IRIFF 2026

Technology Validation

Assessing the feasibility of new technologies in real-world settings and industry counterpart contributions

Dr. Vu-Duc Ngo · MobiFone High Technology Center, MobiFone Corporation

Outline

01 **Readiness**
What TRL 5–7 require of the test environment

02 **Evidence**
The gap between laboratory and field performance

03 **Industry role**
What counterparts contribute, and the barriers

04 **Viet Nam**
Legal basis for controlled testing; bottlenecks

05 **International cases**
United Kingdom, India, Japan, United States, Rwanda

06 **Proposed framework**
Five components, formulation requirements, coordination modalities

07 **MobiFone case**
AI vision for public security and traffic

08 **Recommendations**
Six measures for funders and partners in Viet Nam

Technology readiness levels

The middle levels are defined by where the technology is tested (Mankins, 2009).

INVESTMENT THRESHOLD (GAO, 2020)

TRL 5

Relevant environment

Component or breadboard validation

TRL 6

Relevant environment

System or prototype demonstration

TRL 7

Operational environment

System prototype demonstration

DoD wording; NASA's original refers to space

15 challenges in applying TRLs (Olechowski et al., 2020) — just a little about integration, manufacturability, regulation or market fit.

The laboratory-to-field gap

RETROSPECTIVE · 25,326 IMAGES (THAILAND)

0.97 0.74

AI sensitivity Human graders

AI diabetic retinopathy screening, at slightly lower specificity (0.96 vs. 0.98)

Ruamviboonsuk et al., 2019

Prospective, 9 sites: accuracy largely held (sensitivity 91.4%, specificity 95.4%). Ruamviboonsuk et al., 2022

FIELD · 11 THAI CLINICS

Real-world conditions affected performance

Socio-environmental factors affected model performance, nursing workflows and the patient experience — imperfect, resource-constrained data clashed with the model's quality thresholds.

Beede et al., 2020

Validated on accuracy, not yet on workflow integration and real-world data quality.

Industry counterpart contributions

01
Test sites
Access to operational environments

02
Real data
Operational data, not curated sets

03
Engineering
Integration, reliability and standards expertise

04
Adoption
First user, buyer or channel to market

O-RAN GLOBAL PLUGFEST · SPRING 2025

O-RAN ALLIANCE, 2025; n.d.

Shared certification cuts repeated testing — a partial analogue: interoperability, not research validation

22
Co-hosts: operators, OTICs, research institutes

19
Test labs

69
Organisations

Viet Nam’s legal basis

22 DEC 2024

Resolution 57-NQ/TW

Breakthroughs in science, technology, innovation and digital transformation

Politburo of the CPV, 2024

27 JUN 2025

Law 93/2025/QH15 adopted

Science, Technology and Innovation

National Assembly of Viet Nam, 2025

1 OCT 2025

Law 93 in force

Controlled testing (sandbox) and acceptable risk in research; Law 71/2025/QH15 adds controlled testing for digital products

2030 TARGET

R&D at 2% of GDP

More than 60% from non-state sources

Politburo of the CPV, 2024

PERSISTENT BOTTLENECKS · MINISTRY OF SCIENCE AND TECHNOLOGY (Tạp chí Khoa học và Công nghệ Việt Nam, 2026)

- Research not matched to market needs
- Enterprises look for TRL 6–7 or above
- Hesitancy over audit liability
- Few intermediaries; no first market

Five cases of real-world validation

In every case, the owner of the operating environment was committed to adoption and involved before validation began

UNITED KINGDOM

AI in Health and Care Award

7 of 10

third-phase projects reached first real-world testing

Two were deployed without proven benefit: validation can conclude a working technology should not scale

Cresswell et al., 2025

INDIA

BSNL indigenous 4G stack

92,600+

towers on the domestic stack by Sep 2025

Operator was validation site; scale exposed problems the trials had missed

PIB, 2025; TelecomTalk, 2026

JAPAN

Level 4 mobility, Eiheiji

1st

Level 4 approval, permit and service in Japan (2023)

Public institute led the consortium; approvals advanced with the evidence

METI, 2023a–c

UNITED STATES

FAA BEYOND programme

48,383

BVLOS flights of 70,563 in phase 1

Most participants missed their metrics; data helped rulemaking less when indicators were not agreed in advance

OIG, 2025

RWANDA

Drone delivery of blood

79 min

faster than road delivery, with about two-thirds fewer expired units

Researchers independent of the vendor measured outcomes from routine data

Nisingizwe et al., 2022

A jointly governed validation framework

COMPONENT	KEY QUESTION	MAIN RESPONSIBILITY
1 Readiness baseline	Which TRL — and integration, manufacturing, regulatory readiness (e.g. IRL, MRL) — is demonstrated, on what evidence?	Research team; independent reviewers
2 Validation environment	Is the set-up truly “relevant” or “operational” — site, data, users, scale?	Industry counterpart, with independent verification
3 Acceptance criteria	Which technical, economic and user metrics, agreed in advance, define success or stop?	Joint: research, industry, funder
4 Contributions, data, IP	How are in-kind inputs valued, and how are results, data and IP shared?	Joint, under funder guidelines
5 Decision gate	Scale up, redesign or terminate? Is failure documented and accepted?	Funder; adopting enterprise

Author's proposal, for discussion — not an established standard

Anchor validation in practice before funding

Validation planned after the research ends often finds no environment owner, no integration budget and no committed adopter

FORMULATION-STAGE REQUIREMENTS FOR APPLIED RESEARCH PROPOSALS

a — Co-defined problem
Problem statement co-defined with a named prospective adopter

b — Environment and exit TRL
Operating environment, exit TRL and indicative acceptance criteria

c — Adopter commitment
Co-funding, in-kind sites and data, intent to procure, or a governance role

d — Regulatory pathway
Approvals, permits or controlled testing the technology will need

e — Adoption plan
Who will own, operate, maintain and finance the technology

VALUING IN-KIND CONTRIBUTIONS

1 — Documented cost
Verifiable cost, not notional market value; opportunity cost dominates for data and network capacity

2 — Agreed in advance
Unit rates and evidence requirements fixed upfront, so contributions are auditable

3 — Separate from IP
IP follows inventive contribution; providers of sites or data get pre-agreed access, licensing or first-refusal rights

Author's proposal, for discussion; in-kind valuation rules should be piloted before standardisation

Six ways to anchor applied research in practice

Modalities can be combined; the mix depends on who owns the environment, who buys the result, the risks and the enterprise's capacity

COORDINATION MODALITY	TYPICAL DIVISION OF ROLES	CASE
1 Enterprise commissioning, adopter as first customer	Adopter sets requirements, hosts validation in live operations and commits to buy on success; public R&D supplies core technology	BSNL 4G, India
2 Public challenge funding with independent evaluation	State funds staged awards; suppliers deploy; adopting sites host; independent evaluators judge against pre-agreed criteria	AI Award, United Kingdom
3 Consortium validation with regulatory co-development	Ministries fund and adapt approvals; a public institute leads; manufacturers supply; a municipality provides a bounded area	Eiheiji Level 4, Japan
4 Regulator-led operational pilot programme	Regulator grants waivers and specifies reporting data; public bodies host; industry operates; data inform rules	BEYOND, United States
5 Public–private service partnership with outcome evaluation	Government integrates the service; the company operates it; researchers evaluate outcomes from routine data	Blood delivery, Rwanda
6 Shared neutral test infrastructure	Operators, vendors and academia test jointly; common certification cuts duplicate testing; state or industry co-funds	O-RAN test centres

Applying the framework to AI vision

COMPONENT	APPLICATION TO AI VISION	EVIDENCE AND RESPONSIBILITY
1 Readiness baseline	TRL per module (detection, plates, violations, face, edge hardware), plus integration and manufacturing readiness	MobiFone R&D; independent reviewers
2 Validation environment	Operating domain set in advance: road, light, weather, cameras, traffic mix; pilot to provincial centre	Police unit as site owner; MobiFone network, edge, cloud
3 Acceptance criteria	Alert precision after officer review, recall against sampled ground truth, false alerts per 10,000 vehicles	Developer, user unit, funder; independent evaluator
4 Contributions, data, IP	Video stays on user systems; in-kind at documented cost; background vs foreground IP separated	Joint, under data protection law and fund rules
5 Decision gate	Scale, redesign or stop; conformity assessment and metrological inspection before any enforcement use	Fund council; user unit; MobiFone

Illustrative; metrics and thresholds to be agreed with the user unit, funder and an independent evaluator

Six recommendations for Viet Nam

01 **Make anchoring in practice a funding condition**
Co-defined problem, operating environment and exit TRL, adopter commitment and adoption plan; assess by coordination modality

02 **Fund validation as a distinct stage**
Entry and exit TRL, complementary readiness dimensions and pre-agreed acceptance criteria

03 **Require a validation partner or shared test infrastructure from TRL 5**
In-kind contributions valued at documented cost; lighter co-funding rules for small firms with limited R&D capacity

04 **Link successful validation to Law 93/2025 and state ordering**
Controlled testing and risk acceptance, with state ordering as a first market for validated products

05 **Co-fund neutral test infrastructure**
Shared facilities open to all vendors, modelled on open testing and integration centres

06 **Record and publish failed or negative validations**
Accepted risk becomes organisational learning, not wasted funding

References

Auerswald, P. E., & Branscomb, L. M. (2003). Valleys of death and Darwinian seas. The Journal of Technology Transfer, 28(3–4), 227–239.

Beede, E., et al. (2020). A human-centered evaluation of a deep learning system deployed in clinics for the detection of diabetic retinopathy. Proceedings of CHI 2020.

Bruneel, J., D'Este, P., & Salter, A. (2010). Investigating the factors that diminish the barriers to university–industry collaboration. Research Policy, 39(7), 858–868.

Cresswell, K., et al. (2025). A mixed methods formative evaluation of the UK NHS Artificial Intelligence Lab. npj Digital Medicine, 8, 448.

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: A Triple Helix of university–industry–government relations. Research Policy, 29(2), 109–123.

GAO. (2020). Technology readiness assessment guide (GAO-20-48G). US Government Accountability Office.

Mankins, J. C. (2009). Technology readiness assessments: A retrospective. Acta Astronautica, 65(9–10), 1216–1223.

Mansfield, T. (2023). Facial recognition technology in law enforcement: Equitability study (NPL Report MS 43). National Physical Laboratory.

METI. (2023). Press releases of 31 March, 12 May and 22 May 2023 on Japan's first Level 4 automated operation approval, permit and service.

National Assembly of Viet Nam. (2025). Laws No. 93/2025/QH15, 71/2025/QH15, 67/2025/QH15 and 134/2025/QH15.

Nisingizwe, M. P., et al. (2022). Effect of drone delivery on blood product delivery time and wastage in Rwanda. The Lancet Global Health, 10(4), e564–e569.

Office of Inspector General, US DOT. (2025). FAA has made progress in advancing BVLOS drone operations but can do more to achieve program goals.

Olechowski, A. L., et al. (2020). Technology readiness levels: Shortcomings and improvement opportunities. Systems Engineering, 23(4), 395–408.

Press Information Bureau. (2025, September 29). BSNL 4G mobile tower in Quepem among over 97500 towers inaugurated by PM. Government of India.

Prime Minister of Viet Nam. (2025). Decision No. 2815/QĐ-TTg on strategic technology products prioritised for immediate deployment.

Prime Minister of Viet Nam. (2026). Decision No. 33/2026/QĐ-TTg promulgating the list of high-risk artificial intelligence systems.

Thank you

Validation in real-world settings is where research evidence becomes decision evidence.

Dr. Vu-Duc Ngo · MobiFone Hi-Tech Center