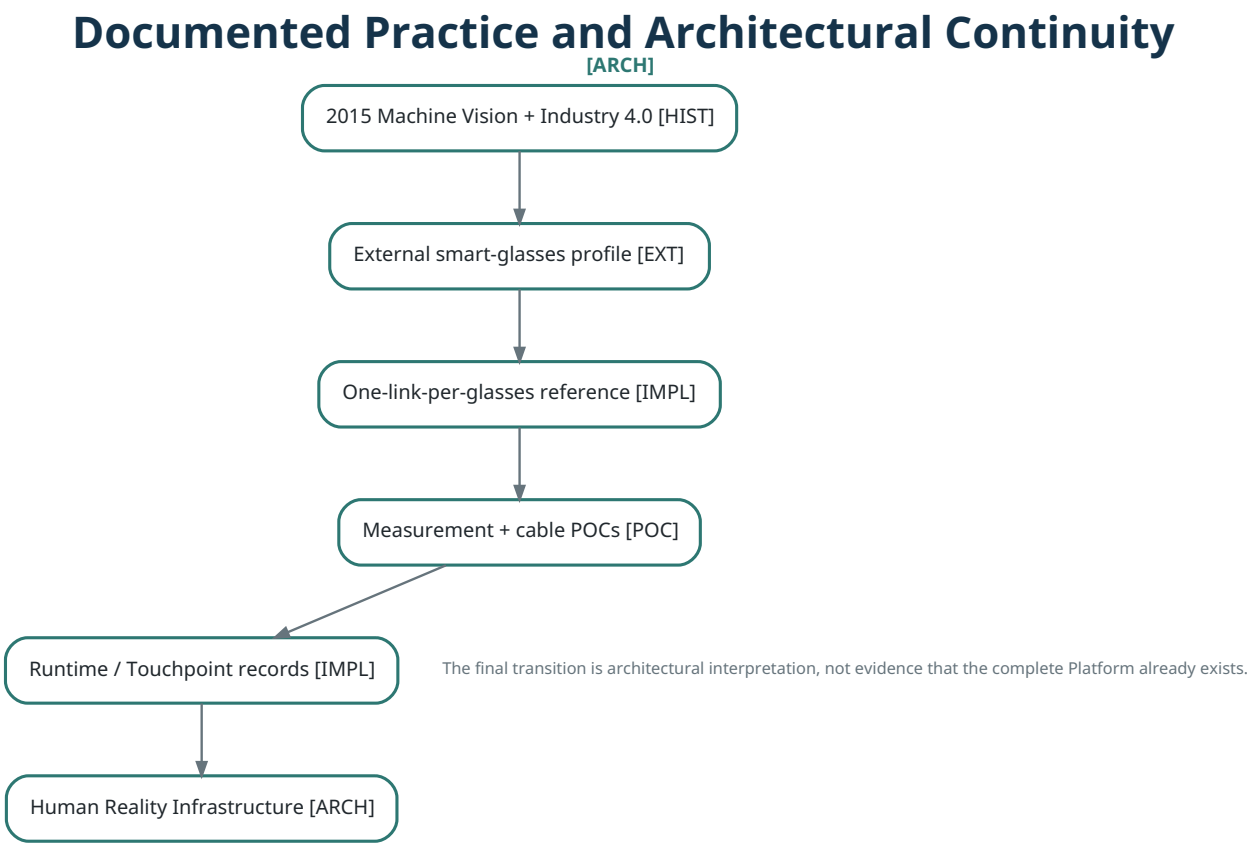


Figure 5.1 — Documented practice and architectural continuity. [HIST] [IMPL] [POC] [ARCH]. The final arrow represents architectural interpretation and proposed consolidation, not proof of completed global infrastructure.

5.8 Addressability as a Foundation for Continuity

A Product without a persistent Route becomes difficult to identify after packaging is removed, distinguish from another version, service correctly, connect to its Evidence, repair, reorder, update or retire respons - ibly.

A stable Route does not solve all these problems. It creates a location where the relationships can be main - tained.

This is why object Identity belongs in the infrastructure layer.

6 • From Machine Vision to GenAI-Native Execution

Chapter Question

How does GenAI change the role of machine vision when visual Perception is connected to Context, human Intent, Runtime and possible physical action?

Core Argument

Machine vision can detect, classify and measure selected features. GenAI can make those Outputs easier to interpret, translate and compile into candidate plans. Neither should silently convert Perception into Authority or physical Command.

6.1 Machine Vision Sees Features; Humans See Purposes

A vision system may identify an object, boundary, distance, movement, surface or pattern.

A person may see a hazard, personal memory, design opportunity, accessibility need, Product defect or reason not to act.

The machine and the person are not observing exactly the same reality. Machine vision processes selected features. Human interpretation connects Perception to experience, purpose and consequence.

The infrastructure should use both strengths without pretending that one has replaced the other.

6.2 Hybrid AI and Human Assistance

The CityU HK Tech 300 profile describes InnoSpire's WeVoice glasses as using "Hybrid AI+Human" computer vision to help people with visual impairment "see" and to support workers through instant remote assistance. It records InnoSpire as an HKSTP incubatee and lists CityU HK Tech 300 Angel Fund support in 2022 [EXT-01].

A Hong Kong Government release dated 13 April 2026 separately records Smart Traffic Fund support for a private enterprise developing smart glasses using AI computer vision to help visually impaired people identify obstacles, bus stops, carriageways and footpaths and to provide navigation functions [GOV-01].

These sources support the existence and intended direction of an accessibility-related smart-glasses project. They do not establish universal performance, certification or unrestricted autonomous navigation.

The phrase hybrid AI and human assistance rejects a false binary. The system need not choose between AI does everything and AI does nothing.

AI may provide rapid description, pattern recognition, translation and candidate interpretation. Humans provide Context, correction, judgement, empathy, Authority and exception handling.

6.3 The Addressable Viewpoint

The one-link-per-glasses prototype adds a new architectural element. The vision device does not send all Output into one undifferentiated repository. Each pair can be associated with an individual URL entry.

That creates the possibility of treating the physical viewpoint as a bounded digital object.

The current implementation supports link creation, device association, connection state, captured photograph, API description and human Save or Delete [IMPL-01]. Architecturally, this can be interpreted as an early Viewpoint Host. A complete Viewpoint Host would eventually require Identity separation, permission, retention profiles, subscriber control, Session boundaries, Evidence and Retirement.

6.4 From Description to Measurement

Machine vision can do more than describe a Scene.

A current prototype poster defines the objective of 2D/3D indoor image measurement via smart glasses for technicians, engineers and visually impaired users. The documented workflow includes image upload or live webcam input, optional camera-to-ground height, pitch angle, field of view or a reference quadrilateral, a quadrilateral to crop the target object, and Outputs for target width, height and camera distance [IMPL-02].

The workflow shows where the result depends on human setup and camera assumptions. The system does not merely "look" and produce universal geometry. It requires target selection, camera parameters or calibration, controlled interpretation and awareness of error.

AI-assisted Perception becomes more valuable when its assumptions are exposed rather than hidden.

6.5 From Measurement to Candidate Physical Configuration

The Socket Cable Estimator moves from Scene description toward a candidate physical requirement. Its stated purpose is to detect wall sockets from a photograph or live camera feed and calculate required cable length from the socket to a target device. Its visual instructions identify template matching and controlled camera orientation as operating conditions [IMPL-03].

The word candidate remains necessary. The image does not establish the electrical requirement, connector compatibility, protocol, safe routing, installation permission, Product qualification or user Acceptance.

The POC contributes Evidence to one decision. It is not the complete decision.

6.6 What GenAI Adds

Traditional machine vision often produces structured Outputs: labels, coordinates, confidence scores, dimensions and tracks.

GenAI adds a natural-language interface, multimodal interpretation, translation, candidate planning, con - figuration compilation and comparison. These abilities lower the cost of preparing the next Test. They do not eliminate the need for the Test.

6.7 GenAI-Native Execution

GenAI-native Execution should not mean that a model is permitted to act without boundaries.

It means the Execution system is designed from the beginning to accept conversational Intent, multimodal Context, uncertainty, human correction, structured candidate Outputs and dynamic Capability routing.

A GenAI-native process may look like:

> Human observes or describes a need → AI interprets the language and Context → the system identifies missing information → the human confirms constraints → AI produces a candidate configuration → Authority and Capability are checked → a bounded Runtime prepares Execu - tion → a qualified human or machine performs the action → the result is tested → a responsible person or authorized organization accepts, rejects or redirects it

The key word is not automatic. It is native. The system is designed to use GenAI where it is strong while preserving explicit control where consequence begins.

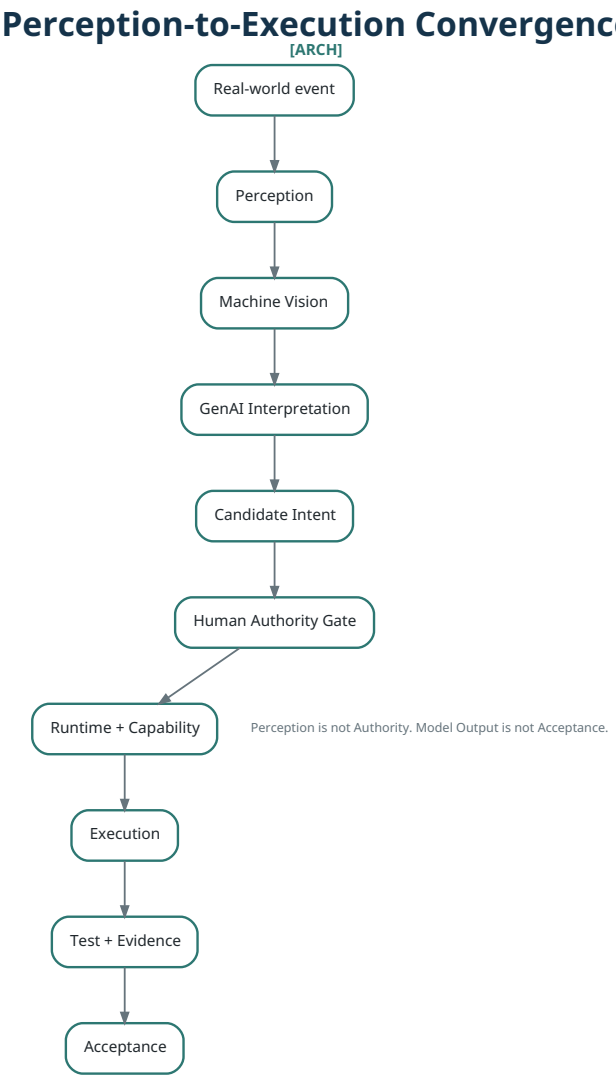


Figure 6.1 — Perception-to-Execution convergence. [ARCH] Original HRI diagram. The visible Human Gate separates candidate interpretation from consequential action.

6.8 The Strongest Productivity Value May Be the Next Test

The most important GenAI production value may not be its first answer. It may be its ability to reduce the cost of forming the next testable reality.

A user can say:

> "This Product works, but the button is difficult for me to press."

GenAI may help convert that experience into a structured observation, user Context, candidate design change, questions about force, geometry and location, and a prototype Test plan.

The infrastructure can then decide whether the issue is reproducible, whether the proposed change is safe, who can make a POC, how the original and modified versions should be compared, and who accepts the result.

This keeps the user's experience inside the innovation process without treating every comment as universal engineering truth.

Closing Boundary

The documented practice supports smart-glasses work, public accessibility and transport-related project descriptions, one-link-per-glasses interface behaviour, image description, Save and Delete, and measurement and cable-estimation POCs.

It does not establish autonomous universal navigation, complete manufacturing automation, globally fed - erated Viewpoint Hosts, universal measurement accuracy, full Product qualification or completed Human Reality Infrastructure.

The next requirement is a common operating grammar capable of holding these parts together without collapsing their boundaries.

Part III — The Canonical Human Reality Model

Governing question: How can Perception, Intent, Capability, Authority, Execution, Acceptance and Evidence remain distinct while operating as one lifecycle?

> **Reality becomes governable only when its transitions are explicit.**

7 • Perception, Context and Intent

Chapter Question

How does a human observation or machine-detected event become a bounded Intent without being mistaken for truth, consent or Command?

Core Argument

Perception provides a source event. Context gives the event operational meaning. Intent expresses a desired change. None of these, alone or together, authorizes Execution.

7.1 Perception Is an Event, Not a Verdict

Perception is the entry into the Canonical Model. A Perception may originate from a person, smart glasses, camera, microphone, sensor, device log, AI model, remote expert, Product user or maintenance technician.

The infrastructure records that something was observed or reported. It does not immediately declare that the observation is complete, correct or actionable.

A person may say:

> "The Product is too heavy."

That is a valid reported experience. It does not establish that the Product is defective, that every user will find it too heavy, that the weight exceeds a specification, that reducing the weight is safe, or that the Product should be remade.

A camera may detect an object. That does not establish why the object is present, whether it is relevant, whether it may be photographed or whether any action should follow.

An AI system may describe a Scene. That description is a derived interpretation, not the Scene itself.

> **Perception is not Fact and is not Authorization.**

7.2 Source Classes

Every material Perception should retain its source class.

Source class	Meaning
Human Observation	A person directly reports what they saw, heard, felt or experienced

Source class	Meaning
Human Instruction	A person explicitly states a desired outcome or requested action
Device Observation	A device or sensor records a state or event
Model Interpretation	An AI or analytic model derives a label, description, score or candidate meaning
Imported Record	Information enters from another system, document or prior event
Provider Report	A service, manufacturer, operator or professional reports a result
Test Observation	A declared Test produces a measurement or result

These classes may support one another, but they must not be collapsed. A model interpretation should not be stored as if it were a direct human observation. A supplier statement should not be stored as if it were an independent Test. A Test result should not be rewritten as a broader Product Claim without preserving the original scope.

7.3 The Perception Envelope

A Perception enters through a **Perception Envelope**. The detailed schema belongs to Appendix D and later technical specifications, but the canonical envelope preserves at least:

- Perception ID;
- source class;
- source Identity or role;
- target object, Scene or Context;
- captured or reported time;
- received time;
- original content or controlled reference;
- processing history;
- confidence or uncertainty where applicable;
- visibility and retention state;
- related Session;
- human correction status.

The Perception Envelope may be temporary. A photograph can be held for a few minutes and then Deleted. Its existence does not require permanent storage.

The current smart-glasses demonstration shows a useful early version of this principle: a dedicated glasses URL can present a captured image and API description while leaving the human with separate Save and Delete choices [IMPL-01]. Capture, interpretation and retention remain separate decisions.

7.4 Context Gives Perception Meaning

The same Perception may imply different actions in different Contexts.

A liquid on a floor may be a cleaning process, harmless spill, safety hazard, part of an experiment or Evid - ence of equipment failure. A disconnected cable may be intentionally removed, incorrectly installed, awaiting repair, retired or unnecessary for the current configuration.

Context answers:

- Who is involved?
- What object or place is involved?
- Where is it?
- When did it occur?
- What was happening before it?

- What purpose is relevant?
- Which version or configuration applies?
- Which constraints apply?
- Who owns or controls the affected resource?
- What is still unknown?

Context is not only metadata. It changes the meaning of the intended action.

7.5 The Context Envelope

The Canonical Model defines a **Context Envelope** as the bounded set of conditions used to interpret an Intent or action.

It may include Principal and role, object or Product, Scene or Space, location or jurisdiction, time window, current state, version and configuration, human purpose, known constraints, safety profile, privacy profile, economic limits, language and accessibility needs, unknowns and assumptions, and related Evidence.

A Context Envelope must be versioned. Reality may change after the envelope is created. A Route that was safe five minutes earlier may no longer be available. A Product configuration may have changed. A Session may have moved to another location.

The system should be able to say:

> This Intent was interpreted against Context Version 3 at 10:42 HKT.

It should not imply that the Context remains permanently true.

7.6 Intent Is a Desired Reality, Not an Execution Instruction

An **Intent** expresses a desired outcome, direction or change.

Examples include:

- Help me understand this object.
- Help me reach the correct bus stop.
- Make this cable shorter.
- Preserve this shared travel memory.
- Repair this Product.
- Print and bind these accepted pages.
- Make this Space easier to use.
- Do not retain this image.

An Intent may be explicit, incomplete, conditional, exploratory, conflicting or withdrawn.

An AI system may infer a candidate Intent, but that inferred Intent must be labelled as derived and presented for correction or confirmation where consequence may follow.

7.7 Intent Object

The canonical **Intent Object** distinguishes the desired outcome from the means of achieving it. It should contain Intent ID, originating Principal, desired outcome, target, Context reference, scope, constraints, success criteria, exclusions, urgency or time window, economic boundary where relevant, risk class, known unknowns, current Intent state, and withdrawal and expiry rules.

A good Intent Object says:

> Produce one 0.7 m prototype cable for controlled desk testing, using the confirmed connector types and declared electrical requirements.

It does not merely say:

> Make the cable.

7.8 Intent State

The canonical Intent state family is:

State	Meaning
PROPOSED	A desired outcome has been expressed
CLARIFYING	Required Context or constraints are incomplete
DEFINED	The bounded outcome is sufficiently clear for Capability evaluation
WITHDRAWN	The originating Principal no longer wishes to proceed
EXPIRED	The Intent is no longer valid for the current Context
BLOCKED	A known condition prevents evaluation or progression
SUPERSEDED	A later Intent replaces this one without erasing it

`DEFINED` does not mean authorized. It means sufficiently bounded for the next stage.

7.9 Intent versus Command

> **An Intent describes the desired result. A Command instructs a selected Capability to perform a bounded action.**

A Command may be created only after the Intent is sufficiently defined, the relevant Capability is selected, the applicable Authority is bound, Execution preconditions are checked, and action scope and limits are declared.

The progression is:

> Human need → Intent → candidate Execution Plan → Authority decision → authorized Com - mand

An AI model may assist in preparing the candidate Execution Plan. It must not silently convert the Intent into the Command.

7.10 Command Envelope

The canonical Command Envelope conceptually includes Command ID, related Intent ID, Session ID, target Capability, action, parameters, scope, preconditions, Authority Binding, expiry, resource and cost limits, stop conditions, failure Route, Evidence requirements, human-confirmation requirement and duplicate-Execution control.

A Command without an Authority Binding is not an authorized Command. It is a draft request.

7.11 Uncertainty Must Remain Visible

GenAI systems are often optimized to produce a useful continuation even when information is incomplete. Physical Execution requires the opposite discipline at critical boundaries.

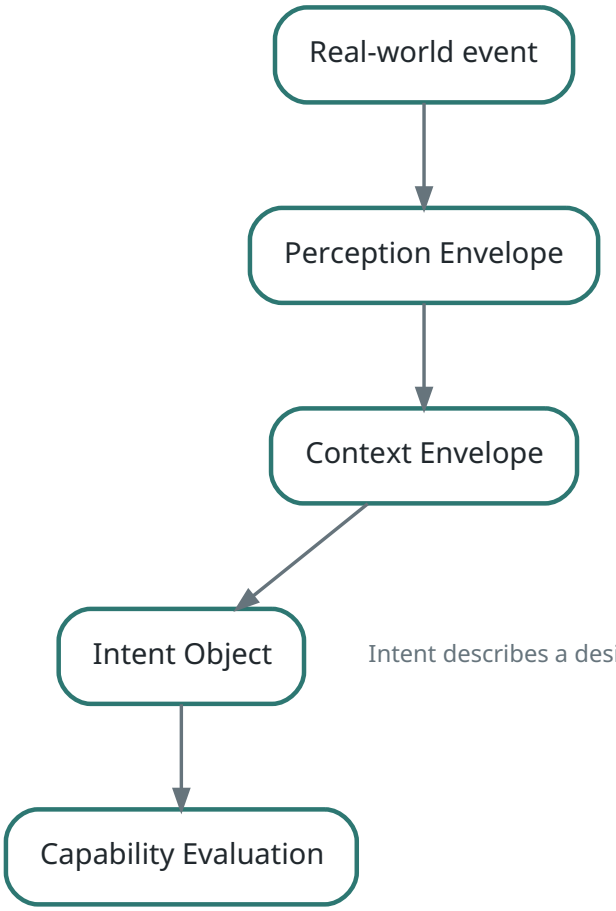
The system must be able to state:

- unknown connector type;
- uncertain object Identity;
- location not verified;
- user purpose unclear;
- professional approval required;
- no qualified Provider available;
- measurement confidence insufficient;
- cost not authorized.

Uncertainty should not be hidden merely to preserve conversational fluency. A useful system may still propose the next information-gathering step. It must not claim readiness that has not been established.

Perception–Context–Intent Entry

[ARCH]



Intent describes a desired result; it is not a Command.

Figure 7.1 — Perception–Context–Intent entry. [ARCH] Original HRI diagram. Perception does not au - thorize Execution; Context does not create Authority; Intent does not constitute a Command.

8 • Capability, Authority and Execution

Chapter Question

How does a defined Intent become a bounded action without confusing technical ability with permission or process Completion with human success?

Core Argument

Capability answers whether an action can be performed. Authority answers whether it may be performed and who bears responsibility. Execution records what was attempted. Completion records that the process ended. None independently establishes Acceptance.

8.1 Capability Means Bounded Ability

A Capability is a declared ability to perform an action or produce an Output under stated conditions.

A Capability may belong to a human, AI model, software tool, Runtime, device, smart-glasses system, sensor, Space, Workcell, manufacturer, professional or service organization.

A Capability statement must be bounded.

Weak statement:

> This AI can understand Products.

Stronger statement:

> This model can generate a candidate English description from a supplied image under the current Provider and model configuration.

Weak statement:

> This Workcell can make cables.

Stronger statement:

> This Workcell can assemble and Test declared connector and cable configurations within its qualified material, length, equipment and operator limits.

8.2 Capability Profile

The canonical **Capability Profile** identifies Capability ID, Provider or operator, Capability class, supported actions, accepted inputs, produced Outputs, operating conditions, excluded actions, required resources, qualification or Test status, locality and availability, cost or quota logic, data and privacy boundary, Evidence produced, failure and escalation Route, and lifecycle state.

A Capability Profile is a statement of available ability. It is not Authority to use that ability.

8.3 Provider Is Not Runtime

A Provider supplies a model, tool, service, person, Workcell, data source or physical Capability. A Runtime is the bounded operational environment in which one or more Provider Capabilities may be invoked.

> **Provider — Who or what supplies the Capability?**
> **Runtime — Under which bounded operating conditions is that Capability invoked for this Session?**

A model Provider may change while the Runtime policy remains. A Runtime may invoke several Providers. A Provider may participate in many Runtimes. A physical MakeCell can be a Provider. The Job Runtime remains the bounded coordination environment around the MakeCell action.

8.4 Capability Discovery and Matching

Capability routing begins with requirements derived from the Intent and Context Envelopes. Matching may evaluate functional fit, technical compatibility, location, availability, language, accessibility, privacy, risk class, qualification, cost, lead time, Evidence requirements, jurisdiction and human supervision.

The canonical routing states are:

> CANDIDATE → ELIGIBLE → QUALIFIED → SELECTED → BOUND

with negative states:

> UNAVAILABLE · DECLINED · REVOKED

A high model confidence does not make a Provider qualified. A low price does not make a Capability eligible.

8.5 Authority Means Permission and Responsibility

Authority answers:

> Who may decide that this action can proceed under these conditions?

Authority may derive from personal consent, ownership, custody, contract, organizational role, professional qualification, legal mandate, delegated approval, budget responsibility, site control or Product responsibility.

The person requesting an action may not be the person authorized to approve it. The person performing the work may not be the person authorized to accept it. The person who owns the device may not control the Space. The person who controls the Space may not own the data.

8.6 Canonical Authority Roles

Role	Responsibility
Originating Principal	Expresses or owns the Intent
Affected Principal	Is materially affected by the action or result
Resource Owner	Controls a device, object, budget, Space or material
Authorizing Principal	Grants permission for bounded Execution
Operator	Performs or supervises the action
Provider	Supplies the Capability
Test Authority	Determines or administers applicable examination
Acceptance Authority	Accepts, rejects or redirects the result
Evidence Custodian	Maintains the declared Evidence record
Handoff Recipient	Receives the result and continuing responsibilities

One person may hold several roles. The roles should still be recorded separately where consequence mat - ters.

8.7 Authority Profile and Authority Binding

An Authority Profile is a reusable description of what a role or Principal may authorize. It may define per - mitted action classes, prohibited actions, maximum cost, duration, locations, data classes, physical-risk boundary, required approvals, required human presence, expiry and revocation.

An Authority Binding connects that Profile to a specific Principal, Session, Intent, Capability, Runtime, time window and scope.

The Authority Profile says:

> This role may authorize low-risk prototype printing up to the declared limit.

The Authority Binding says:

> This named role authorizes this specific prototype-printing Job, in this Session, with this file, quantity, cost and expiry.

8.8 Capability versus Authority

> **Capability answers "Can it act?" Authority answers "May it act, and who is responsible?"**

Combination	Meaning
Capability without Authority	Possible, but not permitted
Authority without Capability	Permitted in principle, but not executable
Capability + Authority	Eligible for bounded Execution
Capability + Authority + Command	Prepared to execute a specific action

This distinction prevents an AI model invoking a tool merely because it exists, a technician modifying a site without site Authority, a user publishing another person's content, a device acting outside its Session, or a manufacturer producing a configuration never approved.

8.9 Execution Plan

Before a Command is issued, the system requires an Execution Plan connecting the defined Intent, selected Capability, Authority Binding, expected action, required resources, preconditions, Tests, Evidence requirements, failure Routes, stop conditions and Acceptance criteria.

An Execution Plan may remain a draft. It may be rejected before any action occurs. It may require quotation, professional review, site inspection or additional consent.

8.10 Execution Preparation State

State	Meaning
DRAFT	The approach is being prepared
REVIEWING	Required Principals or Providers are examining it
READY	Preconditions, Capability and Authority appear sufficient
BLOCKED	A requirement is not met
CANCELLED	The Plan will not proceed
EXPIRED	The preparation is no longer valid for current Context

State	Meaning
AUTHORIZED	A Command may be issued within the declared scope

`READY` is not `AUTHORIZED`. `AUTHORIZED` is not `STARTED`.

8.11 Execution

Execution begins when a valid Command is accepted by the target Capability. Execution state describes the process, not the value of the result.

> QUEUED · STARTED · IN_PROGRESS · PAUSED · AWAITING_HUMAN · AWAITING_PROVIDER · FAILED · ABORTED · TIMED_OUT · COMPLETED

`COMPLETED` means the declared process reached its defined end. It does not mean the Output is correct, the Test passed, the user accepts it, the Evidence is complete or the Product is market ready.

8.12 Execution versus Completion

Execution is an attempted state change. Completion means the attempt ended according to its workflow.

A printer may complete a Job while producing the wrong orientation. A manufacturing cell may complete assembly while a later Test reveals a fault. An AI Provider may complete a response while the human finds it irrelevant. A smart-glasses capture may complete while the image is unusable.

The Completion record should answer whether the Command was received, whether Execution started, which Provider and version acted, which inputs were used, what Output was produced, what errors occurred, when the process ended and what state requires examination next.

It should not answer the Acceptance question on behalf of the responsible person.

8.13 Output Object

Execution may produce an Output Object: an image, description, configuration, document, measurement, physical component, repair, installed system, Learning Artifact or manufacturing result.

The Output Object retains Output ID, related Command and Intent, producer or Provider, version, time, declared type, integrity reference, known limitations, required Test class and current Acceptance state.

The Output is a candidate result.

8.14 Failure Is a First-Class Route

A Canonical Model must represent failure without disguising it as a minor exception.

Failure may occur because Context changed, the Provider was unavailable, the Command was invalid, the material was missing, the user withdrew consent, the result exceeded a limit, a safety condition was triggered, the Output could not be tested or the Acceptance Authority rejected it.

The system preserves where failure occurred, what already happened, which resources were consumed, whether physical change must be reversed, whether Evidence must be retained and whether another Route may proceed.

A failed Execution may create valuable Evidence. It does not create Accepted Reality.

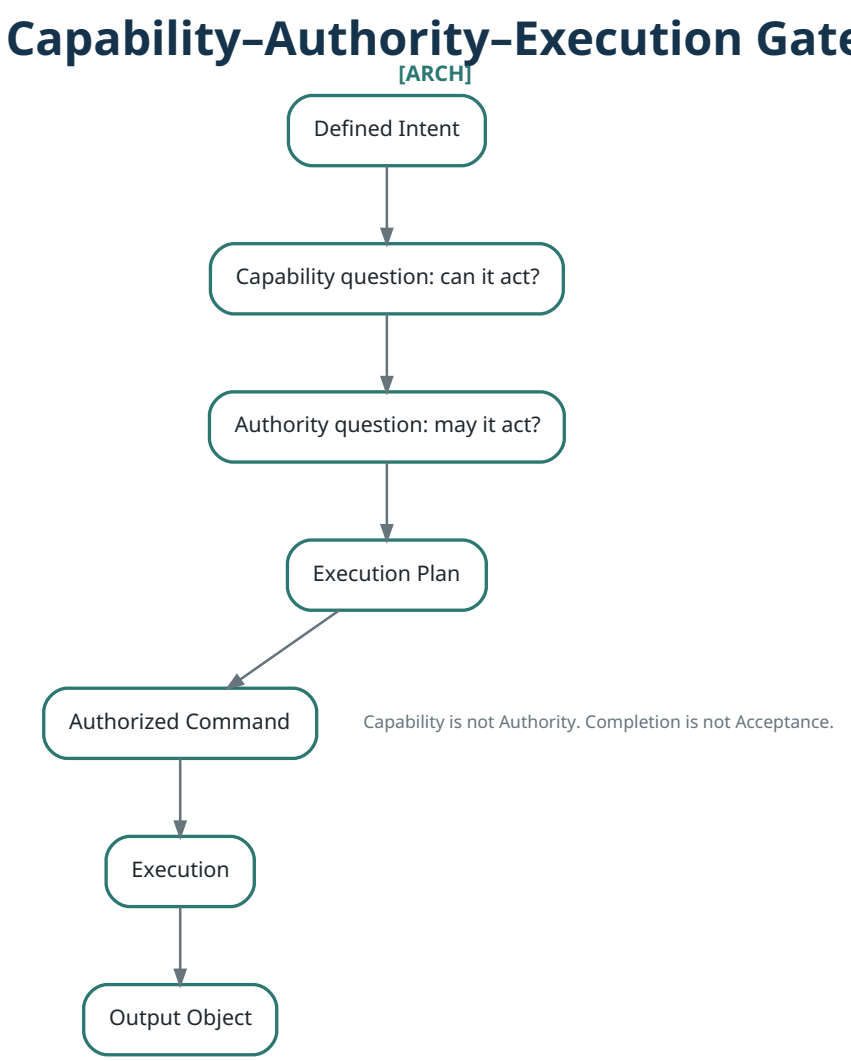


Figure 8.1 — Capability–Authority–Execution Gate. [ARCH] Original HRI diagram. Capability is not Au - thority; Authority is not Command; Command is not Completion; Completion is not Acceptance.

9 • Acceptance, Evidence and the Next URL

Chapter Question

How does an Output become Accepted Reality, and how does that Accepted Reality remain addressable without turning every record into permanent public data?

Core Argument

Acceptance is an explicit responsible decision against bounded criteria. Evidence supports that decision and Claims derived from it. Evidence Closure creates the durable accepted record. The Next URL provides governed continuity beyond the first result.

9.1 Output Is Not Yet Reality Accepted

An Output may exist without satisfying its intended use. A generated description exists. A printed document exists. A cable exists. A repaired Product exists. A changed room exists.

The Output becomes meaningful only in relation to the original Intent, relevant Context, declared criteria, applicable Tests and Acceptance Authority.

The system preserves what was intended, what was produced, what was examined, what was accepted, what was rejected and what remains unresolved.

9.2 Test

A Test is a declared examination of an Output or state. It may be technical, functional, dimensional, electrical, usability-related, accessibility-related, educational, contractual, operational, interoperability-related, visual or field-based.

The canonical Test states are:

> REQUIRED · NOT_REQUIRED · PLANNED · IN_PROGRESS · PASSED · FAILED · INCONCLUSIVE · WAIVED · EXPIRED

A Test is meaningful only within its conditions. A pass under one Test does not create a universal Claim.

9.3 Test Record

The Test Record retains Test ID, Output or target, method, criteria, environment, version, equipment, operator or Test Authority, start and end time, result, exceptions, raw Evidence reference, interpretation and retest requirement.

A model may summarize the result. It must not replace the Test Record.

9.4 Acceptance

Acceptance is the explicit decision that a bounded result is acceptable for a stated purpose.

The canonical decisions are:

> ACCEPTED · CONDITIONALLY_ACCEPTED · REJECTED · REDIRECTED · RETURNED_FOR_CORRECTION · WITHDRAWN · EXPIRED

Acceptance identifies the Acceptance Authority, accepted object or result, accepted purpose, Context and version, criteria, Evidence reviewed, conditions, exclusions, time, expiry or review date, and continuing obligations.

9.5 Acceptance Classes

Class	Meaning
Personal Acceptance	An individual accepts the result for bounded personal use
Learning Acceptance	A teacher or responsible Guide accepts a declared learning outcome
Operational Acceptance	An operator accepts readiness for the declared operational purpose
Technical Acceptance	A qualified technical Authority accepts against technical criteria
Contractual Acceptance	A customer or organization accepts delivery against contractual terms
Professional Acceptance	A qualified professional accepts within regulated scope
Regulatory Acceptance	A competent Authority grants applicable approval or recognition

One class does not imply another. A prototype accepted for internal learning is not market ready. A customer accepting appearance does not certify electrical safety. A public demonstration does not create Regulatory Acceptance.

9.6 Human Acceptance Gate

The Acceptance Authority may use AI assistance. AI may summarize Evidence, compare criteria, identify missing information, highlight anomalies, propose a decision or draft an Acceptance note.

AI must not silently become the Acceptance Authority unless a valid policy explicitly delegates a low-risk decision class and a responsible Principal remains accountable for the delegation.

For consequential physical, professional or human-impact outcomes, Acceptance should remain explicitly attributable to a responsible person or authorized organization.

9.7 Accepted Reality

> **Accepted Reality is a bounded result that has been executed, examined, accepted and evidentially closed for a declared purpose.**

The canonical formula is:

> Bound Intent + Context Reference + Authority Binding + Execution Record + Examined Output + Acceptance Decision + Evidence Closure + Version Identity

Accepted Reality does not mean universal truth, permanent validity, absence of disagreement, certification in every jurisdiction, unrestricted public access or permission for unlimited reuse.

9.8 Acceptance versus Evidence Closure

Acceptance and Evidence Closure are related but different.

Acceptance is the decision. Evidence Closure freezes the minimum Evidence set supporting what happened and what was accepted.

A preliminary state may be:

> ACCEPTED_PENDING_EVIDENCE_CLOSURE

It becomes Accepted Reality when the required Closure conditions are met.

9.9 Evidence versus Claim

A Claim is a statement. Evidence is a record that may support or challenge that statement.

Claim:

> The cable passed the required functional Test.

Potential Evidence:

- identified cable version;
- Test method;
- equipment;
- operator;
- timestamp;
- measured result;
- pass criterion.

The Evidence does not automatically support the broader Claim:

> The cable is universally safe for all uses.

> **Claim — what is being stated**
> **Evidence — what supports, limits or contradicts it**
> **Acceptance — who accepts the bounded result and for what purpose**

9.10 Evidence Object and Classes

The Evidence Object retains Evidence ID, class, source, related Principal or Provider, related object or event, creation and observed time, version, integrity reference, access state, retention state, Claim relationships, correction relationships, custodian and Closure status.

Canonical Evidence classes include Source Evidence, Context Evidence, Authority Evidence, Execution Evidence, Test Evidence, Acceptance Evidence, Handoff Evidence and Continuity Evidence.

9.11 Evidence Closure Model

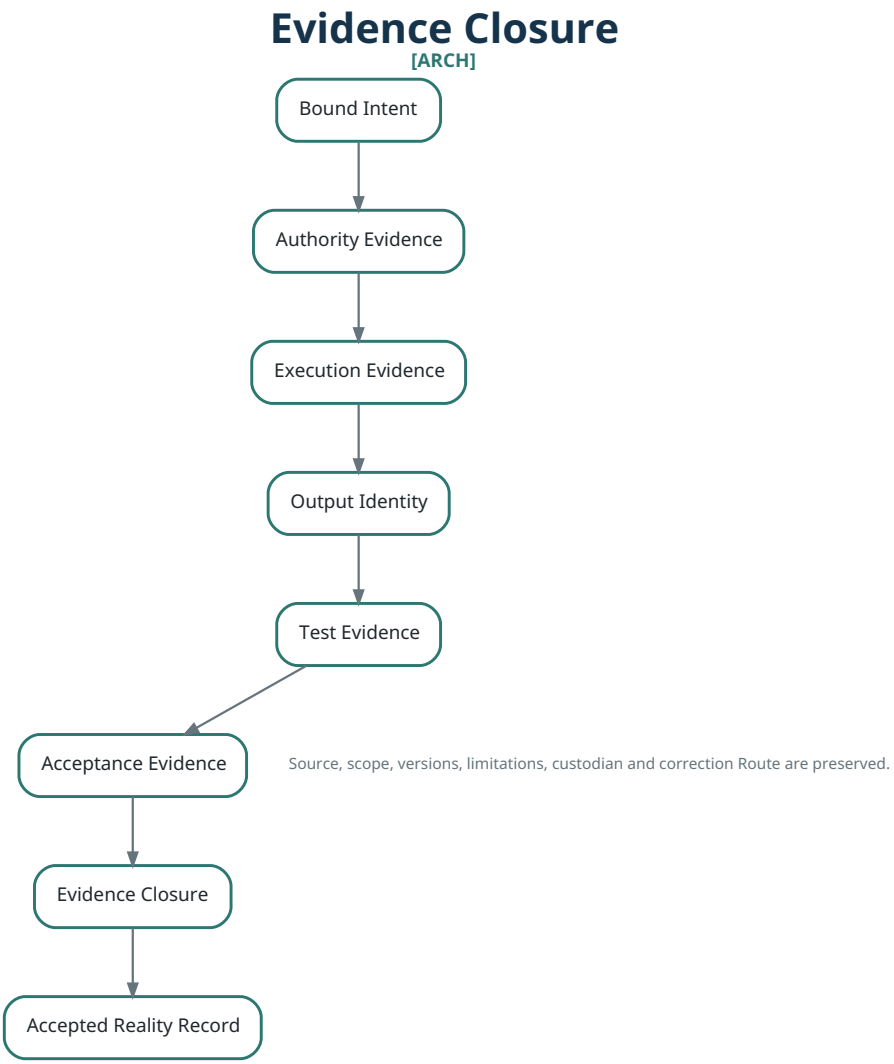


Figure 9.1 — Evidence Closure. [ARCH] Original HRI diagram. Closure requires source completeness, declared scope, linked versions, recorded integrity, visible limitations, assigned custody and an open correction Route.

Evidence Closure does not require every related file to be public or permanently retained. It requires the declared record to state what exists, where it is governed, what may be Deleted and what must remain.

9.12 Handoff

A Handoff transfers the result and its continuing responsibilities. It states what was delivered, which ver - sion, what was completed, what was not completed, which Tests were performed, what was accepted, what remains conditional, who receives it, what maintenance or support applies, what must happen next and how the result may be returned or retired.

The current InnoSpire Product material describes Order → Build → Handoff, with Handoff documenting what is done, what is not and what comes next [IMPL-04]. The Canonical Model extends that discipline by connecting Handoff to Acceptance, Evidence Closure and continuing Identity.

9.13 The Next URL

The Next URL is the governed continuity Route created for an accepted result, Artifact, service, Space state or learning outcome.

It is not necessarily public, permanent in its current form, tied to one brand or domain, or accessible without Authorization.

The Next URL may resolve to different Views for Owner, user, service, repair, Provider, public Product, Evidence, return and Retirement roles.

9.14 URL versus Identity

> **The URL is a Route. The canonical Identity is the stable reference underneath it.**

Layer	Function
Canonical Identity	Stable reference to the object or accepted result
Resolver	Maps a controlled Route to current representation
URL	Human- or machine-accessible Route
View	Role-appropriate information or action surface

A public domain can change without changing the Artifact Identity. An access token can rotate. A public page can be retired. The underlying Evidence and version lineage can remain governed.

9.15 The Next URL Continuity Loop

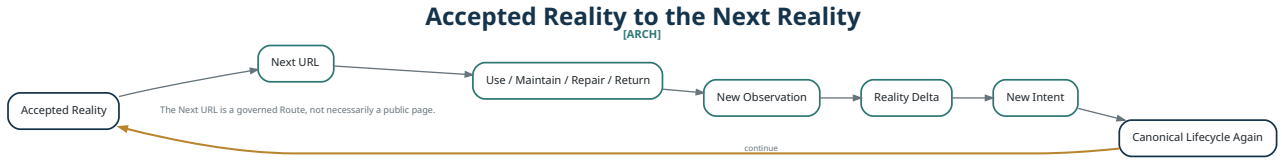


Figure 9.2 — Accepted Reality to the next reality. [ARCH] Original HRI diagram. The loop does not guar - antee that a new version will be made. It guarantees that a valid new observation has a governed Route back into evaluation.

9.16 Continuity and Retirement

Canonical continuity states include ACTIVE, IN_USE, MAINTAINED, UNDER_REPAIR, RE - TURN_REQUESTED, RETURNED, BRANCH_PROPOSED, BRANCH_ACCEPTED, SUPERSEDED, SUSPENDED, RECALLED and RETIRED.

Retirement is the controlled end of active use, Authority, access or Execution. It may apply to a Session, Runtime, Provider binding, Capability, Command, public Route, Artifact, Product version, Claim or pub - lication.

Retirement is not always Deletion. A physical Artifact may be retired while its safety record remains. A Session may expire while the accepted result remains active. Raw media may be Deleted while the minimal Acceptance record remains. A Provider credential may be revoked while historical Execution Evidence re - mains.

Canonical Reality Lifecycle 1.0

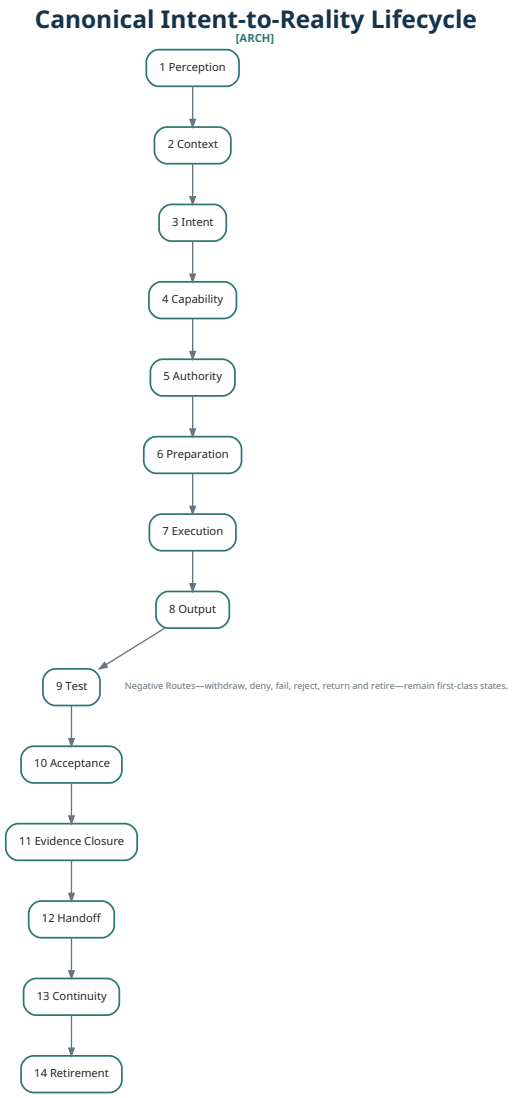


Figure 9.3 — The Canonical Intent-to-Reality Lifecycle. [ARCH] Original HRI diagram. Every later Product must map to this lifecycle; no Product may create a conflicting state machine.

Canonical Lifecycle Invariants

1. Perception does not imply Fact.
2. Context does not imply consent.
3. Intent does not imply Command.
4. Capability does not imply Authority.
5. Authority does not imply Execution occurred.
6. Execution does not imply Completion.

7. Completion does not imply Test success.
8. Test success does not imply Acceptance outside declared scope.
9. Acceptance does not imply universal certification.
10. Evidence supports a Claim; it is not the Claim itself.
11. Handoff does not erase Provider responsibilities.
12. The Next URL does not make the object public.
13. Retirement does not necessarily mean erasure.
14. Every skipped phase must be explicitly declared not required; it must not disappear silently.

Part IV — InstantReady: The Core Reality Operating Platform

Governing question: Which common Platform objects and services make the Canonical Lifecycle operable across Products, Providers and Spaces?

> **Identity is durable. Session is temporary. Runtime is bounded. Acceptance remains attrib - utable.**

10 • Identity, Registry, Resolver and Session

Chapter Question

How can people, devices, viewpoints, Scenes, Spaces, Jobs and Artifacts remain identifiable without exposing private identities or confusing a temporary URL with the underlying reality object?

Core Argument

Identity is durable, typed and versioned. A Host is a bounded addressable state container. A URL is a Route. A Session is a temporary operating relationship. These objects must remain distinct.

10.1 Identity Is a Reference, Not a Display Name

A display name may change. A domain may change. A public URL may expire. A Bluetooth identifier may rotate. A Product may be renamed.

The infrastructure still requires a stable internal reference.

Canonical Identity should be opaque, non-semantic, unique within its Registry scope, immutable after as - signment, separable from public Identity, and connected to version and Retirement state. It should not encode unnecessary personal data.

10.2 Identity Classes

The Canonical Platform recognizes Principal Identity, Organization Identity, Host Identity, Capability Identity, Authority Profile Identity, Session Identity, Runtime Profile Identity, Runtime Instance Identity, Command Identity, Output Identity, Test Identity, Acceptance Identity, Evidence Identity, Handoff Identity, Artifact Identity and Route Identity.

Not every Product needs to expose every class. The Platform preserves them underneath.

10.3 Host

A Host is a bounded, addressable state container representing a continuing relationship to part of reality. It is not necessarily a physical computer.

A Host may represent a device, viewpoint, Scene, Space, Job, Artifact or public projection. It contains or links canonical Identity, Host class, responsible Principal, current lifecycle state, access policy, Authority policy, Evidence policy, retention policy, related objects, current Routes, version and Retirement record.

10.4 Canonical Host Classes

Host class	Boundary
Device Host	Physical device, technical state and events
Viewpoint Host	Human- or role-centred perspective distinct from the capture device
Scene Host	Bounded event, visit, shop, exhibition, class or field Context
Space Host	Governed physical Space, zone or spatial node
Job Host	One bounded Execution Plan and operational state
Artifact Host	One accepted physical or digital result and its continuity
Public Host	Deliberately published projection of selected information

10.5 Device Host versus Viewpoint Host

The distinction is particularly important for smart glasses.

The Device Host answers which physical glasses, whether they are connected, what firmware or configuration applies and what device events occurred.

The Viewpoint Host answers whose or which role’ s bounded perspective the Session represents, what may be Saved, who may subscribe, and which interpretation and retention rules apply.

A person can change glasses without losing the Viewpoint Host. A pair of glasses can be reassigned without becoming the same person.

The current smart-glasses implementation shows one unique link per pair, connection state, image cap - ture, API description and Save/Delete [IMPL-01]. This is a documented early Device-to-URL pattern, not yet a complete separation of Device Host and Viewpoint Host.

10.6 Registry

A Registry preserves typed identities and authoritative metadata. InstantReady requires a logical Registry Plane capable of representing Principals, Hosts, Capabilities, Authority Profiles, Sessions, Runtime Profiles and Instances, Commands, Outputs, Tests, Acceptance Records, Evidence, Handoffs, Accepted Realities, Routes and Retirement Records.

The word logical is deliberate. The records may initially exist in a simple database, JSONL Registry or con - trolled file structure. They may later become distributed or federated. The Canonical Model does not require one global centralized database. It requires interoperable object semantics.

Every Registry Entry should preserve Canonical ID, object type, created time, creator, responsible Principal, version, current lifecycle state, parent and related identities, Authority Profile reference, access policy, Evidence policy, retention policy, public-Route state and Retirement state.

10.7 Resolver

A Resolver maps an external Route to the current permitted representation of a canonical object.

The Resolver may receive a URL, QR code, NFC payload, opaque token, short path, device Touchpoint or partner identifier. It determines which canonical object, which role or access state, which current interface, language, Session, expiry, privacy boundary and next action.

The Resolver should not reveal the canonical identifier unnecessarily.

10.8 URL Is a Route

> **The URL is not the object. The URL is a governed Route to the object.**

A URL may be private, shared, temporary, public, service-only, Evidence-only, revoked, redirected or retired. The same Host may have several Routes. The Routes may expose different Views.

A public Route must not automatically expose private Session history.

10.9 Session

A Session is the temporary operating boundary within which Principals, Hosts, Intent, Capabilities, Authority, Runtime and data policies are connected for a declared purpose.

A Session answers who is participating, for what purpose, for how long, which Hosts are involved, which Intent is active, which Capabilities may be used, which Authority Bindings apply, which Runtime may execute, which data may enter, what may be retained and how the Session ends.

Identity persists. A Session expires. A person may participate in many Sessions. A Host may be used in many Sessions. A Session may involve several Hosts. A Session must not become the permanent Identity of the person, Product or Artifact.

10.10 Session Profile and State

The Session Profile includes Session ID, purpose, starting Principal, participants and roles, related Hosts, Context version, active Intent, allowed Capability classes, Authority Bindings, Runtime Profile, start and expiry, locale and accessibility, privacy and retention profile, budget or resource limits, escalation Route, termination conditions and Handoff requirement.

Canonical Session states are DRAFT, INVITED, ACTIVE, PAUSED, AWAITING_AUTHORITY, AWAIT - ING_HUMAN, AWAITING_PROVIDER, COMPLETING, COMPLETED, EXPIRED, REVOKED, ABORTED and ARCHIVED.

`COMPLETED` means the Session ended according to its procedure. It does not mean every Output was accepted.

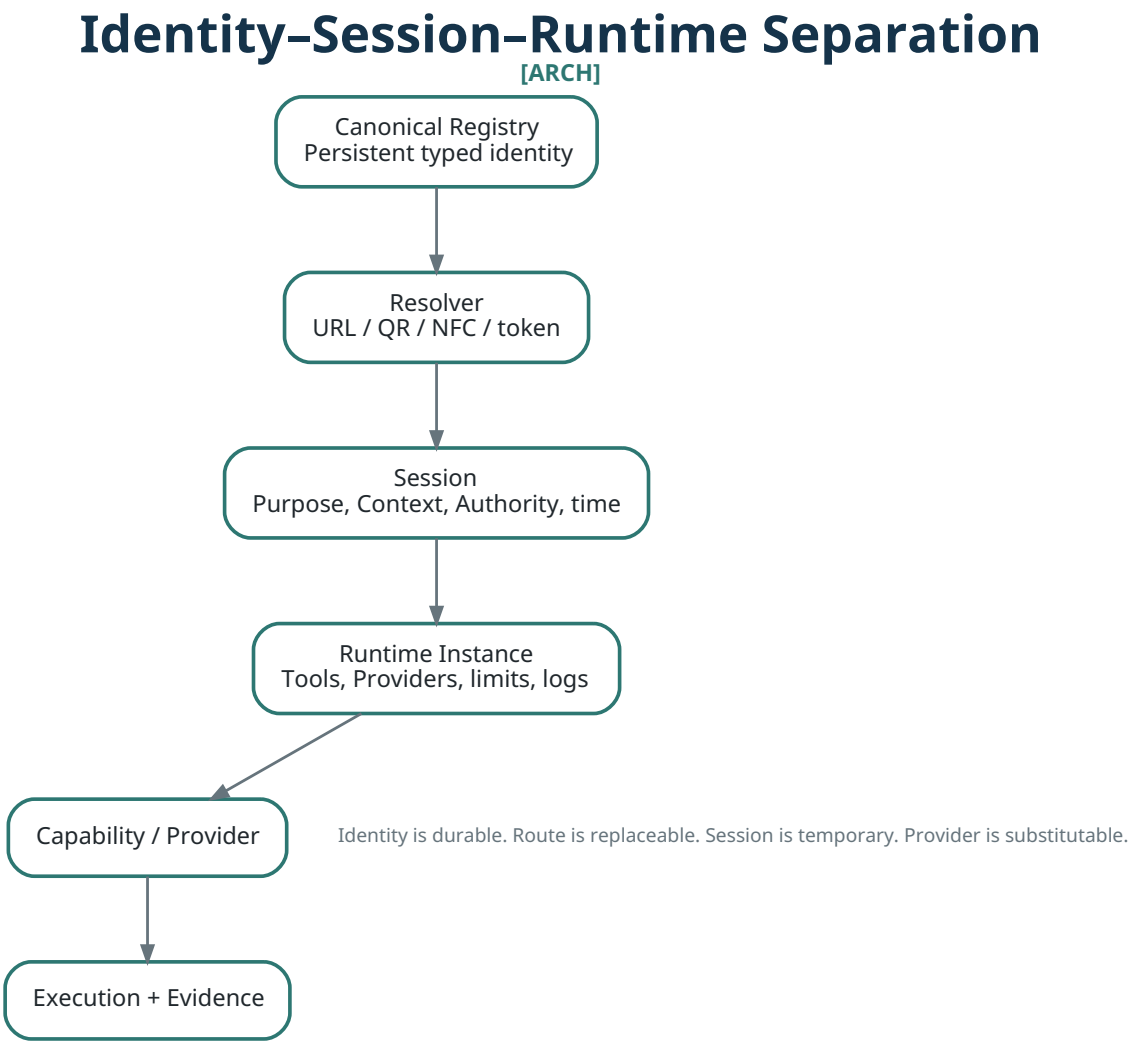


Figure 10.1 — Identity–Session–Runtime separation. [ARCH] Original HRI diagram. Identity is durable; Route replaceable; Session temporary; Runtime executable; Provider substitutable; Evidence records what occurred.

11 • Runtime, Bot, Capability Routing and Authority

Chapter Question

How does InstantReady coordinate AI, software, human and physical Capabilities without becoming identical to any one Provider or allowing a Bot to exceed the Authority of its Session?

Core Argument

The Runtime is a bounded Execution environment. A Provider supplies Capability. A Bot is a scoped interaction and coordination layer. Capability routing selects eligible Providers. Authority Binding limits what may be invoked.

11.1 Runtime

A Runtime is the bounded computational and operational environment in which an Execution Plan is prepared or carried out. It may include application code, AI models, tools, data access, Provider Adapters, device interfaces, workflow state, resource quotas, logs, safety conditions and stop rules.

The Runtime may be local, cloud-based, edge-based or distributed. Its canonical meaning does not depend on where the process runs.

11.2 Runtime Profile versus Runtime Instance

A Runtime Profile defines the reusable operating contract: allowed tools, Provider classes, data classes, resource limits, network policy, Authority requirements, Evidence requirements, failure rules and termination policy.

A Runtime Instance is one active or historical occurrence of that Profile within a specific Session, with specific Authority Bindings, Provider versions, start and end times, Commands, Outputs, logs and Evidence.

Runtime states include DRAFT, REVIEWED, PENDING, PROVISIONING, READY, RUNNING, PAUSED, AWAITING_HUMAN, AWAITING_PROVIDER, DEGRADED, FAILED, STOPPED, COMPLETED, EXPIRED, REVOKED and RETIRED.

`RUNNING` does not imply that a Provider call occurred. `COMPLETED` does not imply that the Output was accepted.

11.3 Runtime versus Provider

The Provider supplies Capability. The Runtime governs invocation.

A Provider may be a model vendor, human expert, device, data service, Workcell, manufacturer or professional.

The Runtime is the Session-bound environment controlling when, how and within which limits the Provider may participate.

Provider credentials should remain outside the user-facing Session. The Runtime should expose only the Capability necessary for the declared purpose. A Provider should not automatically gain access to all Session data.

11.4 Provider Adapter

A Provider Adapter translates the Canonical Command and Evidence requirements into the Provider-specific interface. It may manage authentication, input transformation, model or tool selection, rate and cost limits, timeout, retry, Output normalization, Provider metadata, error translation and Evidence capture.

The Provider Adapter does not become the Acceptance Authority.

11.5 Bot

A Bot is a scoped interaction and coordination agent bound to a Host, Session or Runtime. It may ask clarifying questions, present Context, help define Intent, call permitted tools, route Capability requests, present Evidence, request human confirmation and produce Handoff information.

A Bot is not the human Principal, legal Authority, underlying model, Provider, Runtime itself or final Acceptance Authority.

The same Bot may use different model versions over time. The same model may support many Bots. The system preserves Bot identity, Bot version, policy version, instruction version, model and Provider version, available tools, Authority scope, Session, Outputs and human corrections.

11.6 One URL Wakes One Bot

The pattern:

> **One URL wakes one Bot**

is a useful interface principle. It means a physical object, Product, Scene or Session may open a Context-aware interaction without requiring the user to rebuild the Context manually.

It does not require one permanent model, one unlimited agent, one public conversation or one Bot owning the underlying object.

The more precise principle is:

> A controlled Route may activate a scoped Bot within an authorized Session and Runtime.

11.7 Bot Policy

The Bot Policy defines purpose, supported roles, allowed and prohibited Intent classes, available tools, data access, retention, escalation, human-confirmation gates, failure behaviour, Provider limits, Output classes, Evidence requirements, and Retirement and update policy.

A Bot should refuse or escalate outside its declared scope.

11.8 Capability Routing

Capability routing converts a defined requirement into one or more eligible Execution options:

1. Read the bounded Intent.
2. Read Context and risk class.
3. Derive Capability requirements.
4. Discover candidate Capabilities.
5. Filter by compatibility and policy.
6. Verify qualification and availability.
7. Compare cost, locality, privacy and lead time.
8. Present or select an eligible Route.
9. Bind the selected Capability to the Session.
10. Record why the Route was selected.

Routing is not necessarily an open marketplace. It may be curated, internal, partner-only or local.

11.9 Human Capability as a First-Class Provider

The Platform must not treat human participation as a temporary workaround for insufficient AI.

A human may provide contextual interpretation, accessibility assistance, professional judgement, exception handling, manual fabrication, repair, testing, Acceptance, teaching, and emotional or cultural understanding.

The Capability Registry should describe human Capability without reducing the person to an anonymous API endpoint. Relevant conditions may include role, language, availability, qualification, location, compensation, supervision, safety, Evidence and refusal rights.

11.10 Physical Capability as a Provider

A printer, Workcell, repair station, spatial node or MakeCell may participate through a Provider Adapter or operating Handoff. The Runtime may prepare the Job, verify Authority, transmit the accepted Manifest, receive status, capture Evidence and request Acceptance.

The Runtime must not pretend that it physically performed the work. The physical Provider remains responsible for its declared process.

11.11 Authority Enforcement

Authority enforcement occurs before consequential invocation. The Runtime evaluates whether the Authority Binding is active, covers the Command and target Capability, whether Context remains valid, cost limits are respected, human confirmation is required, the Session has expired, consent has been withdrawn, the Provider remains eligible, or an incident rule blocks Execution.

If a required condition fails, the Command must not proceed.

11.12 Human Intervention States

The Runtime must be able to pause for a person. Canonical human-intervention states include HUMAN_CONFIRMATION_REQUIRED, HUMAN_CORRECTION_REQUIRED, HUMAN_SELECTION_REQUIRED, HUMAN_ACCEPTANCE_REQUIRED, HUMAN_ESCALATION_REQUIRED, HUMAN_REFUSAL_RECORDED and HUMAN_TIMEOUT.

A pause is not system failure. It is part of the operating model.

11.13 Runtime Safety Boundary

The Runtime is bounded by Time, Scope, Identity, Data, Network, Provider, Cost, Resources, Physical action, Evidence, Human supervision, Stop and Retirement.

A public TapPort visitor should not receive infrastructure credentials. A Session user should not receive unrestricted Provider keys. A Bot should not access another Session's private Evidence. A Runtime should not act after its Authority Binding expires.

11.14 Runtime and Locality

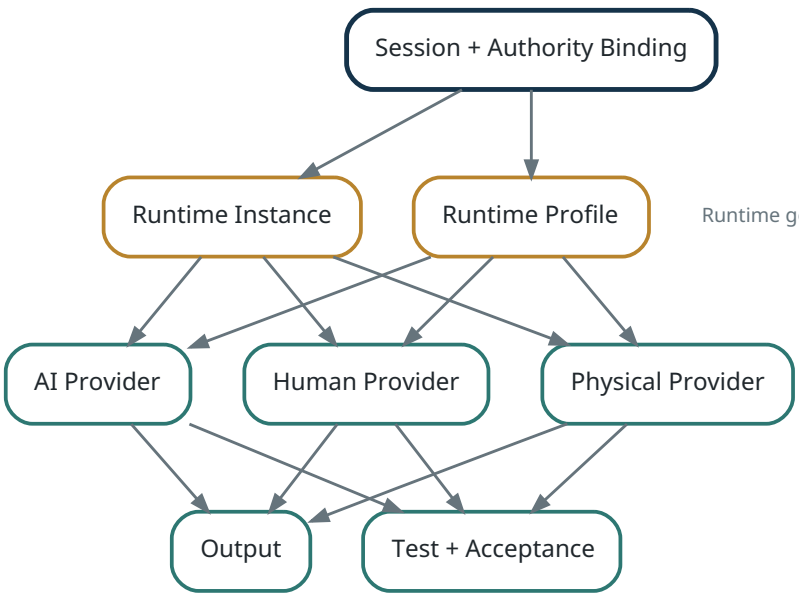
A Runtime may need to remain close to physical Context. Local or edge Execution may be necessary for privacy, latency, network resilience, device connectivity, large media, physical control or local Authority.

Cloud Execution may be appropriate for coordination, Registry, multi-party access, model services, accepted Evidence and cross-border continuity.

The Canonical Model permits both. It does not require all raw Perception to move to a central cloud.

Runtime and Provider Boundary

[ARCH]



Runtime governs invocation; Providers supply Capability.

Figure 11.1 — Runtime and Provider boundary. [ARCH] Original HRI diagram. Runtime is not Provider; Bot is not Runtime; Provider Output is not Acceptance; Authority constrains every consequential Route.

12 • Acceptance, Evidence, Handoff and Retirement

Chapter Question

How does InstantReady convert a completed Execution into an accepted, evidence-bounded and continuing result—and how does it close the lifecycle when the result, Route or Capability should end?

Core Argument

InstantReady completes the reality lifecycle by coordinating examination, responsible Acceptance, Evid - ence Closure, Handoff, continuity and Retirement. It preserves the difference between a working process and a responsible result.

12.1 The Platform Does Not Declare Its Own Success

An Execution engine can report request completed, file produced, device responded, Job ended or Provider returned Output.

InstantReady must not convert that report directly into Accepted Reality.

The Platform provides the Acceptance mechanism. The Acceptance Authority makes the decision.

12.2 Acceptance Service

The InstantReady Acceptance Service logically assembles the current Intent, Context version, Authority Binding, Execution Record, Output Object, required Test Records, exceptions, conditions and Acceptance Authority.

It then records one of the canonical decisions. The interface may be simple—Accept, Reject, Redirect, Return for correction—but the underlying record remains complete.

12.3 Acceptance Criteria

Acceptance criteria may be defined in the Intent, Execution Plan, Product specification, contract, professional standard, Learning Mission, or by the Acceptance Authority before decision.

Late-added criteria should be identified. They should not be presented as if they were part of the original agreement.

12.4 Conditional Acceptance

Conditional Acceptance is not a weaker synonym for full Acceptance. It identifies the accepted use, unmet condition, responsible party, deadline, prohibited use, Evidence still required and action if the condition is not closed.

Examples include accepted for internal prototype evaluation only; accepted for one supervised event; ac - cepted pending final documentation; accepted for appearance but not electrical performance; accepted for learning, not commercial distribution.

12.5 Rejection and Redirection

Rejection is a productive state. A rejected Output may reveal incomplete Context, wrong Capability, failed Test, unsuitable Provider, misunderstood Intent, inaccessible design, unacceptable cost or changed human preference.

The system preserves the rejection reason and possible next Routes.

`REDIRECTED` means the current Output is not accepted, but a new Intent or Execution Route may be opened.

12.6 Evidence Ledger

The Evidence Ledger is the logical record connecting what was intended, what Authority was active, what was executed, what was produced, what was tested, what was accepted, what was handed off and what happened next.

The term ledger does not require a blockchain. The implementation may use append-only files, signed records, a database, JSONL, object storage or a federated Evidence service. The requirement is traceable state and correction discipline.

12.7 Evidence Integrity and Minimization

Evidence integrity may be supported by timestamps, version identifiers, hashes, signatures, access logs, source references, Provider metadata and chain-of-custody records. The required strength depends on Acceptance class.

Evidence completeness does not mean collecting everything. The Platform should minimize unnecessary personal data, continuous raw media, irrelevant location history, unrestricted Provider logs and data unrelated to the accepted Claim.

The Evidence Pack contains what is necessary to support the declared action, Acceptance and continuing responsibility.

12.8 Evidence and Correction

A closed record may later be wrong. The correction model preserves the original record, correction, reason, Authority, time, Claims affected and current valid version.

A correction does not silently overwrite history. A public page may display only the current valid statement while preserving the governed correction chain underneath.

12.9 Accepted Reality Record

The canonical Accepted Reality Record contains Accepted Reality ID, accepted result, Intent scope, Context version, Authority Binding, Execution and Output identities, Test identities, Acceptance record, Evidence Closure, Acceptance class, conditions and exclusions, responsible Principals, effective time, expiry or review, continuity state, Next URL and Retirement Route.

This record is the principal Output of the InstantReady Platform.

12.10 Handoff Pack

A Handoff Pack may include summary of the accepted result, version and configuration, scope, use instructions, known limitations, Tests performed, Evidence references, support contact, maintenance, repair, return, incident Route, Next URL and Retirement Route.

It may be digital, physical or both, embedded in an Artifact Host, QR code, NFC object, printed document, Product label or private customer page.

12.11 Handoff versus Transfer of Responsibility

Handoff does not necessarily transfer all responsibility. The Platform states what remains with the Provider, what moves to the recipient, what depends on correct use, what support period applies, what voids the accepted condition and who owns later maintenance.

Unclear responsibility after Handoff creates a continuity Gap.

12.12 Next URL Service

The InstantReady Resolver maintains the connection between Accepted Reality ID and current authorized Routes. The Next URL Service may Route to current instructions, private owner View, service history, repair booking, replacement component, reorder, new Intent, Reality Delta, Branch, return, recall or Retirement.

The public surface may be TapPort, AfterMake, InstantSpace or another approved Product. The underlying Identity remains Platform-neutral.

12.13 Continuity without Forced Permanence

The Next URL does not require every Artifact to remain online forever. Continuity may be temporary, contract-bound, warranty-bound, life-of-Product, archive-only, successor-routed or retired.

The user should know how long the Route remains active, which information remains, who controls it, how to export or transfer it and what happens at Retirement.

12.14 Retirement Service

The InstantReady Retirement Service coordinates the end of Sessions, Runtimes, Provider access, creden - tials, Routes, Capabilities, Hosts, Artifacts, versions, Evidence access and publications.

Retirement may be scheduled, requested, automatic or incident-driven.

Retirement ends active use. Deletion removes designated data. They are not the same action.

12.15 InstantReady Core Platform Stack

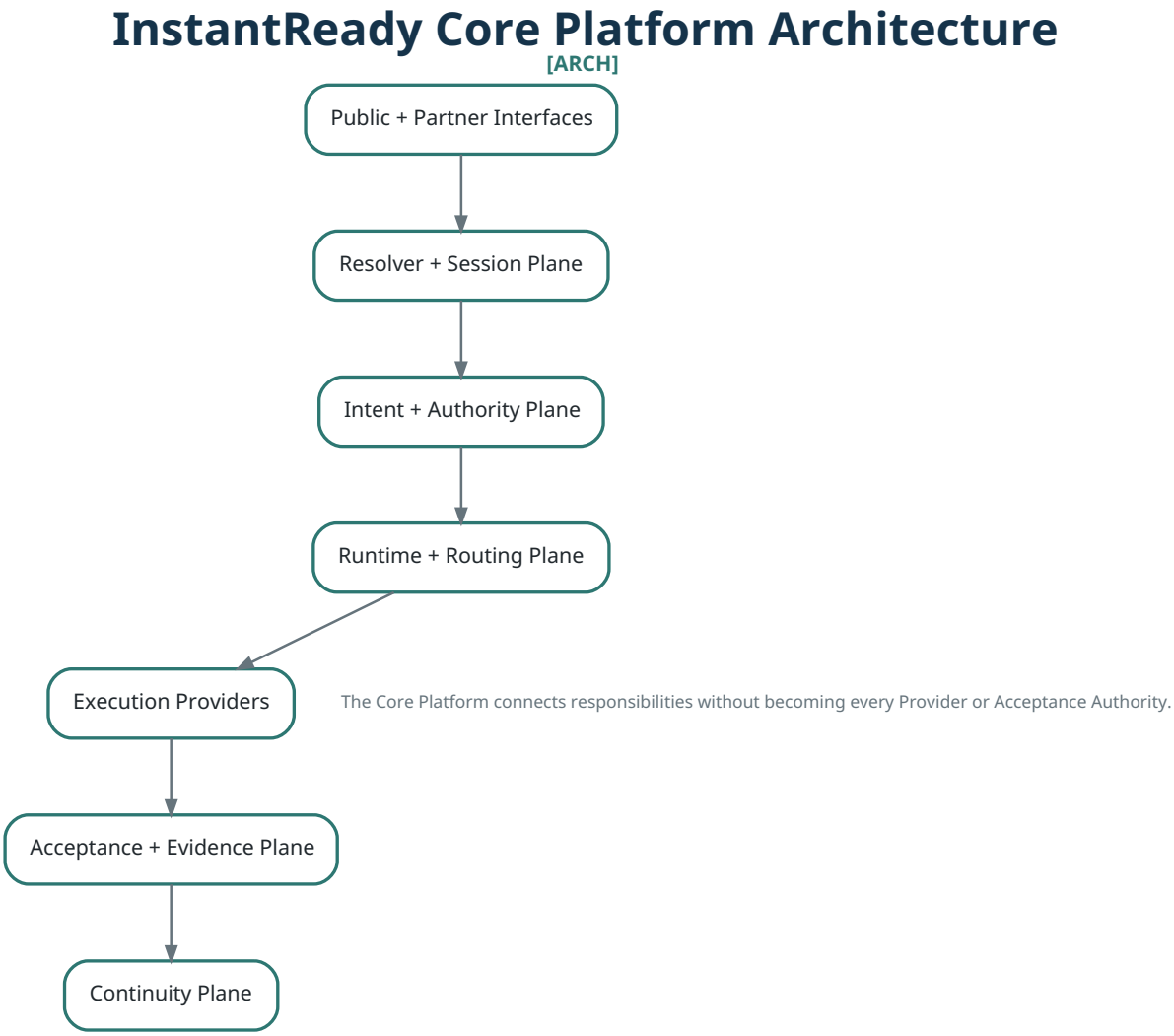


Figure 12.1 — InstantReady Core Platform architecture. [ARCH] Original HRI diagram. The Platform connects public and partner interfaces to the Resolver and Session Plane, Intent and Authority Plane, Runtime and Routing Plane, Execution Providers, Acceptance and Evidence Plane, and Continuity Plane.

12.16 InstantReady Responsibility Boundary

InstantReady is responsible for the Platform contract: Identity, state, routing, Authority enforcement, Runtime boundaries, Evidence relationships, Acceptance recording, continuity and Retirement.

It does not automatically assume responsibility for the factual correctness of every Provider Output, the physical quality of every MakeCell, the professional judgement of a regulated practitioner, the legality of every action in every jurisdiction, the user' s undisclosed purpose, the safety of an unqualified external Product or the truth of an unsupported Claim.

Those responsibilities remain attached to the relevant Principals and Providers.

12.17 Current Implementation Boundary

Current materials support early implementation elements including one unique URL per pair of smart glasses, device connection state, image capture, API description, human Save and Delete, hosted Runtime, physical Touchpoints and documented Handoff [IMPL-01] [IMPL-04].

They do not yet prove one production-grade Registry covering all canonical objects, complete cross-Product Resolver interoperability, full Session and Runtime isolation, universal Provider Adapters, automated Evidence Closure, globally federated Identity and Authority, or complete Retirement automation.

This white paper defines the target operating model against which those Capabilities may be built and tested.

Part V — TapPort: The Entry Product

Governing question: How does a person enter a governed real-world Route without first understanding the infrastructure beneath it?

> **One tap opens a real-world Route. It does not authorize an automatic action.**

13 • One Tap Opens a Real-World Route

Chapter Question

How can a person enter a real-world Context with minimal friction while preserving Identity, purpose, privacy, Authority and the right not to continue?

Core Argument

A tap should open a bounded Route, not trigger an unrestricted action. TapPort separates entry, Context resolution, Session formation, human choice and later Execution.

13.1 The Entry Problem

Physical experiences often lose continuity at the moment they are most valuable.

A visitor enters a shop and hears a detailed Product explanation. A student attends a workshop and sees a technology demonstration. A traveller visits a place and records photographs without retaining why those moments mattered. A technician observes a problem but cannot immediately connect the observation to the correct expert, specification or process. A visually impaired user requires an interpretation of the immediate environment.

The person may later possess photographs, payment records, chat messages, Product links, printed bro - chures and a Guide’ s contact details. The relationship among those objects is often lost.

The problem is not simply missing storage. It is missing continuity.

13.2 TapPort Definition

TapPort is:

> **The low-friction Entry Product through which a person, object, Scene, Journey or physical Touchpoint opens a governed real-world Route powered by InstantReady.**

The public principle is:

> **One tap opens a real-world Route.**

A TapPort Route may allow a person to understand, keep privately, ask, share within a scope, request as - sistance, continue later, enter a Learning Mission, begin an Intent, hand off to another Capability or Delete and leave.

The tap does not itself authorize a physical or consequential action.

13.3 One Tap Does Not Mean One Automatic Action

A QR scan, NFC touch, short URL or smart-glasses capture may identify a Route. It does not automatically authorize payment, public sharing, AI-Provider processing, permanent storage, manufacturing, physical control, publication or creation of a permanent personal profile.

The canonical progression is:

> Touchpoint detected → Route resolved → purpose presented → Session boundary established → human choice → Intent where applicable → Authority and Execution only where separately es - tablished

> **Tap is not consent. Route is not Authority. Open is not Execute.**

13.4 Entry Surfaces

Entry surface	Typical role	Canonical result
QR code	Universal visual entry	Resolver Route
NFC card or label	Low-friction physical Touchpoint	Resolver Route
NFC-enabled cable or useful object	Persistent everyday return Route	Route linked to an object
Smart glasses	Perception or guided capture	Device/Viewpoint Session
Web link	Remote or shared entry	Scene, Product or Journey Session
Product packaging	Product-specific explanation and continuation	Product Route
Printed edition	Physical memory or learning object	Journey or Artifact Route
Space marker	Entry to a zone, object or spatial View	Space Route
Guide or merchant interface	Human explanation and controlled capture	Scene Session

The physical carrier is replaceable. The canonical Route and Identity remain governed through Instan - tReady.

13.5 Current Smart-Glasses Foundation

The current InnoSpire smart-glasses demonstration provides a bounded implementation foundation. Its administrative interface is described as “One link per pair of glasses,” with creation, Copy, Unbind and Delete controls. Its user view shows device state, a photograph captured from the glasses, an API-generated description, Save and Delete [IMPL-01].

This supports the present implementation Claim:

> A pair of smart glasses can be connected to a dedicated URL through which captured media, an AI description and human retention choices are presented.

It does not yet prove a complete TapPort Scene system, production Journey service, governed Locker, uni - versal smart-glasses interoperability, automatic public sharing or complete cross-border operation.

13.6 Route Resolution

When a person taps or scans a Touchpoint, the InstantReady Resolver determines which canonical object or Host, which active Product surface, language, accessibility profile, Session type, role, privacy profile, expiry and next actions are permitted.

The same physical Touchpoint may resolve differently over time. A Product Touchpoint may first open a live demonstration, later a private owner page and eventually a repair or Retirement Route.

The Touchpoint remains stable while the governed Route evolves.

13.7 The TapPort Entry Session

TapPort creates or joins a bounded InstantReady Session. The minimum Entry Session identifies Session purpose, Scene/Product/Journey/Space, participating role, starting time, expiry, available actions, privacy state, retention state, language, accessibility needs and Handoff Routes.

A visitor should be able to receive value without creating a permanent account where the purpose does not require one. The architecture supports identity-light participation, temporary alias, group role, anonymous private Session and named account only where useful or necessary.

13.8 Progressive Commitment

TapPort should not demand the highest commitment at the first tap. Entry may progress through a Commitment Ladder:

> LOOK → HOLD → KEEP → ASK → SHARE → CONTINUE → REQUEST → AUTHORIZE → MAKE OR ACT

The user may stop at any level.

LOOK views public or permitted information. HOLD temporarily retains the object in a Session. KEEP Saves privately. ASK opens a question or guided interaction. SHARE allows a named person or group to view. CONTINUE opens another Session or Next Route. REQUEST forms a candidate Intent. AUTHORIZE enters a separate Authority Gate. MAKE OR ACT proceeds only through the Canonical lifecycle.

13.9 Browser-First Entry

A central advantage of TapPort is browser-first entry. The person should normally be able to tap, scan, open, understand and choose without first installing a proprietary mobile application.

A dedicated application may later provide offline operation, device integration, stronger Identity, local storage, accessibility or background synchronization. It should not be the only path into the Product.

13.10 TapPort Is Not a Social Network

TapPort does not begin from followers, public posting, engagement ranking, advertising profiles, continuous personal Identity or algorithmic popularity.

It begins from a real object, real place, declared purpose, bounded relationship and human choice.

Public sharing may exist. It is not the default definition of the Product. A TapPort Session can be valuable even when nothing becomes public.

13.11 The Route May End

A successful TapPort interaction may end because the user understood the object, Deleted the capture, chose not to continue, received an answer or allowed the Session to expire.

The infrastructure must not treat non-conversion as failure. Refusal or departure is a valid terminal Route.

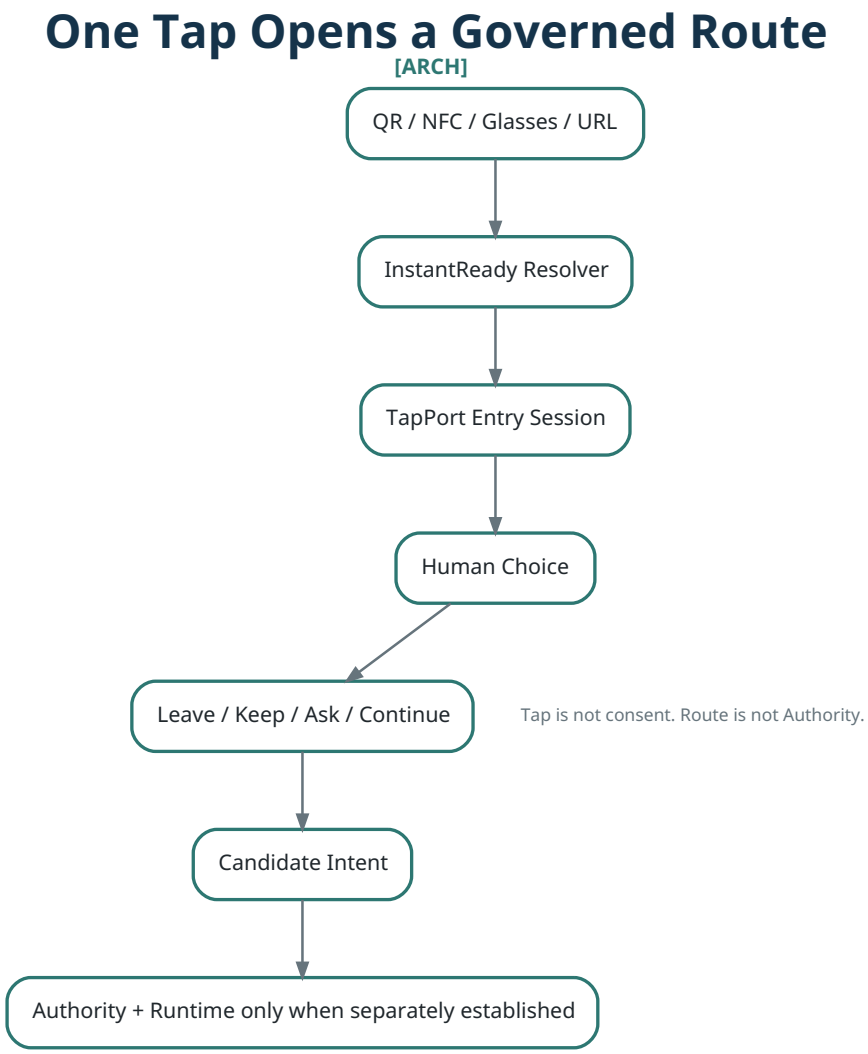


Figure 13.1 — One tap opens a governed Route. [ARCH] Original HRI diagram. No consequential action occurs without separate Authority and Runtime.

14 • Scene, Product, Journey, Locker and Touchpoint

Chapter Question

What Product objects are required to preserve the relationship among a real encounter, selected item, time-bounded visit, private holding Space and physical entry point?

Core Argument

TapPort separates the Context being encountered from the Route used to enter it, the items selected by the participant and the later systems to which those items may be handed off.

14.1 Five Product Objects

The TapPort Product family uses five principal objects:

> Scene · Product Card · Journey · Locker · Touchpoint

They are Product-level objects mapped to the Canonical Host and Session model. They are not a second Identity system.

14.2 TapPort Scene

A TapPort Scene is a bounded real-world Context prepared for one purpose or purpose family.

A Scene may represent a shop, exhibition stand, workshop, university visit, tourist stop, classroom, technical demonstration, Product consultation or spatial zone.

It may define Scene ID, public name, operator, place, time window, purpose, available Product Cards, Guides, languages, accessibility profile, available Capabilities, permitted capture modes, privacy and retention profile, Handoff Routes and current state.

A Scene maps primarily to a Scene Host and one or more InstantReady Sessions.

14.3 Scene Is Not Space

A Scene is a contextual arrangement. A Space is the governed physical environment in which the Scene may occur.

The same Space may host different Scenes at different times. The same Scene design may be instantiated in different Spaces.

> **Space — Where and under which physical conditions?**
> **Scene — What arrangement, content and interaction are intended for this purpose and time?**

A Scene may be proposed without physically changing the Space.

14.4 Scene State

TapPort may present Scene states such as PREVIEW, LIVE, PAUSED, RECAP, ARCHIVE and CANCELLED. These are presentation states. They do not replace Canonical Session, Context, Authority or Retirement states.

A Scene being LIVE does not mean every linked Capability is authorized to execute.

14.5 TapPort Product Card

A TapPort Product Card represents a Product, sample, object or offer encountered within a Scene or Jour - ney.

It may include a current real-world photograph, merchant or Guide explanation, AI-assisted translation, declared Product facts, version or model, approximate price, purchase or enquiry Route, user note, customization possibility, and source and Claim status.

The Product Card must distinguish merchant-supplied Claim, AI-generated description, user observation, verified measurement and actual delivered unit.

A Product Card is not yet an AfterMake Artifact Host. It represents the encounter-layer Product or Product class. If a particular unit is later purchased, customized or manufactured, Handoff may create or connect to an Artifact Host.

14.6 Product Card versus Artifact Host

> **TapPort Product Card — What did the person encounter, consider or select?**
> **AfterMake Artifact Host — What specific accepted unit, configuration or result exists after delivery?**

A visitor may Save a Product Card without purchasing the Product. No Artifact Host is required.

14.7 TapPort Journey

A TapPort Journey is a time-bounded continuity container linking a sequence of Scenes, objects, selected moments and participant choices.

A Journey may represent one shop visit, a one-hour workshop, school field trip, day in Hong Kong, exhibition, company delegation, multi-location research exercise or distributed shared-time event.

A Journey identifies Journey ID, purpose, start and end time, participating roles, Scenes, selected items, Guide or operator, privacy profile, group-sharing policy, retention period, Handoff and archive rules.

A Journey does not imply that every participant shares every capture.

14.8 Journey Is Not Continuous Surveillance

A Journey is not defined as a continuous audio, video or location stream.

The default favours intentional moments, declared tasks, participant-selected items, bounded capture windows and explicit retention.

Continuous recording may be justified in some professional Contexts. It requires a separate profile and Authority boundary.

14.9 TapPort Locker

A TapPort Locker is a temporary, private or group-bounded holding Space for items selected during a Session or Journey.

It may hold controlled references to Product Cards, Scene items, selected photographs, AI descriptions, human notes, questions, accepted Learning Outputs and candidate next Routes.

A Locker is not unlimited cloud storage, a permanent public archive, the canonical source of all raw media, a substitute for a user's personal backup, automatic permission for AI training or an Artifact Host.

14.10 Locker Retention Profiles

Profile	Intended use
Session Locker	Active Session and short closure window
Visit Locker	One visit, workshop or shop encounter
Journey Locker	Multi-Scene Journey for a declared period
Group Locker	Only items explicitly shared to the bounded group
Handoff Locker	Temporary items awaiting transfer to a user or Artifact Host
Archive Locker	Deliberately accepted collection under an identified custodian

Exact retention periods belong to final privacy and Product profiles. The essential rule is that retention must be stated before the Locker becomes a hidden permanent archive.

14.11 Locker Decisions

Each held object should support one or more explicit decisions:

> KEEP PRIVATE · MOVE TO GROUP · DOWNLOAD OR EXPORT · HAND OFF · DELETE · ALLOW TO EXPIRE

A held item does not automatically become accepted Evidence. A Deleted item should not remain available through an undocumented secondary Route.

14.12 TapPort Touchpoint

A TapPort Touchpoint is the physical or digital carrier that opens a controlled Resolver Route. Examples include QR label, NFC card, NFC cable, Product label, packaging, printed booklet, room marker, smart-glasses button or short URL.

The Touchpoint may contain an opaque Route, Touchpoint ID, activation reference, version, current status, fallback Route and human-readable label.

It should not expose Provider secrets, canonical private identities, unrestricted control credentials or unnecessary personal data.

14.13 Touchpoint States

> DEFINED → PAYLOAD_PREPARED → PHYSICALLY_WRITTEN → ATTACHED → ACTIVE

with PAUSED, REVOKED, REPLACED and RETIRED as lifecycle states.

`PAYLOAD_PREPARED` must not be presented as `PHYSICALLY_WRITTEN`.

14.14 Relationship among the Five Objects

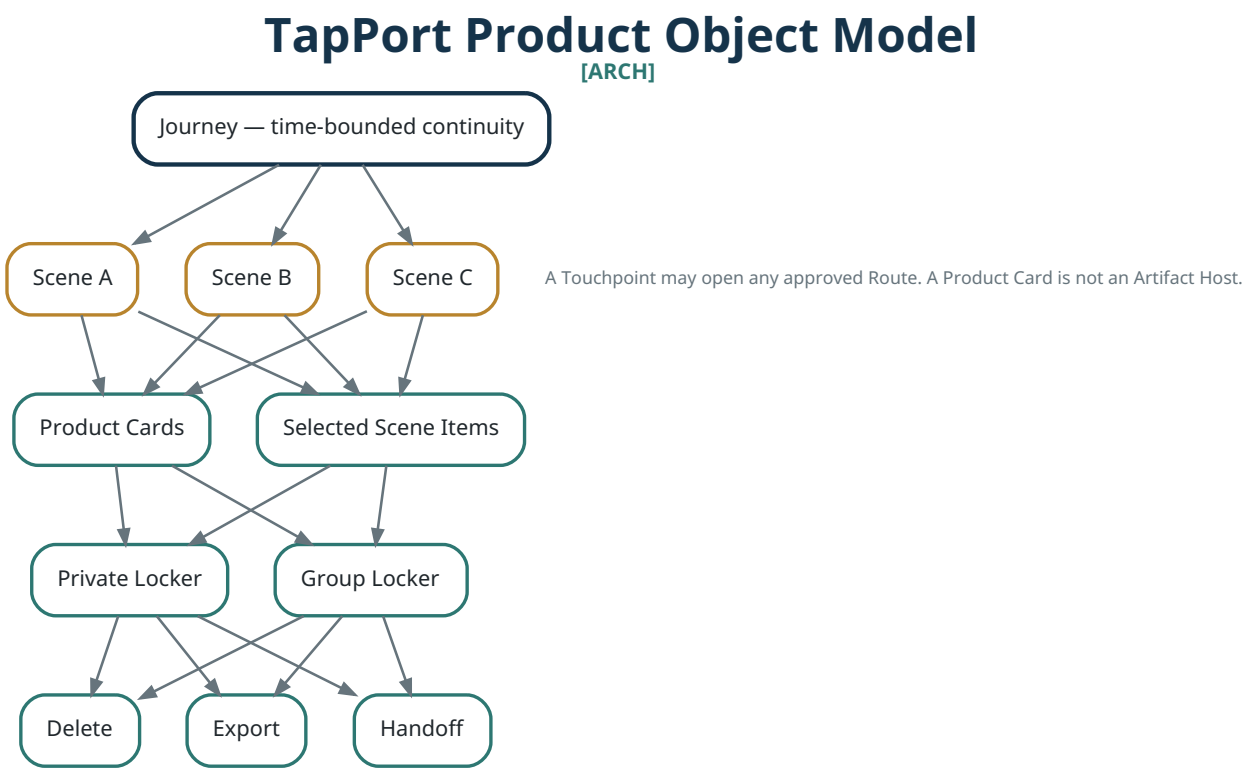


Figure 14.1 — TapPort Product Object model. [ARCH] Original HRI diagram. A Touchpoint may open a Journey, Scene, Product Card or Locker Route. Handoff occurs only after an explicit human decision.

14.15 Merchant and Guide Roles

A merchant, Guide, teacher, technician or host may contribute explanation, Context, translation, Product selection, capture, question handling and Handoff.

That role should not automatically receive access to the visitor’ s full Locker, other merchants’ Product Cards, private Journey notes, Deleted items or unrelated participant Identity.

The Guide operates within a declared Scene and Session role.

14.16 TapPort-to-AfterMake Handoff

A TapPort item may create a candidate Handoff when a person purchases a specific unit, requests custom - ization, accepts a manufactured Output, begins a repair or forms a next-version Intent.

The Handoff identifies source Product Card or Scene, human Intent, selected configuration, responsible Provider, delivered or proposed object, applicable Evidence and new Artifact Identity if and when created.

15 • Human-First Perception and Controlled Continuity

Chapter Question

How can smart glasses, cameras, AI interpretation and shared Journeys increase human understanding without turning Perception into surveillance or convenience into silent consent?

Core Argument

Human-first means that the system serves the person’ s declared purpose, preserves correction and refusal, separates capture from retention, and keeps each continuity step explicit.

15.1 Human-First Does Not Mean Human-Only

HRI includes human observation, machine Perception, AI description, remote assistance, sensor input and multimodal analysis.

Human-first does not mean that AI must always wait until a person independently completes the same task. In an educational or visitor Context, the preferred pattern may be:

> **See first. Ask AI second.**

In an accessibility Context, AI description may need to arrive immediately.

The deeper principle is that the system is organized around the person’ s declared purpose, control and right to correct—not around the model’ s desire to produce or retain more Output.

15.2 Human-First Questions

Before capture or processing, the system should be able to answer who is the intended beneficiary, what purpose is being served, what information is necessary, who may see the result, how long it remains, whether the person can correct or stop it, what happens if the system is uncertain, and what happens after the Session.

15.3 Object First

For many introductory TapPort profiles, especially in shops, exhibitions, workshops and travel, the default should be **Object First**.

Capture focuses on Product, exhibit, material, Space, task or environmental feature and avoids unnecessary capture of unrelated faces, private conversations, Identity documents, payment credentials, sensitive screens, private residences and prohibited areas.

Object First is not a universal rule. It is a safe initial profile.

15.4 Private First

The default continuity Route should normally begin as PRIVATE or SESSION-BOUND, not PUBLIC.

A visitor may choose to keep an item privately, share it with one person, place it in a group Journey or publish a selected derivative. Those are separate choices.

15.5 Temporary First

The initial capture should normally have a declared expiry.

Temporary First reduces forgotten media, unnecessary personal data, hidden long-term archives and secondary use disconnected from original purpose.

A participant may deliberately promote a selected item to a longer-lived state. The promotion must be explicit.

15.6 Controlled Continuity Actions

TapPort freezes six separate actions.

Save

Retain privately under a declared profile.

Share

Permit a defined person or bounded group to access.

Broadcast

Send selected events to previously authorized subscribers for a declared period.

Publish

Create a wider public or semi-public representation.

Make

Allow an accepted Intent to enter a separate physical-Execution Route.

Delete

Remove designated content according to the stated Deletion contract.

> **Save ≠ Share ≠ Broadcast ≠ Publish ≠ Make**

AI processing is not permission to retain. Delete must not mean hiding content from the user while retaining an undocumented active copy.

15.7 Save

Save means the person has chosen to retain an item in a private or declared Locker. Save does not establish factual accuracy, Acceptance of the AI description, permission for public use, permission for model training or manufacturing Authority.

The smart-glasses interface already distinguishes Save from Delete at the item level [IMPL-01].

15.8 Share and Broadcast

Share identifies recipient, scope, duration, download permission, resharing permission and revocation conditions.

A group Journey should not automatically expose every participant's private Viewpoint Host.

Broadcast is not public publication. A Broadcast may send selected events to a Guide, remote expert, accessibility assistant, classroom screen, group Room Host or authorized AI service. It should be time-bounded, scope-bounded, subscriber-bounded, revocable and visible to the participant.

15.9 Publish

Publication requires an explicit public or extended-audience decision. The publication record preserves who authorized it, which derivative was published, whether raw media remains private, what may be withdrawn and whether another person's image or work is involved.

A public TapPort page should normally contain a curated projection, not the complete private Journey history.

15.10 Make

The Make Route does not transmit raw Perception directly to a machine. It begins a new Intent and Authority process:

> selected TapPort item → candidate physical Intent → clarification → configuration → Authority → qualified physical Route

> **View Event ≠ Make Command**

15.11 Delete

Delete must be understandable. The user should know whether Deletion means immediate removal from active View, queued physical Deletion, temporary backup retention, minimal audit record or retention under a stated legal or contractual duty.

The Product should avoid an absolute Deletion Claim when the implementation cannot support it.

15.12 Human Correction

AI-generated descriptions should support correction, added Context, uncertainty marking, rejection and Deletion.

A corrected interpretation should preserve the distinction among original model Output, human correction and currently accepted description. The correction should not imply that the model was originally correct.

15.13 Shared Sight without Shared Ownership

Several people may visit the same place and notice different things. TapPort may support a shared Moment or Journey View while preserving distinct viewpoints, individual retention choices, bounded group access, human explanations and time relationships.

The system should not assume the group owns every participant's capture, the Guide owns the group's content, the Platform may publish everything or AI may infer personality and relationships from attention history.

15.14 Attention Is Sensitive Context

A first-person device may reveal what a person repeatedly looks at, where they pause, whom they follow, which locations they visit and what they ignore.

The initial TapPort architecture should not require continuous gaze history, personality scoring, emotion inference, participant ranking or attention-based performance evaluation.

These exclusions are particularly important in education and employment.

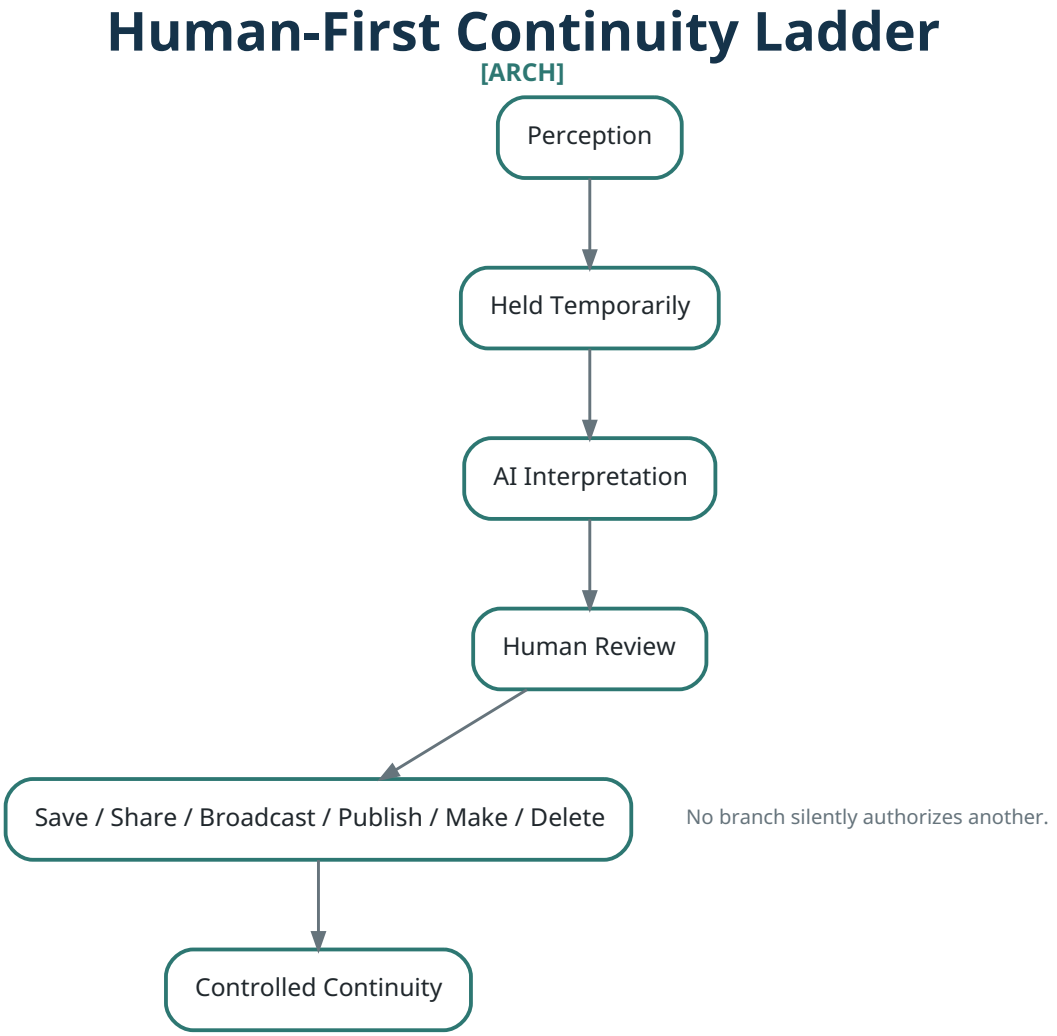


Figure 15.1 — Human-first continuity ladder. [ARCH] Original HRI diagram. No branch silently author - izes another.

15.15 Failure and Offline Behaviour

TapPort should remain understandable when smart glasses disconnect, a Provider does not respond, network access fails, translation is unavailable or the Touchpoint Route expires.

A safe fallback may include human explanation, approved static content, local cached Scene information, a Replay or a clear unavailable state.

The Product should not create false Output merely to avoid appearing unavailable.

Part VI — InstantSpace: The Spatial Execution Platform

Governing question: How does a real-world Route obtain a place in which Capability can be formed, authorized, tested and accepted?

> **A Space becomes productive when it can support a governed change in reality.**

16 • Space as Governed Execution Capacity

Chapter Question

What transforms an ordinary physical Space from a location into a bounded environment capable of supporting authorized, evidenced and accepted Execution?

Core Argument

Space becomes Execution capacity when geometry, objects, Capabilities, time-dependent states, Authority and Evidence are sufficiently understood and organized for a declared Intent.

16.1 Space Is More Than Area

Conventional property descriptions emphasize location, area, occupancy, rent, asset value and building type. These attributes are important. They do not fully describe what the Space can accomplish.

Two rooms of equal area may have radically different productive capacity because they differ in power, access, tools, layout, materials, network, safety, staff, permissions and ability to reconfigure.

InstantSpace asks:

> What accepted human or physical outcome can this Space support, under which conditions and Authority?

16.2 Productive Space

A Productive Space is:

> **A governed physical environment capable of transforming a real Intent into an authorized, evidenced and accepted change in human or physical reality.**

Productive does not mean manufacturing only. A Productive Space may support learning, accessibility, repair, inspection, testing, public service, design, local computing, assembly, research, care or collaboration.

16.3 Existing Space before New Construction

Before proposing a new room, building or permanent installation, the system should ask what already exists, how it is currently used, what is obstructed, what is underused, what can be recovered, what can be time-shared and what can be reconfigured.

This principle does not prohibit construction. It changes the default sequence.

16.4 Existing Assets before New Procurement

A Space may already contain tables, displays, cameras, tools, materials, storage, network equipment, local computers, machines and human expertise.

Those assets may be functionally invisible because they lack Identity, condition, Capability description, location, ownership, availability and Authority.

InstantSpace attempts to recover hidden capacity before recommending new procurement.

16.5 Formation Protocol before Hardware Package

InstantSpace should not be defined first as a bundle of cameras, processors, markers, screens, labels and sensors.

The primary Product is a **Formation Protocol** determining how the Space is observed, objects registered, geometry quality stated, Capability described, Gaps identified, Authority bound, Workcell formed, Execution controlled, Evidence captured and Acceptance recorded.

Hardware supports the protocol. Hardware does not define the architecture.

16.6 From Spatial Data to Execution Capacity

The spatial transition is:

> Spatial Data → Spatial Understanding → Capability Mapping → Workcell Formation → Governed Execution

Spatial Data identifies dimensions, surfaces, objects, zones and relationships. Capability Mapping adds what each object can do, current condition, who may use it and dependencies. Workcell Formation ar - ranges selected resources for one bounded Intent. Governed Execution connects the arrangement to InstantReady Authority, Runtime, Evidence and Acceptance.

16.7 Six Formation Qualities

Quality	Meaning
Measurable	Relevant geometry can be expressed with declared quality
Observable	People, cameras, sensors or devices can report relevant changes
Reconfigurable	Objects, zones, surfaces or workflows can be reorganized
Authorized	Responsible actors and permission scopes are identified
Executable	Approved Capability can connect to a human, tool, service or Runtime
Evidence-Producing	The system can preserve enough information to inspect what happened

None is absolute. A Space may be measurable for layout planning but not precision robotics; observable for object presence but not safety certification; reconfigurable for education but not regulated clinical work.

Every Claim remains scoped.

16.8 Space State Is Not Authority

A sensor may report that a machine is online, a door open, a Workbench clear, a person present or power available. Those facts do not authorize action.

> **Space State — what appears to be true**
> **Authority — who may change it, use it or accept the result**

The system must not infer permission merely from availability.

16.9 Observation Does Not Authorize Change

A camera may observe that a table moved. The observation does not automatically update the canonical spatial model.

A model may propose a new object position. The proposal does not automatically become an accepted spatial fact.

A user may View a room through a browser. The user does not automatically gain permission to alter it.

> **Observation ≠ Canonical Write**
> **Location ≠ Permission**
> **Connectivity ≠ Authority**

16.10 Formation Milestones

InstantSpace may present:

> UNSEEN → OBSERVED → METRIC_MAPPED → OBJECTS_REGISTERED → CAPABILIT - IES_DESCRIBED → AUTHORITY_BOUND → BOT_READY → WORKCELL_FORMED → CON - TROLLED_EXECUTION → FIRST_REALITY_ACCEPTED → SPACE_LIVE → CLONEABLE

These are maturity and formation milestones. They are not a replacement for the Canonical lifecycle.

`SPACE_LIVE` requires at least one bounded accepted productive outcome; it is not merely a server status.

16.11 Ready Is a State; Live Is Proof

A Space may be technically connected, mapped, registered, equipped and ready for a Test. That does not prove that it produced accepted value.

> **Ready is a declared state. Live requires accepted Evidence.**

A Space becomes meaningfully Space-Live only when a bounded Execution occurred, was tested, accepted and reached Evidence Closure.

16.12 Current Reference Boundary

The current browser-first spatial work documents one Space identity, six logical surfaces, approximate or measured geometry states, semantic objects, Scene recipes, Time Evidence and a read-only public Viewer. Protected measurement workflows create local drafts and do not promote them into accepted spatial state without a separate Acceptance process.

This supports governed spatial representation, read-only public access, protected draft formation and separation of draft from accepted state.

It does not yet prove an active Space Bot Runtime, formed operational Workcell, controlled physical Execution, first accepted productive Output or successful second-site cloning.

16.13 Perception-to-Space Research

The smart-glasses and computer-vision measurement poster provides a related POC. Its workflow includes uploaded image or live webcam, optional camera-to-ground height, pitch angle, field of View or reference quadrilateral, manual target quadrilateral, and target width, height and camera distance [IMPL-02].

This is Evidence of a candidate Perception-to-spatial-measurement workflow. It is not Evidence of automatic canonical spatial updating or universal accuracy.

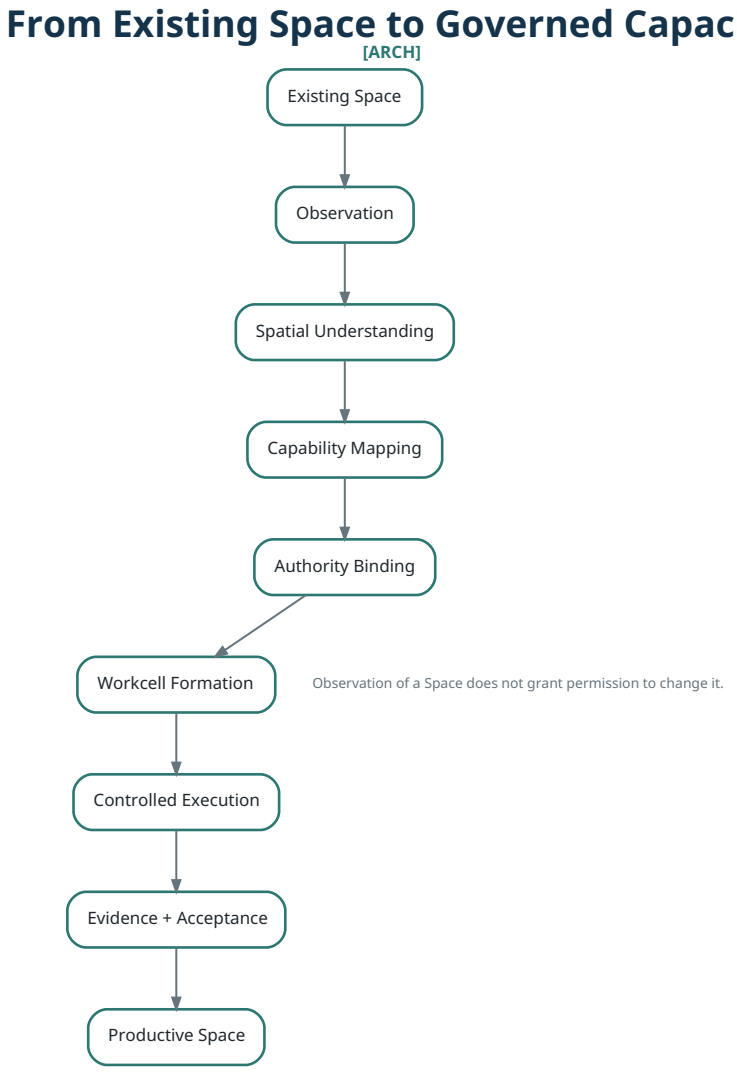


Figure 16.1 — From existing Space to governed capacity. [ARCH] Original HRI diagram. Spatial observation becomes productive only through Capability mapping, Authority Binding, Workcell Formation, Execution, Evidence and Acceptance.

17 • The Four-Dimensional Space Contract

Chapter Question

How can a physical Space maintain one accepted spatial Identity while supporting changing geometry, objects, states, derived Views and time-dependent Authority?

Core Argument

A governed Space requires one canonical model. Its physical representation is four-dimensional—three-dimensional geometry plus time—while Meta State and Authority remain distinct governance layers rather than being collapsed into geometry.

17.1 What Four-Dimensional Means

The physical Space model is four-dimensional in the operational sense:

> X · Y · Z · Time

Three dimensions describe spatial configuration. Time describes when that configuration is valid, observed, recorded or accepted.

The complete Space Contract adds two non-geometric governance layers:

> Meta State · Authority

Authority is not a geometric dimension. It is the permission layer governing spatial facts and possible ac - tions.

17.2 One Canonical Space Model

A Space may have many Views: top, front, side, 3D, Scene, object list, surface View, time replay, mobile View or machine-readable JSON.

These derive from one canonical spatial model.

> **One Space Model — Many Derived Views**

A derived View must not become an independent source of truth merely because it is visually persuasive.

17.3 Space Identity

The Space Host preserves Space ID, responsible organization, physical location reference, World Frame, geometry profile, current Snapshot, Spatial Event history, registered objects, Authority references, Evidence profile, maturity state, active Routes and Retirement status.

The public URL may change. Space ID and accepted spatial history remain governed.

17.4 World Frame and Local Frames

The canonical model requires a World Frame. Objects, surfaces, zones and Workcells may use nested Local Frames.

> World Frame → Surface Frame → Zone Frame → Object Frame → Component or interaction point

A Local Frame can move while preserving object Identity. The transform retains parent, position, orientation, quality and accepted version.

17.5 Logical Surfaces and Physical Envelopes

A room may be represented through logical surfaces: north, south, east, west, floor and ceiling.

The logical surface provides a stable reference. It does not imply that the physical surface is perfectly planar, empty or available for installation.

17.6 Current Snapshot and Append-Only Spatial Events

The Space Contract maintains:

> Current Snapshot + Append-only Spatial Events

The Snapshot answers what is currently accepted. The Event history answers how the representation reached that state.

A corrected state should not silently erase a previous accepted or proposed state.

17.7 Metric Space

Metric Space describes measurable spatial properties: coordinate frame, position, dimensions, orientation, anchor, unit, tolerance, geometry profile, measurement method, measurement quality and support reference.

Metric Space answers:

> Where? How large? In which orientation? With what declared quality?

17.8 Explicit Precision

The minimum requirement is not maximum precision. It is explicit precision.

A room outline may be suitable for early visualization, basic layout or workshop planning. It may be unsuitable for collision avoidance, precision assembly, structural design or clinical positioning.

> **Known Approximation before Unlabelled False Precision.**

17.9 Spatial Quality Ladder

> APPROXIMATE → MEASURED → VERIFIED → AS_BUILT

The system must not automatically promote one level to another. A measured value does not become verified merely because it was entered into a trusted interface. A verified design does not automatically become as-built reality.

Each promotion requires applicable Evidence and Acceptance.

17.10 Meta State

Meta State describes what the object or spatial element means. It may include stable Identity, type, name, description, Capability, operational state, relationships, responsible organization, connectivity profile, Authority reference, Evidence reference, maintenance or Retirement state.

Meta State answers:

> What is this? What might it do? What condition is it in? Who is responsible? Which governance applies?

Meta State does not determine position.

17.11 Metric Space Is Not Meta State

> **Metric Space — Where and how large?**
> **Meta State — What and capable of what?**

Moving an object should not silently change its Identity. Changing a Capability description should not silently change its position.

> **Geometry ≠ Capability**

A geometric volume may show where a machine is located. It does not establish whether it works, what process it supports, whether material is available, whether an operator is qualified or whether the Session may use it.

17.12 Time Evidence

InstantSpace distinguishes at least four relevant times:

- Valid Time — when the represented state was true or intended to become true;
- Observed Time — when a person, camera or sensor observed it;
- Recorded Time — when the system received and preserved it;
- Accepted Time — when an authorized person accepted the canonical state.

These times may differ. A disconnected Local Edge may observe a change and record it later. Human Acceptance may occur later still.

The system must not collapse the events into one misleading timestamp.

17.13 Authority

Spatial Authority is not a single yes-or-no field. The Contract separates READ, PROPOSE, REVIEW, PUB - LISH, REQUEST_ACTION, EXECUTE_ACTION, APPEND_EVIDENCE, ACCEPT_EVIDENCE, ACCEPT_RESULT, SUSPEND, ROLLBACK and RETIRE.

These scopes may apply at Space, Surface, Zone, Object, Scene, Workcell, Action and Evidence levels.

A person who can read the Space may not propose a change. A sensor may submit an observation without publishing a canonical Fact. An operator may execute without being the Acceptance Authority.

17.14 Observation versus Canonical Write

A spatial observation enters as an Observation Event with proposed object match, position, state, uncertainty, source and observed time.

It becomes a Canonical Spatial Event only after applicable review, Authority and Acceptance.

> **Observation → Protected Draft → Authorized Review → Accepted Canonical Write**

17.15 Derived Views Are Not Duplicate Databases

A top, front, side or slice View should be produced through query and projection.

> **Derived View = Query + Projection**
> **Derived View ≠ Independent Source of Truth**

A browser preview can remain safe. The user may examine a proposal without moving the canonical object.

17.16 Full Space Contract

The Four-Dimensional Space Contract is:

> Spatial Identity + Metric State + Meta State + Time Evidence + Authority + Change Rules + Evidence + Acceptance

It answers what spatial Fact is currently accepted, what quality supports it, when it was valid and observed, who may propose and publish a change, who may execute in the Space, what Evidence is required, who accepts the result, and how the prior state can be reconstructed.

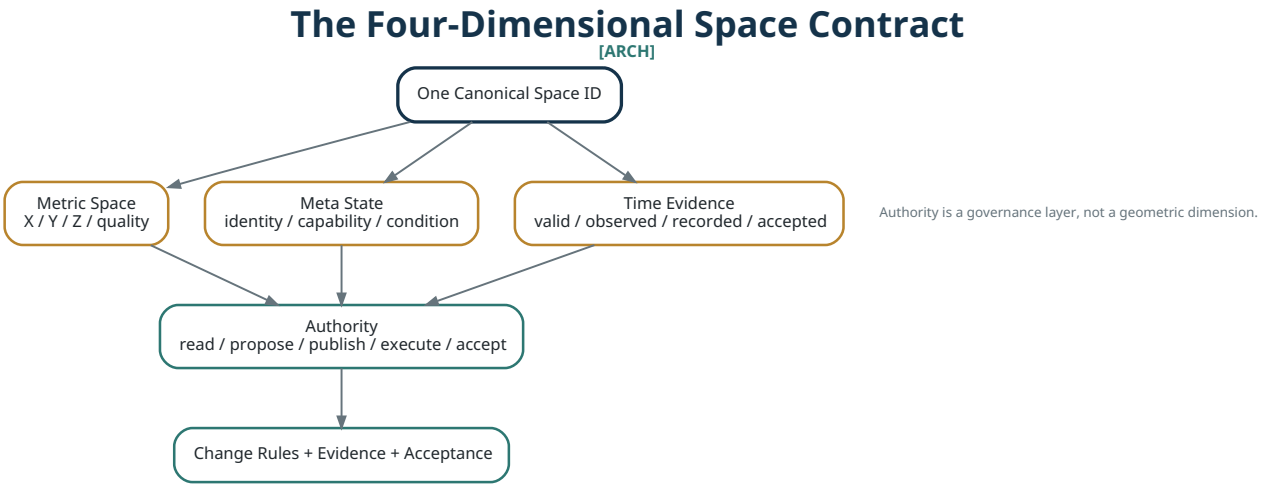


Figure 17.1 — The Four-Dimensional Space Contract. [ARCH] Original HRI diagram. Authority remains a governance layer; it is not inferred from geometry or state.

17.17 Core Spatial Invariants

> One Space Model ≠ One View
> Metric Space ≠ Meta State
> Geometry ≠ Capability
> Observation ≠ Canonical Fact
> Draft ≠ Canonical Write
> Pixel Output ≠ Source of Truth
> Location ≠ Permission
> Connectivity ≠ Authority
> Touch ≠ Control
> Runtime Execution ≠ Accepted Result

18 • Local Edge, Workcells and Cloneable Capacity

Chapter Question

How can a Space form local Execution Capability, continue through network failure and be replicated to another site without transferring credentials, Authority or false Evidence?

Core Argument

Local Spatial Edge supports bounded on-site observation and continuity. Workcells assemble existing and new resources for one task. Cloneable capacity transfers a formation structure, not the legal, professional or Acceptance Authority of the source site.

18.1 Why Local Edge Matters

Physical reality is local. Devices may connect through Bluetooth, Wi-Fi, wired networks, cellular links, local buses or proprietary machine interfaces. Raw media may be large. Latency may matter. The public network may fail. Privacy may require local processing.

A Local Spatial Edge provides bounded on-site functions close to the physical Space.

18.2 Local Spatial Edge Definition

The Local Spatial Edge may support observation intake, device connection, local caching, coordinate con - version, object hit testing, event buffering, local rendering, privacy preprocessing, safe degradation, store-and-forward synchronization and bounded Runtime Adapters.

It is not automatically the canonical source of truth, final Authority, public Resolver, universal AI Provider or machine-control permission.

18.3 Local-First and Cloud-Coordinated

The architecture may divide responsibility.

Local Edge handles raw Perception, device connectivity, temporary cache, immediate human interaction, local rendering and safe offline operation.

InstantReady Platform handles canonical identities, Session, Authority Binding, cross-party routing, Evidence Closure, Acceptance, continuity and Next URL.

The division varies by risk, latency and jurisdiction. Canonical objects remain consistent.

18.4 Safe Degradation

When connectivity fails, the Local Edge should degrade to a declared safe profile. It may continue read-only Viewer, local observation, draft formation, cached instructions, human-guided work and event buffering.

It should not silently continue expired Authority, high-risk machine Commands, unrecorded Provider actions, uncontrolled canonical writes or unbounded payment and resource use.

18.5 Workcell

A Workcell is:

> **A bounded formation of objects, tools, materials, people, services and spatial relationships assembled for one task or task family.**

A Workcell is defined by Capability, purpose, governance, Test and Acceptance boundary, not only by walls or machinery.

A temporary classroom table can form a low-risk Learning Workcell. A repair bench can form a service Workcell. A printer, binder and NFC station can form a production Workcell. A Workcell may be manual, automated or hybrid.

18.6 Workcell Components

A Workcell may include Space or Zone, objects, tools, materials, people, digital services, AI Runtime, instructions, layout, sequence, Authority gates, Tests, Evidence and Acceptance criteria.

The absence of any critical component may leave the Workcell only proposed.

18.7 Formation Recipe

A Formation Recipe describes how selected resources may become a Workcell for one bounded outcome. It may define required objects, Capability Profiles, layout, human roles, materials, sequence, Authority gates, Runtime Routes, Tests, Evidence requirements, Acceptance criteria, rollback and failure modes.

A Formation Recipe is not automatically a machine-control program, legal approval, professional sign-off, completed Workcell or accepted productive outcome.

18.8 Workcell Formation Route

> Defined Intent → Space and asset observation → Capability mapping → Formation proposal → Authority and safety review → physical formation → readiness check → controlled Execution → Test → Acceptance → Evidence Closure

A Workcell exists operationally only after required formation conditions are met.

18.9 From Perception to Candidate Workcell

The image-measurement POC can produce candidate width, height and camera-distance information after camera parameters and a target quadrilateral are supplied [IMPL-02]. The Socket Cable Estimator attempts to identify a socket and estimate cable length under declared camera-orientation assumptions [IMPL-03].

These Outputs may help prepare spatial understanding, configuration, resource selection and a Formation Recipe. They do not themselves form or authorize a Workcell.

18.10 Cloneable Capacity

A mature InstantSpace should transfer a bounded Capability structure to another site.

The transferable package may include Space-profile requirements, Capability Blueprint, required object profiles, Formation Recipe, Test sequence, Evidence templates, Acceptance criteria, limitations, failure modes and migration notes.

This creates cloneable capacity. It does not create cloned governance.

18.11 Clone Capability Is Not Clone Authority

> **Clone Capability Structure ≠ Clone Authority**

A cloned package must not inherit live credentials, private keys, local machine-control permission, pro - fessional approval, budget Authority, Acceptance Authority, verified measurements from another site or local legal approval.

Every second site requires fresh local Binding.

18.12 Fresh Local Binding

A second-site implementation establishes a new Space ID, physical survey, object resolution, local asset owner, operator, professional review where required, Runtime permission, Evidence Custodian, Acceptance owner, Workcell Formation and accepted Output.

Copying a Viewer and JSON files is not sufficient.

18.13 Cloneable Capacity without Authority Leakage

The desired result is:

> **Capability Continuity + Local Adaptation + Fresh Authority**

without credential leakage, Authority leakage, false measurement inheritance, false professional approval inheritance or false Acceptance inheritance.

This is a validation criterion and roadmap direction, not yet an evidenced Product Claim.

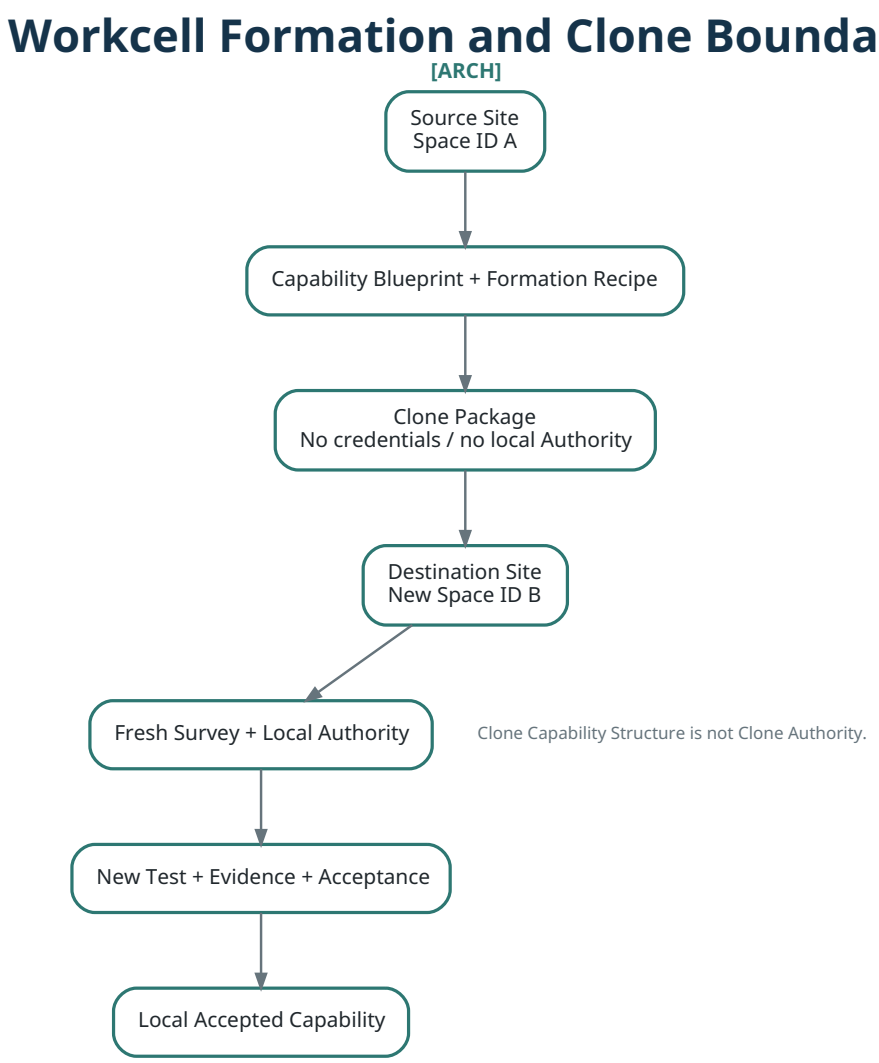


Figure 18.1 — Workcell Formation and clone boundary. [ARCH] Original HRI diagram. A Clone Package carries formation knowledge, not local credentials, Authority or Acceptance.

18.14 Clone Validation

A valid second-site Test compares time to understand the new Space, object discovery completeness, time to form the Workcell, Authority Closure, time to first accepted Output, Evidence completeness, reconfiguration time, rollback readiness and differences from the source site.

These metrics are research and validation instruments. They do not automatically create property-value or ESG Claims.

18.15 TapPort and InstantSpace Relationship

TapPort opens the human Route into the Space. InstantSpace does not require every user to see its complete spatial Contract.

A person may tap a marker and receive the Scene, permitted object View, current task, applicable instruction and next human decision.

Underneath, InstantSpace maintains spatial Identity, geometry, object state, Time, Authority and Evidence.

> TapPort — human-facing entry
> InstantReady — Session and Authority
> InstantSpace — spatial Execution Context

A TapPort Touchpoint may open a Space or Workcell Route. The Touchpoint does not grant control of the Space.

Part VII — MakeHere and HSIMC MakeCells

Governing question: How does a bounded physical Intent reach a qualified execution node without becoming an unrestricted machine command?

> **A Physical Subscriber receives an authorized physical Intent—not an unbounded idea.**

19 • Physical Subscribers and Addressable Production

Chapter Question

How can a physical machine, Workcell, technician, studio or factory become a governed and discoverable Execution Capability without becoming an unrestricted endpoint that anyone may command?

Core Argument

A Physical Subscriber is a bounded physical Capability that may receive an authorized Job under declared conditions. Addressability enables discovery, matching and Evidence; it does not create public control.

19.1 The Missing Physical Endpoint

Most digital systems end with a file, recommendation, workflow status or purchase order. Physical reality requires an endpoint capable of changing matter, assembling components, repairing an Artifact or producing a testable result.

That endpoint may be a machine, human operator, workbench, studio, repair technician, manufacturing cell or complete factory.

HRI treats the endpoint as a governed Capability rather than an anonymous destination.

19.2 Physical Subscriber Definition

A Physical Subscriber is:

> **A bounded physical Capability, operated by an identified responsible party, that may receive an authorized Job and perform a declared physical process under defined material, spatial, technical, Test and Evidence conditions.**

The word Subscriber does not mean the endpoint continuously receives all user content. It means the endpoint can subscribe to a declared class of authorized physical work.

A Physical Subscriber subscribes to an eligible Job class, authorized Make Manifest, declared inputs, and Test and Evidence obligations. It does not subscribe to raw private images, a person’s entire Journey, unbounded AI suggestions, all data in an Artifact Host or unconfirmed user comments.

19.3 Physical Subscriber Classes

Class	Illustrative Capabilities
Print and Mark	document printing, labels, photos, controlled marking

Class	Illustrative Capabilities
Cut, Fold and Bind	cutting, folding, booklet formation, binding, packaging formation
Program and Attach	NFC payload writing, QR attachment, Touchpoint verification
Assemble and Integrate	cable assembly, component integration, Kit assembly, packaging
Test and Inspect	dimensional, continuity, electrical, functional or visual Tests
Repair and Replace	diagnosis, component replacement, refurbishment and rework
Prototype and Low-Volume Make	one-off POC, MVP, controlled small batch
Recover and Retire	disassembly, component recovery, material segregation and Retirement

The presence of a category does not mean every MakeCell is qualified for every action within it.

19.4 Addressable Production

Addressable Production is:

> **The ability to identify, evaluate, bind and invoke a qualified physical Capability through a governed Identity and Job Route.**

Addressable Production requires more than a website listing. The Platform must answer which Capability, operator, location, process, materials, limits, qualification, availability, Authority, Tests, Evidence and Handoff apply.

The endpoint becomes addressable when those relationships can be resolved. It does not become publicly controllable.

19.5 Addressable Does Not Mean Automatically Executable

The Physical Subscriber may be:

> ADDRESSABLE → DISCOVERABLE → ELIGIBLE → SELECTED → BOUND → AUTHORIZED → EX - ECUTING

Each transition is separate. A public listing never substitutes for an Authority Binding.

19.6 MakeHere

MakeHere is:

> **The network interface through which an accepted physical Intent may discover and reach a qualified Physical Subscriber.**

Its public question is:

> **Where can this accepted Intent be responsibly made?**

MakeHere may present available MakeCells, declared processes, regions, capacity, qualification state, lead-time class, Evidence expectations and partner onboarding.

The initial model should be curated before open. Capabilities should be invited, documented, tested and reviewed before receiving consequential Jobs.

19.7 HSIMC MakeCell

An HSIMC MakeCell is:

> **A reference Physical Subscriber operated or directly governed by HSIMC to prove a bounded production, Test, Evidence and Handoff Contract.**

A MakeCell may contain one machine, several machines, one operator, a physical Workcell, local computer, Test equipment, material set and one or more qualified processes.

The MakeCell is the physical Execution node. MakeHere is the network and routing interface. InstantReady provides Platform Identity, Authority, Runtime and Evidence relationships.

19.8 Workcell versus MakeCell

A Workcell is a bounded spatial and operational formation. A MakeCell is a Workcell—or stable unit containing Workcells—that has been qualified as a Physical Subscriber for a declared physical process.

Not every Workcell is a MakeCell. A classroom table may be a Learning Workcell without being qualified for commercial manufacturing.

Every MakeCell operates within an actual spatial and Authority Context.

19.9 Node, Operator and Provider

A MakeCell includes three related but separate identities:

- Node — the physical Execution unit;
- Operator — the person or organization operating it;
- Provider — the contractual or Platform party supplying the Capability.

The operator may be HSIMC or a qualified partner. A Provider may manage several nodes. A node should not lose its Evidence history merely because the operator changes. Operator change may require requalification.

19.10 Physical Subscriber Lifecycle

> PROPOSED → DOCUMENTING → UNDER_REVIEW → SAFE_TO_TEST → QUALIFIED → AVAILABLE

with BUSY, SUSPENDED, INCIDENT_REVIEW, REQUALIFICATION_REQUIRED, REVOKED and RETIRED.

`SAFE_TO_TEST` permits only a limited internal or supervised Test. `QUALIFIED` means the declared Capability met the Evidence threshold for its stated Job class. `AVAILABLE` means the node is currently eligible to receive relevant Jobs.

19.11 Reference Cells and Partner Cells

> **HSIMC Reference Cells prove the process, Test, Evidence and Handoff Contract. Qualified Partner Cells replicate an accepted Capability under fresh local responsibility.**

Reference Cells reduce the risk of publishing an abstract protocol never exercised physically. Partner Cells provide locality and potential scale.

A partner does not inherit HSIMC qualification merely by using the same equipment. The local operator, Space, material, process, Tests and Authority must be evaluated.

19.12 Production Subscriber Inputs

A Physical Subscriber may receive:

- a Standard Job — previously qualified configuration;
- a Configured Job — qualified process with Context-specific parameters;
- a Development Job — POC, repair, adaptation or new Branch requiring stronger review.

The Evidence and Acceptance burden differs. A repeated print Job and a new electrical Product prototype should not pass through identical review.

19.13 First Reference Capabilities

The first proposed HSIMC reference families are print and controlled marking; cutting, folding and binding; NFC writing, verification and attachment; cable configuration, assembly and Test; packaging and personalization; bounded integration and low-volume prototyping; and diagnosis and controlled repair.

These names describe proposed Capability families. They do not, by themselves, establish current qualification.

19.14 Current Implementation Foundation

The InnoSpire Product overview places Smart Glasses Kit, hosted Runtime, NFC/RFID activation, design Output and an Order–Build–Handoff sequence in one operating relationship [IMPL-04].

This supports the bounded Claim that current work already connects selected hardware, Runtime, physical activation, design Output and documented Handoff.

It does not evidence a production MakeHere network, completed MakeCell qualification, automated Job routing, federated Physical Subscriber Registry or repeatable partner-cell replication.

19.15 Relationship to InstantSpace

A Physical Subscriber cannot be separated from physical Context. The MakeCell depends on Space, equipment condition, operator presence, materials, environment, power, network, safety and access.

> InstantSpace — Where and under which local conditions?
> MakeHere — Which qualified Capability?
> InstantReady — Which Intent, Authority, Runtime and Evidence Contract?
> MakeCell — Who physically performs the work?

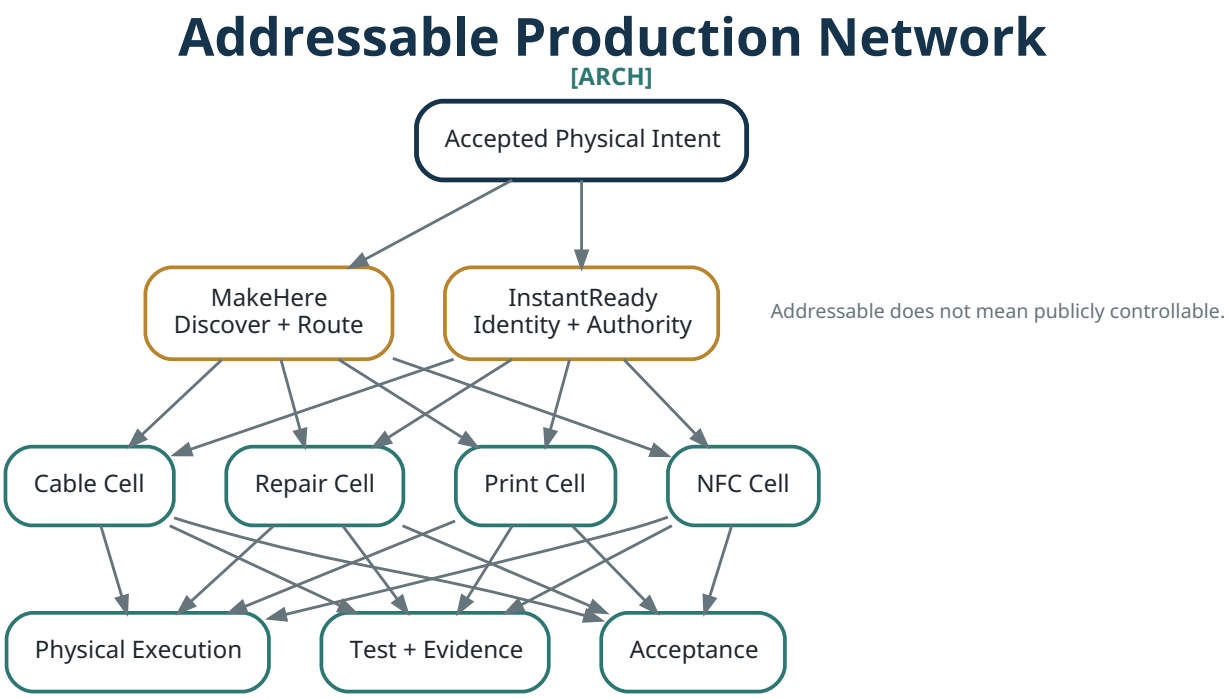


Figure 19.1 — Addressable Production network. [ARCH] Original HRI diagram. Addressable is not pub - licly controllable; Discoverable is not Qualified; Qualified is not authorized for every Job; Job Completion is not Artifact Acceptance.

20 • Capability Manifests and Safe-to-Make Boundaries

Chapter Question

What must a Physical Subscriber declare before it can receive a Job, and how can the system distinguish plausible manufacturing ability from a Capability safe and qualified for a defined scope?

Core Argument

A Capability Manifest defines the bounded ability of a Physical Subscriber. A Safe-to-Make Boundary states the conditions under which a specific Job may proceed to controlled testing or production. Neither is a universal declaration of safety.

20.1 Why a Name Is Not a Capability

A label such as printer, 3D printer, repair shop, cable factory or NFC station does not provide enough information for responsible Job routing.

The system must know accepted inputs, Outputs, materials, dimensional limits, tolerances, quantity, operator requirements, Tests, exclusions, current capacity and incident state.

Without those details, Capability matching becomes little more than search advertising.

20.2 Capability Manifest Definition

A Capability Manifest is:

> **A versioned, evidence-bounded declaration of what a Physical Subscriber can perform, under which operating conditions, with which limitations, Tests, responsibilities and Retirement rules.**

The Manifest is a Provider declaration governed by review and Evidence. It is not automatically independent certification.

20.3 Required Manifest Sections

The canonical Manifest covers:

- Identity — Subscriber ID, MakeCell ID, operator, Provider, location, Space Host and version;
- Process — supported processes, sequence, operator involvement, automation level and Job classes;
- Inputs — files, materials, components, quality requirements and prohibited inputs;
- Outputs — type, dimensional range, tolerance, finish, functional boundary and quantity;
- Resources — equipment, tools, software, fixtures, power, network, environment and consumables;
- People — operator role, training, supervision, qualification and workload;
- Tests — mandatory Tests, sampling, criteria, equipment, Test Authority and retest Route;
- Evidence — production record, material record, operator record, Test record, exceptions and Handoff Pack;
- Limits — prohibited Jobs, maximum risk class, unsupported materials, use and jurisdictions;
- Lifecycle — state, effective date, review date, change and incident history, suspension and Retirement.

20.4 Declaration, Verification and Qualification

The Manifest distinguishes:

> DECLARED ≠ VERIFIED ≠ QUALIFIED

A Provider may declare a Capability. Selected facts may be verified. The Capability becomes Qualified only for a defined Job class when the required Evidence threshold is met.

Qualified for one Job class does not mean Qualified for every use.

20.5 Safe-to-Make Boundary

A Safe-to-Make Boundary is:

> **The declared combination of Product, process, material, operator, environment, Test and Authority conditions within which one physical Job may proceed to the applicable make stage.**

It is deliberately narrower than "safe Product." It may mean safe to produce a paper prototype, safe to conduct one supervised electrical Test, safe to manufacture one internal POC, safe to repeat a previously qualified configuration, or safe to proceed only after professional review.

20.6 Safe-to-Test versus Safe-to-Make

> **Safe-to-Test — the configuration may enter a bounded Test.**
> **Safe-to-Make — the Job may be manufactured under the declared production boundary.**

A new cable construction may be Safe-to-Test for a laboratory prototype but not Safe-to-Make for customer delivery. A paper observation tool may be Safe-to-Test with adults but not yet with young children.

20.7 Safe-to-Make Is Not Market Ready

> Prototype ≠ Safe-to-Test
> Safe-to-Test ≠ Safe-to-Make
> Safe-to-Make ≠ Market Ready
> Market Ready in one jurisdiction ≠ Universal Conformance

A Safe-to-Make decision is Job- and scope-specific.

20.8 Job Compatibility Evaluation

Before a Physical Subscriber receives a Job, InstantReady and MakeHere evaluate process, material, dimensions, tolerance, quantity, operator, Space, equipment, Test, lead time, cost, data, jurisdiction, risk and Evidence.

The result is COMPATIBLE, COMPATIBLE_WITH_CONDITIONS, REQUIRES_REVIEW, INCOMPATIBLE, INFORMATION_INSUFFICIENT or PROHIBITED.

AI may assist with comparison. It does not become the qualification Authority.

20.9 Quotation Is Not Authorization

A quotation states proposed price, lead time, process, assumptions, validity and exclusions. It does not establish that the Job is authorized.

> Capability Match → Quotation → Human or organizational decision → Job Authorization

Payment may form part of Authorization. Payment alone is not always sufficient where safety, site or professional approval is required.

20.10 Make Manifest versus Capability Manifest

> **Capability Manifest — What the MakeCell is qualified to do.**
> **Make Manifest — What this specific authorized Job requires the MakeCell to do.**

The Capability Manifest is reusable. The Make Manifest is Job-specific.

20.11 Material Boundary and Substitution

The Capability Manifest states material type, grade, supplier, batch, recycled-content Claim, storage condition, expiry, substitution rule and compatibility.

A supplier Claim remains distinguishable from independent verification. A recycled-content statement for one component must not become a Claim that the complete Product is certified.

Physical production often requires substitution. A component may be unavailable, a new supplier introduced or a nominally equivalent material used. Substitution must not occur silently.

The decision records original component, substitute, reason, technical comparison, affected Tests, Authority, version impact and customer notification where required.

20.12 Process and Operator Boundary

A machine does not operate independently of process and operator. The Manifest identifies setup, calibration, training, inspection frequency, stop rules, maintenance and environmental limits.

A MakeCell qualification may depend on a named operator or role. When the operator changes, requalification may be required.

20.13 Test Contract

Each Job class specifies what will be tested, when, how, by whom, against which criteria and what happens after failure.

The Test Contract distinguishes 100% Test, sample Test, first-article Test, visual inspection, functional Test and customer Acceptance Test.

A completed process without required Test Evidence remains incomplete for Acceptance.

20.14 Evidence Output

A qualified MakeCell produces a bounded Job Evidence Pack that may include Make Manifest, input material record, operator, process start and end, equipment Identity, exceptions, Test results, photographs, NFC/QR verification, quantity, nonconforming Output, rework, Handoff and Acceptance state.

The Evidence Pack should not collect unrelated personal data.

20.15 Change Control, Incident and Prohibited Jobs

A Capability Manifest may change because of new equipment, process, operator, material, dimensions, Test, incident, relocation or ownership change. Material changes create a new Manifest version.

A Physical Subscriber should be suspended when repeated failed Tests, equipment damage, unauthorized substitution, missing qualification, Evidence tampering, incident or relocation challenges its boundary.

The Manifest states prohibited Job classes, including unsupported hazardous materials, unqualified safety-critical Products, counterfeit production, unauthorized copying, illegal Products, actions outside equipment limits, Jobs lacking required professional approval, and Products whose intended use cannot be responsibly established.

Refusal is a valid and necessary Output.

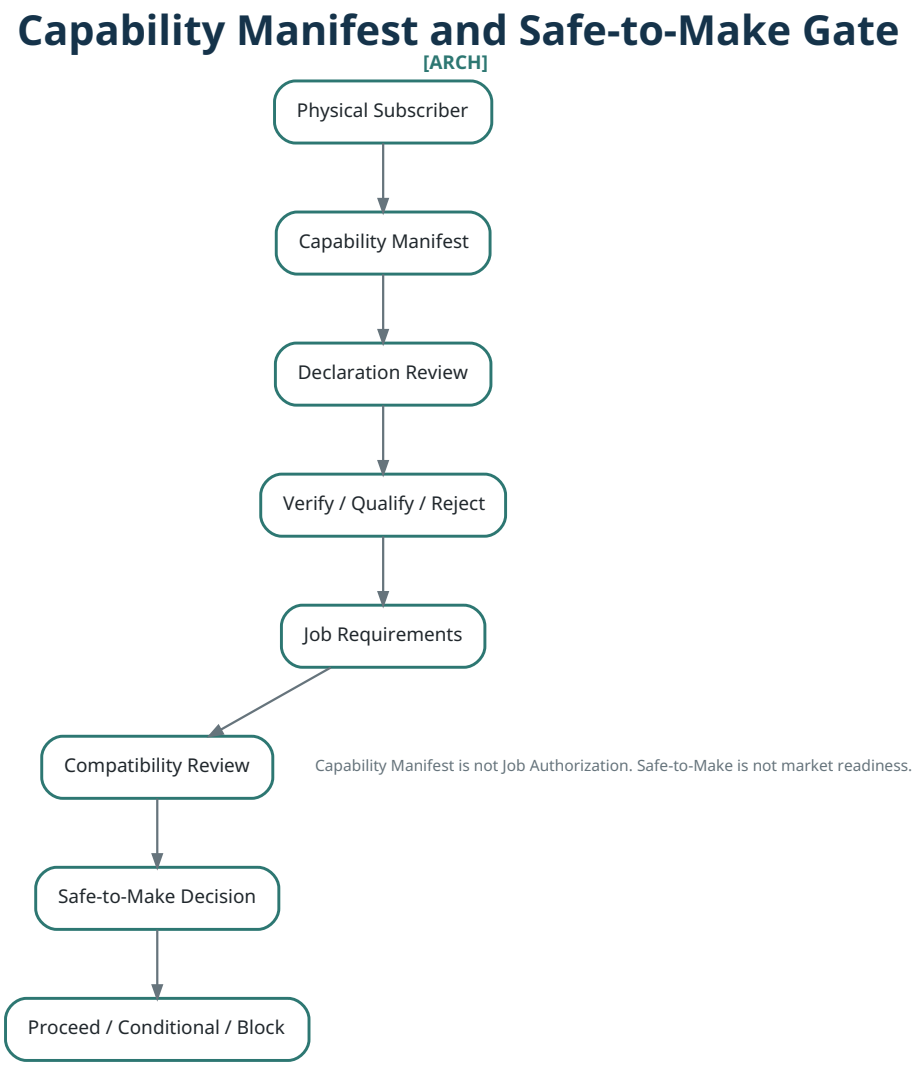


Figure 20.1 — Capability Manifest and Safe-to-Make Gate. [ARCH] Original HRI diagram. Capability Manifest is not Job Authorization; Safe-to-Test is not Safe-to-Make; Safe-to-Make is not Market Ready; Quotation is not Authority.

21 • Accepted Make Intent, Capability Atoms and Micro-BOM Access

Chapter Question

How can a natural-language need or real-world observation become a bounded physical-production Route, and how can the smallest useful parts and processes become addressable without bypassing safety, compatibility or responsibility?

Core Argument

Accepted Make Intent separates human purpose from manufacturing Command. Capability Atoms and Micro-BOM Access make small physical requirements discoverable. The Make Manifest converts a reviewed and authorized configuration into one bounded Job.

21.1 From Observation to Make Intent

A person may begin with:

- This cable is too long.
- I need three screws like this.
- I want this booklet printed and bound.
- I want an NFC link attached to this gift.
- This part is broken.
- I want to Test a lighter version.
- I want ten units for an MVP.

These statements are valid starting points. They are not complete manufacturing instructions.

The Route begins:

> Observation → Candidate Make Intent → Clarification → Configuration → Accepted Make Intent → Capability Matching → Quotation → Authorization → Make Manifest

21.2 Accepted Make Intent Definition

An Accepted Make Intent is:

> **A physical Intent that has been sufficiently clarified and explicitly accepted by the originating or responsible Principal for Capability evaluation, quotation and make preparation.**

Accepted applies to the Intent definition. It does not mean Job authorized, Product accepted, Safe-to-Make established, payment completed or physical Execution permitted.

> Accepted Make Intent — "We agree this is the physical result we wish to evaluate and prepare."
> Job Authorization — "We permit this MakeCell to execute this Make Manifest."
> Artifact Acceptance — "We accept the completed physical result for the stated purpose."

21.3 Accepted Make Intent Object

The object contains Intent ID, originating Principal, desired physical outcome, intended use, target object or Context, quantity, critical dimensions, interfaces, materials or preferences, performance requirements, excluded outcomes, risk profile, cost boundary, time boundary, Acceptance criteria, known unknowns, rights-to-make state and current state.

The state family is PROPOSED, CLARIFYING, CONFIGURED, ACCEPTED_FOR_MATCHING, QUOTING, REQUIRES_REVIEW, WITHDRAWN, EXPIRED, SUPERSEDED and BLOCKED.

`ACCEPTED_FOR_MATCHING` is the principal Accepted Make Intent state. It does not authorize Execution.

21.4 AI Role in Make Intent Formation

GenAI may help convert natural language into a structured problem statement, candidate requirements, missing questions, possible materials, dimensional options, candidate process, risk list, Test proposal and cost factors.

AI must preserve uncertainty. It must not invent confirmed dimensions, assume electrical conditions, declare rights-to-make, select a regulated process without review, authorize the Job or claim that the proposed Artifact will pass the Test.

21.5 View Event Is Not a Make Command

A smart-glasses photograph may reveal an object, socket, distance, connector, damaged part or desired placement. The image does not establish the complete physical requirement.

The Socket Cable Estimator POC attempts to identify a wall socket and calculate a cable length while stating that it uses template matching and requires the camera to be held perpendicular to a vertical wall and floor [IMPL-03].

That Output may support a candidate length requirement. It does not establish connector type, power profile, data protocol, material, installation Route, Product qualification or customer Acceptance.

> **A View Event is not a Make Command.**

21.6 Make Manifest Definition

A Make Manifest is:

> **The versioned, Job-specific configuration describing what a selected Physical Subscriber is required and authorized to make, under which process, material, Test, Evidence and Handoff conditions.**

It is formed after Accepted Make Intent, Provider selection, compatibility review, quotation, Safe-to-Make review and applicable Authority.

The Make Manifest includes Job ID, Accepted Make Intent ID, Artifact or target reference, selected Physical Subscriber, Capability Manifest version, quantity, configuration, dimensions, materials, components, substitutions, process, operator requirements, Space and Workcell, Test Plan, Acceptance criteria, Evidence requirements, price and resource limits, schedule, failure Route, rework rule, Handoff, recovery Route and Authority Binding.

21.7 Make Manifest State

> DRAFT → TECHNICAL_REVIEW → QUOTED → CUSTOMER_REVIEW → SAFE_TO_MAKE_PENDING → AUTHORIZED → QUEUED → IN_EXECUTION → COMPLETED → TESTING → ACCEPTED

with REJECTED, CANCELLED, SUPERSEDED and RETIRED.

`ACCEPTED` applies only after the resulting Artifact passes the Acceptance Gate. A Make Manifest may be `COMPLETED` while the Output remains rejected.

21.8 Capability Atom

A Capability Atom is:

> **The smallest useful unit of physical Capability, supply, process, Test or skill that can be independently identified, evaluated, priced, routed and evidenced within a bounded Job.**

An Atom is not necessarily physically indivisible. It is the smallest economically and operationally useful addressable unit.

Examples include one screw, connector, NFC tag, printed page, binding operation, cable cut, crimp operation, Test, ten minutes of qualified machine time, packaging insert, repair diagnosis or technician skill.

Capability Atom classes include Material, Component, Process, Tool-Time, Test, Human-Skill, Data/Configuration, Packaging and Recovery Atoms.

Atoms can be combined into a Job. The combination may create new risks not present in the individual Atom. A qualified component does not automatically create a qualified system.

21.9 Micro-BOM Access

Micro-BOM Access is:

> **The governed ability to obtain, substitute, recover or locally produce small quantities of the parts, materials and process units required for one bounded physical Intent.**

A user may need three specific screws, one connector, a short cable, one hinge, clip, NFC object or re - placement cover. The existing market may make the complete finished Product easier to purchase than the small component required for repair or experimentation.

Micro-BOM Access attempts to reverse that imbalance.

21.10 Source Classes and Records

A Micro-BOM item may be a new qualified component, supplier-declared component, verified reclaimed component, donor-Product component, locally fabricated substitute or experimental component.

The source class remains visible. A reclaimed component must not be represented as new. An experimental substitute must not be installed in a safety-critical use without applicable review.

The record includes component Identity, description, dimensions, material, source, condition, compatib - ility, quantity, batch, Evidence, Test requirement, approved use, prohibited use and related Artifact and Job.

21.11 Compatibility beyond Physical Fit

A screw may fit physically but use the wrong material. A connector may fit mechanically but support the wrong protocol. A cable may charge one device while failing required data. A reclaimed component may function but have unknown service history.

Compatibility may include mechanical, electrical, data, thermal, chemical, environmental, aesthetic, lifecycle, regulatory and human-use dimensions.

21.12 Rights-to-Make

A physical Job may require Evidence that the requesting party has the right to make, copy, modify or repair the object. The review may concern intellectual property, confidentiality, counterfeit risk, contract, warranty, licensed design, personal data, copyrighted image or brand marking.

AI generation does not establish rights-to-make. A public image does not establish permission to manufacture the depicted Product.

21.13 POC, MVP and Qualification Ladder

> CONCEPT → DIGITAL PROPOSAL → PHYSICAL POC → SAFE-TO-TEST PROTOTYPE → MVP → CONTROLLED SMALL BATCH → QUALIFIED RELEASE → REPLICATED PRODUCTION

One level does not silently become the next. A POC answers a bounded question. It need not pretend to be ready for global sale.

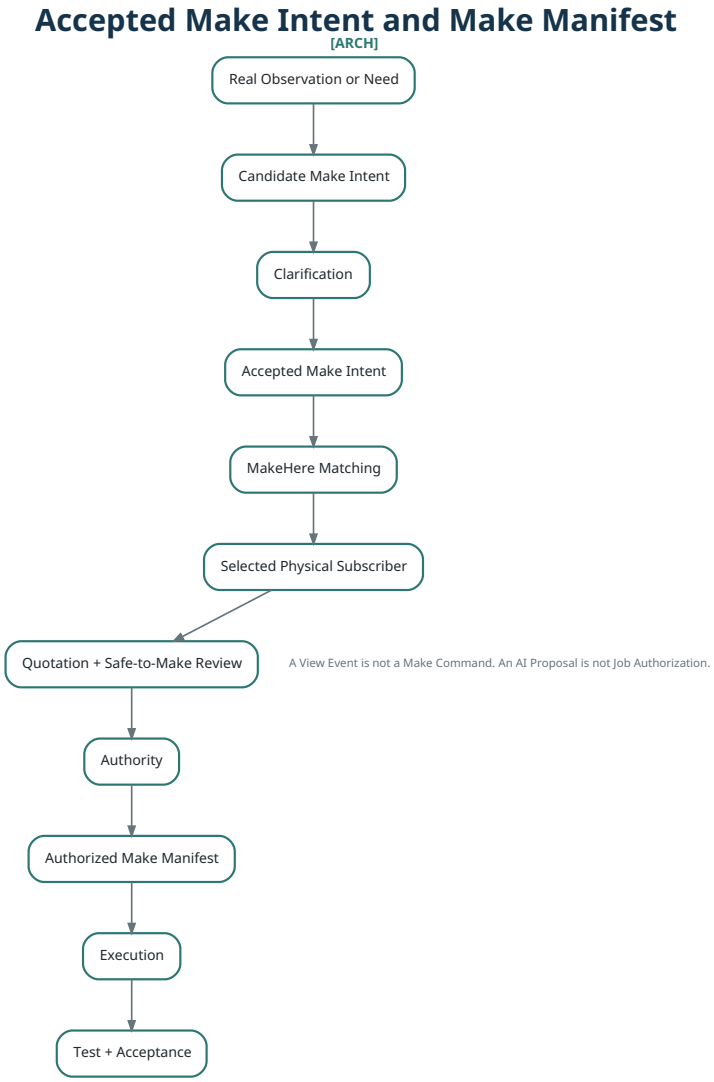


Figure 21.1 — From real observation to authorized Make Manifest. [ARCH] Original HRI diagram. AI may structure the candidate Intent; it does not authorize the Job.

21.14 Reference Example: Printed NFC Journey Edition

A low-risk reference Job may begin with selected photographs, approved captions, declared page count, selected paper, binding method, private Journey URL and NFC Touchpoint.

The Route may require Print, Cut, Bind, NFC and Verification Capability Atoms, final visual inspection and group or customer Acceptance.

The first edition becomes an Artifact only after Handoff and Acceptance.

Part VIII — AfterMake: Post-Delivery Innovation Infrastructure

Governing question: What happens when the delivered Product finally meets the reality of use?

> **Manufacturing does not end with delivery. It creates the Next URL.**

22 • Delivery Is Where Reality Begins

Chapter Question

Why should delivery be treated as the beginning of a new Product reality rather than the end of the manufacturing lifecycle?

Core Argument

Before delivery, the Product exists primarily as Claim, design, specification and production record. After delivery, a specific physical unit enters real human use. The difference among promise, Intent and lived result creates the next source of Product knowledge.

22.1 Before Delivery

Before delivery, the Product is represented through Product page, photograph, rendering, specification, sample, quotation, contract, production record and Test result.

These representations may be accurate. They remain incomplete because the final use Context has not yet occurred.

22.2 The Delivered Unit

Delivery creates a specific reality:

> this unit · this version · this batch · this configuration · this customer · this place · this use · this time

The actual unit may differ from the general Product class because of component substitution, batch, customization, repair, packaging, firmware, installation or user configuration.

A generic Product page cannot represent the complete delivered-unit reality.

22.3 Product Page versus Delivered Reality

> Product Page — what the seller or Provider represents before use
> Delivered Unit — what physically arrived
> Use Reality — what happened in the actual Context

The three should remain connected but distinct.

A polished digital representation does not become false merely because it is attractive. It becomes problematic when AI-generated or rendered material is not identified, material conditions are hidden, the delivered configuration differs, a use limitation is omitted, or the image implies performance unsupported by Evidence.

AfterMake does not begin by assuming fraud. It begins by preserving the difference between representation and reality.

22.4 Delivery Is a Context Transition

Delivery changes custody, location, control, responsibility, environment, available Evidence and user knowledge.

A Product that passed factory testing may fail after incorrect installation. A Product that meets specification may be unsuitable for actual need. A Product that appears disappointing may be technically correct but poorly explained.

The system must distinguish these situations.

22.5 AfterMake Definition

AfterMake is:

> **The post-delivery innovation infrastructure through which a delivered Artifact remains addressable for understanding, use, support, repair, adaptation, return, Branch formation, remanufacture and Retirement.**

AfterMake is not merely an after-sales portal. It connects post-delivery reality back to Intent, Capability, Authority, MakeHere, MakeCell, Test, Acceptance and next version.

22.6 Manufacturing Creates a Continuing Object

> **Manufacturing does not end with delivery. It creates the Next URL.**

The Next URL may provide exact Product or Artifact Identity, instructions, configuration, Evidence, service, replacement component, repair, Reality Delta, return, next version or Retirement.

It need not be public. It need not expose every manufacturing record. It preserves governed continuity.

22.7 The Handoff Gap

A documented Handoff can state what was done, what was not and what comes next. The current InnoSpire Product overview demonstrates this discipline through Order → Build → Handoff [IMPL-04].

AfterMake extends the lifecycle:

> Order → Build → Handoff → Use → Observe → Reality Delta → Resolve / Repair / Adapt / Return / Fork → Make Again → Test Again → Accept Again

The current Product material supports the Order–Build–Handoff foundation. It does not evidence the complete AfterMake lifecycle as a production system.

22.8 AfterMake Is Not a Review Platform

Reviews remain useful. AfterMake does not reduce the user's experience to five stars, one paragraph, positive or negative.

A review is a human expression. It is not automatically a verified defect, universal Product Fact, engineering requirement, Authorization to remake or Evidence that the user is wrong.

AfterMake attempts to preserve Context behind the experience.

22.9 A Review Is Not a Verdict

> **A review is not a verdict. It is a possible beginning of a testable Branch.**

A user may report that a button is difficult to press. The report is real. The system may still need to de - termine Product version, user Context, reproducibility, whether difficulty arises from force, geometry or instructions, and whether a proposed change creates another problem.

The report should not be deleted because it is inconvenient. It should not become universal Fact merely because it is strongly expressed.

22.10 Return Is a First-Class Route

AfterMake must not become a mechanism to obstruct lawful return, refund or rejection.

The user may choose RETURN without providing Product-development labour, accepting repair, entering a long AI dialogue, accepting a discount, consenting to research or allowing public use of their experience.

The return Route remains first-class.

22.11 Post-Delivery Event and Unit-Specific Reality

A post-delivery event may be a question, use note, support request, defect report, fit problem, component request, repair, accessibility issue, improvement idea, return, recovery or Retirement.

The event enters through Perception or Intent. It does not automatically change the Artifact or Product Claim.

The Product class may remain unchanged while one delivered unit experiences damage, modification, different firmware, component replacement or local adaptation.

AfterMake preserves Product class, design version, delivered configuration and current Artifact state.

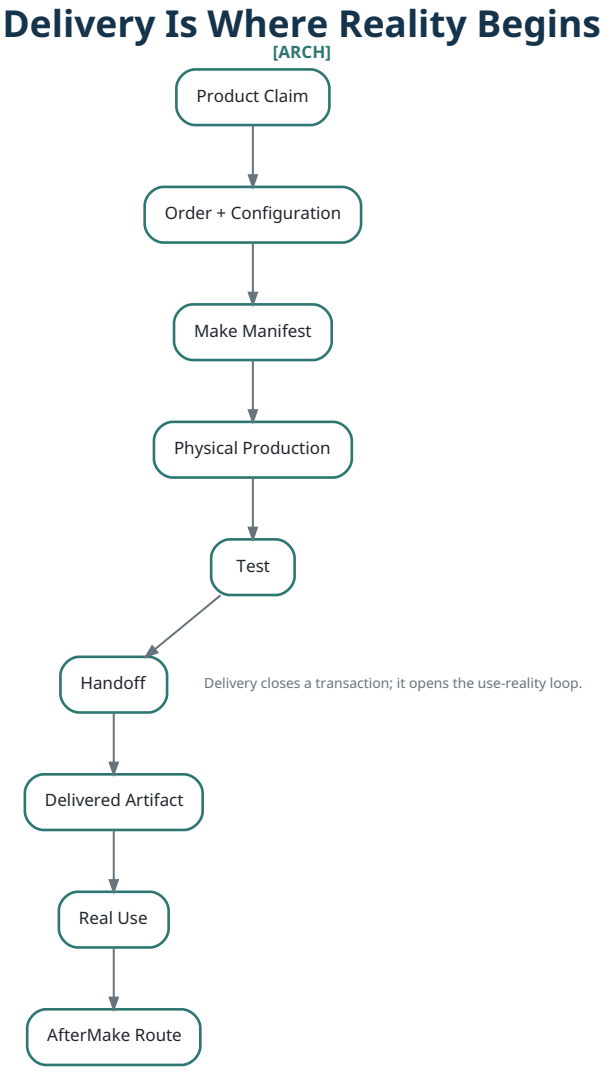


Figure 22.1 — Delivery as the beginning of reality. [ARCH] Original HRI diagram. The delivered Artifact enters real use and may open several AfterMake Routes.

23 • Artifact Host, Reality Delta and Change Branch

Chapter Question

How can a delivered physical unit retain its Identity and Evidence while allowing disagreement, repair and new versions to develop without silently overwriting the original reality?

Core Argument

The Artifact Host represents a specific accepted unit or result. The Reality Delta records the bounded dif - ference among promise, Intent, delivery and use. A Change Branch preserves a proposed alternative without erasing the source Artifact.

23.1 Artifact Host Definition

An Artifact Host is:

> **The persistent digital Identity and governed continuity container for one accepted physical or digital Artifact, configuration, batch, Kit, installation or bounded result.**

It may represent one cable, NFC object, printed Journey Edition, Learning Kit, repaired unit, installation, accepted POC or small-batch Product.

23.2 Artifact Host Is Not a Product Page

> Product Page — represents a Product class, offer or marketing Claim
> Artifact Host — represents a specific accepted result, unit, configuration or batch

A Product Page may say "USB-C cable, 1 m." An Artifact Host may record actual length, connector con - figuration, batch, material version, MakeCell, Test result, delivery and current state.

23.3 Artifact Host Minimum Record

The Host preserves Artifact ID, Product or result class, design version, delivered configuration, Make Manifest, MakeCell or Provider, production time, batch, materials and components, Tests, Acceptance Re - cord, Handoff, owner or custodian role, access profile, service state, Reality Deltas, Change Branches, Next URL, return Route and Retirement Route.

Not every user View exposes every field.

23.4 Artifact Views and State

The same Artifact Host may provide Owner, user, service, MakeCell, Evidence, public, return and Retirement Views.

Access is role-based. The Artifact Host does not require a public owner Identity.

Canonical Artifact states include ACCEPTED, DELIVERED, IN_USE, MAINTAINED, UNDER_REPAIR, MODIFIED, RETURN_REQUESTED, RETURNED, SUPERSEDED, RECALLED and RETIRED.

A modified Artifact should create a new version, linked Branch or exact modification record. The prior accepted configuration remains visible in governed history.

23.5 Reality Delta Definition

A Reality Delta is:

> **A structured and contextualized difference among what was represented, what the person intended, what was delivered and what occurred in actual use.**

The Delta does not automatically determine fault. It identifies a difference requiring understanding or routing.

23.6 Reality Delta Inputs and Classes

A Reality Delta may compare Product Claim, purchase or use Intent, ordered configuration, Make Manifest, delivered Artifact, use Context, human experience, Test result and current Artifact state.

Delta classes include Claim, Existence or Availability, Fit, Knowledge, Component, Quality, Context, Accessibility, Intent and Innovation.

23.7 Delta Is Not Defect

> Reality Delta ≠ automatic defect
> Reality Delta ≠ automatic user error
> Reality Delta ≠ automatic seller misrepresentation

The Delta creates a structured examination Route. The result may be confirmed defect, fit mismatch, documentation issue, changed Intent, unsupported use, repair need, valid innovation opportunity or unresolved disagreement.

23.8 Reality Delta Record and State

The Delta Record contains Delta ID, Artifact ID, reporting Principal, report type and time, use Context, original expectation, observed reality, affected function, severity, Evidence, requested Route, AI interpretation where used, human correction, status and resolution.

States include REPORTED, CONTEXTUALIZING, UNDER_REVIEW, REPRODUCED, NOT_REPRODUCED, CONFIRMED, DISPUTED, ROUTED, RESOLVED, CLOSED, REOPENED and RETIRED.

`NOT_REPRODUCED` does not mean the person's experience did not occur. It means the system could not reproduce it under declared conditions.

23.9 Change Branch Definition

A Change Branch is:

> **A versioned proposal for an alternative Artifact, configuration, process or use Route originating from a Reality Delta or new Intent.**

The Branch preserves source Artifact, source Delta, proposed change, responsible Principal, Evidence and state.

23.10 Branching versus Overwriting

A new proposal must not silently rewrite the original Artifact.

Example:

> Source Artifact — 1.5 m cable
> Branch A — 0.7 m desk version
> Branch B — 2 m travel version
> Branch C — same length with reinforced strain relief

The Branches may serve different Contexts. The system need not force them into one universal "improved" version.

23.11 Change Branch State

> PROPOSED → CLARIFYING → FEASIBILITY_REVIEW → CONFIGURED → QUOTED → AUTHORIZED_FOR_POC → POC_MADE → TESTING → ACCEPTED_VARIANT

with REJECTED, MERGED, SUPERSEDED and RETIRED.

`ACCEPTED_VARIANT` is not automatically a qualified market release.

23.12 AI Role

AI may summarize a reported experience, separate observation from interpretation, identify missing Con - text, suggest Delta classes, propose alternative changes, produce a Test draft and compare source and Branch.

AI must not decide fault, Delete an inconvenient report, authorize manufacturing, declare the Branch safe, declare a universal improvement or convert a subjective experience into Product Fact.

23.13 Branch Evidence and Lineage

A Branch preserves source Delta, design or configuration change, assumptions, risk, cost, Make Intent, Make Manifest, Test Plan, comparative Evidence, Acceptance Record and new limitations.

A successful Branch may create a new Artifact Host. A rejected Branch remains useful historical Evidence.

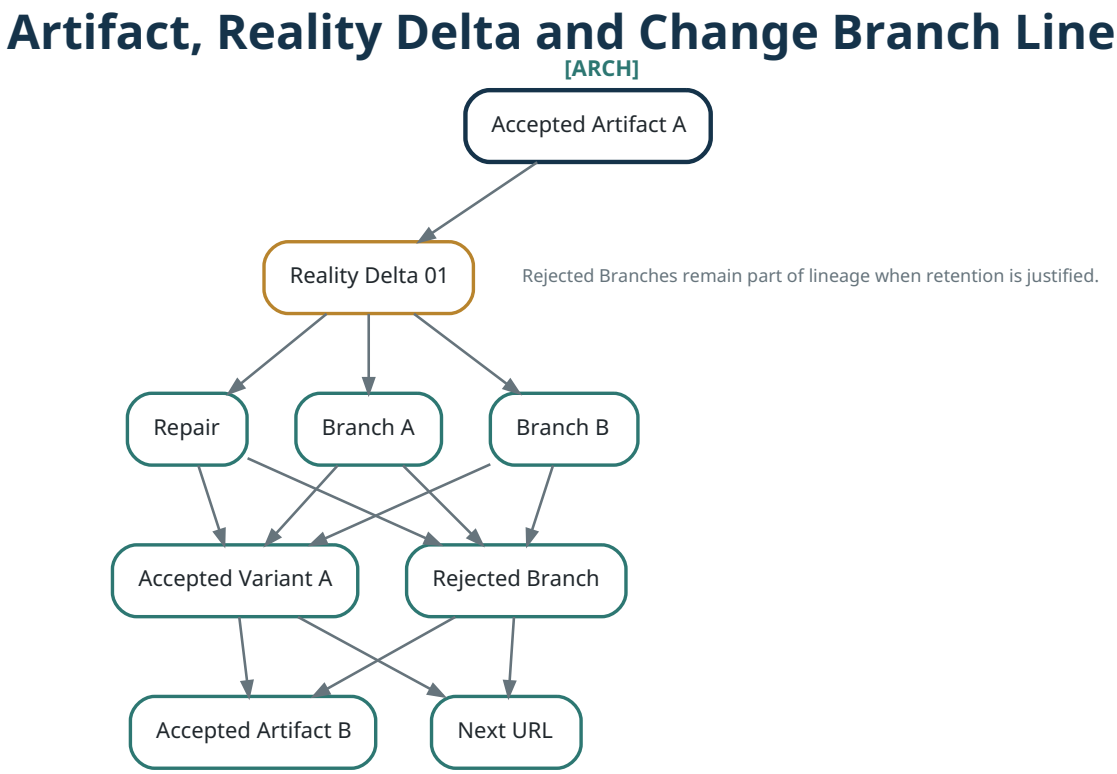


Figure 23.1 — Artifact, Reality Delta and Change Branch lineage. [ARCH] Original HRI diagram. Rejec - ted Branches remain in lineage; new Artifacts do not erase source Artifacts.

23.14 Product-Class Learning

Several unit-level Deltas may indicate a broader Product issue. The system may compare Deltas across version, batch, Context, component, use and MakeCell.

Any aggregate Claim must preserve selection method, data completeness, affected population, uncertainty and privacy.

24 • Resolve, Repair, Adapt, Fork, Return—and Make the Next

Chapter Question

How should AfterMake Route post-delivery reality into the smallest responsible resolution while preserving return rights, Product responsibility and the possibility of a genuinely new version?

Core Argument

The system should not force every Delta into return or remanufacture. It presents several first-class Routes and allows a responsible person to choose the smallest sufficient action. A new version becomes an Accepted Next Artifact only after a new make, Test and Acceptance cycle.

24.1 Resolution Router

A Reality Delta may be Routed to:

> ACCEPT AS IS · CLARIFY · CONFIGURE · SUPPORT · REPLACE PART · REPAIR · ADAPT · FORK · RETURN · RECOVER · RETIRE

No Route is universally preferred. The correct Route depends on user choice, safety, economics, availability, Product condition, law, time, environmental consequence, rights-to-make and Evidence.

24.2 Accept as Is

The user may decide the Product remains acceptable after understanding the reality. The decision may record accepted with explanation, accepted for limited use, accepted after configuration or no further action requested.

The decision should not erase the Delta.

24.3 Clarify and Configure

Some Deltas arise from missing or misleading information. Clarification may provide instruction, Product Facts, translation, compatibility guidance, installation steps or limitations. It must not disguise a genuine quality failure.

Configuration may involve software setting, physical adjustment, calibration, accessory or operating mode. Material configuration changes should remain versioned.

24.4 Support

A human or AI-assisted support Route may resolve a use question, accessibility need, setup, diagnosis or remote assistance. Support remains distinct from Artifact Acceptance and manufacturing Authorization.

24.5 Replace Part

If one component creates the Delta, Micro-BOM Access may provide a compatible screw, connector, cable, label, cover, NFC object or printed insert.

Replacing the smallest component may be preferable to returning the complete Product. It is not always technically, economically or legally possible.

24.6 Repair

Repair seeks to restore the Artifact to an accepted state. It requires diagnosis, repair Authority, qualified Capability, repair Make Manifest, parts, Test, reacceptance and updated Artifact Host.

Repair Completion is not reacceptance.

24.7 Adapt

Adaptation modifies the Artifact for a specific user or Context. Examples include shorter cable, larger label, changed grip, alternative packaging, additional NFC Touchpoint, improved accessibility or different mounting.

An adaptation may remain a one-user variant. It should not be presented as a universal improvement without broader Evidence.

24.8 Fork

Fork creates a deliberate Change Branch that may become POC, variant, MVP, small batch or qualified re - lease.

A Fork preserves the source version. It does not silently replace it.

24.9 Return

Return remains first-class. AfterMake may support reason classification, condition, Evidence, logistics, refund state, Artifact state and recovery Route.

The user should not be penalized merely for declining repair or innovation participation where return is available.

24.10 Recover and Retire

Recovery may involve reuse, refurbishment, component harvesting, material segregation or controlled disposal. Recovered components retain source and condition class before entering a Micro-BOM.

Recovery is not automatically environmentally beneficial. Outcome Evidence is required.

Retirement may be required because the Artifact is unsafe, obsolete, unrepairable, recalled, unsupported or no longer needed. The Retirement Record preserves residual duties and recovery.

24.11 Smallest Responsible Resolution

> **Resolve the Reality Delta at the smallest responsible level.**

This may mean one explanation instead of return, one component instead of full replacement, one local repair instead of cross-border shipping, or one POC instead of immediate mass production.

The smallest action is not always the cheapest or safest. Responsible remains the controlling word.

24.12 From Delta to the Next Make Intent

> Reality Delta → desired change → Accepted Make Intent → Capability matching → authorized Make Manifest → physical Execution → comparative Test → responsible Acceptance → Accepted Next Artifact

The source Artifact remains in lineage.

24.13 Comparative Test

The new Artifact is compared against source version, declared problem, Acceptance criteria, new limitations, cost, material and use Context.

The comparison may conclude better for this Context, worse for another, no meaningful improvement, new failure introduced, safe only as POC or acceptable as variant.

A comparison should not be forced into a positive outcome.

24.14 Accepted Next Artifact

An Accepted Next Artifact is:

> **A new or modified physical result that has completed the applicable Make, Test, responsible Acceptance and Evidence Closure cycle and has been linked to its source Artifact and Change Branch.**

It preserves source Artifact, source Reality Delta, Change Branch, new Make Manifest, Tests, Acceptance, new limitations and Next URL.

The word Next is deliberate. The Artifact may later enter new use, reveal a new Delta, require repair, be adapted again, become obsolete or be retired.

24.15 Version Maturity Ladder

> Observation → Change Proposal → Physical POC → Tested Prototype → Accepted Variant → MVP → Controlled Small Batch → Qualified Release → Replicated Production

Each level has a different Evidence and responsibility threshold.

24.16 AfterMake and MakeHere Loop

AfterMake identifies post-delivery reality. InstantReady forms the new Intent and Authority. MakeHere finds the qualified Physical Subscriber. A MakeCell performs the Job. Responsible Acceptance establishes the new bounded reality. AfterMake continues the next Artifact.

24.17 Proposed Reference Exercises

One Object · One Reality Delta · One Next URL selects one existing object, records expectation and use reality, defines one Delta, chooses a resolution Route, creates one Accepted Make Intent where justified, produces one bounded POC, compares source and POC, accepts or rejects, and creates a next Artifact URL only if accepted.

Many Eyes · One Made Memory allows multiple authorized viewpoints to contribute selected moments to a printed edition, bound booklet, NFC object or useful cable/gift object. Only explicitly selected and authorized content enters the Make Intent.

> Raw View Event ≠ Make Command
> Shared Moment ≠ Manufacturing Authorization

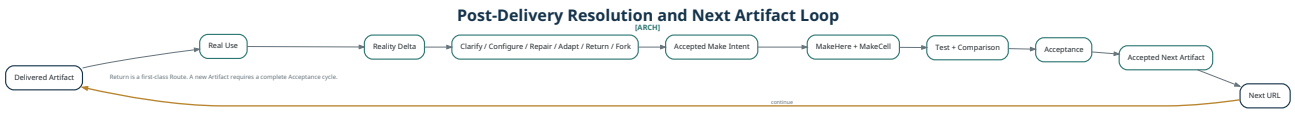


Figure 24.1 — Post-delivery resolution and the Accepted Next Artifact loop. [ARCH] Original HRI dia - gram. Return and rejection remain valid Routes; every new Artifact re-enters the Canonical lifecycle.

Part IX — The Accepted Reality Graph and Economic Model

Governing question: Which relationships create durable value without turning human Perception into a surveillance asset?

> **The Graph should remember the governed relationship—not the whole human life.**

25 • The Accepted Reality Graph

Chapter Question

How can HRI retain the relationships necessary for accountability, continuity and learning without converting raw human Perception into a surveillance asset?

Core Argument

The Accepted Reality Graph is a permissioned, evidence-bounded and state-aware Graph of canonical identities and relationships. It preserves provenance, scope, Authority, Acceptance and version. Raw media may support the Graph without becoming its permanent centre.

25.1 Why a Graph Is Required

The reality lifecycle is not a single linear record.

One Intent may involve several people, devices, one Space, multiple Providers, a Runtime, several Tests, one Acceptance Authority, one Artifact, later Reality Deltas and several Change Branches.

A traditional transaction table may record customer, Product, price and date. It is insufficient to explain which version was delivered, which Context applied, which Capability acted, which Authority allowed it, which Test passed, who accepted the result, which repair changed it and which Branch became the next Artifact.

A Graph structure is useful because reality is relational.

25.2 Definition

The Accepted Reality Graph is:

> **A permissioned, evidence-bounded and versioned Graph connecting the canonical identities, events and relationships through which human Intent becomes Accepted Reality and later continues, changes or retires.**

The Graph may connect Principals, Organizations, Hosts, Scenes, Spaces, Intent Objects, Capabilities, Authority Bindings, Sessions, Runtime Instances, Commands, Outputs, Tests, Acceptance Records, Evidence Objects, Handoffs, Artifacts, Reality Deltas, Change Branches, versions and Retirement Records.

25.3 The Graph Is Not Necessarily One Database

The word Graph describes the relationship model. It does not require one central database, cloud Provider, global owner, public interface or permanent copy of every object.

Some records may remain with the user, Product Provider, MakeCell, Space operator, public institution, Local Edge or regulated Evidence store.

InstantReady may resolve authorized relationships across those stores. The architecture may become federated.

25.4 Node Families

Principal Nodes represent person, role, organization, responsible Authority, Provider, operator and Acceptance Authority.

Context Nodes represent Scene, Space, Journey, Product class, use Context and time-bounded conditions.

Intent and Authority Nodes represent Intent, Accepted Make Intent, Authority Profile, Authority Binding and Job Authorization.

Capability and Runtime Nodes represent Capability Profile, Physical Subscriber, MakeCell, Runtime Profile, Runtime Instance, Bot and Provider Adapter.

Execution and Evidence Nodes represent Command, Job, Make Manifest, Output, Test, Evidence Object, Acceptance Record and Handoff.

Continuity Nodes represent Artifact Host, Reality Delta, Change Branch, Accepted Next Artifact, version, return, repair and Retirement.

25.5 Relationship Classes

The Graph may express OBSERVED_BY, OBSERVED_IN, REPORTED_BY, CONTEXT_FOR, INTENDED_BY, AFFECTS, AUTHORIZED_BY, BOUND_TO, OPERATED_IN, EXECUTED_BY, USED_PROVIDER, PRODUCED, TESTED_BY, SUPPORTED_BY_EVIDENCE, ACCEPTED_BY, HANDED_OFF_TO, REPRESENTED_BY, DERIVED_FROM, DELTA_REPORTED_AGAINST, BRANCHED_FROM, SUPERSEDES, REPAIRED_BY, RETURNED_TO and RETIRED_BY.

Each relation remains typed. `AUTHORIZED_BY` must not be replaced by a vague edge such as `CONNECTED_TO`.

25.6 Graph Relation Record

A material relationship is represented through a Graph Relation Record preserving Relation ID, source node, target node, relationship type, source, scope, Valid Time, Recorded Time, Acceptance state, responsible Principal, supporting Evidence, access policy, retention policy, version, correction or dispute status and Retirement state.

The relationship is not meaningful without state and provenance.

25.7 The Accepted Layer

The Graph may reference proposed, disputed or rejected objects for lineage. It must not present them as accepted operational truth.

It distinguishes:

> Observed Layer → Proposed Layer → Authorized Layer → Executed Layer → Accepted Layer → Retired Layer

The Accepted Layer is the part used as current bounded source for downstream operation.

25.8 Accepted Does Not Mean Universally True

An accepted relation may state:

> Artifact A was accepted by Customer B for internal prototype use on Date C.

It does not state:

> Artifact A is universally safe and suitable for every user.

The Graph preserves Acceptance class, scope, criteria, time, conditions and exclusions.

25.9 Raw Media Is Supporting Material, Not the Core Asset

A photograph or video may support object Identity, condition, spatial Context, Product discrepancy, Test Evidence or Handoff.

The Graph does not require permanent storage of all raw media. It may preserve a controlled reference, hash, derived measurement, human-confirmed description, retention state and Deletion event.

> **The Graph should remember the governed relationship—not necessarily retain the entire raw Perception.**

The smart-glasses prototype already demonstrates the beginning of this separation: a dedicated URL presents an image and API description while the human retains distinct Save and Delete choices [IMPL-01].

25.10 Prompts Are Not the Primary Asset

A Prompt may help interpret a Scene, configure a Job, summarize Evidence or prepare a Branch. The Prompt is not the Accepted Reality.

A reusable system preserves more operationally relevant elements: model and Provider version, instruction or policy version, input classes, Output, human correction, action taken and Acceptance state.

A Prompt may remain part of Evidence where it materially affects the result. It should not become an unlimited corporate Claim over the user’ s thought process.

25.11 Attention Is Not a Product Asset by Default

Smart glasses and first-person devices may reveal where a person looked, what they ignored, where they paused, which people they encountered and which locations they visited.

The Accepted Reality Graph should not default to storing continuous gaze, attention duration, inferred personality, emotion, relationship scoring, employee or student ranking.

A selected View Event may enter the Graph for a declared purpose. Continuous attention history should not become a hidden asset merely because it can be measured.

25.12 Permissioned Graph Views

Different users receive different Views.

- Owner View may show Artifact, service, repair, private Deltas and Next Routes.
- Provider View may show only the authorized Job, required Context, Tests and Handoff obligations.
- MakeCell View may show Make Manifest, materials, process and Test, but no unrelated Journey content.
- Public View may show selected Artifact Facts and current public Claim, but no private owner his - tory.

- Research View may show approved, minimized or aggregated relationships, not unrestricted personal histories.

A Graph View is assembled through Authority and policy.

25.13 Data Minimization as Graph Design

Data minimization occurs at four levels:

> Collect less → derive what is necessary → retain only what supports the lifecycle → expose only what the role is authorized to see

The Graph can become more useful as unnecessary data is removed. A smaller, well-governed Graph may be more trustworthy than a larger ambiguous one.

25.14 Correction, Dispute and Version

Reality can be misunderstood. The Graph supports CORRECTION, DISPUTE, SUPERSESSION, RETRACTION and RETIREMENT.

A later correction should not erase the original statement, reason, Authority, time and affected Claims. A disputed relation may remain visible to authorized parties without remaining active in the Accepted Layer.

Graph Relation states include OBSERVED, PROPOSED, EVIDENCED, AUTHORIZED, EXECUTED, ACCEPTED, CONDITIONALLY_ACCEPTED, DISPUTED, CORRECTED, SUPERSEDED, RETRACTED and RETIRED.

25.15 Current Foundation and Value without Surveillance

The current source base supports early graph-like relationships among device, URL, Runtime, capture, AI description, Save/Delete and Handoff [IMPL-01] [IMPL-04]. It does not evidence a production-scale Accepted Reality Graph.

The Graph creates value when it can answer:

- Which version is this?
- What was the intended use?
- Which MakeCell produced it?
- Which Test supports the Claim?
- Who accepted the result?
- What changed later?
- Which replacement component is compatible?
- Which Branch became the next accepted version?
- Which Route remains active?

None of these questions requires a continuous archive of the person’s life.

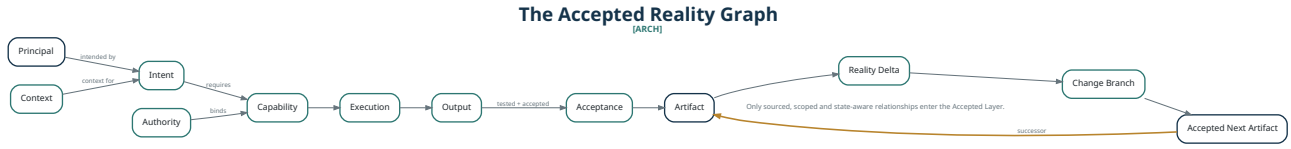


Figure 25.1 — The Accepted Reality Graph. [ARCH] Original HRI diagram. Raw Perception may support the Graph; only sourced, scoped and state-aware relationships enter the Accepted Layer.

26 • Reality Commerce

Chapter Question

What commercial category emerges when the Product relationship continues after delivery and real use can become a governed Route to explanation, repair, return, adaptation or a next version?

Core Argument

Reality Commerce organizes commercial value around the full Accepted-Reality lifecycle. It preserves re - turn rights, distinguishes experience from verdict and creates value by resolving Reality Deltas at the smallest responsible level.

26.1 Definition

Reality Commerce is:

> **A proposed commercial category in which Products, services and physical Capabilities re - main addressable through real use, resolution, repair, adaptation, return, remanufacture and continuing Artifact Identity.**

Reality Commerce connects Product Claim, human Intent, ordered configuration, delivered Artifact, use Context, Reality Delta, resolution Route, Physical Subscriber and Accepted Next Artifact.

AfterMake is the current Commercial Wedge into this category.

26.2 Commerce before Reality

Conventional digital commerce is highly optimized before delivery. It improves discovery, recommenda - tion, Product imagery, description, conversion, payment and logistics.

The relationship often weakens after the object reaches the person. The post-delivery system may know delivered, reviewed, returned or refunded without knowing what the person originally intended, which unit and version arrived, what occurred in use, which small intervention could resolve the difference or what was learned for the next version.

26.3 Reality Commerce Is Not Return Suppression

The purpose is not to reduce returns at any cost, make complaint difficult, force repair, delay refund or turn every dissatisfied customer into unpaid Product research.

Return remains first-class. Reality Commerce adds clarify, configure, support, replace one component, repair, adapt, fork, recover and retire.

The user may decline those Routes.

26.4 Reality Delta as the Commercial Event

The central event is not the star rating. It is the Reality Delta.

The Delta may reveal Claim mismatch, fit issue, knowledge Gap, component problem, quality failure, accessibility barrier, Context mismatch, changed Intent or innovation opportunity.

Each Delta class may require a different commercial response. A one-star review cannot provide that routing precision.

26.5 The Smallest Responsible Resolution

Reality Commerce uses the principle:

> **Resolve the Reality Delta at the smallest responsible level.**

The smallest responsible resolution may be one explanation, configuration, replacement part, repair, local adaptation, return or bounded POC.

The smallest action is not always the right action. Safety, rights, time, customer preference and Evidence remain controlling conditions.

26.6 Commercial Units

The proposed commercial system may contain:

- Entry Session — TapPort Scene, Product or Journey;
- Artifact Continuity — Artifact Host, service and Next URL;
- Resolution Event — Delta clarified, repaired, returned or redirected;
- Physical Job — MakeCell printing, binding, programming, assembly, testing or repair;
- Replacement or Micro-BOM Unit — component or Process Atom;
- Branch and POC — new physical version prepared and compared;
- Qualification Service — Capability or partner cell reviewed;
- Evidence and Handoff Service — bounded Evidence Pack and continuing Route.

These are proposed business units, not a finalized price list.

26.7 Value to Participants

User value may include better Product understanding, record of the actual unit, clear support, repair and part access, local adaptation, return Route, next-version proposal and continuity after the original seller interaction ends.

Merchant or brand value may include Context-rich feedback, separation among Claim, fit and quality is - sues, repair and replacement Routes, less knowledge loss after return, version-level Evidence and validated Product Branches.

Manufacturer value may include structured Context, specific Artifact version, reproduced issue, candidate change, Make Manifest, comparative Test and Accepted Variant Evidence.

Physical Subscriber value may include small but complete Jobs below traditional minimum order quant - ity.

Platform value arises from coordinating Identity, Context, Intent, Authority, Capability routing, Job form - ation, Evidence, Acceptance and continuity—not from selling unrelated personal attention data.

26.8 From Transaction to Lifecycle

Figure 26.1 — Reality Commerce loop. [ARCH] Original HRI diagram. Return remains a valid Route; the system creates value by linking real use to responsible resolution and the next accepted Artifact.

26.9 Trust through Separation

Reality Commerce requires separation among seller Claim, AI description, user observation, Test result, Acceptance decision and public statement.

Trust is not created by making all statements appear consistent. It is created by showing which statement has which source and state.

A review is human expression. Evidence is bounded support. A verdict is a formal determination under declared Authority. Most Product reviews are not verdicts.

26.10 Return as a Learning Event

A return may produce useful structured information when the user permits it. The Platform may record wrong fit, wrong version, changed Intent, Product defect, delivery damage, poor explanation or no longer needed.

The user is not obligated to contribute beyond the return process. A return without research participation remains valid.

26.11 Adjacent Categories

Category	Primary focus	Reality Commerce adds
E-commerce	Discovery, transaction and fulfilment	Delivered-unit continuity and next-version Routes
Aftermarket	Parts and service	Structured Reality Delta and governed Branch creation
Customer Support	Question and issue resolution	Artifact lineage, physical routing and Accept - ance
Reverse Logistics	Return movement	Context, repair, recovery and Product learning
Repair Marketplace	Finding repair Providers	Canonical Artifact, Authority, Tests and Evid - ence
Product Passport	Product information and Identity	Actionable repair, adaptation, Branch and next Make
Review Platform	Public experience expression	Contextualized, testable and state-aware Delta

Reality Commerce may integrate these systems. It does not need to replace them.

Boundary

Reality Commerce is a proposed category. The current source base does not evidence production-scale Af - terMake transaction volume, measurable return reduction, proven unit economics, a live open repair/ manufacturing network or sector-wide adoption.

27 • Platform Economics and Capital Logic

Chapter Question

How can HSIMC organize software, physical Execution, Evidence and Product continuity into one capital-efficient Platform rather than several disconnected businesses?

Core Argument

The economic model is built around one shared operating Platform, one low-friction Entry Product, one post-delivery Commercial Wedge and two Execution networks. Owned reference Capabilities prove the system; qualified partners provide locality and scale.

27.1 Frozen Platform Architecture

Layer	Identity
Corporate Master	HSIMC
Core Platform	InstantReady
Entry Product	TapPort
Commercial Wedge	AfterMake
Spatial Execution	InstantSpace
Physical Execution Network	MakeHere and HSIMC MakeCells
Perception Capability	InnoSpire Smart Glasses
Human Capability Layer	TapPort Learning

This architecture prevents each early experiment or domain from becoming an independent company-level story.

27.2 One Platform

InstantReady provides shared Identity, Resolver, Session, Context, Authority, Runtime, Capability routing, Evidence, Acceptance, Artifact Registry, Version and Retirement.

The Platform value is reduced when every Product builds its own login, Identity, Evidence state, payment logic and incompatible Artifact record.

27.3 One Entry Product

TapPort lowers the cost of entering the Platform. It begins with one tap, QR, NFC object, Product, Scene, Journey or smart-glasses capture.

TapPort does not need to monetize every entry immediately. Its economic role is to convert a temporary encounter into a governed Route that may later produce a Session, private Locker, Intent, Artifact, learning outcome or AfterMake relationship.

27.4 One Commercial Wedge

AfterMake provides the clearest early commercial problem:

- Products lose structured continuity after delivery;
- returns and reviews do not reliably become engineering input;
- repair and small parts remain difficult;
- customization and POC Routes are fragmented;
- the next version is expensive to initiate.

AfterMake is the Wedge because it connects software, Product Identity, customer experience, repair, local manufacturing and version continuity.

It does not mean TapPort, InstantSpace or MakeHere have no independent revenue. It means AfterMake currently provides the strongest unifying commercial entry.

27.5 Two Execution Networks

InstantSpace provides Space Identity, geometry, state, Local Edge, Authority and Workcell Formation.

MakeHere and MakeCells provide physical Capability, process, material, operator, Test and Handoff.

The networks intersect. A MakeCell exists in a Space. A Space can host several Workcells. Their identities and qualification conditions remain distinct.

27.6 Proposed Revenue Layers

Entry and Experience: TapPort Scene, Journey, Locker, Touchpoint Kit and guided Session.

Platform and Runtime: Runtime usage, enterprise Platform licence, Resolver and Session service, Authority and Evidence service, partner API.

Artifact Continuity: Artifact Host, support, service history, Branch and version management, enterprise Product-continuity service.

Physical Execution: printing, binding, NFC, cable, packaging, repair, testing, POC and small batch.

Partner and Network: Capability qualification, MakeCell onboarding, deployment support, local-node licence, Evidence-conformance service.

Learning and Public Programmes: Field Lab, Kit, Builder programme, teacher and Guide package, sponsored programme.

These are proposed revenue classes, not an audited revenue statement.

27.7 Cost Layers

Principal costs include Platform engineering, security and governance, Provider use, device and Edge integration, reference MakeCells, materials and testing, partner onboarding, field operations, support, Evidence and publication, and local compliance.

A realistic capital model accounts for software and physical operations. The company should not be presented as a pure software Platform while depending on unpriced physical work.

27.8 Reference Cells Prove; Partner Cells Scale

> **Owned Reference Cells prove the Contract. Qualified Partner Cells provide locality and scale.**

Reference Cells allow HSIMC to learn process reality, material limitations, Evidence burden, operator requirements, customer Acceptance and failure modes.

Partner Cells reduce the need for HSIMC to own every machine in every market. A partner network should not be expanded before the reference Contract is sufficiently proven.

27.9 Three Defensibility Layers

1. **Accepted Reality Graph** — version-specific Product reality, Authority and Provider relationships, Test and Acceptance history, repair and Branch lineage, Capability performance and continuity.
2. **Physical Subscriber Network** — real equipment, process knowledge, operator discipline, materials, Space, Tests, Evidence, incident handling and customer Acceptance.
3. **Standards and Evidence Discipline** — ability to distinguish proposal from implementation, prototype from qualification, Completion from Acceptance, supplier declaration from verified Evidence, and one pilot from universal conformance.

The Graph’s value does not arise from ownership of every raw user image. It arises from operating the protocol through which relevant accepted relationships remain trustworthy and useful.

27.10 Current Asset Base

The documented asset base includes a smart-glasses interface with one link per pair, capture, API description and Save/Delete [IMPL-01]; Product material connecting smart glasses, hosted Runtime, NFC/RFID, design Output and Handoff [IMPL-04]; image-measurement POC [IMPL-02]; socket and cable-length POC

[IMPL-03]; externally documented InnoSpire involvement in HKSTP and HK Tech 300 [EXT-01]; and a gov - ernment-documented Smart Traffic Fund project direction involving AI smart glasses for visually impaired mobility [GOV-01].

These assets support a credible foundation. They do not establish mature Platform economics.

27.11 Capital Sequence

1. Prove one closed loop
2. Standardize shared Platform objects
3. Prove Reference Cells
4. Prove Artifact continuity
5. Qualify selected partners
6. Replicate to a second site
7. Federate only after local boundaries work

This avoids investing first in large inventory, many unqualified partners, broad marketplace, unsupported public Claims or duplicated software stacks.

27.12 Economic Flywheel

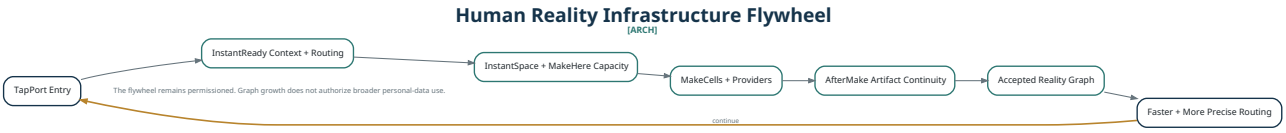


Figure 27.1 — Human Reality Infrastructure flywheel. [ARCH] Original HRI diagram. Growth in the Graph does not authorize broader reuse of personal data.

27.13 Operating Metrics before Vanity Metrics

Early metrics include Time to First Useful Route, Intent Clarification Time, Authority Closure Time, Ac - cepted Output Rate, Evidence Completeness, Repair or Resolution Completion, Return Route Completion, Time to Next POC, MakeCell First-Pass Test Rate, Handoff Completeness, Next URL Reactivation, Second-Site Clone Time and Agency or Privacy Incident Rate.

Page Views and social engagement may be useful. They do not prove Accepted Reality.

27.14 Portfolio Discipline

A new branded Product should require a distinct customer, problem, operating object, revenue Route and clear relationship to InstantReady. Otherwise it should remain a programme, Capability, research project or Product module.

This discipline protects the company from becoming a collection of domains and unfinished interfaces.

Part X — Human Agency, Learning and Public Value

Governing question: How can the infrastructure expand Capability without reducing human ownership of Perception, decision and Acceptance?

> **Human Agency is not an ethical appendix. It is a continuous operating rail.**

28 • Human Agency before Automation

Chapter Question

How can HRI use AI, sensing and automation while preserving meaningful human control over Perception, action, Acceptance and continuity?

Core Argument

Human Agency requires timely understanding, real choice, attributable Authority and an effective ability to correct, refuse, stop, return or redirect. Automation level and Authority level must remain distinct.

28.1 Definition

Human Agency is:

> **The person’s practical ability to understand the relevant system state, express or correct Intent, control consequential participation, refuse or stop a Route, and accept or reject the bounded result.**

Agency must be practical. A hidden setting, unreadable notice or irreversible action does not provide meaningful control merely because a button technically exists.

28.2 Human Agency Contract

An HRI Product should preserve, where applicable, the right to know, understand, correct, consent, refuse, pause or stop, restrict sharing, Delete where applicable, return, reject an Output, accept a bounded result and begin a next Branch.

Precise legal rights vary by jurisdiction. The architectural principle is broader: the person must not be silently removed from a consequential lifecycle.

28.3 Meaningful Control

Control is meaningful when it is timely, understandable, specific, actionable, reversible where possible and attributable.

The choice occurs before or during consequential action, not only after harm. The person can understand what is proposed and what may happen. The choice relates to the actual action, data or result. The system provides a real alternative. The person can pause, revoke, return or correct where possible. The system records who or which policy made the decision.

28.4 Originating and Affected Principals

The person requesting the action may not be the only affected person.

A smart-glasses capture may affect the wearer, nearby people, shop operator, Product owner and group participant. A spatial action may affect Space owner, operator, visitor, technician and neighbour.

The Agency model distinguishes Originating Principal, Affected Principal, Authorizing Principal and Acceptance Authority.

28.5 Automation Level Is Not Authority Level

A highly automated system may operate under a narrow human-approved policy. A low-automation manual task may still require strong Authority.

> **Automation Level — how much of the process is automatic?**
> **Authority Level — who may permit the action, under which scope and responsibility?**

The two must not be merged.

28.6 Automation–Authority Modes

Mode	Description
0 • Observe Only	Records or presents information; no consequential action
1 • Advise	Proposes interpretation or next step; human decides
2 • Draft	Prepares configuration, Command or Make Manifest; responsible review required
3 • Confirm-to-Act	Executes after explicit human confirmation
4 • Pre-Authorized Bounded Action	Acts within declared policy, time, resource and risk boundary
5 • Consequential Human Gate	May prepare, but named Authority must approve the consequential action

The appropriate mode depends on risk and Context.

28.7 Delegation

Human Agency does not require the same person to approve every action. A Principal may delegate routine payment, repeated print Job, low-risk device response, scheduled maintenance or defined data processing.

Delegation preserves scope, duration, limits, revocation, responsible Principal and Evidence. A delegated policy must not silently grow.

28.8 Human Confirmation Is Not Always Agency

A system can require frequent clicks while still reducing Agency. Consent fatigue, forced acceptance, no real alternative, irreversible defaults, misleading language and approval without sufficient information do not create meaningful control.

Agency is not measured by the number of confirmation screens. It is measured by the quality of the de - cision.

28.9 Correction before Consequence

AI interpretation should support correction before it becomes public Claim, manufacturing input, navigation Route, Product decision or Learning assessment.

The current smart-glasses interface separates API-generated description from human Save and Delete [IMPL-01]. It does not implement the complete Human Agency Contract, but demonstrates a useful early separation between machine Output and human retention choice.

28.10 Refusal and Return as Agency

A person may refuse capture, AI processing, sharing, publication, repair, adaptation, manufacturing or continued Session.

The system should not interpret refusal as poor engagement, low performance, invalid participation or wrongdoing.

Return is a form of human control over an unacceptable or unwanted Artifact. AfterMake must not remove that Route merely because repair or Branch formation may create more Platform activity.

A person can say:

> I do not want this Product and I do not want to co-design the next version.

That choice remains valid.

28.11 Acceptance as Agency

Acceptance is not passive receipt. It is an attributable decision:

> I accept this bounded result for this declared purpose under these known conditions.

The person or organization may accept, conditionally accept, reject, redirect or return for correction.

28.12 Agency Event Record

Where consequential, the system preserves a bounded Agency Event Record: Principal or role, decision, object, scope, time, information presented, conditions, expiry, revocation and related Authority or Acceptance Record.

The record should not become a general behavioural profile.

28.13 Accessibility and Agency

Accessibility support strengthens Agency when it helps a person perceive, understand, navigate, commu - nicate and decide. It can reduce Agency if it speaks over the person, hides uncertainty, assumes preference, transfers control without consent or creates unnecessary dependency.

External sources establish a documented human-assistance Context for smart glasses [EXT-01] [GOV-01]. They do not prove universal effectiveness or autonomous field safety.

28.14 Agency in Education and Work

Students, Interns and workers should not be evaluated through hidden gaze history, emotional inference, personality profile, Prompt count, camera activity or AI-generated engagement score.

Relevant Evidence should focus on what responsibility was owned, what Output was produced, how it was tested, what was accepted, what was learned and what was handed off.

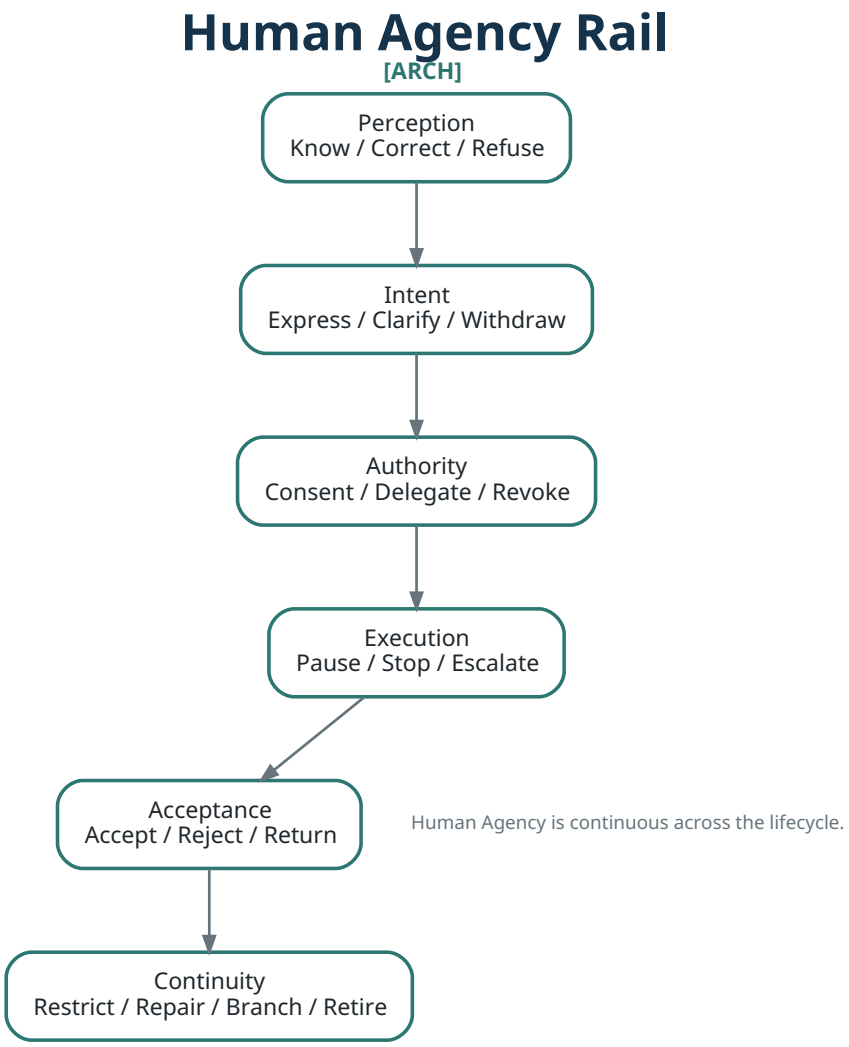


Figure 28.1 — Human Agency rail. [ARCH] Original HRI diagram. Agency continues through Perception, Intent, Authority, Execution, Acceptance and continuity.

29 • TapPort Learning

Chapter Question

How can HRI become a learning environment in which people learn to observe, question, make, Test, accept and continue—rather than simply consume AI-generated answers?

Core Argument

TapPort Learning is a real-world Capability-formation layer, not a conventional course-management Platform. Its primary learning cycle is See → Ask → Make → Test → Accept → Continue.

29.1 Definition

TapPort Learning is:

> **The learning and human-Capability layer through which a real object, Scene, Space, prob - lem or Touchpoint opens a bounded Learning Mission connected to observation, making, testing, Acceptance and continuation.**

TapPort Learning may serve young children, school students, university students, Interns, teachers, families, visitors, technicians, local makers and community participants.

29.2 Not a Conventional Learning Management System

TapPort Learning is not principally organized around course enrolment, video Completion, quiz score, content consumption, credential issuance or student ranking.

Those functions may exist in supporting systems. The central object is a real Mission. The central Output is an accepted Learning or physical result.

29.3 Learning Cycle

> **See** — observe a real object, Scene, Space or human need
> **Ask** — describe uncertainty and form a meaningful question
> **Make** — create a bounded representation, explanation, configuration, POC or Artifact
> **Test** — examine whether the Output does what was intended
> **Accept** — learner, teacher, Guide or responsible Authority evaluates the bounded result
> **Continue** — create a next question, version, Handoff or Next URL

29.4 Learning Begins before the AI Answer

For many early-learning Contexts, the preferred sequence is:

> Human observes → human describes → human compares → AI helps interpret → human corrects → human makes or Tests

This prevents the learner from treating the first machine answer as the world itself.

The rule is not universal. In accessibility or urgent support, AI may need to assist immediately. TapPort Learning should state which interaction mode applies.

29.5 Learning Mission

A Learning Mission includes Mission ID, learner or group role, real-world question, Scene or Space, objects and materials, age or Capability profile, time, Guide or teacher, available AI and tools, safety boundary, expected Output, Test, Acceptance criteria, Evidence and next Route.

A Mission may be simple. It should still be complete enough to close one learning loop.

29.6 Accepted Learning Moment

An Accepted Learning Moment is:

> **A bounded learning result that has been observed, expressed or made, examined against Mission criteria and accepted by the responsible learner, teacher or Guide for the declared learning purpose.**

It may include one observation, learner statement, comparison, made object, Test, correction or next question. It is not necessarily a grade.

29.7 Acceptance Is Not Ranking

A teacher may accept that the learner observed carefully, completed the task, produced an Output that answered one question or corrected an earlier assumption.

The system should not automatically infer intelligence, personality, future performance, attention quality or relative worth.

Learning Acceptance remains scoped to the Mission.

29.8 Product Objects and Programme Family

TapPort Learning objects include Learning Mission, Learning Scene, Learning Touchpoint, Learning Kit, Accepted Learning Moment, Builder POC, teacher/Guide Handoff and Next Mission.

Proposed programme families include TapPort First Look, Paper World, Field Lab, Young Builders, Teacher Kit, Reality Lab and Build Week.

These are proposed programme lines, not yet validated global curricula.

29.9 Proposed K0 Paper World

A proposed early-years Mission may use a screenless paper observation frame, recycled or responsibly sourced paper, large material cards, safe real objects and adult-guided observation.

The child may See one object, Say its colour, shape, texture or location, Compare it with another, Ask one question, Make a new paper object and Tell what was discovered.

AI remains behind the teacher or Guide. It should not stand between the child and the real object.

This is a proposed Product and learning hypothesis, not a completed child-safety qualification.

29.10 Smart Glasses as a Later Learning Layer

Smart glasses can become useful when learners are ready to examine first-person Perception, AI description, human correction, measurement, spatial Context, accessibility, privacy and manufacturing input.

The current smart-glasses prototype demonstrates one URL per glasses entry, device state, capture, API description and Save/Delete [IMPL-01]. The measurement poster demonstrates image input, camera parameters, target selection and dimension Outputs [IMPL-02]. The Socket Cable Estimator demonstrates movement from visual observation to a candidate cable-length requirement under controlled assumptions [IMPL-03].

These examples can become learning objects. They do not prove curriculum effectiveness or production readiness.

29.11 Learning through Real Public Context

Public sources document an InnoSpire “Hybrid AI+Human” smart-glasses direction and a government-reported Smart Traffic Fund project involving AI smart glasses for visually impaired mobility [EXT-01] [GOV-01].

These sources provide real public and social Context for discussion. They should not be presented to students as proof that all accessibility problems are solved.

29.12 Teacher and Guide Role

The teacher or Guide establishes safety and Mission boundaries, invites observation, avoids giving the full answer too early, helps distinguish AI Output from Fact, supports testing, accepts or redirects the Learning result, preserves the learner’s voice and completes Handoff.

The Guide is not required to know every technical answer. The Guide must know when to stop, escalate or bring in another Capability.

29.13 Learning Evidence and Kit

Learning Evidence focuses on learner observation, question, made Output, Test, correction, Acceptance and next Route. It minimizes unnecessary Identity, continuous face recording, attention tracking, personality inference and public comparison.

A Learning Kit may contain physical materials, paper observation frame, task cards, NFC or QR Touchpoint, teacher guide, safety note, Output template, Evidence template and Next URL.

The Kit is a physical Capability container. Its presence does not guarantee learning.

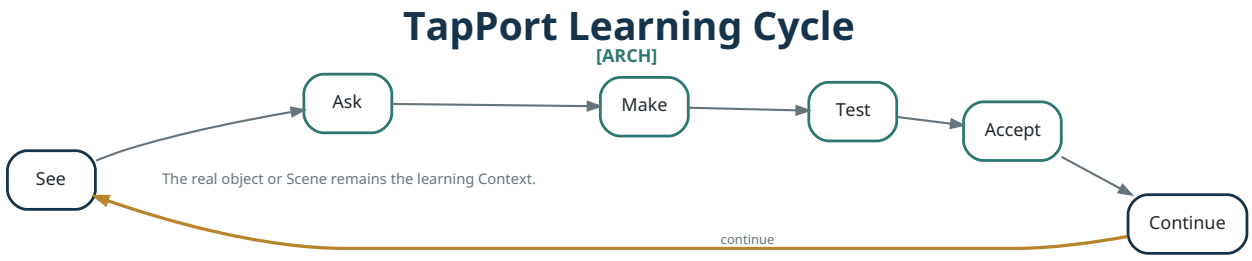


Figure 29.1 — TapPort Learning cycle. [ARCH] Original HRI diagram. See → Ask → Make → Test → Accept → Continue returns the learner to reality rather than ending at an AI answer.

30 • One Small Complete Success

Chapter Question

What is the smallest complete unit through which a person can learn, contribute, create Evidence and become capable of owning a larger part of HRI?

Core Argument

A small complete success has one bounded problem, responsible owner, Output, Test, Acceptance, Evid - ence record, Handoff and next Route. It is complete enough to learn from, not perfect enough to stop evolving.

30.1 Failure of Large Unfinished Work

Large Platform visions can create motivation. They can also create unclear ownership, endless research, partially connected features, no Acceptance criterion, no Handoff, student or employee frustration and untestable progress Claims.

A person may work for weeks without being able to say what they owned, what now works, who tested it, who accepted it or what remains.

The organization gains activity without Capability.

30.2 Definition

One Small Complete Success is:

> **A bounded real-world result owned by an identified person or team, produced within a de - clared scope, tested, accepted, evidenced and handed off with one clear next Route.**

The result may be one working URL, corrected Product Card, smart-glasses capture loop, printed booklet, NFC Touchpoint, cable POC, Learning Mission, spatial object registration, repair or Evidence Pack.

30.3 Complete Does Not Mean Perfect

A complete result may remain small, visually unfinished, manually operated, limited to one Context, unsuitable for market release or dependent on human supervision.

It is complete because the learning loop is closed:

> Intended → Made → Tested → Accepted or Rejected → Evidenced → Handed Off

30.4 Success Contract

Every small complete success identifies:

1. Real Problem — the bounded need;
2. Owner — who is responsible for Closure;
3. Context — where, for whom and under which limits;
4. Output — the exact result that must exist;
5. Test — how it will be examined;
6. Acceptance — who decides whether it is acceptable;
7. Evidence — what proves what happened;
8. Failure Route — what happens if it does not work;
9. Handoff — who receives it and what they must know;
10. Next Route — what becomes possible afterwards.

30.5 One Owner Does Not Mean One Worker

A result may require several contributors. One person or role remains accountable for Closure.

The owner may coordinate designer, developer, operator, Guide, teacher, technician and reviewer. Shared work should not become shared ambiguity.

30.6 Builder Role

A Builder is any person who owns or contributes to a bounded reality result. A Builder may be a student, Intern, employee, founder, technician, teacher, person with a disability, older person, community maker or external partner.

The role is defined by accepted responsibility, not status or age alone.

30.7 Builder Evidence

A Builder record focuses on role, owned Output, boundary, Evidence, Tested By, Acceptance, failure or remaining risk, Handoff and next Capability.

It should not become a personality score, surveillance profile, AI-generated judgement of motivation or public ranking.

30.8 Five-Working-Day Success Cycle

An illustrative cycle is:

- Day 1 — define one problem, boundary, owner and Acceptance criterion;
- Day 2 — build the smallest working result;
- Day 3 — Test normal use, one failure and independent reproduction;
- Day 4 — integrate with relevant Host, Session, Runtime or physical process and prepare Handoff;
- Day 5 — accept, reject or redirect; close Evidence; identify the next POC.

The five-day cycle is a management pattern, not a universal rule.

30.9 Failure Is Part of the Success

A small complete success may conclude that the POC failed under a stated condition, the failure was re - produced, the reason is partially understood, Evidence is preserved and the next Test is clear.

This can be more valuable than a demonstration that appears successful but has no reproducible boundary.

30.10 From Task to Capability

> First attempt → bounded successful Output → repeat by another person → documented method → known failure Route → qualified Capability candidate

One successful task does not automatically qualify a Provider. It creates Evidence for the next level.

30.11 Talent Development

Traditional talent signals emphasize school, degree, title, interview and self-description.

HRI adds:

- What bounded result did this person own?
- What tools and Context were involved?
- What did they Test?
- What failed?
- Who accepted the result?
- Can another person repeat it?
- Can the person hand it off?

This does not replace education or professional qualification. It adds real Execution Evidence.

30.12 Learning and Work

A student can participate in a real project without being made responsible for the entire company archi - tecture. The student may own mobile interface testing, Evidence caption, Replay fallback, NFC verification, one Learning Kit or one MakeCell Job record.

The task becomes meaningful because it has a real user, real boundaries, real Output and real Acceptance.

30.13 Social Value

Small complete work units may allow more people to participate in physical and digital value creation, in - cluding students, local makers, people returning to work, older persons, persons with disabilities, community workshops and small suppliers.

Participation remains safe, voluntary, scoped, supported by training, fairly attributed, fairly compensated where commercial value is created and subject to real Acceptance.

Social value is not created merely by counting participants. It is created when people gain repeatable Capability, real responsibility and an accepted result.

30.14 Capital Value

One small complete success can reduce uncertainty about user need, technical integration, operating cost, MakeCell process, Evidence burden, partner repeatability and customer Acceptance.

A company that closes many small loops may be more ready to scale than a company with one visually complete but operationally untested Platform.

30.15 Builder Handoff

The minimum Builder Handoff is:

> Role · What I owned · What now works · What does not work · Evidence · Tested by · Accepted by · Remaining risk · How to operate it · How to stop it · Recommended next POC

The Handoff is itself an accepted Output.

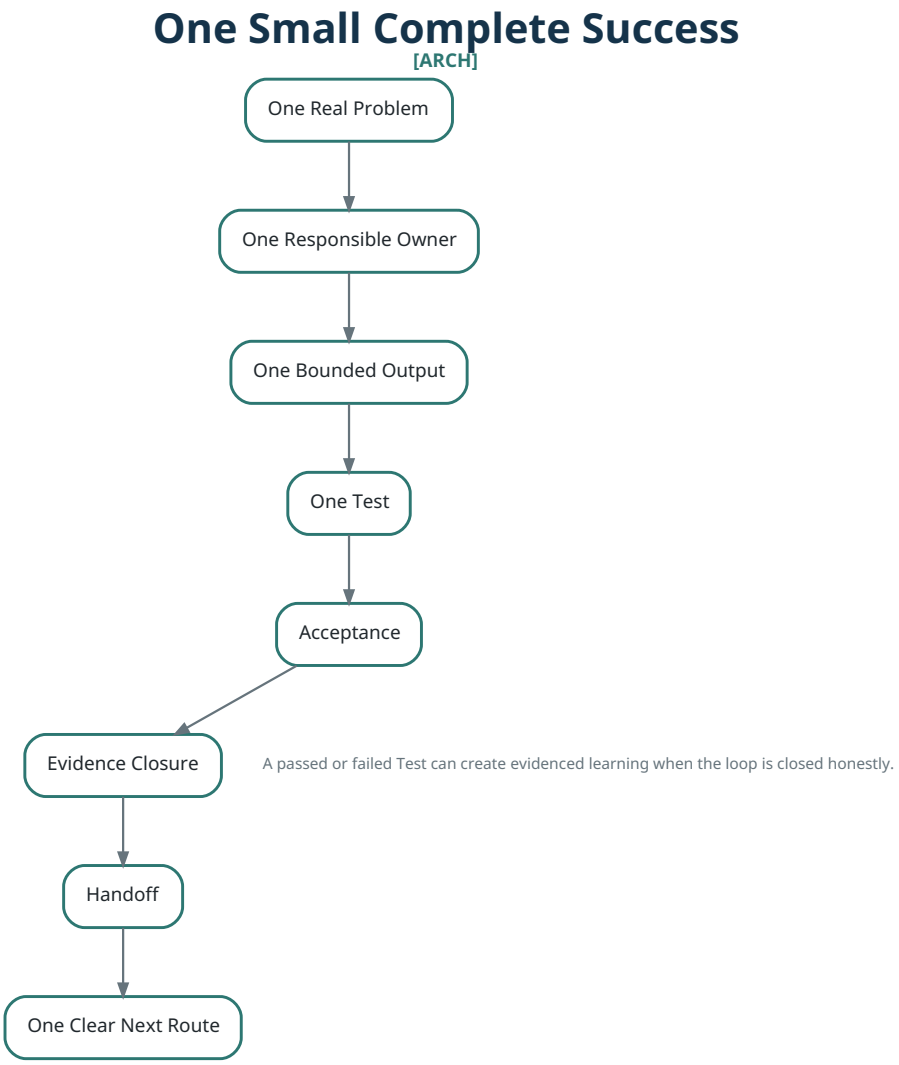


Figure 30.1 — One Small Complete Success. [ARCH] Original HRI diagram. A passed or failed Test may both create evidenced learning; the loop closes through Acceptance and Handoff.

PART XI — GOVERNANCE, SUSTAINABILITY AND INTEROPERABILITY

Governance begins before execution

Human Reality Infrastructure connects people, AI, devices, Spaces, manufacturers and continuing Artifacts. That connection creates power. It may help a person express and execute a small real-world need. It may also over-collect perception, permit a Provider to exceed its role, turn a prototype into an unsupported Claim or attach environmental language to an unevidenced outcome.

Governance is therefore not a final compliance layer. It determines which Perception may enter, which Intent may proceed, which Capability may act, which person may authorize, which result may be accepted, which Evidence may support a Claim, which data may cross a boundary and which Route must be retired.

31 — CORPORATE RESPONSIBILITY AND CLAIM–EVIDENCE DISCIPLINE

Chapter question

How can one company coordinate several Products, Providers, Spaces and physical execution partners without making unsupported Claims or allowing responsibility to disappear between interfaces?

Core argument

Corporate responsibility requires explicit entity, Product, Provider, Authority, Evidence and Acceptance boundaries. A Claim must identify its owner, source, scope, Evidence state, affected Product and correction Route before it becomes a public or operational statement.

31.1 Responsibility follows material control

HSIMC is the Corporate Master for the HRI thesis. It is responsible for the corporate thesis, Platform governance, brand architecture, publication discipline, reference MakeCell governance, the integrity of HSIMC-issued Claims and the conditions under which qualified partners participate.

That role does not make HSIMC the owner of every partner Capability, the operator of every Space or the Acceptance Authority for every result. Responsibility remains attached to the party that materially controls the relevant decision or action.

The operating roles include:

Role	Principal responsibility
Corporate Claim Owner	Authorizes an HSIMC-level public statement.
Product Owner	Owns Product scope, interface and operating boundary.
Platform Operator	Operates the relevant InstantReady infrastructure.
Capability Provider	Supplies the declared Capability.
Space Operator	Controls local Space and site conditions.
Physical Operator	Performs the physical process.

Role	Principal responsibility
Authorizing Principal	Permits a bounded consequential action.
Test Authority	Defines or administers the applicable Test.
Acceptance Authority	Accepts, rejects or redirects the result.
Evidence Custodian	Maintains the declared Evidence set.
Affected Principal	Is materially affected by the action or data use.
Handoff Recipient	Receives the result and continuing obligations.

One person may hold more than one role. The records still distinguish the roles.

31.2 Claim definition and classes

A **Claim** is a statement about a person, Product, Capability, process, result, environmental effect, social effect, market status, historical event or future Route that may influence another person's understanding or decision.

Claim classes include:

- Historical Claim;
- Current Implementation Claim;
- Capability Claim;
- Performance Claim;
- Qualification Claim;
- Acceptance Claim;
- Environmental Claim;
- Social Claim;
- Commercial Claim;
- Roadmap Claim.

A material Claim records its ID, text, class, owner, subject, scope, jurisdiction, Product or version, effective date, Evidence references, Evidence strength, known limitations, review date, correction Route and state.

Claim states are:

> DRAFT · UNDER_REVIEW · EVIDENCED · APPROVED_FOR_BOUNDED_USE · PUBLIC · CHALLENGED · CORRECTED · DEPRECATED · WITHDRAWN · RETIRED

31.3 Evidence strength

Evidence may be a source record, Provider declaration, internal implementation record, internal Test, independent Test, user or customer Acceptance, public institutional record or regulatory/certification Evidence.

The class helps the reader understand who produced the Evidence, whether it is independent, what scope it supports and what stronger Claim it cannot support.

31.4 No silent Claim upgrade

The following upgrades are prohibited without a new review:

> Founder experience → current Product qualification
> Supplier availability → integrated Capability
> Prototype → Safe-to-Test
> Safe-to-Test → Safe-to-Make
> Safe-to-Make → market ready
> Internal Test → independent certification
> Public demonstration → official adoption
> Funded project → government approval
> One accepted pilot → universal conformance
> Potential environmental benefit → verified environmental outcome

31.5 Public demonstration boundary

A public demonstration may prove that an interface existed, a device connected, a workflow was shown or a participant experienced a bounded function. It does not automatically prove long-term reliability, procurement, certification, public deployment, suitability for every user or commercial scale.

The Hong Kong Government release records a Smart Traffic Fund-supported private-enterprise project using AI computer vision in smart glasses to assist visually impaired persons with obstacles and transport-related features. It also records the Director of Transport's visit to the Smart Hong Kong Pavilion. The source supports the public project and demonstration context. It does not identify that enterprise as InnoSpire in the registered text, and it does not constitute certification, procurement or endorsement of this white paper [GOV-01].

The CityU HK Tech 300 profile describes InnoSpire as an HKSTP incubatee and attributes the "Hybrid AI+Human" smart-glasses direction and listed achievements to the company profile. It is an external institutional record, not an independent performance Test [EXT-01].

31.6 Product-interface Claim discipline

Each public interface should identify what is Live, Demo, POC, Field Trial, Proposed, Unavailable, Suspended or Retired.

An unavailable Capability should not be simulated as live without a visible Replay or demonstration label. An AI-generated example should not be presented as actual user Evidence. A prototype interface should not silently display a mature-Product status.

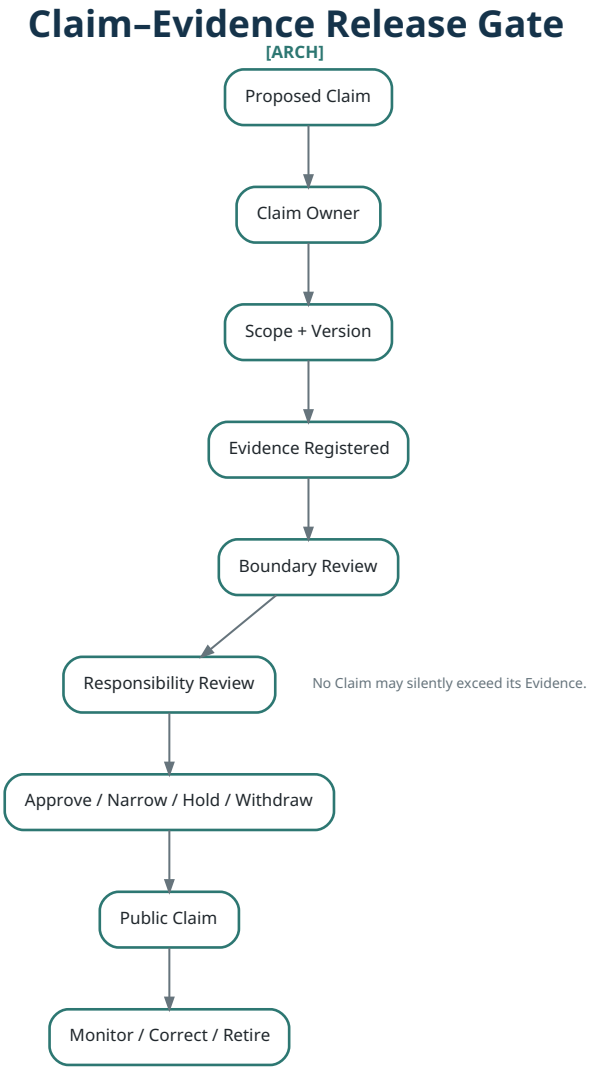


Figure 31.1 — Claim–Evidence Release Gate. [ARCH] Original HRI diagram. A Claim proceeds only after Claim Owner, scope, Evidence, boundary and responsibility review. Correction and retirement remain active after publication.

31.7 Correction, dispute and retirement

A correction records the original Claim, reason, corrected Claim, affected Products and pages, responsible Authority, effective time and whether any prior decision must be re-examined.

A dispute may concern factual correction, scope disagreement, Evidence challenge, lived experience, contractual dispute, safety incident or malicious content. Dispute does not automatically erase the original record. It may suspend the Claim from the Accepted Layer while review occurs.

A withdrawn Claim must be removed from active websites, PDFs, partner decks, Touchpoints, sales materials and Bot responses where operationally possible. The governed history retains the withdrawal record and reason.

31.8 Relationship to the Canonical Lifecycle

Claim drafting is a proposed object. Claim scope establishes Context. A Claim Owner establishes responsibility. Evidence supports review. Public release is an Acceptance decision for a bounded communication purpose. Challenge creates a new Perception and dispute Context. Correction creates a new accepted version. Withdrawal is Retirement.

> **Boundary:** This chapter defines corporate and publication discipline. It does not replace company law, consumer law, professional regulation, Product-safety law, employment law, contractual liability or formal certification.

32 — PRIVACY, SAFETY, SECURITY AND CROSS-BORDER OPERATION

Chapter question

How can HRI operate across people, smart glasses, AI Providers, Spaces and jurisdictions without turning temporary Perception into permanent surveillance or technical connectivity into unrestricted Authority?

Core argument

Privacy, safety, security and cross-border governance are distinct but connected. The architecture minimizes data, separates identities, contains Runtime privileges, keeps raw Perception close where appropriate, provides safe failure and establishes a fresh local operating basis whenever a Route crosses organizational or jurisdictional boundaries.

32.1 Four different governance questions

Privacy asks which information about people may be collected, used, retained, shared or deleted.

Safety asks whether the system's action or failure could cause physical, psychological, operational or Product harm.

Security asks whether an unauthorized party could access, alter, execute, impersonate or disrupt the system.

Cross-border operation asks which identities, data, Capabilities, Authorities and Evidence may move, remain local or require a new legal and operating basis.

A system may be secure but invasive. It may protect privacy while remaining physically unsafe. It may be safe in one Space and unauthorized in another jurisdiction.

32.2 Canonical data classes

The architecture distinguishes:

- Raw Perception Data — image, audio, video, sensor stream, device event or first-person capture;
- Derived Interpretation — AI description, object label, measurement, confidence score, summary or translation;
- Operational Data — Session, Runtime, Command, Provider, resource use, error and action log;
- Authority Data — consent, delegation, approval, budget permission and professional or site Authority;
- Evidence Data — Test result, Acceptance Record, Handoff, Artifact history, correction and incident;
- Public Projection — approved public page, selected Product facts, published image or public Claim.

A public projection must not expose all underlying data classes.

32.3 Purpose before collection

Before collection, the system identifies the declared purpose, minimum required data, affected people, retention period, processing location, Provider Route, available refusal or alternative and Evidence that must remain.

The architecture does not collect more merely because future AI analysis may find it useful.

32.4 Identity-light participation

A person should not be required to create a permanent public identity when the purpose can be achieved through a temporary alias, group role, opaque Session token, private Locker, anonymous learning participation or locally controlled record.

A stable Artifact identity does not require a stable public user profile.

32.5 First-person sensing and bystanders

Smart glasses create a special privacy boundary because capture may be less visible than phone photography and may reveal the wearer's attention history.

The initial discipline is:

> **Object First · Private First · Temporary First**

The system minimizes unrelated faces, private conversations, documents, payment information, credentials, prohibited exhibits, intimate Context and continuous attention history.

Bystander handling may require clear notice, no-capture zones, manual pause, local redaction, publication review and deletion.

32.6 Minors

A Minor Learning profile should default to:

- no required public account;
- minimal identity;
- no face recognition;
- no personality inference;
- no attention ranking;
- no automatic public posting;
- no continuous location history;
- a responsible-adult boundary;
- child-appropriate explanation;
- clear deletion and retention.

The child's own refusal remains relevant even where an adult organized the activity.

32.7 Security architecture

The minimum security architecture includes least privilege, typed identities, opaque public tokens, public/Admin separation, Session expiry, Runtime isolation, Provider-secret isolation, credential rotation, encrypted transport, protected storage, access logging, integrity checks, resource limits, incident detection, recovery and retirement.

A user must not receive cloud administrator credentials, Provider API keys, SSH access, another Session's media or Authority outside the declared Route.

32.8 AI Output security

AI Output may contain incorrect instruction, unsafe suggestion, fabricated fact, prompt-injection result, hidden data leakage or unauthorized Command text.

The system distinguishes:

> MODEL OUTPUT · VALIDATED INTERPRETATION · AUTHORIZED COMMAND · ACCEPTED RESULT

A string that resembles a Command is not an authorized Platform Command.

32.9 Safety profiles and safe degradation

A Safety Profile identifies harm class, affected Principals, normal boundary, misuse, abnormal condition, supervision, stop condition, recovery, Test and Acceptance Authority.

When a Capability becomes uncertain or unavailable, the system stops consequential action, preserves the last known accepted state, informs the person, allows human takeover, may switch to approved static or Replay content and records the incident. It must not invent a successful result.

A network failure does not silently extend expired Authority.

32.10 Cross-border operation profile

A Cross-Border Operation Profile records origin, destination, participating organizations, data classes, sensitive-data status, purpose, recipient, processing and storage location, retention, legal or contractual mechanism, security controls, affected-person rights, Evidence custodian, local Authority and incident/termination Route.

The profile is not a substitute for legal analysis. It makes the analysis operationally possible.

32.11 Keep raw sight close

> **Raw sight stays close. Accepted Evidence travels.**

Raw media may remain on the device, phone or Local Spatial Edge. Only selected images or derived records enter a Session. Accepted Output and minimum Evidence may cross systems. Public pages receive curated derivatives. No central cloud automatically owns all Perception.

The correct boundary depends on purpose, risk and jurisdiction.

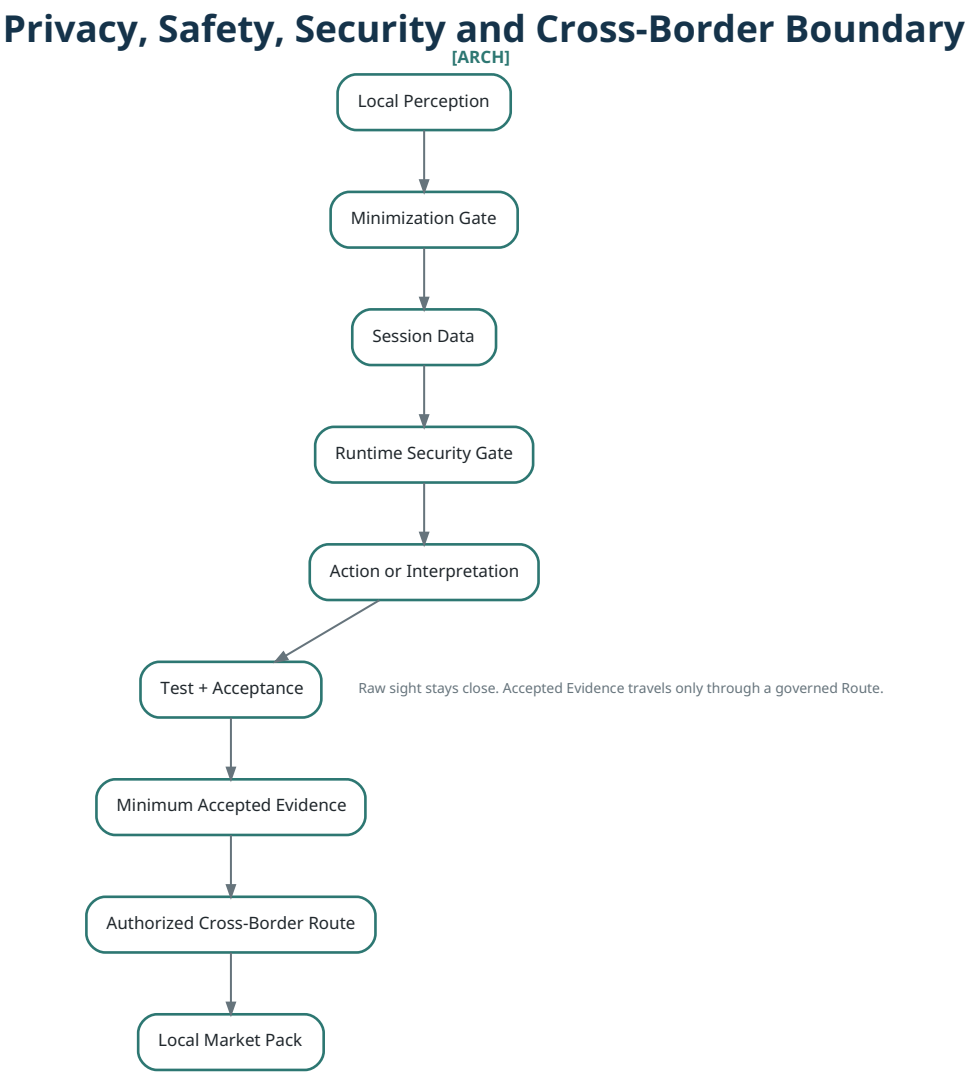


Figure 32.1 — Privacy, Safety, Security and Cross-Border Boundary. [ARCH] Original HRI diagram. Local Perception passes through minimization, Session, Runtime security, Test and Acceptance before minimum Evidence may travel through an authorized Route.

32.12 Incident state

Incident states are:

> DETECTED · CONTAINING · PAUSED · INVESTIGATING · CORRECTING · RETESTING · RE - STORED · CLOSED · DISCLOSURE_REQUIRED · CAPABILITY_SUSPENDED · ARTI - FACT_RECALLED

An incident may affect a Session, Runtime, Provider, MakeCell, Artifact, public Claim or Evidence set.

32.13 Relationship to the Canonical Lifecycle

Capture notice and choice govern Perception. Minimization constrains Context. Consent or delegation be - comes an Authority Binding. Runtime isolation belongs to Execution Preparation. Provider invocation is Execution. AI or device result is an Output. Human correction is Test or Context correction. Acceptance establishes the bounded result. Minimal Evidence closes it. Authorized transfer is Handoff. Expiry and deletion are Retirement actions.

> **Boundary:** This global architecture does not itself establish compliance with any local privacy, cybersecurity, child-data, consumer or sector-specific law. Each deployment requires a Local Market Pack and responsible review.

33 — SUSTAINABILITY AS AN EVIDENCE-BOUNDED EXECUTION DISCIPLINE

Chapter question

How can HRI support reuse, repair, local Capability and lower-waste production without converting plausible environmental benefits into unevidenced ESG Claims?

Core argument

Sustainability is not a Product label or software feature. It is an evidence-bounded comparison of demand, materials, process, transport, use, repair, recovery and outcome across the Artifact lifecycle.

33.1 Sustainability boundary

HRI may support more responsible outcomes by enabling better understanding before purchase, use of existing Space and assets, repair, component replacement, adaptation, production against accepted demand, local execution, Product continuity and recovery.

None of these outcomes is automatic. Local manufacture may use more energy. Repair may require long-distance shipping. A personalized Product may increase consumption. Digital continuity adds devices, storage, network and AI compute.

33.2 Four operating principles

See Before Buying

Understand the real object, Context and need before creating demand.

Reuse Before Replacing

Use an existing Artifact, component or Space where it remains suitable.

Reconfigure Before Rebuilding

Change arrangement, configuration or Workcell before creating new permanent infrastructure.

Produce Only against Accepted Demand

Avoid speculative physical production where a bounded accepted requirement can be established first.

These are decision principles, not outcome Claims.

33.3 Sustainability Evidence classes

Evidence class	Minimum question
Demand Evidence	Who requested the object, what need was accepted and was production demand-bound?
Material Evidence	What material, supplier, batch, mass, recycled/reclaimed status and substitution apply?
Process Evidence	Where and how was it made; what energy, yield, scrap and rework were recorded?
Transport Evidence	What origin, destination, mode and movement count apply?

Evidence class	Minimum question
Use Evidence	Was it actually used, for how long and under which maintenance or failure history?
Repair and Reuse Evidence	What was repaired or replaced and did use continue?
Recovery Evidence	Was it reused, refurbished, harvested, recycled or disposed?
Social Evidence	Who performed the work, under which training, safety, compensation and Acceptance?

33.4 Evidence boundary before Claim

> Design Intent ≠ Supplier Declaration ≠ Batch Evidence ≠ Certified Claim ≠ Outcome Evidence

A supplier’ s recycled-content statement for one component does not automatically make the complete Artifact certified. A digital identity does not prove circularity. A repair Route does not prove that repair oc - curred.

33.5 Environmental hierarchy

The preferred sequence is:

> avoid unnecessary demand → use existing asset → reconfigure → maintain → repair → reuse → adapt → remanufacture → recover component → recycle material → dispose responsibly

The sequence is not absolute. Safety or contamination may make reuse unsuitable. A more durable new object may outperform repeated repair. Context and Evidence govern the decision.

33.6 Local production boundary

Local production may reduce lead time, enable personalization, support local repair and lower transport for some Jobs. It may also create low equipment utilization, inefficient small batches, duplicated machinery, higher local energy use and inconsistent quality.

A local-production Claim compares actual Routes rather than treating locality as a benefit by definition.

33.7 Digital and AI footprint

The Platform consumes devices, servers, storage, network, AI-provider compute, maintenance and replacement hardware.

It should minimize continuous capture, unused media retention, repeated AI processing, duplicated storage and oversized models where a smaller method is sufficient.

33.8 Rebound risk

Efficiency may increase total consumption. Cheap personalization may create more unnecessary objects. Lower POC cost may create many unused POCs. Easy local printing may increase paper use. Rapid versioning may shorten Product life.

The system should monitor whether lower cost per unit produces a higher total impact.

33.9 Social-value boundary

Potential social value includes accessibility, local learning, new Builder roles, participation by small suppliers, repair skills and work for people excluded from conventional production.

Social value requires safe work, real choice, training, clear responsibility, fair compensation, accepted Output and repeatable Capability. Participation count alone is insufficient.

33.10 Sustainability Claim ladder

> L0 Design intention
> L1 Supplier declaration
> L2 Batch-documented input
> L3 Process and material Evidence
> L4 Applicable third-party certification
> L5 Delivered Artifact Evidence
> L6 Use, repair or recovery outcome
> L7 Comparative lifecycle conclusion within a declared method and scope

The public Claim must not exceed the achieved level.

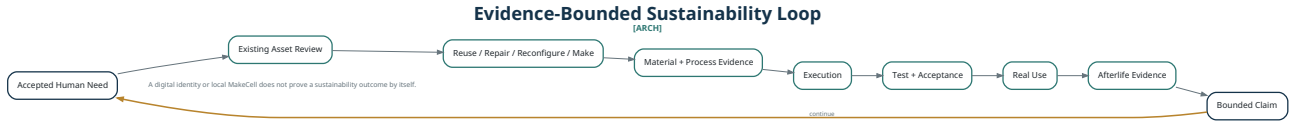


Figure 33.1 — Evidence-Bounded Sustainability Loop. [ARCH] Original HRI diagram. Accepted demand, existing assets, materials, process, real use and afterlife Evidence precede a bounded sustainability Claim.

33.11 Relationship to the Canonical Lifecycle

Identifying the need and existing assets is Perception and Context. Selecting reuse, repair or make is Intent. Finding a Provider is Capability. Approving material and Route is Authority. Execution changes the Artifact or state. Test measures Output and waste. Acceptance closes the bounded result. Material and process records become Evidence. Use, maintenance and recovery are Continuity and Retirement.

> **Boundary:** HRI does not claim automatic carbon reduction, ESG compliance, circularity, certi - fication, Digital Product Passport conformity, zero waste or sustainability from local manufacture alone.

PART XII — REFERENCE IMPLEMENTATIONS, VALIDATION AND ROADMAP

Build only the next Claim the current Evidence can support

A reference implementation is a bounded physical or digital system used to Test an architectural distinc - tion, expose failure, produce Evidence, improve a specification and support a stronger Claim. It is not a promise that the full Platform already exists.

34 — PERCEPTION AND ENTRY REFERENCE

Chapter question

What has been sufficiently evidenced in perception, smart glasses and URL-based entry, and what remains a proposed TapPort or HRI extension?

Core argument

The strongest current reference implementation is a bounded smart-glasses-to-URL workflow with device state, image capture, API description and human Save/Delete. External records support the accessibility and public-innovation Context. Measurement, cable estimation, TapPort Journey and Graph extensions remain POCs or proposed infrastructure.

34.1 Historical reference

The 2015 conference record documents a presentation titled Machine Vision and Industry 4.0 by Liao Yan at the Second Global Sensor Summit and China Internet of Things Application Summit [HIST-01]. It supports a documented continuity from machine perception and industrial systems to the later HRI thesis. It does not prove that the current Platform architecture existed in 2015.

34.2 External institutional reference

CityU HK Tech 300 describes InnoSpire Technology Limited as an HKSTP incubatee and presents its stated "Hybrid AI+Human" smart-glasses direction for visual impairment and remote support. It also lists CityU HK Tech 300 Angel Fund support in 2022 and earlier awards [EXT-01]. These are source-attributed institutional records, not independent technical Tests.

34.3 Government public Context

The Hong Kong Government release dated 13 April 2026 describes a Smart Traffic Fund-supported private enterprise developing AI computer-vision smart glasses to assist visually impaired persons with obstacles, bus stops, carriageways, footpaths and navigation. It also records the Director of Transport's visit to InnoEX [GOV-01].

The source supports the public project and mobility Context. It does not name the enterprise in the registered text and does not constitute Product certification or unrestricted deployment approval.

34.4 Working smart-glasses reference

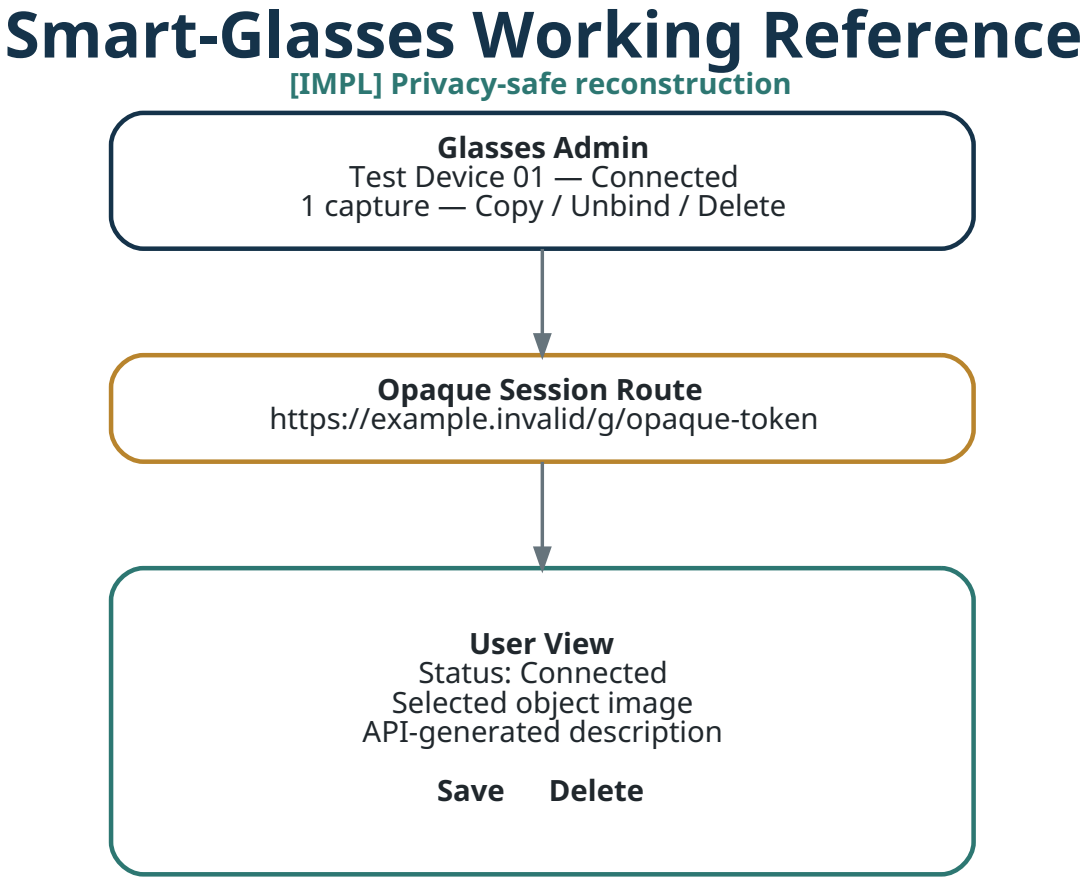
The current smart-glasses demonstration visibly contains:

- one link per pair of glasses;
- creation of a unique URL;
- Copy, Unbind and Delete;
- connection state;
- photo count;
- a photograph received from the glasses;
- an API-generated description;
- Save;
- deletion of the image and description [IMPL-01].

This supports the bounded implementation Claim:

> A pair of smart glasses can be associated with a dedicated URL that presents device state, received media, an API-generated interpretation and separate human Save/Delete decisions.

The public proof uses a privacy-safe interface reconstruction rather than the unredacted source screenshot.



Names, live-looking URLs and device identifiers have been replaced. Functions reflect [IMPL-01].

Figure 34.1 — Smart-glasses working reference. [IMPL] Privacy-safe reconstruction based on [IMPL-01]. It preserves the supported functions while replacing personal names, live-looking URLs and device identifiers with non-identifying examples.

34.5 What the reference does not prove

The current source does not prove full Device Host/Viewpoint Host separation, production identity federa - tion, complete privacy profiles, bystander handling, complete raw-media deletion semantics, multi-glasses Journey orchestration, production Locker, public-space field reliability, autonomous navigation safety, complete Provider portability or cross-border legal compliance.

34.6 Product and Runtime direction

The current InnoSpire product overview connects a Smart Glasses Kit, hosted Python Runtime, NFC/RFID activation, design Output and a documented `Order` → `Build` → `Handoff` sequence [IMPL-04].

It supports an implementation direction connecting Perception, Runtime, physical activation, design and Handoff. It does not establish the full InstantReady, TapPort or AfterMake Platform.

34.7 Measurement POC

The 2D/3D measurement poster describes image upload or live webcam input, optional camera-to-ground height, pitch, field of view or reference quadrilateral, human target selection and outputs for target width, height and camera distance [IMPL-02].

It is Evidence of a candidate Perception-to-measurement workflow. It is not Evidence of automatic geometry truth, universal accuracy or direct canonical spatial write.

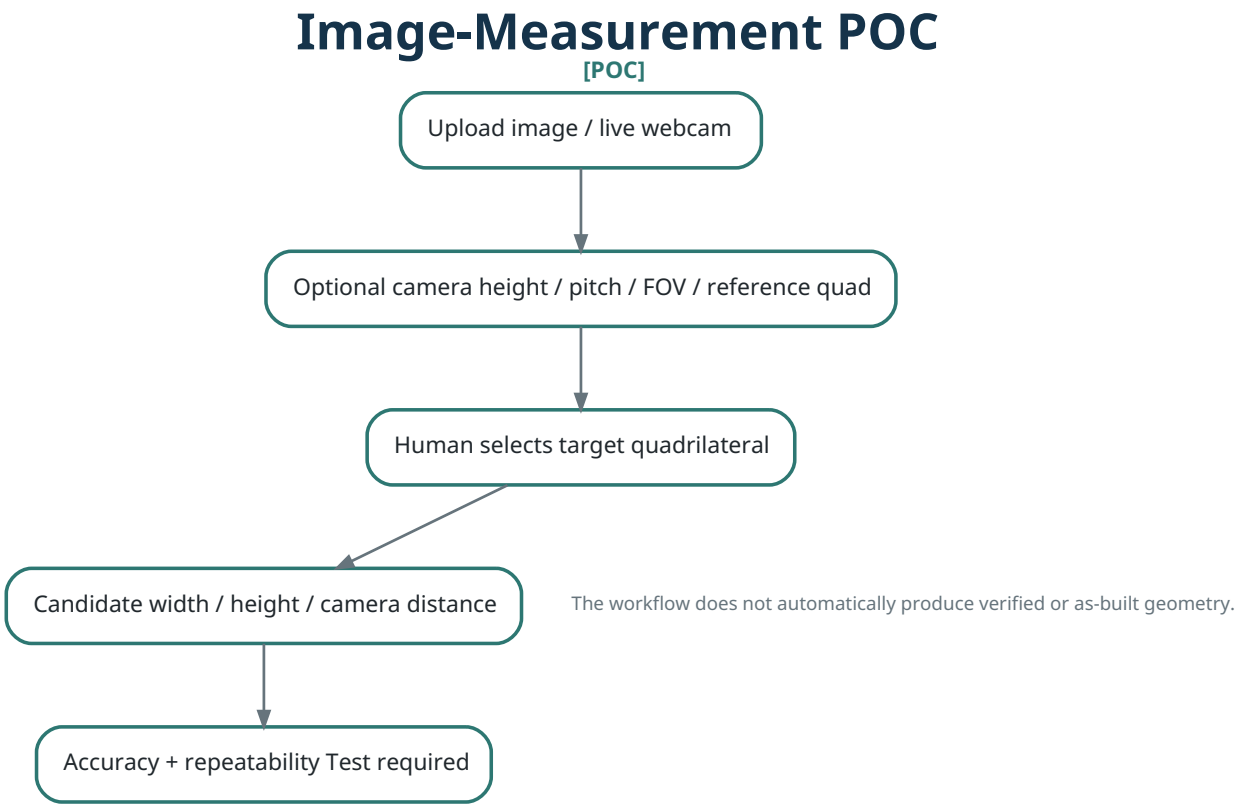


Figure 34.2 — Image-measurement POC. [POC] Original HRI redrawing based on [IMPL-02]. The figure preserves human target selection and camera assumptions.

34.8 Socket and cable POC

The Socket Cable Estimator poster states that the tool detects a wall socket from an image or live camera, estimates cable length to a target device, uses template matching and requires a camera perpendicular to a vertical wall and floor [IMPL-03].

It supports a POC-level movement from Perception to a candidate physical requirement. It does not estab - lish connector, electrical, protocol, routing, manufacturing, Test or Acceptance requirements.

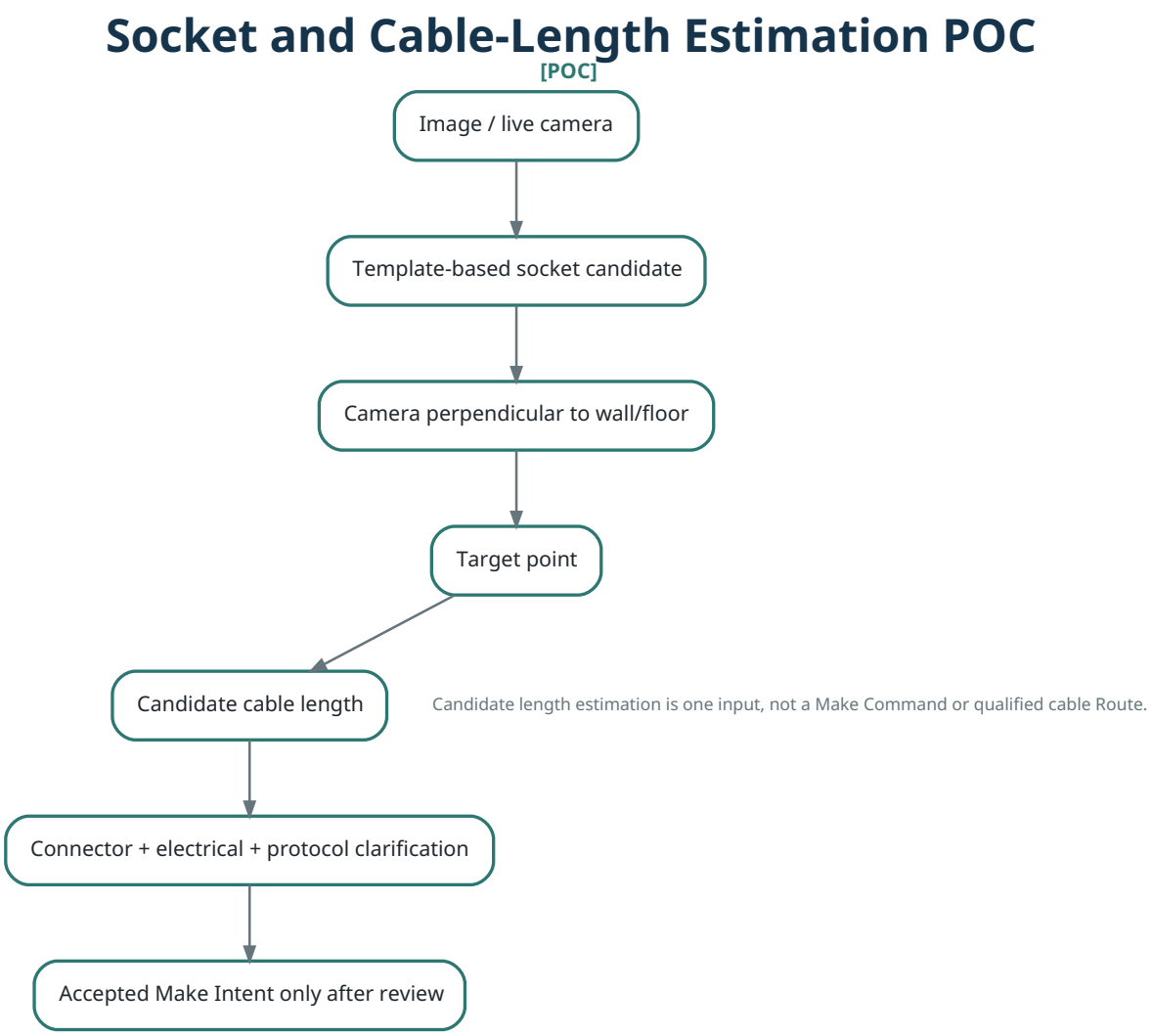


Figure 34.3 — Socket and cable estimator POC. [POC] Original HRI redrawing based on [IMPL-03]. Candidate length estimation is one input to a later Accepted Make Intent, not a Make Command.

34.9 Minimum perception-and-entry reference Test

A minimum Test includes one identified Device Host, one opaque participant or role Route, one bounded Session, one intentional object capture, one AI description, one human correction opportunity, one Save decision, one Delete decision, one Provider-failure fallback, one Evidence record and one Session retire - ment.

Acceptance requires public/Admin separation, identifiable device connection, distinction between media and AI description, working human Save/Delete control, truthful Provider-failure state, declared retention, no autonomous-safety Claim and reproducible Handoff.

34.10 Relationship to the Canonical Lifecycle

Glasses image is Perception. Scene and use purpose are Context. Human question is Intent. AI model is Capability. Session and consent supply Authority. Provider call is Execution. Description is Output. Human correction is Test or Context correction. Save/Delete are retention or rejection decisions. The reference record is Evidence. Continued URL is Handoff and Continuity. Expiry is Retirement.

> **Boundary:** The smart-glasses reference is the strongest demonstrated Perception-and-entry foundation. It must not be described as the complete TapPort or HRI Platform.

35 — SPATIAL AND PHYSICAL EXECUTION REFERENCE

Chapter question

What spatial and physical execution Capabilities currently exist, what remains at POC level, and what must be demonstrated before InstantSpace, MakeHere and AfterMake can support stronger production Claims?

Core argument

The current spatial reference supports a governed browser-first foundation and protected draft formation. Perception POCs can contribute candidate spatial and Product requirements. A qualified MakeCell, first accepted productive Output, complete Artifact Host and repeatable AfterMake loop remain to be demonstrated.

35.1 Current Implementation Boundary

Layer	Current Evidence state	Supported Claim	Not yet supported
Historical practice	Registered source	Machine-vision and industrial-system work documented by 2015	Full HRI architecture in 2015
External company Context	Institutional source	InnoSpire described as HKSTP incubatee with stated hybrid AI/human smart-glasses work	Independent proof of every performance Claim
Public project Context	Government source	Smart Traffic Fund-supported smart-glasses project direction for visually impaired mobility	Certification, procurement or universal deployment
Smart-glasses URL	Working demonstration	One link per glasses entry, connection, image, API description, Save/Delete	Complete Viewpoint Host, Journey or federation
Runtime/NFC/Handoff	Product material and internal evidence	Selected Runtime, Touchpoint, Authority and Handoff components	Full InstantReady Platform
Image measurement	POC	Candidate image-to-dimension workflow under stated inputs	Verified universal measurement
Cable estimation	POC	Candidate socket and length estimation under stated assumptions	Qualified cable-production Route
TapPort Field Trial	Field-trial material	Bounded external-load preparation and preview	Product-market validation
InstantSpace reference	Internal governed foundation	Browser-first spatial model and protected drafts	Active productive Space
MakeHere/MakeCells	Proposed architecture	Capability and Job contracts defined	Qualified operating network
AfterMake	Proposed architecture	Artifact, Delta, Branch and Next URL model defined	Production post-delivery Platform
Accepted Reality Graph	Proposed architecture	Canonical Graph relationships defined	Production Graph service
Federation	Research direction	Conditions defined	Operational federation

35.2 First physical reference Jobs

The preferred first complete physical reference is a low-risk **Print–Bind–NFC Job**:

> Accepted content → Accepted Make Intent → Print Capability → Bind Capability → NFC Capab - ility → authorized Make Manifest → physical production → NFC verification → visual and functional Test → Acceptance → Artifact Host → Next URL

A cable reference provides a stronger engineering Test and requires use Context, connector types, length, power/data requirements, BOM, material Evidence, assembly process, electrical/functional Test, label, Handoff and customer Acceptance.

The visual estimator may supply one input. It cannot supply the complete Job.

35.3 AfterMake reference

A complete AfterMake reference begins after one Artifact is delivered:

> Artifact in use → one Reality Delta → one selected resolution Route → one repair or Change Branch → new Accepted Make Intent → new Make Manifest → comparative Test → reacceptance → Accepted Next Artifact → Next URL

The first reference should not begin with a complex regulated Product.

35.4 Validation Ladder 1.0

The Validation Ladder is an internal publication and operating control, not an external certification scheme.

Level	State	Evidence question
L0	Thesis	Is the problem and proposed architecture clearly defined?
L1	Registered Evidence	Is a source, implementation record or historical Artifact preserved?
L2	Working Component	Does one bounded technical component operate?
L3	Integrated POC	Do several components form one limited working loop?
L4	Safe-to-Test	May a declared Test proceed under supervision and limits?
L5	Field Trial	Has a real external participant or Context exercised the bounded loop?
L6	First Accepted Output	Has one real result passed Test, Accept - ance and Evidence Closure?
L7	Repeatable Reference	Has another person or Session repeated the result under the same boundary?
L8	Second-Site Replication	Has a new site formed the Capability with fresh local Identity, Context, Authority and Acceptance?
L9	Qualified Partner Operation	Has a partner operated under a reviewed Capability Manifest?
L10	Federated Interoperation	Have independent nodes exchanged typed identities, Authority, Evidence and continuity?
L11	Sector-Qualified Scale	Have applicable Product, professional, regulatory and market requirements been met?

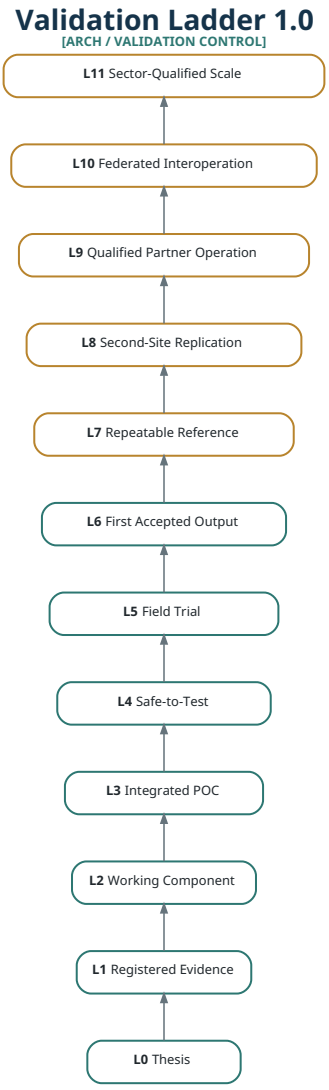


Figure 35.1 — Validation Ladder 1.0. [ARCH / VALIDATION CONTROL] Original HRI diagram. Each higher level requires Evidence from the levels below it.

35.5 Reference Implementation Matrix

Ref ID	Reference	State	Primary question	Next Acceptance gate
RI-01	2015 Machine Vision re - cord	Documented History	Is there historical con - tinuity?	Source registration com - plete
RI-02	InnoSpire HK Tech 300 profile	External Record	Is the company and smart-glasses direction extern - ally recorded?	Keep wording source-specific
RI-03	Smart Traffic Fund public record	Government Record	Is there a public accessib - ility and transport Con - text?	Do not upgrade to certi - fication
RI-04	One-link-per-glasses Demo	Working Component / POC	Can one device entry produce capture, AI de - scription and Save/Delete?	Repeatable clean Session
RI-05	2D/3D Measurement	POC	Can image and camera inputs produce candidate dimensions?	Accuracy and repeatability Test
RI-06	Socket Cable Estimator	POC	Can Perception produce a candidate physical re - quirement?	Compare against meas - ured Routes

Ref ID	Reference	State	Primary question	Next Acceptance gate
RI-07	TapPort Field Trial 000	Field-trial preparation	Can an external participant understand and operate the entry Route?	Field Trial Evidence Pack
RI-08	InstantSpace / IR6K shell	Internal foundation	Can one Space maintain governed browser-visible state?	First Workcell and accepted Output
RI-09	Print–Bind–NFC Job	Proposed reference	Can several Capability Atoms close one Artifact lifecycle?	Accepted Artifact Host
RI-10	Cable MakeCell Job	Proposed reference	Can visual Context become a Tested cable Artifact?	Customer Acceptance and Handoff
RI-11	One Object, One Delta, One Next URL	Proposed AfterMake pilot	Can post-delivery experience produce a next accepted Artifact?	Comparative reacceptance
RI-12	Second-Site Clone	Research Route	Can Capability replicate without Authority leakage?	New-site first accepted Output
RI-13	Federated Node Exchange	Research Route	Can independent operators share semantics without central ownership?	Federation conformance Test

35.6 Validation Evidence Pack

Each reference produces Reference ID, problem, scope, state, responsible owner, system/version, normal Test, failure Test, Authority, Output, Acceptance, Evidence, limitations, unresolved items and next level.

A photograph of an event is not sufficient.

35.7 Relationship to the Canonical Lifecycle

Reference implementations are evaluated through the same lifecycle as Products. A POC may contain an accepted Output within its bounded POC scope. That does not make the complete Product market ready.

> **Boundary:** The current spatial and physical work supports a governed foundation and candidate inputs. It does not yet evidence a complete productive Space, qualified MakeCell family or production AfterMake loop.

36 — FROM FIELD TRIAL TO FEDERATED INFRASTRUCTURE

Chapter question

What sequence can convert the current Evidence and POCs into repeatable reference infrastructure without scaling faster than Authority, Evidence, safety and local responsibility?

Core argument

The next 18 months prioritize closed-loop Evidence, reference cells, first accepted Outputs, second-site replication and selective federation. Federation proceeds only when identities, lifecycle states, Authority, Evidence, security, correction and retirement semantics are interoperable.

36.1 Field Trial as external load

A Field Trial is not a Product launch. It introduces an external person, unfamiliar Context, real time pressure, device/network failure, communication uncertainty, privacy risk and Handoff responsibility.

It asks whether another person can understand the Route, whether the system fails visibly and safely, whether the operator can recover, whether Evidence distinguishes what worked from what was simulated and whether the next Builder can continue the work.

36.2 Gate-based development

> Gate 0 — thesis and scope clear
> Gate 1 — one component works
> Gate 2 — one bounded integrated loop works
> Gate 3 — loop is Safe-to-Test
> Gate 4 — one real participant completes it
> Gate 5 — one result is accepted and evidenced
> Gate 6 — the result is repeated
> Gate 7 — a second site forms the Capability
> Gate 8 — a qualified partner operates it
> Gate 9 — independent nodes interoperate

Capital, public Claims and partner expansion follow the gates rather than precede them.

36.3 18-Month Roadmap

Months 0–3 — Foundation Closure and First External Load

Complete TapPort Field Trial 000, freeze canonical object names, separate public/Admin Routes, prove a clean smart-glasses Session, define raw-media retention, complete the first Builder Handoff and close the Global Foundation Publication Candidate.

Gate: L5 Field Trial for the TapPort entry Route.

Months 4–6 — First Closed Physical Loop

Complete a Print–Bind–NFC reference Job, create the first Artifact Host, complete one Reality Delta, complete one repair/adaptation/Branch and produce one Accepted Next Artifact.

Gate: L6 First Accepted Output.

Months 7–9 — Spatial and Multi-Host Reference

Form one InstantSpace Workcell, operate one Local Spatial Edge profile, separate Device Host and View - point Host, complete a multi-Host visibility Test and produce one accepted Output inside the reference Space.

Gate: L7 Repeatable Reference at the first site.

Months 10–12 — Second-Site Replication

Prepare a Clone Package, select a second site, perform a fresh survey, bind fresh local Authority, form the local Workcell, produce the first accepted Output and compare source and destination.

Gate: L8 Second-Site Replication.

Months 13–15 — Selective Partner and Sector Pilots

Qualify one or two partner MakeCells, operate one merchant/travel Scene, operate one education/access - ibility profile, Test Artifact portability and Provider substitution and complete Local Market Pack tem - plates.

Gate: L9 Qualified Partner Operation.

Months 16–18 — Controlled Federation and Commercial Readiness Review

Connect independent nodes through shared identity and Evidence semantics, Test Resolver portability, cross-node Authority, correction and retirement, compare Platform economics and publish an Evidence-bounded Release 1.1 decision.

Gate: L10 Federated Interoperation for the declared limited scope.

No phase guarantees progression to the next.

36.4 Second-site replication logic

A second-site Clone transfers a Capability Blueprint, Formation Recipe, required object/equipment profiles, Test method, Evidence template, Acceptance criteria, known failure modes, training and Handoff.

It does not transfer live credentials, private keys, local personal data, professional approval, site-control Authority, customer Acceptance, verified source-site measurements or current safety state.

The sequence is:

1. create a new Space ID;
2. perform a new local survey;
3. register local objects and tools;
4. identify local operators;
5. establish local privacy, safety and security profiles;
6. bind fresh Authority;
7. form the Workcell;
8. run normal and failure Tests;
9. produce one local Output;
10. obtain local Acceptance;
11. close local Evidence;
12. compare source and destination;
13. record differences;
14. decide whether the Capability is repeatable, adapted or rejected.

> Copying duplicates files. Replication recreates the Capability under fresh local reality. Federation allows independently governed replicated Capabilities to interoperate.

36.5 Federation definition and conditions

Federated HRI is a network of independently governed nodes that can resolve shared identities and ex - change bounded Intent, Capability, Authority, Evidence, Acceptance and continuity records without requiring one entity to own every Space, Provider, Artifact or underlying data store.

Federation is not central ownership, unrestricted data sharing, universal Authority, automatic mutual qualification, one global database or one Provider.

Federation conditions include:

- identity semantics for Principal, Host, Session, Runtime, Capability, Artifact and Evidence;
- lifecycle semantics for Proposed, Authorized, Executed, Tested, Accepted, Corrected and Retired;
- Authority semantics for request, authorization, execution, Acceptance and revocation;
- Evidence semantics for source, version, integrity, scope, custodian and correction;
- security minimums for authentication, authorization, transport, secrets, incident communication and revocation;

- privacy boundaries for purpose, minimization, local retention, cross-border mechanism and affected-person rights;
- Provider portability, qualification, suspension and replacement;
- dispute, correction and suspension from the Accepted Layer;
- retirement, successor, export and residual Evidence;
- economic and responsibility boundaries for charge, payment, warranty, return and incident.

Technical exchange without semantic alignment creates false interoperability.

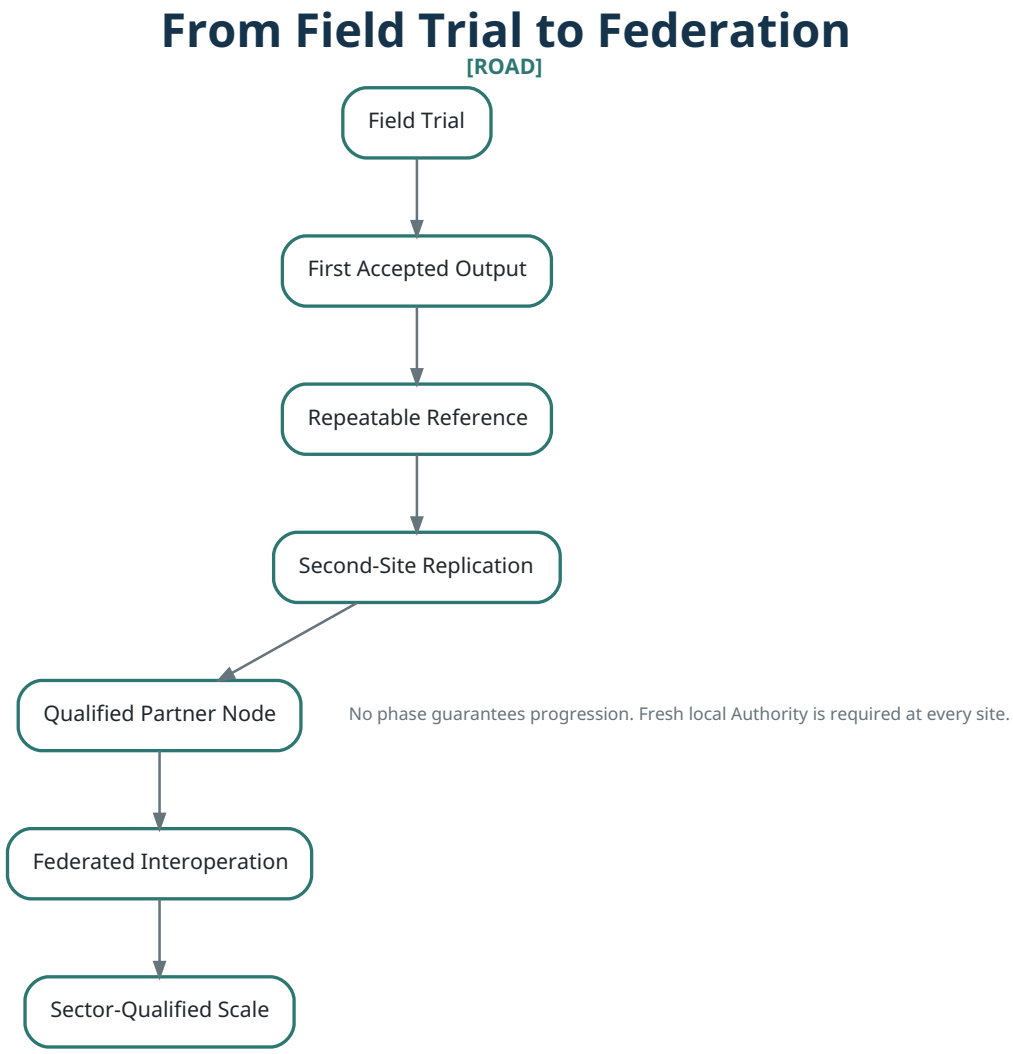


Figure 36.1 — From Field Trial to Federation. [ROAD] Original HRI diagram. One accepted Output precedes repeatability, second-site replication, qualified partner operation and limited federation.

36.6 Open research questions

The research agenda includes:

Intent and Context — How much Context is sufficient before an Intent may be evaluated? How should inferred Intent remain correctable? How should conflicting Intent among affected Principals be represented?

Human Agency — What makes consent meaningful in a fast physical workflow? Which low-risk actions may be delegated? How should bystanders exercise practical control?

Smart glasses and Perception — How should Device Host and Viewpoint Host remain separate? Which capture indicator is sufficient? How much raw media must be retained? How should uncertainty affect physical execution?

Acceptance and Evidence — What minimum Evidence is required for each Acceptance class? How should conditional Acceptance expire? How do corrections propagate across federated nodes?

InstantSpace — What geometry quality is sufficient for each Workcell class? Which observations may be accepted automatically? How can Local Spatial Edge remain useful while disconnected without extending expired Authority?

Physical Subscribers and Micro-BOM — What is the smallest viable Capability Atom? How should re-claimed parts be qualified? Which Jobs must never be routed through a general Physical Subscriber network?

AfterMake — Which Reality Deltas can be resolved without remake? How should a unit-level Delta become a Product-class issue? What makes a Next URL worth reopening?

Accepted Reality Graph — Which relationships require long-term retention? How can Graph value grow while raw personal data decreases? Can a federated Graph remain useful without a central operator?

Economics and learning — What is the cost of Evidence Closure? When does local production outperform centralized production? Does See–Ask–Make–Test–Accept–Continue improve learning? How should commercially valuable student and Intern work be compensated?

Sustainability — When does repair create a lifecycle benefit? How should rebound effects be measured? Can Artifact continuity improve actual recovery rates?

36.7 Decision after the roadmap period

The evidence may support:

- **GO** — the bounded system is repeatable and ready for selective scale;
- **NARROW** — one Product or sector is stronger while others remain research;
- **HOLD** — Evidence or operating capacity is insufficient;
- **REDESIGN** — the architecture requires a new boundary;
- **RETIRE** — a Product, Claim or Route should end.

A disciplined retirement can be a successful infrastructure outcome.

> **Boundary:** The Roadmap is a gate-based plan, not a delivery guarantee. Second-site replication and federation remain future validation states.

CONCLUSION — THE WORLD IS NOT FINISHED

GenAI has changed the cost of expressing an intention. A person can now generate language, images, software, configurations, plans and candidate designs with a speed that previously required substantially more time, training or organizational capacity.

This abundance is real. It is not the same as reality.

A generated proposal does not establish the Context in which it will be used. It does not establish who has Authority to act. It does not provide the Space, tools, materials, operators or qualified Capabilities required for Execution. It does not prove that the result will pass an applicable Test. It does not decide whether the person affected by the result will accept it.

The central thesis of this white paper is therefore unchanged:

HSIMC builds the missing infrastructure between AI intent and accepted reality.

The missing layer is not one more interface between a person and a model. It is the governed relationship among Perception, Context, Intent, Capability, Authority, Execution, Test, Acceptance, Evidence, Handoff, Continuity and Retirement.

HRI makes those relationships explicit so that an Intent can proceed without being mistaken for a Com - mand, a Capability can be used without being mistaken for Authority, and a completed process can be examined without being mistaken for an accepted result.

Its purpose is not to make every intention real. Its purpose is to make the Route into reality understandable, bounded and accountable.

The first loop — from Intent to Accepted Reality

The first loop begins with a person, organization, device or system perceiving something in the real world. That Perception enters a Context. The Context gives meaning to the observation: who, what, where, when, for which purpose, under which conditions and with which unknowns.

A desired outcome may then be expressed as an Intent. The Intent remains separate from Execution. A relevant Capability must be identified. A responsible Principal must hold or establish the Authority re - quired for the action. An Execution Plan states the limits, resources, Tests, Evidence and failure Routes.

Only then may a bounded Command enter a Runtime or reach a human, digital or physical Provider.

Execution may succeed. It may fail. It may stop halfway. It may produce an Output that appears complete but does not satisfy the original purpose.

The system therefore continues through Test and Acceptance. Acceptance does not mean universal truth. It does not mean that a prototype has become a qualified Product, that one pilot has become general conformity or that one organization’ s approval applies everywhere.

Acceptance means that an identified responsible person or authorized organization has accepted a bounded result for a declared purpose, against stated criteria and Evidence.

When the Evidence is sufficiently closed and the result is handed off, the first loop reaches **Accepted Real - ity**.

InstantReady provides the common identity, Session, Runtime, Authority, routing, Acceptance and Evid - ence relationships. TapPort provides the human-facing entry. InstantSpace provides the governed spatial Context. MakeHere and HSIMC MakeCells provide the Route to bounded physical Execution. The result remains humanly and institutionally accountable rather than merely machine-completed.

The second loop — from Accepted Reality to the Next URL

Traditional manufacturing and commerce often treat Handoff as the end. The Product is made. It is delivered. The transaction is closed.

Reality begins after that point.

The delivered Artifact enters a particular person’ s life, a particular Space and a particular use Context. It encounters conditions that the Product page, design model, production line and first Test may not have fully represented.

The Artifact may work as intended. It may require explanation or configuration. It may need repair. One component may be wrong while the rest remains useful. It may be technically correct but inaccessible to a particular person. The user’ s purpose may change. The Product may reveal a new and valuable use.

These differences form the second loop:

> Use → Observation → Reality Delta → Clarify / Configure / Repair / Adapt / Return / Branch → New Intent → Make Again → Test Again → Accept Again

AfterMake preserves this continuity. It does not convert every criticism into a defect determination. It does not require the person to accept repair, adaptation or participation instead of a valid return Route.

Where a new make is justified, the new physical result re-enters the same Canonical Lifecycle. It requires a defined Intent, suitable Capability, Authority, Make Manifest, Execution, Test, Acceptance and Evidence Closure. Only then does it become an **Accepted Next Artifact**.

The source Artifact remains part of the lineage. A rejected Branch remains part of the learning. The next version does not erase the first reality.

> **Manufacturing does not end with delivery. It creates the next URL.**

The Next URL is not merely another Product page. It is not automatically public, permanent or tied forever to one domain. It is a governed continuity Route through which an accepted Artifact may remain connected to its identity, version, Evidence, instructions, maintenance, repair, return, Change Branches, successor and Retirement.

The human remains inside both loops

Human Agency is not decorative. It is the continuous rail running through the architecture.

The person must be able, within the applicable responsibility boundary, to know, understand, correct, consent, refuse, pause, stop, restrict sharing, delete where applicable, return, reject, accept and begin another Branch.

AI may assist with Perception, translation, clarification, comparison, configuration and Evidence review. It may prepare a candidate Command or Make Manifest. It must not silently convert its interpretation into human Intent, its confidence into Authority or its completed Output into Acceptance.

Automation level and Authority level remain separate.

The Accepted Reality Graph is not a licence to accumulate every image, Prompt, location, gaze history or behavioural signal. TapPort is not a social network that requires public identity. A Locker is not an unlimited hidden cloud archive. Smart glasses are not a justification for continuous first-person surveillance. A learning system is not an instrument for ranking people through attention histories.

The Graph preserves the authorized relationship required to understand what happened—not the whole person.

What exists now

The registered Evidence base supports a documented 2015 machine-vision conference record [HIST-01], an external CityU profile of InnoSpire and its stated smart-glasses direction [EXT-01], a Hong Kong Government record of a Smart Traffic Fund-supported AI smart-glasses mobility project [GOV-01], and a working smart-glasses interface with one link per glasses entry, connection state, image capture, API description and human Save/Delete [IMPL-01].

Current Product material connects smart glasses, hosted Runtime, NFC/RFID, design Output and a documented `Order → Build → Handoff` sequence [IMPL-04]. Additional POCs explore image-based indoor measurement [IMPL-02] and socket/cable-length estimation [IMPL-03].

These foundations demonstrate that Perception, physical devices, URLs, AI interpretation, Runtime, Touchpoints, design and Handoff can meet inside bounded working systems.

They do not prove that the full infrastructure is complete.

What remains to be built

The next gates include a production-grade InstantReady Registry, Resolver, Session and Runtime boundary; a complete TapPort entry and temporary Locker service; a productive InstantSpace Workcell with one accepted physical Output; qualified reference MakeCells; a complete MakeHere Job Route; one Accepted Make Intent becoming one Tested and accepted Artifact; one real post-delivery Reality Delta; one repaired, adapted or branched Accepted Next Artifact; one complete Artifact Host and Next URL; one repeatable reference; one second site formed under fresh local Authority; and only then selective federation.

The Accepted Reality Graph must be implemented without becoming a raw-media or behavioural archive. The commercial model must be Tested without obstructing return rights. The learning model must be Tested without confusing participation with free labour or one POC with professional qualification. The sustainability thesis must be supported through material, process, use, repair and afterlife Evidence.

The road remains governed by one practical discipline:

> **One small complete success before unsupported scale.**

A small complete success contains one real problem, one responsible owner, one bounded Output, one Test, one Acceptance, one Evidence record, one Handoff and one next Route.

Several such successes may form a repeatable Capability. A repeatable Capability may form a reference implementation. A reference implementation may be reproduced at a second site. Independent sites may eventually federate.

No later stage should be claimed before its Evidence exists.

The Next URL

The world is not finished because no Accepted Reality is the final state of every object, Product, Space or human need.

An accepted result is not perfection. It is the point at which the result has become bounded, accountable and real enough to continue.

The Next URL may lead to use, maintenance, repair, return, correction, a successor, another person asking a better question, a Branch that fails and teaches why, a version serving a different Context or eventual Retirement.

Its value is not that every object remains permanently online. Its value is that the relationship between reality, responsibility and what happens next does not have to disappear at delivery.

The World Is Not Finished

> AI may generate an intention.
> Infrastructure must make it governable.
> People must decide whether the result is accepted.
> Every accepted result may then become the beginning of another reality.

APPENDIX A — CANONICAL GLOSSARY AND FOUNDATIONAL DISTINCTIONS

A.1 Contract status

These Appendices use concise normative language. **MUST** means required for consistency with the Canonical Model. **MUST NOT** means prohibited because it would collapse a frozen boundary. **SHOULD** means recommended unless a documented Context justifies another Route. **MAY** means permitted but not required.

This normative language does not make the white paper a formal standard or certification scheme.

A.2 Canonical glossary

Term	Canonical definition
Human Reality Infrastructure	The technical, physical, organizational and evidentiary infrastructure through which human Intent can become authorized Execution, Accepted Reality and continuing Capability.
Principal	A person, organization or explicitly defined role participating in, affected by or responsible for a lifecycle event.
Perception	Something observed, reported, measured or inferred by a human, device, sensor, model or imported source.
Perception Envelope	The bounded record preserving source, target, time, uncertainty, processing and retention state of a Perception.
Context	The conditions that give a Perception, Intent or action operational meaning.
Context Envelope	The versioned set of relevant Principal, object, place, time, purpose, state, constraint, risk and unknown conditions.
Intent	A desired outcome, direction or change. Intent is not an instruction to execute.
Intent Object	The versioned record defining desired outcome, target, scope, con - straints, success criteria, exclusions and current state.
Command	A bounded instruction directed to a selected Capability after Authority and preconditions have been established.
Capability	A declared and bounded ability to perform an action or produce an Output under stated conditions.
Capability Profile	The versioned description of actions, inputs, Outputs, limits, resources, qualifications, Tests and Evidence.
Provider	A person, organization, AI service, device, Space, MakeCell or system supplying a Capability.
Authority	The legitimate permission and responsibility to allow an action to proceed within a declared scope.
Authority Profile	A reusable description of which actions a Principal or role may authorize and under which limits.
Authority Binding	The operational connection of a Principal and Authority Profile to a Session, Intent, Capability, time and scope.
Runtime	The bounded computational and operational environment in which Capabilities are prepared or invoked.

Term	Canonical definition
Runtime Profile	The reusable contract defining tools, Providers, data, resources, policies, Evidence, stop rules and retirement.
Runtime Instance	One specific operating occurrence of a Runtime Profile within a Session.
Bot	A scoped interaction and coordination agent bound to a Host, Session or Runtime.
Execution Plan	The prepared relationship among Intent, Capability, Authority, action, resources, Tests, Evidence, failure and Acceptance criteria.
Execution	An authorized digital or physical attempt to perform a bounded action or create a state change.
Completion	The workflow state indicating that Execution has ended according to its process definition.
Output	A digital or physical result produced by Execution before applicable Acceptance.
Test	A declared method for examining an Output or state against specified criteria.
Acceptance	The explicit decision by a responsible person or authorized organization that a bounded result is acceptable for a declared purpose.
Acceptance Authority	The Principal or role permitted and responsible for the applicable Acceptance decision.
Evidence	A sourced and governed record supporting, limiting or challenging a Claim about what occurred.
Evidence Closure	The event through which the minimum required Evidence, versions, limitations, custodian and correction Route are frozen.
Accepted Reality	A bounded result that has been executed, examined, accepted and evidentially closed for a declared purpose.
Handoff	The documented transfer of a result, status, limitations, Evidence, responsibilities and next Routes.
Continuity	The governed ability of an accepted result to remain usable, maintain - able, repairable, returnable, improvable or retireable.
Retirement	The controlled end of active use, access, Authority, Capability, Route, version or Artifact status.
Next URL	A governed continuity Route associated with an Accepted Reality or Artifact. It is not necessarily public or permanent.
Canonical Identity	A stable, typed and preferably opaque internal reference distinct from display name, public URL and temporary token.
Registry	The logical system preserving canonical identities, typed metadata, state, version, responsible Principal and retirement.
Resolver	The service mapping a URL, QR code, NFC payload, token or partner identifier to the permitted representation of a canonical object.
Route	A governed path through which a role may view or act upon a canonical object.
View	The role-appropriate representation returned through a Route.
Session	A temporary operating boundary connecting purpose, participants, Hosts, Context, Intent, Authority, Runtime, privacy and expiry.
Host	A bounded, addressable state container representing a continuing relationship to part of reality.
Device Host	A Host representing a physical device and its technical state.
Viewpoint Host	A Host representing a person- or role-centred bounded perspective, distinct from the capture device.
Scene Host	A Host representing a bounded event, visit, shop, exhibition, class or field Context.
Space Host	A Host representing a governed physical Space, zone or spatial node.
Job Host	A Host representing one bounded Execution Plan, Make Manifest and Job state.
Artifact Host	A Host representing one accepted Artifact, configuration, batch or bounded result and its continuity.

Term	Canonical definition
Public Host	A deliberately published projection of selected information from another Host or Accepted Reality.
TapPort	The low-friction Entry Product through which a person, Product, Scene, Journey or Touchpoint opens a governed real-world Route.
Scene	A bounded interaction Context arranged for one purpose or purpose family.
Product Card	An encounter-layer representation of a Product, sample, object or offer. It is not the delivered unit.
Journey	A time-bounded continuity container linking Scenes, selected objects and participant choices.
Locker	A temporary, private or group-bounded holding space for selected Session or Journey items.
Touchpoint	A physical or digital carrier—such as QR, NFC, Product label or URL—that opens a Resolver Route.
InstantReady	The Core Reality Operating Platform for identity, Session, Context, Authority, Runtime, routing, Acceptance, Evidence, continuity and retirement.
InstantSpace	The Spatial Execution Platform for Space identity, geometry, Meta State, Time Evidence, Authority, Local Spatial Edge and Workcell formation.
Workcell	A bounded formation of people, objects, tools, materials, services and spatial relationships assembled for a declared task.
Formation Recipe	The versioned plan describing how resources may be arranged into a Workcell, including Authority, Test, Evidence, failure and rollback.
Physical Subscriber	A bounded physical Capability that may receive an authorized Job under declared process, material, operator, Test and Evidence conditions.
MakeCell	A qualified Physical Subscriber node capable of receiving declared Job classes and producing Evidence and Handoff.
MakeHere	The network interface through which an Accepted Make Intent may discover and reach a qualified Physical Subscriber.
Accepted Make Intent	A physical Intent accepted for Capability matching, quotation and make preparation. It is not Job Authorization.
Make Manifest	The Job-specific, versioned and authorized configuration stating what is to be made, by whom, with which inputs, process, Tests, Evidence and Handoff.
Capability Atom	The smallest useful unit of supply, process, Test, tool time, skill or physical Capability that can be independently identified and routed.
Micro-BOM Access	The governed ability to obtain, substitute, recover or locally produce small quantities of components and process units.
AfterMake	The post-delivery innovation infrastructure through which an Artifact may be supported, repaired, adapted, returned, branched, remade or retired.
Reality Delta	A structured difference among what was represented, intended, delivered and experienced in actual use.
Change Branch	A versioned proposal for an alternative Artifact, configuration, process or use Route originating from a Reality Delta or new Intent.
Accepted Next Artifact	A new or modified Artifact that has completed the applicable Make, Test, Acceptance and Evidence Closure cycle.
Accepted Reality Graph	The permissioned, evidence-bounded and versioned Graph connecting the identities and relationships through which reality is formed, accepted and continued.
TapPort Learning	The learning and human-Capability layer through which a real object, Scene, Space, problem or Touchpoint opens a bounded Learning Mission.
Accepted Learning Moment	A learning result examined and accepted for a declared learning purpose. It is not automatically a grade or qualification.
One Small Complete Success	One bounded result with a real problem, responsible owner, Output, Test, Acceptance, Evidence, Handoff and next Route.

A.3 Foundational distinctions

Perception ≠ Fact ≠ Authorization
Context ≠ Consent
Intent ≠ Command
Capability ≠ Authority
Runtime ≠ Provider
Execution ≠ Completion
Completion ≠ Test success
Test success ≠ Acceptance outside the declared scope
Evidence ≠ Claim
Acceptance ≠ universal certification
URL ≠ Canonical Identity
Save ≠ Share ≠ Broadcast ≠ Publish ≠ Make
Product Card ≠ Artifact Host
View Event ≠ Make Command
AI Proposal ≠ Job Authorization
Reality Delta ≠ automatic defect
Change Branch ≠ approved release
Delivery ≠ end of the reality lifecycle
Retirement ≠ necessarily deletion

APPENDIX B — CORPORATE, PLATFORM, PRODUCT AND DOMAIN MAP

B.1 Canonical map

Layer	Identity	Canonical role	Publication Route
Corporate Master	HSIMC	Corporate, industrial, standards, manufacturing, Evidence and long-term governance boundary	Corporate Route pending
Corporate Category	Human Reality Infrastructure	Category linking AI Intent, author - ized Execution, Accepted Reality and continuing Capability	This publication family
Core Platform	InstantReady	Identity, Registry, Resolver, Session, Authority, Runtime, routing, Ac - ceptance, Evidence, continuity and retirement	instantready.live
Entry Product	TapPort	Scene, Product, Journey, Locker and Touchpoint entry	tapport.live
Commercial Wedge	AfterMake	Artifact continuity, Reality Delta, repair, Branch and Next URL	aftermake.live
Technical specifications	AfterMake Tech	APIs, Manifests, Physical Subscriber contracts and partner specifications	aftermake.tech
Spatial Execution Platform	InstantSpace	Space identity, geometry, state, time, Authority, Edge and Workcells	instantspace.live
Physical Subscriber Network	HSIMC MakeCells / MakeHere	MakeCell discovery, qualification, Job routing and physical execution partnership	makehere.tech

Layer	Identity	Canonical role	Publication Route
Learning and Human Capability	TapPort Learning	Missions, Kits, Field Labs, Young Builders and Accepted Learning Moments	tapport.live/learn
Perception Capability	InnoSpire Smart Glasses	Smart glasses, assistive Perception, camera and wearable input	Provider-owned Routes
Experimental Runtime namespace	Homelinked	POC, Intern, Field Trial and pre-publication Runtime namespace	*.homelinked.tech
Retired / migration brand	SpaceGuide	Early learning research history and migration Route	spaceguide.live
Legacy vision R&D	VisionGo	Experimental vision, OCR and Per - ception-to-URL research namespace	visiongo.tech

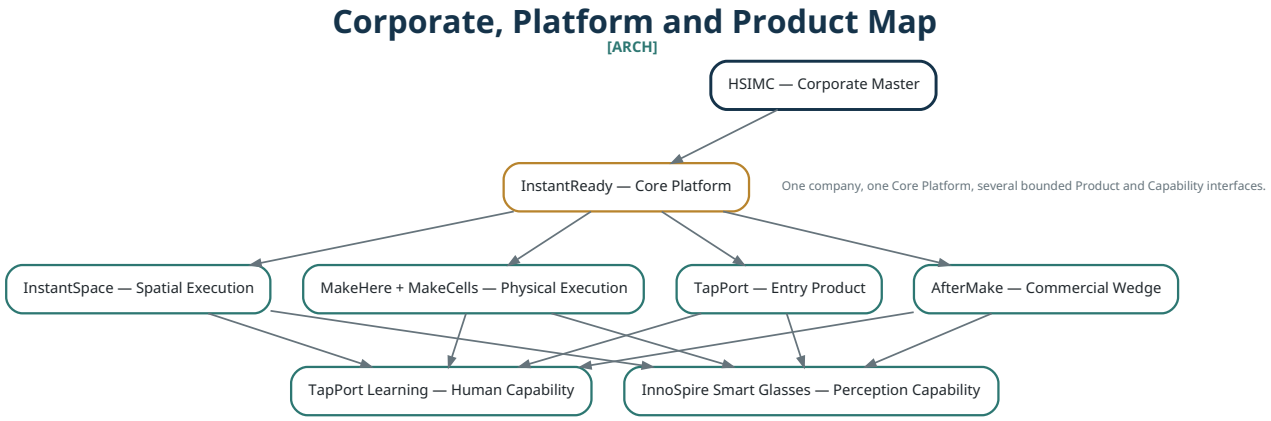


Figure B.1 — Corporate, Platform and Product Map. [ARCH] Original HRI diagram. One company and one Core Platform support several bounded Products and Capability interfaces.

B.2 Endorsement rule

Approved Product endorsement SHOULD use:

> Product Name — An HSIMC Product · Powered by InstantReady

The first public screen MUST NOT require the user to understand every identity before completing the primary action. Legal, Product-responsibility and Provider attribution remain available where relevant.

B.3 Shared Platform rule

Canonical Identity, opaque token, Registry, Resolver, Session, consent and Authority, Runtime, Provider routing, Acceptance, Evidence, notification, Artifact Registry, Physical Subscriber Registry, version and retirement SHOULD be shared through InstantReady.

A Product MAY add domain-specific fields. It MUST NOT create a conflicting meaning for a canonical object or state.

B.4 Domain and migration rule

`.live` is the primary human-facing action or Session convention. `.tech` is the technical, partner and specification convention. `*.homelinked.tech` is experimental, preview or Field Trial infrastructure.

Domain ownership does not establish trademark clearance, regulation, Product maturity, certification or legal permission in every market.

A retired Route records retirement status, replacement Route, effective date, affected scope, historical-content state and whether canonical identity changed.

APPENDIX C — HUMAN REALITY LIFECYCLE AND STATE MODEL

C.1 Canonical phases

Phase	Required object	Entry condition	Exit condition	Negative Routes
1 Perception	Perception Envelope	Event observed, reported or inferred	Source, target, time, uncertainty and retention bounded	Discard, Delete, Challenge
2 Context	Context Envelope	Perception relevant to a purpose	Principal, object, place, time, state, constraints and unknowns versioned	Insufficient, Expired, Disputed
3 Intent	Intent Object	Desired outcome proposed	Intent sufficiently defined for Capability evaluation	Withdrawn, Blocked, Expired, Superseded
4 Capability	Capability Profile and selection	Requirements available	Eligible Capability selected or absence recorded	Unavailable, Declined, Unqualified
5 Authority	Authority Binding	Capability and action class known	Permission and responsibility bound to scope and time	Denied, Revoked, Expired
6 Execution Preparation	Execution Plan / Make Manifest draft	Intent, Capability and Authority available	Preconditions, resources, Tests, Evidence and failure Routes ready	Blocked, Cancelled, Outdated
7 Execution	Authorized Command and action record	Valid Command accepted	Action ends in Completion, Failure, Abort or Timeout	Pause, Failure, Abort, Human intervention
8 Completion and Output	Output Object	Execution ended	Output and limitations recorded	No Output, Corrupt, Incomplete
9 Test	Test Record	Test required or expressly not required	Passed, Failed, Inconclusive, Waived or Expired	Failed, Retest
10 Acceptance	Acceptance Record	Required Output and Evidence available	Accepted, conditionally accepted, rejected or redirected	Rejected, Returned for correction
11 Evidence Closure	Closed Evidence set	Acceptance decision exists	Minimum Evidence, versions, limitations and custodian frozen	Incomplete, Disputed, Corrected
12 Handoff	Handoff Pack	Accepted result ready for transfer	Recipient and continuing responsibilities recorded	Refused, Incomplete, Returned
13 Continuity	Accepted Reality / Artifact Host / Next URL	Handoff or accepted operation begins	Use, service, repair, return, Branch or retirement	Suspended, Recalled, Abandoned
14 Retirement	Retirement Record	Active use, Route or Capability must end	Residual obligations, Evidence and successor closed	Reopen only through explicit new state

C.2 State families

Intent: PROPOSED · CLARIFYING · DEFINED · WITHDRAWN · BLOCKED · EXPIRED · SUPERSEDED

Capability: CANDIDATE · ELIGIBLE · QUALIFIED · SELECTED · BOUND · UNAVAILABLE · DECLINED · REVOKED

Execution Preparation: DRAFT · REVIEWING · READY · AUTHORIZED · BLOCKED · CANCELLED · EXPIRED

Execution: QUEUED · STARTED · IN_PROGRESS · PAUSED · AWAITING_HUMAN · AWAITING_PROVIDER · FAILED · ABORTED · TIMED_OUT · COMPLETED

Test: REQUIRED · NOT_REQUIRED · PLANNED · IN_PROGRESS · PASSED · FAILED · INCONCLUSIVE · WAIVED · EXPIRED

Acceptance: ACCEPTED · CONDITIONALLY_ACCEPTED · REJECTED · REDIRECTED · RETURNED_FOR_CORRECTION · WITHDRAWN · EXPIRED

Evidence Closure: OPEN · MINIMUM_COMPLETE · CLOSED · INCOMPLETE · DISPUTED · CORRECTED · SUPERSEDED · RETIRED

Continuity: ACTIVE · IN_USE · MAINTAINED · UNDER_REPAIR · RETURN_REQUESTED · RETURNED · BRANCH_PROPOSED · BRANCH_ACCEPTED · SUPERSEDED · SUSPENDED · RECALLED · RETIRED

C.3 Mandatory transition rules

Intent MUST NOT become a Command without Capability selection and Authority Binding. Execution MUST NOT be reported as Accepted Reality because it reached COMPLETED. Acceptance MUST identify Authority, scope, criteria and Evidence reviewed. Evidence Closure MUST preserve source, version, limitation, custodian and correction Route. A Next URL MUST NOT imply public access unless publication was separately authorized.

A phase MAY be declared `NOT_REQUIRED` for a specific risk class, with reason, Authority and scope. It MUST NOT disappear silently.

Failure is a first-class state. A Failure Record SHOULD identify phase, time, cause or hypothesis, resources used, physical change made, Evidence retained, affected Principals, recovery/rollback and any new Intent.

APPENDIX D — OBJECT, HOST AND URL ONTOLOGY

D.1 Required identity fields

Every material canonical object MUST contain:

> Canonical ID · Object Type · Version · Created Time · Created By · Responsible Principal · Current State · Related Object IDs · Access Policy Reference · Evidence Policy Reference · Retention or Retirement State

Optional fields MAY include display name, localized labels, public description, external identifiers, source-system identifiers, public Routes and successor.

D.2 Host contract

A Host MUST contain or resolve Host ID, Host Class, Responsible Principal, canonical object relationship, lifecycle state, access policy, Authority policy, Evidence policy, retention policy, active Routes, version and retirement status.

A Host MUST NOT be assumed to be a physical server, public, personally identifiable or permanently online.

Host class	Required boundary	Typical state
Device Host	One physical device	Connectivity, firmware, configuration, health, device events
Viewpoint Host	One bounded person- or role-centred perspective	Session, capture policy, retention, subscriber scope
Scene Host	One bounded interaction Context	Operator, purpose, time, available objects and Routes
Space Host	One governed physical Space	Geometry, objects, state, time, Authority and Workcells
Job Host	One bounded Job	Intent, Make Manifest, Provider, Execution, Test and Acceptance
Artifact Host	One Accepted Artifact	Version, configuration, Evidence, service, Deltas and continuity
Public Host	One approved projection	Public Claims, selected media, public links and withdrawal state

D.3 Device Host versus Viewpoint Host

Device Host answers which physical glasses, camera or sensor and its technical state. Viewpoint Host answers whose or which role's bounded perspective and policy.

A person MAY change devices without losing Viewpoint identity. A device MAY be reassigned without becoming the same person.

D.4 Route contract

A URL is a Route, not the canonical object. A Route MUST contain or resolve Route ID, target Canonical ID, role/access class, View type, expiry, token/authentication rule, language/accessibility profile, revocation state, successor/fallback and public/private state.

Route classes include Owner, User, Session, Group, Service, Provider, Evidence, Public, Return and Retirement Routes.

A physical Touchpoint MUST contain only the information required to reach the Resolver safely. It MUST NOT expose Provider secrets, unrestricted control credentials, unnecessary personal identity or private canonical IDs where an opaque token is sufficient.

D.5 Failure and retirement

Host or Route failure distinguishes identity unknown, target unavailable, permission denied, token expired, Route revoked, Provider unavailable, canonical object retired and successor available.

Retirement preserves retired Canonical ID, reason, Authority, time, successor, access changes, Evidence retention and physical recovery where applicable.

APPENDIX E — INSTANTREADY PLATFORM MANIFEST

E.1 Definition

The InstantReady Platform Manifest is the versioned declaration of the common Platform functions, Authority boundaries, Runtime services, Evidence obligations and retirement rules available to an HRI Product or deployment.

InstantReady MUST NOT be represented as the AI Provider itself, every Product Provider, every physical operator, the final Acceptance Authority or a guarantee that every external Capability is correct.

E.2 Required fields

Contract group	Required fields
Platform identity	Manifest ID, InstantReady version, operator, responsible organization, deployment ID, environment, effective time, state
Registry and Resolver	Supported object types, ID policy, Route classes, token policy, public/private separation, successor routing, retirement behavior
Session	Session profiles, participant roles, Context requirements, start/expiry, privacy profiles, resource limits, termination
Authority	Authority Profiles, Binding method, human-confirmation gates, delegation, revocation, expired-Authority behavior
Runtime	Runtime Profiles, Instance policy, tool classes, Provider classes, data/network policy, cost/quota, stop rules, isolation
Provider routing	Capability Registry relationship, eligibility, qualification, Provider Adapter, failure/substitution, Provider Evidence
Execution and Evidence	Command policy, action record, Output identity, Test, Acceptance Service, Evidence Closure, Handoff, continuity, retirement
Security and operations	Authentication, authorization, secret handling, logging, incident Route, backup, recovery, monitoring, Admin separation

Optional fields MAY include payment, billing, notification, multilingual layer, offline/Edge profile, federation profile, external-standard mappings, sector modules and Local Market Pack reference.

Optional fields MUST NOT silently expand the Authority of the Core Platform.

E.3 Platform state

> RESERVED · FOUNDATION · PRIVATE_PREVIEW · FIELD_TRIAL · PUBLIC_REFERENCE · PRODUCT_LIVE · SUSPENDED · INCIDENT_REVIEW · SUPERSEDED · ARCHIVE · RETIRED

A reachable website MUST NOT automatically establish `PRODUCT_LIVE`. Product Live requires a declared operating service, responsibility and support boundary.

E.4 Authority

The Manifest identifies Platform Operator, Product Owner, System Administrator, Authority Policy Owner, Runtime Operator, Evidence Custodian, Incident Authority and Retirement Authority.

A System Administrator MUST NOT automatically be the Authority for every Product action or Acceptance decision.

E.5 Evidence

Platform Evidence SHOULD include deployment version, configuration hash, Runtime Instance records, Authority Bindings, Provider calls, Command and Output records, Tests, Acceptance, incidents, corrections and retirement.

Evidence is minimized to the declared purpose and risk class.

E.6 Failure

The Platform explicitly represents Registry, Resolver, Session, Authority, Runtime, Provider, Evidence, Acceptance, Handoff and retirement failures.

A safe fallback MAY use human operation, approved static content, Replay, local cached data or read-only mode. It MUST NOT fabricate successful Execution.

E.7 Retirement

Platform retirement addresses active Sessions, Runtime Instances, credentials, public Routes, Artifact continuity, Evidence custody, data export, successor Platform, affected-party notice and residual obligations.

A public brand MAY retire while canonical identities continue through a successor Resolver.

E.8 Invariants

> Identity ≠ Route
> Session ≠ Identity
> Runtime ≠ Provider
> Bot ≠ Authority
> Command text ≠ authorized Command
> Provider Output ≠ Accepted Result
> Platform Completion ≠ Acceptance
> Platform operation ≠ ownership of every underlying Artifact

APPENDIX F — TAPPORT MANIFEST

F.1 Definition

The TapPort Manifest declares how one TapPort entry exposes a Product, Scene, Journey, Locker, Learning Mission or Space Route through InstantReady.

TapPort MUST remain an Entry Product. It MUST NOT be presented as a default public social network, unlimited cloud drive, automatic consent or automatic manufacturing Authority.

F.2 Required fields

Contract group	Required fields
Identity	TapPort Manifest ID, version, Product Owner, Scene/Journey operator, InstantReady deployment, effective time, state
Entry	Entry type, Touchpoint ID, Route ID, fallback Route, human-readable label, language, accessibility profile

Contract group	Required fields
Context	Scene, Product, Journey or Space reference, purpose, place, time window, participant role, Guide/merchant role
Session	Session profile, identity requirement, expiry, privacy, retention, available actions, Provider use, Handoff Routes
Human Agency	Notice, correction, refusal, Save, Share, Broadcast, Publish, Make, Delete and exit
Fallback	Offline state, Replay, human explanation, Provider-unavailable behavior, incident contact

Optional fields MAY include price/purchase Route, booking, customization, payment, guided Bot, group Moment View, printed edition, Learning Mission, AfterMake candidate Handoff and Space/Workcell entry.

F.3 Product object fields

Object	Required fields
Scene	Scene ID, operator, place, purpose, time, languages, available objects, capture policy, privacy, Handoff
Product Card	Product reference, source, real-image/source status, merchant Claim, AI-description status, version, user note, next Routes
Journey	Journey ID, purpose, start/end, Scenes, roles, sharing rule, retention, archive/retirement
Locker	Locker ID, owner/group role, object classes, expiry, export, deletion, Han - doff
Touchpoint	Touchpoint ID, carrier, payload state, Resolver Route, activation, replacement, retirement

F.4 State

Scene: PREVIEW · LIVE · PAUSED · RECAP · ARCHIVE · CANCELLED · RETIRED

Journey: DRAFT · INVITED · ACTIVE · PAUSED · COMPLETING · COMPLETED · EXPIRED · ARCHIVED · RETIRED

Locker: OPEN · HELD · PRIVATE · GROUP_BOUNDED · HANDOFF_PENDING · EXPIRED · EXPORTED · DELETED · ARCHIVED · RETIRED

Touchpoint: DEFINED · PAYLOAD_PREPARED · PHYSICALLY_WRITTEN · ATTACHED · ACTIVE · PAUSED · REVOKED · REPLACED · RETIRED

These Product states MUST map to the Canonical Lifecycle.

F.5 Action contract

Action	Meaning
Save	Private retention under a declared profile
Share	Access by named or bounded recipients
Broadcast	Time- and subscriber-bounded transmission
Publish	Wider public or semi-public projection
Make	Creation of a new candidate physical Intent
Delete	Removal according to the declared deletion contract

No action MUST silently authorize another.

F.6 Authority and Evidence

The Manifest identifies Scene Operator, Guide, Participant, Locker Controller, Group-sharing Authority, Publication Authority, Make-Intent Originator, data/privacy responsibility and Retirement Authority.

The Guide MUST NOT automatically control a participant’ s private Locker.

A TapPort Evidence Pack MAY include Touchpoint resolution, Session start/expiry, role, capture event, AI-descrip - tion version, human correction, Save/Delete event, Handoff, fallback use, incident and retirement. It SHOULD NOT preserve unrelated raw Journey content.

F.7 Failure and retirement

The Manifest defines invalid Touchpoint, expired Route, unavailable Product Card, glasses disconnected, Provider timeout, translation unavailable, Locker unavailable, network failure, participant refusal and privacy incident.

Retirement addresses Scene close, Journey expiry, Locker export/deletion, Touchpoint revocation, public Recap, Artifact Handoff, successor Route, raw-media deletion and Evidence retention.

F.8 Invariants

> Tap ≠ consent
> Route ≠ Authority
> Scene ≠ Space
> Product Card ≠ delivered Artifact
> Journey ≠ continuous surveillance
> Locker ≠ unlimited cloud storage
> Touchpoint ≠ physical control
> Save ≠ Share
> Publish ≠ Make
> Make starts a new Intent; it does not issue a direct Command

APPENDIX G — INSTANTSPACE NODE AND WORKCELL MANIFEST

G.1 Definition

The InstantSpace Node Manifest declares one governed spatial identity and its geometry, Meta State, Time Evidence, Authority, Local Spatial Edge, Workcells and Evidence.

The Workcell Manifest declares one bounded formation of resources for a task or task family.

InstantSpace MUST NOT be represented as ordinary property management, automatic physical-control Authority, a guarantee of geometry accuracy at every use level or sustainability certification.

G.2 Node required fields

Contract group	Required fields
Identity	Space ID, Node ID, operator, owner/custodian, physical-location reference, version, maturity state
World Frame	Coordinate frame, origin, units, orientation, quality state, source, Accept - ance
Metric Space	Surfaces, zones, positions, dimensions, orientation, anchors, tolerances, method, quality class
Meta State	Object identity, type, name, Capability reference, condition, relationships, responsible Principal, maintenance state
Time Evidence	Valid time, observed time, recorded time, accepted time
Authority	Read, propose, review, publish, request action, execute, append Evidence, accept Evidence, accept result, rollback, retire
Local Spatial Edge	Edge ID, device interfaces, local cache, privacy processing, offline policy, synchronization, safe degradation, security
Evidence and history	Current Snapshot, Spatial Event history, measurement Evidence, Acceptance, correction, retirement

Optional fields MAY include sensor profiles, device health, environmental state, Scene recipes, TapPort entry, local Bot, Workcell catalogue, public Viewer, clone profile and sector module.

An optional sensor feed MUST NOT automatically update the canonical Snapshot.

G.3 Metric quality and formation maturity

Metric quality is:

> APPROXIMATE · MEASURED · VERIFIED · AS_BUILT

Every Metric statement identifies its quality. Lower-quality geometry MAY support visualization. It MUST NOT support higher-risk action without applicable review.

Formation maturity is:

> UNSEEN · OBSERVED · METRIC_MAPPED · OBJECTS_REGISTERED · CAPABILITIES_DESCRIBED · AUTHORITY_BOUND · BOT_READY · WORKCELL_FORMED · CONTROLLED_EXECUTION · FIRST_REALITY_ACCEPTED · SPACE_LIVE · CLONEABLE

These are maturity milestones, not substitutes for the Canonical Lifecycle state of an action.

G.4 Workcell required fields

> Workcell ID · Space ID and Zone · purpose · related Intent class · operator · participating objects · tools · materials · human roles · digital services · Runtime Profile · layout · Formation Recipe · Authority gates · readiness Tests · Execution limits · Output class · Acceptance criteria · Evidence · failure/rollback · retirement

G.5 Workcell state

> PROPOSED · FORMING · READY_FOR_REVIEW · READY · AUTHORIZED · ACTIVE · PAUSED · FAILED · RECONFIGURING · ACCEPTED_FOR_DECLARED_USE · SUSPENDED · DISMANTLED · RETIRED

`READY` MUST NOT be presented as Evidence of an Accepted Output.

G.6 Authority and Evidence

The Node or Workcell identifies Space Owner, Space Operator, Formation Proposer, Formation Reviewer, Action Authorizer, Operator, Test Authority, Acceptance Authority, Evidence Custodian, Rollback Authority and Retirement Authority.

Observation of a Space MUST NOT grant permission to alter it.

Evidence MAY include survey, geometry quality, object registration, Formation Recipe, Authority Binding, readiness Test, Execution record, Output, Acceptance, Spatial Events, rollback, incident and retirement.

A visual render MUST NOT be treated as the canonical spatial source unless applicable Acceptance occurred.

G.7 Failure, clone and retirement

The Manifest defines measurement uncertainty, object mismatch, sensor failure, Edge disconnect, Authority expiry, resource missing, unsafe state, Workcell formation failure, Execution failure and rollback failure.

A disconnected Edge MUST NOT silently extend expired Authority.

A Clone Package MAY contain Capability Blueprint, Space requirements, Object Profiles, Formation Recipe, Test method, Evidence template, Acceptance criteria, known failure modes, training and Handoff.

It MUST NOT carry live credentials, private keys, local Authority, professional approval, customer Acceptance, source-site measurements or current local safety state.

Retirement addresses active Scenes/Sessions, machines/tools, materials, credentials, canonical Snapshot, Evidence history, public Routes, successor Space/Workcell, physical restoration and recovery/disposal.

G.8 Invariants

> One Space Model ≠ one View
> Metric Space ≠ Meta State
> Geometry ≠ Capability
> Observation ≠ canonical write
> Location ≠ permission
> Connectivity ≠ Authority
> Workcell Ready ≠ Accepted Output
> Clone Capability Structure ≠ Clone Authority

APPENDIX H — PHYSICAL SUBSCRIBER AND MAKECELL CAPABILITY MANIFEST

H.1 Definition

A Physical Subscriber Capability Manifest is the versioned and evidence-bounded declaration of what a physical node can perform and under which process, material, operator, Test, Authority and Evidence conditions.

A MakeCell is a Physical Subscriber qualified for one or more declared Job classes.

A Manifest is not universal certification, Job Authorization, permission for public control or Evidence that the node is currently available.

H.2 Required fields

Contract group	Required fields
Identity and responsibility	Physical Subscriber ID, MakeCell ID, Provider, operator, organization, location, Space Host, contact, Manifest version, effective/review dates
Capability	Capability classes, actions, Job classes, process, automation, operator involvement, quantity range, lead-time class
Inputs	Files, materials, components, input quality, approved sources, prohibited inputs, rights-to-make requirement
Outputs	Output class, dimensions, tolerance, finish, functional boundary, packaging, labelling
Resources	Equipment, tools, software, fixtures, power, network, environment, consumables, maintenance state
People	Operator role, training, supervision, professional qualification, workload, substitution rule
Tests	Mandatory Tests, sampling, criteria, equipment, Test operator, retest, customer Acceptance Test
Evidence	Material, operator, process, equipment and Test records; exceptions, rework, Handoff
Limits	Risk class, unsupported use, prohibited Jobs/materials/jurisdictions, known failure modes, suspension conditions

Optional fields MAY include price logic, minimum order, service area, booking, capacity forecast, repair/recovery Capability, environmental metrics and partner terms.

Optional commercial fields MUST NOT alter the Safe-to-Make Boundary.

H.3 State and compatibility

Physical Subscriber states are:

> PROPOSED · DOCUMENTING · UNDER_REVIEW · SAFE_TO_TEST · QUALIFIED · AVAILABLE · BUSY · SUSPENDED · INCIDENT_REVIEW · REQUALIFICATION_REQUIRED · REVOKED · RE - TIRED

Job comparison returns:

> COMPATIBLE · COMPATIBLE_WITH_CONDITIONS · REQUIRES_REVIEW · INFORMA - TION_INSUFFICIENT · INCOMPATIBLE · PROHIBITED

`COMPATIBLE` MUST NOT be treated as Job Authorization.

H.4 Safe-to-Make Record

The Safe-to-Make Record contains Job or Make Manifest ID, Capability Manifest version, Product/Output class, materials/components, process, operator, Space/Workcell, Tests, risk class, conditions, decision, decision Authority, expiry and Evidence.

H.5 Authority

The Manifest identifies Capability Declarant, Qualification Reviewer, Safe-to-Test Authority, Safe-to-Make Authority, Job Authorizer, Operator, Test Authority, Artifact Acceptance Authority, Suspension Authority and Retirement Authority.

One role MUST NOT silently inherit another.

H.6 Failure and requalification

A Physical Subscriber reports material nonconformance, equipment failure, operator unavailability, un - authorized substitution, Test failure, Evidence failure, security incident, unsafe condition, wrong Job/ version and physical damage.

The affected Capability is suspended where the incident materially challenges qualification.

Requalification SHOULD be triggered by relocation, new operator, new equipment, material/supplier change, process change, expanded dimensions, incident, expired Test Evidence or ownership/Provider change.

H.7 Retirement

Retirement addresses active Jobs, materials/components, customer Artifacts, credentials, qualification Claims, Evidence retention, replacement node, equipment recovery and incident obligations.

H.8 Invariants

> Declared ≠ Verified
> Verified ≠ Qualified
> Qualified ≠ Available
> Available ≠ Selected
> Selected ≠ Authorized
> Safe-to-Test ≠ Safe-to-Make
> Safe-to-Make ≠ market ready
> Job Completed ≠ Artifact Accepted

APPENDIX I — AFTERMAKE ARTIFACT, DELTA AND BRANCH MANIFEST

I.1 Artifact Host Manifest

Required fields

> Artifact ID · Artifact class · Product/design reference · design version · delivered configuration · Make Manifest · MakeCell/Provider · production time · batch · materials/components · Tests · Acceptance Record · Handoff · owner/custodian role · access profile · current state · Next URL · return Route · retirement Route

Optional fields MAY include public Product page, warranty, maintenance schedule, repair Provider, replacement components, learning relationship, environmental data and public Story/Journey.

Artifact states are:

> ACCEPTED · DELIVERED · IN_USE · MAINTAINED · UNDER_REPAIR · MODIFIED · RE - TURN_REQUESTED · RETURNED · SUPERSEDED · RECALLED · RETIRED

I.2 Reality Delta Manifest

Required fields are Delta ID, Artifact ID, reporting Principal/role, report time, use Context, original expectation, observed reality, affected function, Delta class, severity, source Evidence, requested Route, AI-interpretation status, human correction and state.

Delta classes are:

> CLAIM · EXISTENCE_OR_AVAILABILITY · FIT · KNOWLEDGE · COMPONENT · QUALITY · CONTEXT · ACCESSIBILITY · INTENT · INNOVATION

Delta states are:

> REPORTED · CONTEXTUALIZING · UNDER_REVIEW · REPRODUCED · NOT_REPRODUCED · CONFIRMED · DISPUTED · ROUTED · RESOLVED · CLOSED · REOPENED · RETIRED

`NOT_REPRODUCED` MUST NOT be interpreted as proof that the reported human experience did not occur.

I.3 Change Branch Manifest

Required fields are Branch ID, source Artifact, source Delta or new Intent, Branch Owner, proposed change, inten - ded Context, assumptions, risk, configuration, rights-to-make status, Test proposal, state and source-version rela - tionship.

Optional fields MAY include quotation, supplier, MakeCell, POC schedule, comparison group, commercial Route and partner.

Branch states are:

> PROPOSED · CLARIFYING · FEASIBILITY_REVIEW · CONFIGURED · QUOTED · AUTHOR - IZED_FOR_POC · POC_MADE · TESTING · ACCEPTED_VARIANT · REJECTED · MERGED · SUPERSEDED · RETIRED

I.4 Accepted Next Artifact

An Accepted Next Artifact MUST link the source Artifact, source Delta, Change Branch, Accepted Make Intent, Make Manifest, Output, comparative Test, Acceptance Record, new limitations, Evidence Closure, new Artifact ID and Next URL.

I.5 Authority and Evidence

The Manifest identifies Artifact Custodian, Delta Reporter, Delta Reviewer, Return Authority, Repair Authorizer, Branch Owner, POC Authorizer, MakeCell, Test Authority, Acceptance Authority, Recall Authority and Retirement Authority.

Evidence MAY include delivery record, Product Claim, photographs, measurement, use note, failure log, repair record, comparative Test, user Acceptance, return condition and recovery record.

A person’ s subjective experience remains identifiable as reported experience. It MUST NOT be rewritten as a universal Product fact.

I.6 Failure and retirement

Failure includes Artifact cannot be identified, version unknown, Delta insufficiently contextualized, rights-to-make unresolved, repair unsuccessful, Branch Test failed, new failure introduced, next Artifact rejected, return/refund incomplete and Artifact recalled.

A failed Branch remains in lineage where retention is justified.

Retirement preserves reason, Authority, time, successor, recall/safety notice, Evidence, remaining service obligations, physical recovery and data/Route state.

I.7 Invariants

> Product page ≠ Artifact Host
> Reality Delta ≠ automatic defect
> Reported experience ≠ universal fact
> Change Branch ≠ approved release
> POC made ≠ accepted variant
> Accepted variant ≠ sector-qualified Product
> New Artifact ≠ erasure of source Artifact
> Next URL ≠ mandatory public URL

APPENDIX J — AUTHORITY, CONSENT, PRIVACY AND RETENTION PROFILES

J.1 Authority Profile and Binding

An Authority Profile contains Profile ID, Principal/role class, permitted/prohibited actions, target object classes, location/jurisdiction, maximum cost/duration, data classes, physical risk, supervision, co-approvals, expiry, revocation and Evidence.

An Authority Binding contains Binding ID, Profile, Principal, Session, Intent, Capability, target object, scope, start/expiry, conditions, cost/resource limit, confirmation state, revocation state and Evidence.

J.2 Consent Event

A Consent Event contains ID, Principal or authorized representative, affected action/data use, purpose, data/object classes, recipients, retention, withdrawal method, alternative Route, time, language/accessibility, Evidence and state.

Consent MUST be sufficiently specific, timely, attributable, revocable where applicable and separated from unrelated processing.

J.3 Privacy Profile

A Privacy Profile contains Profile ID, participant class, purpose, identity requirement, capture classes, prohibited capture, AI-Provider use, human access, sharing, publication, cross-border state, retention, deletion, minimum Evidence and incident Route.

Profile	Default boundary
ADULT_PRIVATE	Private Session, minimal identity, no automatic publication
ADULT_GROUP	Individual private state plus explicitly shared group items
MINOR_LEARNING	No required public account, face recognition or attention ranking; responsible-adult boundary
PUBLIC_EVENT	Visible notice, Object First capture, no assumption of consent from presence
PROFESSIONAL_FIELD	Role identity, work Evidence, stronger security and retention
ACCESSIBILITY_SUPPORT	Beneficiary-centred purpose, fast assistance, uncertainty and human escalation
MERCHANT_PRODUCT_SCENE	Product-focused capture; merchant cannot inspect private Journey/Locker history
APPROVED_RESEARCH	Separate research purpose, minimization, review, withdrawal and publication boundaries

These global profiles do not replace Local Market requirements.

J.4 Retention Profile

A Retention Profile contains Profile ID, object/data classes, purpose, start/expiry event, maximum period, active storage, backup behavior, deletion method, minimal audit record, legal hold, export, custodian and retirement.

Illustrative classes are:

> EPHEMERAL · SESSION · VISIT · JOURNEY · HANDOFF · ARTIFACT_LIFECYCLE · EVIDENCE · LEGAL_OR_REGULATORY · ARCHIVE

No illustrative class establishes a universal duration.

J.5 Controlled actions

> Save — private retention
>
> Share — defined recipient access
>
> Broadcast — time- and subscriber-bounded transmission
>
> Publish — wider public projection
>
> Make — new physical Intent and Authority Route
>
> Delete — removal under the declared deletion contract

Consent to one action MUST NOT authorize the others.

J.6 Withdrawal, failure and retirement

Withdrawal SHOULD stop future processing within scope. The system states what future action stops, what content is deleted, what Evidence remains, whether published material can be withdrawn, which third parties are notified and whether physical action is reversible.

The profile defines capture outside purpose, wrong recipient, unauthorized publication, retention beyond expiry, deletion failure, Provider leak, cross-Session access, identity disclosure, bystander complaint, minor-safety issue and revocation not enforced.

A profile MAY be retired because of policy, law, Product or incident change. Active Sessions are migrated, ended or explicitly reviewed.

J.7 Invariants

> Presence ≠ consent
> Touch ≠ consent
> Account creation ≠ permission for every data use
> Consent ≠ permanent Authority
> Share ≠ Publish
> Publish ≠ permission to manufacture
> Deletion from View ≠ confirmed deletion from all declared stores
> Guardian/organizer Authority ≠ erasure of participant refusal

APPENDIX K — ACCEPTANCE, EVIDENCE, TEST AND CLAIM LADDER

K.1 Test Record

A Test Record contains Test ID, target, version, method, criteria, environment, equipment, operator, Test Authority, start/end, result, exceptions, raw Evidence, interpretation and retest rule.

States are:

> REQUIRED · NOT_REQUIRED · PLANNED · IN_PROGRESS · PASSED · FAILED · INCONCLUSIVE · WAIVED · EXPIRED

K.2 Acceptance Record

An Acceptance Record contains Acceptance ID, class, Acceptance Authority, accepted/rejected object, purpose, Context version, criteria, Evidence reviewed, decision, conditions, exclusions, effective time, expiry/review and continuing obligations.

Acceptance classes are:

> PERSONAL · LEARNING · OPERATIONAL · TECHNICAL · CONTRACTUAL · PROFESSIONAL · REGULATORY

One class MUST NOT imply another.

K.3 Evidence Object

An Evidence Object contains Evidence ID, class, source, source role, related object/event, observed/created time, version, integrity reference, access state, retention state, Claim relationships, correction relationships, custodian and closure state.

Evidence classes are Source, Context, Authority, Execution, Test, Acceptance, Handoff and Continuity Evidence.

Evidence strength may be Provider Declaration, Internal Implementation Record, Internal Test, Independent Test, User/Customer Acceptance, Public Institutional Record or Regulatory/Certification Evidence.

K.4 Claim Record and states

A Claim Record contains Claim ID, text, class, owner, subject, scope, version, market/jurisdiction, effective date, Evidence references/strength, limitations, review date, correction Route and state.

Claim classes are Historical, Current Implementation, Capability, Performance, Qualification, Acceptance, Environmental, Social, Commercial and Roadmap.

Claim states are:

> DRAFT · UNDER_REVIEW · EVIDENCED · APPROVED_FOR_BOUNDED_USE · PUBLIC · CHALLENGED · CORRECTED · DEPRECATED · WITHDRAWN · RETIRED

K.5 Claim ladder

> Founder Experience ≠ Current Product Qualification
> Supplier Availability ≠ Integrated Capability
> Component Specification ≠ Tested System Performance
> Prototype ≠ Safe-to-Test
> Safe-to-Test ≠ Safe-to-Make
> Safe-to-Make ≠ Market Ready
> Output Produced ≠ Output Accepted
> Internal Test ≠ Independent Certification
> Public Demonstration ≠ Procurement or Adoption
> Funded Project ≠ Government Approval
> One Accepted Pilot ≠ Universal Conformance
> Potential Benefit ≠ Verified Outcome

K.6 Evidence Closure, failure and correction

Evidence Closure requires required Evidence, source and versions, scope, limitations, Acceptance, custodian, retention and correction Route.

A result MAY be `ACCEPTED_PENDING_EVIDENCE_CLOSURE`. It MUST NOT become closed Accepted Reality until the required conditions are met.

A failed Test remains part of Evidence. A corrected Claim preserves the original, reason, correction, Authority and affected decisions. A retired Claim leaves active use while governed history remains.

APPENDIX L — MATERIAL, SUSTAINABILITY AND CIRCULARITY EVIDENCE

L.1 Definition

This Appendix defines the minimum Evidence required before a material, environmental, circularity or social-value Claim may be made.

A digital identity, local MakeCell or repair Route MAY enable a better outcome. It does not prove that outcome by itself.

L.2 Evidence classes

Class	Required fields
Demand	Requesting Principal, accepted need, quantity, speculative/demand-bound status, substitution/cancellation
Material	Material/component, supplier, batch, mass/quantity, source class, declaration/certificate scope, storage, substitution
Process	Place, MakeCell, process, equipment, energy data where collected, yield, scrap, rework, exceptions
Transport	Origin, destination, mode, route/distance class, movement count
Use	Actual use, duration, maintenance, failure, unused/idle outcome
Repair and reuse	Diagnosis, repair, component replaced, continued use, new failure, life-extension basis

Class	Required fields
Recovery	Return, reuse, refurbishment, component harvesting, recycling, disposal
Social	Participant role, training, safety, compensation, Output, Acceptance, repeatable Capability
Digital and AI	Provider use, model class, processing frequency, media retention, storage, Edge/cloud, reprocessing

L.3 Material Record

A Material Record contains ID, material/component, supplier, batch, quantity/mass, source class, declaration/certificate reference, scope, validity, chain-of-custody Evidence, approved use, substitution state and related Job/Artifact.

Source classes are:

> NEW_QUALIFIED · SUPPLIER_DECLARED · BATCH_DOCUMENTED · VERIFIED_RECLAIMED · DONOR_PRODUCT · LOCALLY_FABRICATED · EXPERIMENTAL

A reclaimed or experimental source remains visible throughout the Job and Artifact record.

L.4 Sustainability Claim ladder

> L0 Design intention
> L1 Supplier declaration
> L2 Batch-documented input
> L3 Process and material Evidence
> L4 Applicable third-party certification
> L5 Delivered Artifact Evidence
> L6 Use, repair or recovery outcome
> L7 Comparative lifecycle conclusion within a declared method and scope

A public Claim MUST NOT exceed the achieved Evidence level.

L.5 Operating hierarchy and local boundary

The preferred hierarchy is avoid unnecessary demand, use existing asset, reconfigure, maintain, repair, reuse, adapt, remanufacture, recover component, recycle material and dispose responsibly.

The hierarchy MAY be overridden where safety, contamination, Product life or other Context makes another Route more responsible.

A local-production Claim SHOULD compare transport, equipment utilization, energy, material yield, quality, rework, life, service and recovery. “Made locally” MUST NOT automatically be represented as “lower impact.”

L.6 Certification and social-value boundary

A certification-related Claim identifies current certificate, certificate holder, scope, site, process, Product/component, validity, transaction/batch Evidence and authorized Claim wording.

Use of one certified or recycled component MUST NOT be expanded into an unsupported Claim about the complete Artifact.

A social-value Claim identifies who participated, what they owned, training, safety, compensation, accepted Output and repeatable Capability. Attendance or participation count alone is insufficient.

L.7 Failure and retirement

A sustainability Claim is corrected or retired when source Evidence expires, supplier scope changes, certification changes, material substitution occurs, actual use contradicts the Claim, repair/recovery does not occur or data quality is insufficient.

APPENDIX M — GLOBAL FOUNDATION AND LOCAL MARKET PACK TEMPLATE

M.1 Definition

The Global Foundation defines common architecture. A Local Market Pack defines how a specific Product, sector or deployment operates in one jurisdiction and effective period.

> **Global Foundation ≠ Local Authorization**

M.2 Required cover fields

> Local Market Pack ID · parent HRI document · Product/programme · sector · jurisdiction · language · effective/review dates · operating entity · local responsible entity · publication state · legal-review state

M.3 Required sections

1. **Scope and explicit exclusions** — included Products, users, actions, excluded actions, risk class and implementation state.
2. **Entity and responsibility map** — corporate entity, Platform operator, Product Owner, Providers, Space operators, MakeCells, data-responsibility roles and Acceptance Authorities.
3. **Applicable legal and regulatory Context** — Product safety, consumer rights, privacy/data, cross-border data, cybersecurity, payment/tax, professional Authority, employment, education and environmental Claims.
4. **Identity and data inventory** — personal/non-personal/sensitive data, device data, raw media, Evidence, processing/storage locations and recipients.
5. **Consent, Authority and Human Agency** — operating basis, consent, delegation, affected Principals, minor profile, refusal, revocation and return.
6. **Safety and Product boundary** — normal/abnormal use, misuse, supervision, stop condition, professional review, incident and recall.
7. **Provider and physical Execution** — Provider eligibility, MakeCell qualification, Safe-to-Make, materials, Tests, Handoff, warranty and repair.
8. **Claim and Evidence boundary** — approved Claims, Evidence, unsupported Claims, certification, public demonstration and institutional references.
9. **Retention and cross-border transfer** — retention classes, deletion, export, legal hold, transfer mechanism and local Evidence custodian.
10. **Incident, correction and retirement** — reporting, affected-person communication, Claim correction, Product suspension, Route retirement and successor.

Optional sections MAY include local pricing, tax/invoicing, insurance, procurement, language localization, accessibility, partner list, sector Test methods, sustainability metrics and local roadmap.

M.4 State and Authority

States are:

> DRAFT · LOCAL_REVIEW · LEGAL_OR_PROFESSIONAL_REVIEW · AP - PROVED_FOR_FIELD_TRIAL · ACTIVE · SUSPENDED · CORRECTED · SUPERSEDED · RETIRED

The Pack identifies author, Product Owner, local responsible entity, legal/professional reviewer, Claim approver, data-responsibility role, Incident Authority and Retirement Authority.

M.5 Evidence, failure and retirement

The Pack includes current primary legal/regulatory sources, Product version, implementation state, Test/qualification Evidence, approved Claim Register and review date.

A copied Local Market Pack MUST NOT be reused in another jurisdiction without fresh review.

The Pack SHOULD be suspended when material law, responsible entity, incident, Product scope, Evidence/certification or cross-border basis changes.

Retirement identifies effective date, affected Products, active users/Artifacts, support, Evidence retention, successor Pack, public notice and data/Route consequences.

APPENDIX N — PUBLICATION, VERSION AND CHANGE CONTROL

N.1 Publication Object Passport

Every publication object contains Document ID, title, edition, language, work package or section, publication status, version, date, author, initiating/operating entities, dependencies, canonical parent, Source Register, Claim Register, change history, publication URL, freeze hash and archive location.

N.2 Publication state chain

> WORKING DRAFT → PUBLICATION DRAFT → CONTENT COMPLETE → CONTENT FREEZE CANDIDATE → CONTENT FREEZE → EDITORIAL CONSOLIDATED → TYPESET PROOF → COR - RECTED PROOF → PUBLICATION CANDIDATE → PUBLICATION FREEZE → RELEASED → CORRECTED RELEASE → SUPERSEDED → RETIRED

A manuscript MUST NOT be labelled Released because its text is complete.

N.3 Version and change classes

A **Major Edition** changes canonical thesis, lifecycle, responsibility architecture or scope. A **Minor Edition** adds substantial content or implementation Evidence without invalidating the core. A **Correction Release** fixes factual, citation, typographic, link or limited wording errors without new architecture.

Change classes are Editorial, Factual, Claim, Canonical Architecture, Product Interface, Implementation State, Local Market, Security/Incident and Retirement.

A Change Record contains Change ID, document/version, class, affected section, previous text/state, new text/state, reason, source/Evidence, affected Claims/Products, Authority, effective date, reviewer, publication action and archive reference.

N.4 Approval matrix

Change	Minimum approval
Editorial	Editorial Owner
Factual	Source Reviewer and Publication Owner
Claim	Claim Owner and Evidence Reviewer
Canonical Architecture	HRI Publication Owner and architecture review

Change	Minimum approval
Product Interface	Product Owner and Human-Agency review
Implementation State	Product Owner and Evidence Custodian
Local Market	Local responsible entity and applicable reviewer
Security / Incident	Incident Authority and affected Product Owner
Retirement	Claim, Product or Publication Retirement Authority

N.5 Source and Claim control

The Source Register records Source ID, title, author/issuer, date, source class, location, retrieval date, version, supported Claims, unsupported inferences and archive/hash.

The publication distinguishes:

> [HIST] Historical source · [IMPL] Implementation Evidence · [GOV] Government/public source · [EXT] External institutional source · [STD] Standard/technical reference · [LAW] Legislation · [REG] Regulatory implementation · [ARCH] Proposed architecture · [HYP] Research hypothesis · [ROAD] Roadmap

A Roadmap item MUST NOT be promoted to Implementation without new Evidence and Claim review.

N.6 Cross-document audit

Before Publication Candidate, the process verifies:

- no undefined canonical term;
- no conflicting lifecycle;
- no Product claims Platform Authority;
- no AI Output appears as human Authorization;
- no public demonstration appears as certification or procurement;
- no POC appears as a qualified release;
- no duplicated argument changes meaning;
- all cross-references resolve.

N.7 Correction, withdrawal and Publication Freeze

A Correction Notice states what was wrong, what is corrected, why, which version, affected Claims/decisions, whether the prior file remains accessible and effective date.

A withdrawn Claim is removed from active websites, PDFs, partner decks, Touchpoints, sales material and automated Bot responses where possible. The governed history retains the withdrawal record.

Publication Freeze requires content complete, terminology audited, Claims audited, citations normalized, Human-Agency audit complete, Product-interface audit complete, page budget met, links validated, proof corrected, Publication Object Passport complete, final hash generated and archive created.

No silent edit follows freeze. A change requires a controlled version.

N.8 Publication invariants

> Draft ≠ Release
> Content Complete ≠ Publication Freeze
> New upload date ≠ new content reality
> Correction ≠ silent overwrite
> Roadmap ≠ Implementation
> Implementation record ≠ universal Claim
> New version ≠ erasure of prior version
> Retirement ≠ historical deletion

REFERENCES AND END MATTER

Reference method

The print proof uses concise source-state IDs. The digital Source Register will add persistent location, retrieval date, issuer, version, archived copy or integrity hash, cited section, supported Claims, unsupported inferences, rights status, correction state and supersession state.

A reference entry is not itself Evidence Closure.

Several public sources are originally in Chinese. Where this edition presents an English title or description, the wording is a publication translation unless an official English title is registered. The original-language title remains authoritative for source identification.

Citation or acknowledgement does not imply endorsement of this white paper.

Selected references

Corporate and architectural sources

[ARCH-01] HSIMC. HRI-WP-GF-EN-001: Master Publication Work-Package Directory. Internal publication-control record, 2026. Defines the 206-page working target, 196–212-page publication window, 220-page absolute hard cap and fixed publication sequence.

[ARCH-02] HSIMC. Corporate, Platform, Product and Domain Architecture Freeze. Internal architectural source, 2026. Establishes HSIMC as Corporate Master, InstantReady as Core Platform, TapPort as Entry Product, AfterMake as Commercial Wedge, InstantSpace as Spatial Execution Platform and MakeHere/HSIMC MakeCells as the Physical Subscriber layer.

Government and institutional sources

[GOV-01] Hong Kong Special Administrative Region Government, Transport Department. Smart Traffic Fund combines government, industry, academia and research capabilities to promote the long-term development of smart mobility in Hong Kong [working English translation of Chinese source], 13 April 2026. Records the Director of Transport's visit to the Smart Hong Kong Pavilion and describes a funded private-enterprise AI smart-glasses project for visually impaired mobility. The source does not constitute Product certification or identify that enterprise as InnoSpire in the registered text.

[EXT-01] City University of Hong Kong, HK Tech 300. InnoSpire Technology Limited. Institutional company profile. Describes InnoSpire as an HKSTP incubatee, preserves the company-supplied "Hybrid AI+Human" wording and lists HK Tech 300 Angel Fund support and earlier awards. The page states that founder information is based on the company's application form.

Historical and standard source

[HIST-01] Proceedings of the Second Global Sensor Summit and China Internet of Things Application Summit, Beijing, 28 August 2015. Speaker entry: Liao Yan, Machine Vision and Industry 4.0. Supports conference particip - ation and the source-published speaker biography. It does not establish that the complete HRI architecture existed in 2015.

[STD-01] GB 16844-1997, Self-Ballasted Lamps for General Lighting Services—Safety Requirements. Historical withdrawn edition. The Founder's drafting role remains attributed to the 2015 speaker biography pending stronger official drafting-participant Evidence.

Implementation and POC sources

[IMPL-01] InnoSpire Technology Limited. Smart Glasses: Live Demo. Source dated 08/06/2026; date format not in - dependently resolved for TP0. The source shows one link per glasses entry, unique URL creation, Copy, Unbind, Delete, device connection state, photo count, image received from the glasses, API-generated description, Save and Delete. It does not establish complete TapPort, Viewpoint Host or federation.

[IMPL-02] InnoSpire Technology Limited. Smart Glasses × Computer Vision: 2D/3D Indoor Image Measurement, 2026. POC poster showing image/webcam input, optional camera parameters, human target quadrilateral and candidate width, height and camera-distance Outputs.

[IMPL-03] InnoSpire Technology Limited. Socket Cable Estimator—Smart Cable Length Tool, 2026. POC poster describing socket detection, candidate cable-length estimation, template matching and controlled camera-orientation assumptions.

[IMPL-04] InnoSpire Technology Limited. Smart Glasses, AI Runtime, and Real-World AI Execution, 2026. Product overview connecting Smart Glasses Kit, hosted Runtime, NFC/RFID activation, design Output and `Order → Build → Handoff`. Only the Smart Glasses Kit is visibly labelled Live in the registered source.

[IMPL-05] HSIMC. Runtime Map and Physical Touchpoint Records, internal implementation records, July 2026. Evidence includes administrative Registry/Runtime/Authority/Evidence relationships and explicit states distinguishing defined, validated, mock, no-Provider, no-hardware-write, Admin-only and not-published conditions. These records are cited only where registered in the final Evidence Register.

External governance, Product identity and sustainability references

[STD-02] National Institute of Standards and Technology. Artificial Intelligence Risk Management Framework 1.0, 2023. Voluntary external governance reference; no HRI conformity Claim.

[GOV-02] Office of the Privacy Commissioner for Personal Data, Hong Kong. Artificial Intelligence: Model Personal Data Protection Framework, 2024. External privacy-governance reference; citation does not establish Product compliance.

[LAW-01] Personal Information Protection Law of the People's Republic of China, 2021, and applicable cross-border data provisions. Each mainland deployment requires current Local Market review.

[LAW-02] Regulation (EU) 2024/1781 establishing an ecodesign framework and Digital Product Passport direction. An AfterMake Artifact Host is not automatically an EU-compliant Digital Product Passport.

[LAW-03] Directive (EU) 2024/1799 on common rules promoting repair of goods. Applicability depends on Product scope and national implementation.

[STD-03] GS1 Digital Link and GS1-Conformant Resolver standards. Relevant identifier and distributed-resolution patterns; no current HRI conformance Claim.

[STD-04] Global Reporting Initiative. GRI 306: Waste 2020. External material-flow and waste-Evidence reference.

[STD-05] Textile Exchange. Global Recycled Standard materials. Certification and Claims depend on current certificate, site, chain of custody, batch and authorized Claim scope.

Patent reference status

No individual patent number is entered in TP0 because the registered Evidence base does not yet contain a sufficient official record of jurisdiction, number, title, inventor, applicant, priority date, status and current owner.

The absence of a patent citation does not imply that no patents exist. It means this proof does not have sufficient registered Evidence to cite them responsibly.

Image and reproduction note

Every reproduced photograph, screenshot, logo and scanned page must receive one final state before Publication Freeze:

> PERMISSION_CONFIRMED · LICENSE_CONFIRMED · OFFICIAL_USE_BASIS_CONFIRMED · LINK_ONLY · REDRAWN_AS_ORIGINAL_DIAGRAM · REMOVED

The smart-glasses public proof uses an original privacy-safe reconstruction rather than the unredacted source screenshots, which contain personal names, live-looking URLs and a device identifier.

ACKNOWLEDGEMENTS

This white paper emerged from a continuing interaction among Product engineering, standards practice, manufacturing, machine vision, smart glasses, physical Touchpoints, Runtime infrastructure, spatial research and post-delivery experience.

HSIMC acknowledges the InnoSpire team whose smart-glasses, assistive-technology and computer-vision work provides the strongest current Perception-and-entry reference; the students and Interns who contributed interface work, testing, design, Evidence preparation and Field Trial preparation; the technicians, engineers, manufacturers, suppliers, designers, Space operators and Product users whose constraints keep the architecture connected to reality; the teachers, Guides, accessibility participants and public-service practitioners whose experience reinforces Human Agency and bounded Acceptance; CityU HK Tech 300 and the Hong Kong Science and Technology Park ecosystem for the externally documented company and innovation Context; and the public institutions and standards bodies whose publications provide external comparison points.

Acknowledgement or citation does not imply that any institution, public official, university, standard-setting organization or programme has reviewed, approved or endorsed the HRI thesis.

Individual contributor names will be inserted only after final spelling, role, attribution and publication-consent review.

ABOUT THE FOUNDER

Liao Yan • 廖炎 — also known as Benny Liao

Liao Yan is the Founder and Principal Author behind the Human Reality Infrastructure thesis. His practice spans physical Product engineering, manufacturing and supply chains, standards and Test discipline, object identification, machine vision, IoT, smart glasses, NFC and physical Touchpoints, cloud and local Runtime, spatial execution, Evidence-based Handoff and post-delivery continuity.

The 2015 source records his presentation Machine Vision and Industry 4.0 and includes a biography identifying him as a drafter of GB 16844 [HIST-01]. The present publication treats that role as source-attributed pending stronger official Evidence.

The significance of this history is methodological: define scope, control interfaces, Test Claims, preserve Evidence, identify responsibility and distinguish Completion from Acceptance.

ABOUT HSIMC

The Human Reality Infrastructure Company

HSIMC is the initiating and operating entity for this Global Foundation White Paper and the Corporate Master within the frozen architecture.

Its corporate thesis is:

> **HSIMC builds the missing infrastructure between AI intent and accepted reality.**

Its continuity thesis is:

> **Every accepted reality remains addressable, improvable and manufacturable through its next URL.**

HSIMC brings together Product engineering, standards discipline, physical manufacturing, Runtime and Evidence, spatial execution, physical Capability routing, Artifact continuity, repair and next-version formation.

This architecture is a consolidated corporate and Product thesis. It does not mean that every proposed Platform layer, MakeCell, partner network, commercial service or federation Route is operational.

The exact legal styling of the company name remains pending corporate-record verification at TP0.

FOUNDER–COMPANY–PLATFORM RELATIONSHIP NOTE

Founder. Liao Yan is originator of the HRI thesis, Principal Author and Founder-level architecture owner. Founder recollection is not automatically an independently verified historical fact.

Company. HSIMC is the initiating and operating entity, Corporate Master and Claim Owner for HSIMC-issued corporate statements. It does not automatically own every external Capability or assume every partner's professional responsibility.

Core Platform. InstantReady is the common identity, Session, Authority, Runtime, routing, Acceptance, Evidence, continuity and retirement Platform. It is not the Founder, every AI Provider, every physical operator or every Acceptance Authority.

Products and execution layers. TapPort opens the real-world Route. InstantSpace provides spatial Context. MakeHere routes physical Capability. HSIMC MakeCells perform bounded physical work. AfterMake continues the accepted Artifact. TapPort Learning makes the lifecycle learnable.

InnoSpire boundary. InnoSpire Technology Limited remains a distinct company and Capability Provider. Nothing in this publication transfers its intellectual property to HSIMC, merges the entities, makes HSIMC the owner of every InnoSpire Claim or makes InnoSpire responsible for every proposed HRI layer.

Each Product, deployment, Local Market Pack and agreement must state which entity contracts, processes data, operates the Runtime, manufactures, accepts, supports the Artifact and owns the public Claim.

PUBLICATION VERSION HISTORY

Date	Publication object	State	Material change
9 August 2026	HRI-WP-GF-EN-001A	Content Freeze 0.1	Front Matter, Executive Summary, One-Page Thesis and Visual Thesis completed
10 August 2026	HRI-WP-GF-EN-001B–001K	Freeze Candidate 0.1	Chapters 1–36, Conclusion, Appendices A–N and End Matter completed
10 August 2026	HRI-WP-GF-EN-001L	Editorial Freeze Candidate 0.2	Terminology, Claim, Citation, Human Agency, Product, Brand, page and cross-reference controls frozen
10 August 2026	HRI-WP-GF-EN-001M	Production Control Complete	Typography, proof, accessibility, print/web, Passport and archive gates defined
10 August 2026	HRI-WP-GF-EN-001 MASTER v0.2	TYPESET PROOF TP0	Single Canonical Master assembled and first typeset proof generated

Future controlled states are Corrected Proof, Publication Candidate, Publication Freeze and Release 1.0. They are not completed historical events at TP0.

SELECTIVE SUBJECT INDEX

The print index uses Chapter and Appendix references until final pagination is assigned. The digital edition will add full-text search, source links, Claim IDs and Evidence IDs.

Subject	Primary references
Capability Atom	Chapters 21, 26; Appendix A
Change Branch	Chapters 23–26; Appendices A, I
Claim–Evidence discipline	Chapters 4, 9, 31; Appendices K, N
Cloneable Capacity	Chapters 18, 36; Appendix G
Command	Chapters 7–8, 11; Appendices A, C
Completion	Chapters 8–9, 12; Appendices A, C
Context	Chapters 2, 7, 25; Appendices A, C
Device Host	Chapters 10, 34; Appendices A, D
Evidence	Chapters 4, 9, 12, 25, 31–35; Appendices A, K, L
Evidence Closure	Chapters 9, 12; Appendices A, C, K
Federation	Chapters 25, 32, 36; Appendices E, M
Formation Recipe	Chapters 16, 18; Appendices A, G
Handoff	Chapters 9, 12, 19, 22, 30; Appendices A, C, E
Host	Chapter 10; Appendices A, D
Human Agency	Chapters 15, 28–30, 32; Appendix J
Human Reality Infrastructure	Front Matter; Chapter 3; Appendix A
Identity	Chapters 5, 10, 25; Appendices A, D
InstantReady	Chapters 10–12; Appendices B, E
InstantSpace	Chapters 16–18; Appendices B, G
Intent	Chapters 2, 7, 21; Appendices A, C
Journey	Chapters 14–15; Appendices A, F
Locker	Chapters 14–15; Appendices A, F
MakeCell	Chapters 18–21, 27; Appendices A, H
MakeHere	Chapters 19–21; Appendices B, H
Make Manifest	Chapters 20–21, 24; Appendices A, H
Micro-BOM Access	Chapters 21, 26, 33; Appendix A
Next URL	Front Matter; Chapters 9, 12, 22–24; Appendices A, D, I
One Small Complete Success	Chapter 30; Appendix A
Perception	Chapters 6–7, 15, 25, 34; Appendices A, C
Physical Subscriber	Chapters 19–21; Appendices A, H
Product Card	Chapter 14; Appendices A, F
Reality Commerce	Chapters 26–27
Reality Delta	Chapters 22–26; Appendices A, I
Resolver	Chapters 10, 13, 33, 36; Appendices A, D, E
Retirement	Chapters 9, 12, 24, 31–36; Appendices A, C, N
Return	Chapters 22, 24, 26, 28, 33; Appendices I, J
Runtime	Chapters 6, 10–12, 27, 32; Appendices A, E
Safe-to-Make	Chapters 20–21; Appendices H, K
Scene	Chapters 13–15; Appendices A, F
Session	Chapters 10–11, 13; Appendices A, E, F
Smart glasses	Chapters 6, 13, 15, 29, 34; References IMPL-01–04
Sustainability	Chapter 33; Appendix L
TapPort	Chapters 13–15, 29, 34; Appendices B, F
TapPort Learning	Chapters 29–30; Appendices A, B

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