FROM NEED TO NEXT COMMITMENT

Industrial roadmapping workshop pack

A practical starting point for product, engineering and R&D teams.

Choose the technology for a field pilot. Keep the customer need, product function, supporting evidence and available capacity in the same conversation.

WHY

Reduce unexpected stoppages

WHAT

Detect developing deterioration

HOW

Compare candidate sensing approaches

NEXT

Qualify, pilot, then decide on rollout

Fictional industrial monitoring scenario. Replace its estimates and assumptions with your own evidence. Includes an editable CSV pack and a public interactive example.

Method foundation: T-Plan by Robert Phaal, Clare Farrukh and David Probert, IfM, University of Cambridge [1]. The worksheets and drawings here are original practice material.

01 | DECISION BRIEF

What decision needs a clearer roadmap?

Agree the scope before choosing tools or collecting more information.

Question	Worked example
Decision	Which retrofit monitoring approach deserves a bounded field pilot?
Product / equipment family	Industrial pumps already operating at customer sites.
Planning horizon	Four quarters from the start of the pilot programme.
Next commitment	Pilot preparation, subject to reviewed bench and installation evidence.
People needed	Commercial, product engineering, maintenance, operations and finance.
Out of scope	Confirmed rollout performance, certification and a validated return on investment.

Our decision and scope

Decision owner and next review

02 | NEEDS AND FUNCTIONS

Give the technology a job to do

Separating the function from its implementation keeps alternatives open.

Need	Product function	Candidate technology
Reduce unexpected stoppages	Detect developing deterioration	Accelerometer sensing or ultrasonic sensing
Fit existing equipment	Install during a short access window	Removable magnetic mounting
Dependable field operation	Operate in the specified environment	Sealed enclosure

The candidates are hypotheses. The detection thresholds, operating conditions and acceptance tests still need agreement. A component specification alone cannot validate the complete product outcome.

A customer need we can support with evidence

The function and operating conditions it requires

Alternative ways to deliver that function

03 | LINKING GRID

Make the relationship and its uncertainty visible

Illustrative workshop judgements. The example does not establish technical performance.

Option	Detect deterioration	Fit quickly	Operate in environment
Accelerometer sensing	Support hypothesis	Unknown	Unknown
Ultrasonic sensing	Unknown	Possible adverse effect	Unknown
Magnetic mount	Unknown	Support hypothesis	Unknown
Sealed enclosure	Unknown	Unknown	Support hypothesis

Support hypothesis: there is a plausible enabling relationship to test. Possible adverse effect: investigate whether installation access or training creates a constraint. Unknown: no agreed assessment yet. These judgements are not weighted scores.

Most consequential relationship to test

Evidence, judgement owner and acceptance criteria

What would make us change the preferred option?

04 | EVIDENCE REGISTER

Keep the observation separate from the interpretation

Link each material claim to a source, its limits and a remaining question.

Record	Example entry	Still needed
Observation	A maintenance participant reports short access windows.	Representative access data from the selected sites.
Interpretation	A retrofit approach may need to fit a brief planned stop.	Agree the equipment family and permitted installation procedure.
Technology hypothesis	Sensing may identify developing deterioration.	Representative fault trials and false-alert criteria.

For your own evidence, record an ID, source title, date/version, page or passage, factual observation, interpretation, limitation, owner and review trigger. Keep confidential source material in the appropriate workspace.

Source ID, title, version and supporting passage

Observation and our interpretation

Uncertainty, next evidence action and owner

05 | PATHWAY AND GATES

Put the evidence before the commitment

Keep dependencies across the layers explicit [2]. Dates in this example are relative quarters.

When	Work and decision	Dependency
Q1	Compare and qualify sensing; check mounting and environmental criteria.	Representative faults, installation conditions and agreed criteria.
Q2	Run a bounded installation pilot.	Reviewed Q1 qualification and confirmed site access.
Q3	Review pilot evidence, service readiness and the commercial case.	Pilot findings and an owner for support arrangements.
Q4	Rollout decision or a revised pathway.	Reviewed evidence, capacity and funding decision.

Our next evidence gate and the decision it informs

What must happen first?

Which option remains open if the gate is not met?

06 | RESOURCE WORKSHEET

Do both proposals fit the engineering team?

One engineer-month is one person working full time for one month.

Q1 proposal	Engineer-months	Illustrative budget
Monitoring pilot preparation	4	EUR 60,000
Competing seal redesign	3	EUR 35,000
Combined demand	7	EUR 95,000
Available capacity	6	Funding boundary still to be agreed
Capacity gap	1	Review sequence, scope or qualified capacity

Six engineer-months in a quarter could mean two full-time engineers for three months. Check actual skills, leave, partial availability and existing commitments. Money and people are separate constraints.

Our capacity by skill and period

Options for resolving the gap and their consequences

Accepted sequence, owner and review trigger

07 | FACILITATION PLAN

Four connected discussions

Use these jobs to prepare a sequence that fits your group. The complete T-Plan method is available from IfM [1].

Discussion	Question	Leave with
Market / drivers	Which internal and external needs matter for this product family?	Prioritised drivers, evidence limits and open questions.
Product	Which features, functions and attributes respond to those needs?	Agreed vocabulary and driver-to-function relationships.
Technology	Which options could enable those functions?	Options, adverse effects, unknowns and evidence actions.
Charting	What sequence supports the next decisions?	Connected pathway, gates, resource check and owners.

Prepare each discussion with the right participants and evidence. Use the first result as an input to the next discussion. Do not fill every grid cell simply to make the workshop look complete.

Who needs to contribute or challenge the reasoning?

What should participants prepare before the first discussion?

08 | REVIEW AND REFERENCES

Keep the roadmap useful after the workshop

Name the decision owner, evidence owner and person maintaining the map [3].

Review questions. What changed? Which assumption does it affect? Which option or commitment should be revisited? Who will investigate, and which next decision needs the answer?

Next review date, trigger and owner

[1] Phaal, Farrukh and Probert (2001). T-Plan: The fast start to Technology Roadmapping. IfM, University of Cambridge.
https://www.ifm.eng.cam.ac.uk/insights/roadmapping/t-plan/

[2] Phaal and Muller (2009). An architectural framework for roadmapping: Towards visual strategy. Technological Forecasting and Social Change, 76(1), 39-49.
https://doi.org/10.1016/j.techfore.2008.03.018

[3] Phaal, Chaskel, Gonzalez Nakazawa and Ross (2024). Roadmapping Roadmapping: Strategic planning for roadmapping systems. Frontiers of Engineering Management, 11, 516-527.
https://doi.org/10.1007/s42524-024-4072-0

Online example: innovationflow.app/examples/industrial-technology-roadmap/

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