APPENDIX A: SURVEY INSTRUMENT OVERVIEW

Note: The complete survey instrument as deployed is available as Supplementary Material 3. This appendix presents the survey structure in table format with representative items from each module. All item wording, option counts, and routing targets below were reconstructed from the deployed form printout (56 pages, closed 14 March 2026).

Table A1. Complete survey structure and content overview

Section	Question range	Module	Respondents	Content focus	Items	Sample items
1	Q1–Q4	Eligibility and consent	All	Eligibility screening, information sheet confirmation, age confirmation, voluntary participation	4	Q1: Do you currently work in an engineering, technical, industrial, or engineering-related academic environment? [single-select; ineligible responses exit the survey]; Q2: I have read the participation information sheet [Yes/No]; Q3: I confirm I am 18 years or older [Yes/No]; Q4: I voluntarily agree to participate in this study [checkbox — "I agree to participate"]
2	Q5–Q19	Demographics and work context	All	Age, gender, education, country/region, discipline, industry sector, work setting, employment type, career choice, intention to leave organisation, intention to leave profession, job satisfaction, work–life balance, working hours, team size	15	Q5: Age range [7 options]; Q9: Which discipline or functional area best describes the work you normally do? [17 options plus free text, single-select]; Q15: Overall, how satisfied are you with your job? [5-point]
3	Q20	Role selection	All	Primary role identification (sole routing variable)	1	Q20: Which option best describes your PRIMARY role in your workplace [16 options plus free text; single-select. Options: Commissioning/Start-up; Construction/Site-based; Design Engineering; Project Management; Technical Specialist/SME; Leadership/Management; Graduate/Early Career Engineer; Trades/Technicians;

Section	Question range	Module	Respondents	Content focus	Items	Sample items
						Academia/Research; Commercial/Contracts/Procurement; Operations/Plant Operations/Production; Maintenance/Reliability Engineering; Planning/Scheduling/Project Controls; Quality Assurance/Quality Control; Health, Safety & Environment; Controls/Automation/Instrumentation]
4A	Q21–Q40	Commissioning and start-up	Commissioning / start-up (n = 81)	Pressure to begin testing prematurely, defect severity downgrading, permit bypassing, documentation incompleteness, out-of-sequence work, retrospective checks, risk acceptance, vendor and client pressure	20	Q21: Have you experienced pressure to begin testing or start-up before the system, equipment, or documentation was fully ready?; Q23: Have you experienced peer or team pressure to downgrade defect severity to show commissioning progress?; Scale: Never / Rarely / Sometimes / Often / Very often / N/A
4B	Q41–Q47	Operations and maintenance	Operations, plant operations and production; maintenance and reliability engineering (n = 33)	Keeping equipment running despite defects, deferred maintenance, operating outside limits, fast-tracked work, incomplete sign-offs, maintenance scheduling pressure	7	Q41: Have you experienced pressure to keep equipment running despite known defects or technical concerns?; Q42: Have you been encouraged to defer maintenance, inspections, or shutdown work to avoid production impacts; Scale: Never / Rarely / Sometimes / Often / Very often / N/A
4C	Q48–Q52	Planning and scheduling	Planning, scheduling and project controls (n = 22)	Schedule forecast manipulation, external pressure on reforecasts, delay reporting discouragement, incomplete planning inputs, milestone prioritisation	5	Q48: Have you experienced pressure to adjust schedule forecasts or progress reporting to appear more favourable than the actual project status?; Q50: Have you been discouraged from reporting delays or risks because they may trigger stakeholder concern, escalation, or rework?; Scale: Never / Rarely / Sometimes / Often / Very often / N/A
4D	Q53–Q57	Commercial and contracts	Commercial, contracts and	Commercial deadlines influencing technical	5	Q53: How often have commercial or contractual deadlines influenced engineering, construction, or

Section	Question range	Module	Respondents	Content focus	Items	Sample items
			procurement (n = 14)	decisions, accepting incomplete documentation for milestones, variation and claim suppression, client relationship priorities		operational decisions on your projects?; Q55: Have you been discouraged from issuing variations, claims, or commercial notices because they were seen as "disruptive" to relationships or project momentum?; Scale: Never / Rarely / Sometimes / Often / Very often / N/A
4E	Q58–Q64	HSE/WHS	Health, safety and environment; quality assurance and quality control (n = 39)	Premature safety sign-offs, rushed risk assessments, inappropriate risk acceptance, pushback on safety concerns, bypassed safety processes, late HSE inclusion	7	Q58: How often have you been pressured to sign off or approve work before all safety prerequisites or controls were fully met?; Q61: Have you experienced pushback, resistance, or negative reactions when raising safety concerns that could impact progress or cost?; Scale: Never / Rarely / Sometimes / Often / Very often / Not applicable
4F	Q65	**Unbranched fallback** (single item; not a leadership module)	The nine role categories not routed to a role-specific module: design engineering; project management; construction/site-based; trades and technicians; leadership and management; academia and research; graduate and early career; technical specialist/SME; controls, automation and instrumentation (n = 142)	Supervisory scope. This is the largest single pathway in the instrument.	1	Q65: How many people do you directly supervise or lead? [0 / 1–2 / 3–5 / 6–10 / 11+ / Prefer not to say]

Section	Question range	Module	Respondents	Content focus	Items	Sample items
4G	—	No role-specific module	Free-text role entries at Q20 not matching a listed option (n = 4)	Respondents entering a free-text role receive no role-specific module and proceed directly to Q66. **This applies only to free-text entries; all sixteen listed options route either to a role-specific module or, for nine of them, to the Q65 fallback.**	0	—
5A	Q66–Q70	Workplace pressure	All	Unrealistic expectations, role expansion, peer judgment, mistake treatment, hours pressure	5	Q66: I feel pressure to meet unrealistic expectations at work; Scale: Strongly disagree to Strongly agree
5B	Q71–Q72	Delay and cost attribution	All	Groups (Q71) and processes and systemic factors (Q72) associated with delays and cost increases	2	Q71: In your experience, which groups are most commonly associated with project delays or cost increases? [multi-select, 11 options plus free text]; Q72: Which processes or systemic factors do you believe most commonly contribute to project delays or cost increases? [multi-select, 12 options plus free text]
5C	Q73–Q76	Psychological outcomes	All	Feeling overwhelmed, anxiety, autonomy, wellbeing impact	4	Q73: I often feel overwhelmed at work; Scale: Strongly disagree to Strongly agree
5D	Q77–Q80	Peer influence and team culture	All	Pressure to conform, colleague influence, hesitation to challenge decisions, groupthink	4	Q77: I feel pressure to conform to team norms; Scale: Strongly disagree to Strongly agree
5E	Q81–Q86	Peer pressure impacts on quality	All	Pressure to reduce quality, accepting substandard work, skipping processes, speed over quality, rework,	6	Q81: Has peer pressure ever caused you to reduce the quality of your work (e.g., rushing, skipping steps, lowering standards)?; Scale: No / Yes – rarely / Yes – sometimes / Yes – often / Prefer not

Section	Question range	Module	Respondents	Content focus	Items	Sample items
				delivering unsatisfactory work		to say
5F	Q87–Q96	Peer pressure impacts on project delivery	All	Bypassing approvals, informal scope changes, change request suppression, defect rating manipulation, shortened testing, risk acceptance, out-of-sequence work, workarounds, task assignment, cost increases	10	Q87: Have you experienced peer pressure to bypass or fast-track required approvals, permits, or hold points?; Scale: Never to Very often / Not applicable
5G	Q97–Q100	Organisational context	All	Leadership support, communication transparency, mistake treatment, independence encouragement	4	Q97: Leadership in my organisation is supportive; Scale: Strongly disagree to Strongly agree
6	Q101	Optional qualitative	All	Open-ended feedback	1	Q101: Please describe any experiences of workplace pressure you feel are important for this study. [open text, optional]

Table A2. Branching architecture summary

Role selected (Q20)	Routes to	Role-specific items	Then routes to	Universal items	Total active items	n
Commissioning and start-up	Q21–Q40	20	Q66–Q100	35	20 + 35 + 20 common = 75	81
Operations / maintenance and reliability	Q41–Q47	7	Q66–Q100	35	7 + 35 + 20 common = 62	33
Planning, scheduling and project	Q48–Q52	5	Q66–Q100	35	5 + 35 + 20 common = 60	22

Role selected (Q20)	Routes to	Role-specific items	Then routes to	Universal items	Total active items	n
controls						
Commercial, contracts and procurement	Q53–Q57	5	Q66–Q100	35	5 + 35 + 20 common = 60	14
HSE / quality assurance and control	Q58–Q64	7	Q66–Q100	35	7 + 35 + 20 common = 62	39
Nine unbranched role categories (see 4F)	Q65	1	Q66–Q100	35	1 + 35 + 20 common = 56	142
Free-text role entry (no listed option)	—	0	Q66–Q100	35	0 + 35 + 20 common = 55	4

Notes: "20 common" = four eligibility and consent items (Q1–Q4), fifteen demographic and work-context items (Q5–Q19), and the role-selection item (Q20). Totals exclude the optional open-text item (Q101). Pathway totals agree with Table 3 of the manuscript. ***No completion-time data were captured by the survey platform. No claim of completion-time parity across pathways is made or supported; pathway lengths were set by self-timed completion during construction, which is a design target rather than a measured outcome.*** *Routed pathways total 331; with 4 unrouted free-text entries, N = 335.*

Table A3. Scale types and response formats

Scale type	Questions	Format	Purpose
Single-select eligibility	Q1	Three options; ineligible response exits the survey	Eligibility screening
Binary Yes/No	Q2, Q3	Yes / No	Information sheet confirmation; age confirmation

Scale type	Questions	Format	Purpose
Checkbox consent	Q4	Check all that apply — "I agree to participate"	Voluntary participation
Multiple choice (single select)	Q5, Q6, Q7, Q9–Q14, Q17–Q20, Q65	Select one option	Demographics, work context, role selection, supervisory scope
Multiple choice (multiple select)	Q71–Q72	Select all that apply	Delay and cost attribution
Open text	Q8, Q101	Free text entry	Country or region; qualitative feedback
5-point Likert (agreement)	Q66–Q70, Q73–Q80, Q97–Q100	Strongly disagree to Strongly agree	Attitudinal constructs, organisational perceptions
5-point Likert (satisfaction / rating)	Q15–Q16	Very dissatisfied/poor to Very satisfied/good	Job satisfaction, work–life balance
6-point frequency (with N/A)	Q21–Q64	Never / Rarely / Sometimes / Often / Very often / N/A	Role-specific pressure manifestations
6-point frequency (with Not applicable)	Q81–Q96 (see note; Q81–Q86 use variant anchors)	Never / Rarely / Sometimes / Often / Very often / Not applicable	Peer pressure impacts

Notes: Q9 is single-select with a free-text "Other" and appears in the single-select row only. Several items within the ranges above use non-standard anchors: Q38 "Not at all…Completely"; Q39 "Not recognised…Fully recognised"; Q40 five-point frequency; Q57 single-select stakeholder item; Q81–Q84 yes-gradient; Q85 impact scale; Q86 count scale. Some role-specific items (for example Q34–Q37) also offered an "Other" free-text option. Format heterogeneity across the instrument is deliberate and is discussed in manuscript Section 3.5.

Rationale for scale choices

1. Six-point frequency scales in role-specific modules include an N/A option, since these items may not apply to all experiences within a role.
2. Five-point agreement scales are used for universal attitudinal items, which are universally applicable and need no N/A option.
3. Agreement scales capture perceptions and attitudes toward organisational conditions; frequency scales capture behavioural and experiential phenomena.

1. Key design features

Converge–diverge–reconverge architecture

1. Converge (Q1–Q19): all respondents complete the same eligibility, consent, demographic and work-context items.
2. Route (Q20) and diverge (Q21–Q65): respondents are routed to at most one role-specific module on the basis of the Q20 selection. Nine of the sixteen role options route to the single-item unbranched fallback at Q65.
3. Reconverge (Q66–Q100): all respondents complete the same thirty-five universal comparative items measuring workplace pressure, psychological outcomes, peer influence and organisational context.

Anonymity protection

1. No names, emails, organisational identifiers or IP addresses collected.
2. Google Forms configured with login requirements disabled.
3. Response tracking disabled.
4. Location asked as general "country or region" (Q8), not specific site or city.

Ethical safeguards

1. Multi-step consent: information sheet confirmation (Q2), age confirmation (Q3), voluntary participation (Q4).
2. **Q2 informed respondents that answering "no" would return them to the welcome page to review the information. No automated routing was configured on Q2; the instruction was presented to respondents rather than enforced by the platform. Skip logic exists on Q1 only, where an ineligible response exits the survey.**
3. The optional qualitative item (Q101) allows respondents to skip if preferred.
4. N/A options in role-specific and frequency modules allow non-applicable items to be passed over.

2. Data structure implications

Universal variables (no missing data in the deployed sample)

1. Q1–Q19: eligibility, consent, demographics and work context (all respondents).
2. Q20: role selection (all respondents).
3. Q66–Q100: workplace pressure, psychological outcomes, peer influence, organisational context (all respondents).
4. Q101: optional qualitative (missing data expected and acceptable; 185 of 335 responded, 55.2%).

Role-specific variables (structured missingness by design)

1. Q21–Q65: present only for respondents routed to that module.
2. Role-specific responses are not comparable across roles, since the questions differ.
3. Use for within-role description; filter the dataset by role for role-specific analyses.

Analysis implications

1. Cross-role comparison: use universal variables (Q5–Q19, Q66–Q100) only.
2. Role-specific analysis: filter by role and analyse role-specific variables (Q21–Q65).
3. Branch sizes in this deployment range from 14 to 142. Two branches (commercial, n = 14; planning, n = 22) fall below thirty respondents. No minimum cell size is asserted here as a property of the instrument; minimum sizes should be set in advance from the intended analysis, and small branches should be treated as descriptive rather than inferential. The $n \geq 30$ figure appearing in Supplementary Material 2 is guidance for prospective implementations, not a threshold this deployment meets.