**The KT4TT Need to Knowledge Model**

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| **Stages and Gates** | **Steps** | **Plans/Progress** |
| **Stage 1: Define Problem and Solution** | 1. Opportunity for KT: Assess needs for device or service with input from relevant stakeholders from the six knowledge user (KU) groups.
2. Identify a problem (need). Identify audience for solution. Identify context for both.
3. Propose plausible solution (goal) to problem in the form of a device or service.
4. Determine scope of project (role); output as conceptual discovery, prototype invention or device/service innovation?
5. Consider path to market.
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| **Gate 1: Idea Screen.** PI decides to either terminate or move forward with project to develop solution to problem.  |
| **Stage 2: Scoping** (Initial screen to validate innovativeness and value to target markets)  | 1. Define innovation opportunity.
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| 1. Opportunity for KT: expanding on previously identified needs, perform preliminary valuability assessments (business, market and technical) on device/ service with input from stakeholders in the six KU groups.
2. Identify potential barriers.
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| **Gate 2: Second Screen.** PI must decide if envisioned project output and eventual device/service outcomes are still considered innovative in the light of results from assessments. PI decides if generation of new knowledge is required. If no, PI decides if project should move directly to invention phase or terminate. If yes, should they pursue external funding to conduct remainder of discovery phase? |
| **Stage 3: Conduct Research and Generate Research-Based Findings**(Create/find relevant knowledge) (Campbell & Stanley, 1963) | 1. Opportunity for KT: Identify expertise needs and assemble transdisciplinary research team (I.e. methodologist, statistician, etc.)
2. Identify specific knowledge gaps- purpose of research phase.
3. Select appropriate research design and develop research plan (action research, grounded theory, cooperative research, clinical research, etc).
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| 1. Secure funding.
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| 1. Conduct research.
2. Monitor and track quality.
3. Refine process and optimize quality of results.
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| 1. Results - integrate findings.
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| 1. Conclusion – evaluate discovery in light of solution.
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| **KTA: Discovery Outputs** | 1. Use initial need assessment, valuability

assessments, and value proposition to match the Discovery to the knowledge gap.1. Use need and valuability assessments to demonstrate how the discovery will benefit each separate knowledge user (KU) group.
2. Assess barriers (B) to use of the discovery for each KU group.
3. Depending on B, select and implement interventions.
4. Monitor use of the discovery.
5. Evaluate outcomes – may have to develop new outcome measures.
6. Sustain use of the discovery.
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| **Gate 3: Begin Invention Phase?** Does the discovery have merit on its face? If no, terminate and go to KTA for projects terminated at completion of discovery phase. If yes, conduct stage 4 to validate merit and worth. |
| **STAGE 4: Build Business Case and Establish Development Plans** | 1. Seek key co-development partners.
2. Propose draft solution.
3. Outline preliminary business case.
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| 1. Implement IP strategy in collaboration with technology transfer office or patent attorney.
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| 1. Assess regulatory, and reimbursement requirements.
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| 1. Opportunity for KT: Initiate key co-development practices.
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| 1. Assess resource needs and availability.
2. Develop implementation plan.
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| 1. Secure resources for development.
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| 1. Allocate adequate resources.
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| 1. Gather, analyze and prioritize customer needs.
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| 1. Identify device/service features and specifications in light of production capabilities and component costs.
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| 1. Complete business case.
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| **Gate 4: Implement Development Plan?** PI or partner considers if the business case has been validated. If yes, move to stage 5. If no, terminate or reiterate. |
| **Stage 5: Implement Development Plan** (Kahn, 2005) | 1. Build alpha prototype models.
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| 1. Monitor development process.
2. Test alpha prototype models.
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| 1. Refine models.
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| **Gate 5: Go to Beta Testing?** Will beta prototype solve problem? If yes, move to stage 6; if no, terminate or reiterate.  |
| **Stage 6: Testing and Validation** (Prototype evaluation and refinement) | 1. Test beta prototype with consumers in lab.
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| 1. Refine beta prototype models.
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| 1. Test refined beta prototype with consumers in field.
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| 1. Refine beta prototype models further.
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| **KTA: Invention Outputs** | 1. Revisit the potential value proposition, business case, and focus group/field test data to communicate the value of the invention to knowledge user (KU) groups.
2. Use information from the business case and consumer research activities to explore ways the invention can be used by each KU group.
3. Assess barriers (B) to use of the invention.
4. Depending on B, select and implement interventions.
5. Monitor invention use.
6. Evaluate outcomes – may have to develop new outcome measures.
7. Sustain invention use – use feedback to modify tools as needed.
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| **Gate 6: Go to Production Planning?** Does prototype invention demonstrate sufficient value to move on to production planning? If no, terminate and go to KTA for projects terminated at completion of invention phase or reiterate.  |
| **Stage 7: Production Planning and Preparation**  | 1. Draft preliminary bill of materials.
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| 1. Develop materials plan.
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| 1. Estimate market needs and costs for production.
2. Develop production and capacity plan.
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| 1. Plan and schedule engineering.
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| 1. Plan and schedule tool and process design.
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| 1. Review costs using preliminary BOM.
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| 1. Review IP protection and obtain final approval from regulatory and reimbursement bodies- if needed.
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| 1. Finalize distribution logistics.
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| 1. Finalize marketing and sales activities.
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| 1. Develop post-launch evaluation plan.
2. Initiate trial or limited production runs.
3. Test market or trial sell.
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| **Gate 7: Go to Launch?** PI or partner determines if production plans should be implemented through device/ service launch. If yes, move to stage 8 and implement KTA for launched innovation output; if no, implement KTA for an un-launched innovation output. |
| **KTA3: KTA For Un-Launched Innovations** | K3.1. Identify lessons learned from innovation development process.K3.2. Adapt lessons learned into tools relevant to each knowledge user (KU) group. Consider instrumental, conceptual, and/or strategic uses of the innovation and lessons learned.K3.3. Assess barriers (B) to use of tools relating lessons learned. Survey KUs to understand why they may be unable/ unwilling to use the tools or apply the lessons learned.K3.4. Select and implement interventions to overcome barriers.K3.5. Monitor use of tools and provide support as needed.K3.6. Evaluate outcomes, may have to develop new outcome measures.K3.7. Sustain use of lessons learned via tools. |  |
| **Stage 8: Launch** | 1. Initiate production and launch device/service.
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| 1. Monitor performance.
2. Provide device/service support.
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| 1. Troubleshoot and correct problems.
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| **Gate 8: Post Production Assessment.** PI or partner reviews device/ service performance to decide if/when to remove the device/ service from store shelves. |
| **Stage 9: Post-Launch Review** | 1. Continue production, monitoring and support.
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| 1. Troubleshoot and correct problems.
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| 1. Review performance against expectations.
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| **Gate 9: Terminate Production**. PI or partner review monitoring data to determine when device/service has reached maturity or obsolescence.  |