Technology Readiness Level (TRL) Scale

We all know that research helps make our transportation system better. How do we determine when a research solution is ready to help us solve a transportation challenge? Technology Readiness Level, also known as the TRL scale. Using this assessment tool throughout the life of a research project can help us in a lot of vital ways.

BASIC RESEARCH

1 — Basic Principles and Research
- Understand concepts
- Basic scientific principles

2 — Application Formulated
- New ideas and knowledge
- Develop methodology and approach
- Early analysis and experiments
- Show sound science

3 — Proof of Concept
- Feasibility and case studies
- Modeling and simulation
- Prove innovative technology or idea
- Solicit user input

APPLIED RESEARCH

4 — Components Validated in a Controlled Setting
- Controlled environments
- Individual components
- Component compatibility
- Individual functions tested

5 — Integrated Components Demonstrated in Controlled Environment
- Integrated components
- Fully controlled setting
- System interfaces documented
- Operational requirements developed

DEVELOPMENT

6 — Prototype Demonstrated in Realistic Environment
- Limited prototype testing
- Realistic environment
- Operational requirements satisfied

7 — Prototype Demonstrated in Operational Environment
- Completed prototype
- Test with real world conditions
- Involve broader user community
- Preliminary draft specification

8 — Technology Proven in Fully Operational Environment
- Fully proven across expected real world conditions
- Expanded pilots or larger deployments
- System refinements
- Preliminary training and outreach
- Refined draft specification

IMPLEMENTATION

9 — Technology Refined and Adopted
- Fully deployed as a standard method
- Finalized training and outreach
- Published TxDOT or AASHTO specification

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Texas Department of Transportation