



CLEAR PROGRAM

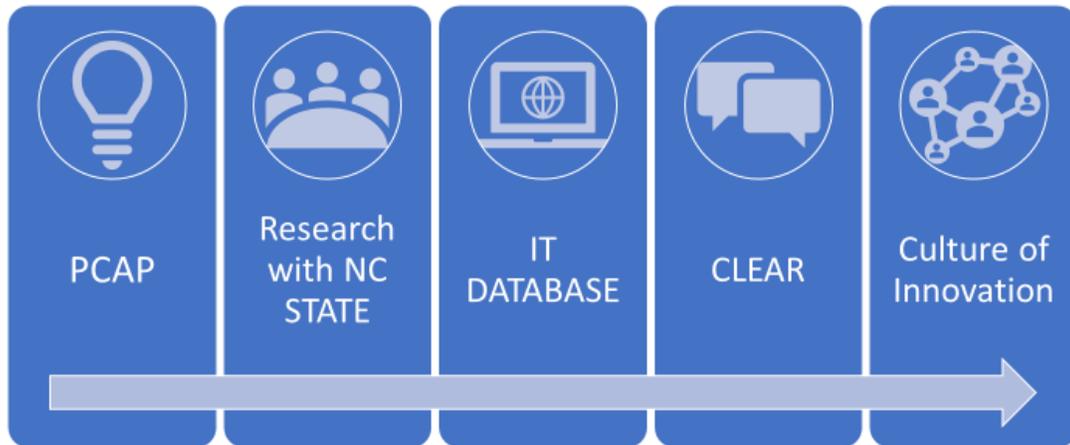
Summary

Summary report of the progress from 2019 and upcoming goals for 2020.
February 7, 2020

Clare Fullerton, PE
cefullerton@ncdot.gov

Annual Report - 2019

The CLEAR (Communicate Lessons, Exchange Advice, Record) is a Program to support internal communication, knowledge sharing, creativity, and innovation. The benefits of the program are to provide open communication, create a space for cross discipline discussions, support a culture of sharing, engage with all personnel throughout the Department on innovations, identify trends on reoccurring issues that need to be addressed, provide an opportunity to celebrate successes by Department personnel, and create an accessible conduit for scaling ideas.



The program began its development as a post construction assessment program (PCAP) to promote communication from construction and maintenance back to planning and design. This In 2017, a research proposal was submitted to develop the PCAP program. During 2017, interviews were conducted with various personnel to help shape and develop the program with the end-user (NCDOT employees) in mind. The research proposal was approved and officially kicked off in 2018. During 2018, extensive interviews were conducted throughout the Department, the idea of submitting ideas was defined, and the workflow for what would happen to the submission was completed. A draft submission form was created and discussion with IT on how to build the database were started.

Over the course of 2019, the program expanded to be considered as a communication tool for all parts of NCDOT and is a part of the larger effort of creating a culture of innovation in the Department. The specific type of communication includes internal innovation ideas and efforts, lessons learned, and best practices. This effort is similar to those taking place throughout other DOTs and a part of NCDOT's overarching efforts to create a culture of innovation throughout the Department.

The following is an update on the activities from 2019, the status of past initiatives starting in 2018, and upcoming action items for 2020.

Summary of Activities

The focus in the beginning of 2019 was in finalizing the database and establishing the infrastructure needed to support the program long term. In the second half of 2019, interviews began place with various state DOT's around the nation that have similar programs in different levels of maturity. Additionally, a Risk Assessment was done on the program with a range of participants to find some opportunities to

improve the program and identify risks that may prevent its success. This report will provide an overview of efforts from 2019 and early 2020 as well as the path forward. These efforts include:

- Expansion of the research work;
- A Risk Assessment;
- Engagement with other state DOTs;
- Database improvements;
- Framework for implementation of an innovation; and
- Draft action plan for establishing a Culture of Innovation.

Research

The official kick-off was in July of 2018 (RP2019-15). The research team is led by Dr. Edward Jaselskis – professor at NCSU. The team concluded their department wide interviews in 2019 and began developing the Standard Operating Procedures (SOPs) for how to functionally use the database portion of the program as the idea submission portal. Additionally, the research team conducted a survey to identify the best way in which people learn. It was determined that a variety of video tutorials, SOPs, and in person training was the best path forward. This will be finalized and rolled out in the first half of 2020 when the research project RP2019-15 concludes.

Pilot Project

The primary pilot projects were selected to gain a better understanding of how project management worked in construction and identify possible areas where lessons could be collected during the course of a project. This initial tactic provided insight into how lessons learned may be captured and gave a contact for ongoing projects. At this stage, these projects are not being monitored as a part of the CLEAR program development because the purpose of engagement for research has been achieved.

DE00204 – B5102 – Division 5

DC000194/SS4903BR – Division 3

C204037 - B5507 – Division 1

DM00228 - I-5885/I5886 – Division 13

HiCAMS

In learning about how a project was managed, HiCAMS was explored as a mechanism to capture lessons learned. HiCAMS was determined not to be the best viable option and will no longer be explored due to it not being a Department wide application.

Utility Claims Review

While conducting initial interviews, the impact of utility delays continued to be a topic of conversation. The team decided that this topic would be further analyzed to demonstrate a use case for when a reoccurring problem persists. The research group was able to use claims data from HiCAMS and conducted an analysis on the data. The information was analyzed by location, project size, type of utility, year, and other notable attributes. Other states' best practices in mitigating utility delays were researched and ideas from NCDOT personnel were compiled to provide options on solutions. Preliminary information was presented in 2019; the analysis is near completion and will be presented to members to the Construction Unit and Utilities Unit in February of 2020. From there, the two units can use the presented information to make informed decisions on changes that may be needed to improve the utility delay issue.

A copy of the summary of this process and outcome – What Happens to a Lesson? can be found in the Appendix A. A copy of the presentation can be provided on request.

Research Committee

The research committee was confirmed and the first meeting took place in July of 2018 at the official research kick-off. The role of the committee was to provide insight in possible uses of the program, different avenues that should be explored, details on the day to day operations of the Department, and various offices or units that needed to be engaged. The following Department personnel are the research committee and their position as the time of appointment to the committee.

Sam Eddy	Maintenance Program Engineer
Michelle Gaddy	State Construction Operations Engineer
Cameron Cochran	Regional Bridge Construction Engineer
Brian Hunter	State Laboratory Operations Manager
Amber Lee	Team Leader, SMU
Carla Schoonmaker	Division 2 Assistant Resident Engineer
Todd Whittington	State Field Operations Manager
Kristy Alford	Team Leader, SMU
Roger Kluckman	Project Engineer, Roadway

Technology Transfer

Towards the end of 2019, it was determined that additional resources were needed to effectively implement the program. An RFP was put out on December 3rd soliciting proposals for a Technology Transfer and Metric Building. This person or team would work to establish a transfer plan that would effectively ingrain the use of CLEAR into an everyday practice. The focus is on creating a culture of innovation within the Department and establishing metrics to monitor the program long term. The goal is to have this person or team on-board in February 2020. Additional information on the metrics can be found under Culture of Innovation.

Risk Assessment

On November 21st, a Risk Assessment was conducted on the program. The Value Management Office facilitated the Risk Assessment process for two defined teams which identified risks and opportunities. The two groups included group 1 with a focus on encouraging employees throughout the Department to use the CLEAR database and group 2 with a focus on systemic program integration and enhancing the culture of innovation. The outcomes of the assessment can be found in the full report in Appendix B. Some of the takeaway items that have been worked on in the program include:

- Improving the SharePoint page;
- Brainstorming some possible non-monetary incentives/rewards for users;
- Identifying ways to integrate to use of CLEAR into everyday practice;
- Utilizing more of the available functions in SharePoint;
- Improving the verbiage, such as changing Approved to Accepted, to capture the appropriate sentiment.

DOT Engagement

At the end of 2019 and beginning of 2020, other states were engaged by the CLEAR program manager to learn about their own DOT's efforts for Internal Innovation programs and cultures. Overall, the consensus that top leadership support is key in a successful innovation program as well as making the process easy to use, approachable, and engaging.

Below is a list of states that have been engaged and some key take-away's that are either in the process of being implemented as a part of the CLEAR program or being explored. Following is a list of best practices provided by FHWA and other states that are planned to be engaged in 2020.

Indiana

- Working on developing a program similar to Missouri's with an annual Innovation Showcase
- Uses paper forms to personnel without access to computers
- Uses District Innovators to help gather ideas in each of the 6 districts and move them forward
- Exploring the use of incentives

Missouri

- Standing program that has been a part of the Department for 12 years
- Use a TRACKER to monitor performance
- Use Coordinators in each of the 7 Districts and Central Units to solicit ideas and support the program
- Long standing Annual Showcase with monetary incentives

Colorado

- Began in 2013 and initially decentralized, now a centralized program
- Online submission with two submission options
 - o Lesson Learned that is not vetted by experts before publishing
 - o Suggestions that are vetted by experts before publishing
- Drawing ran for submitters to earn a prize and names are announced by upper management on video
- Implemented submissions are turned into Idea Cards which explain how it can be implemented by others

Utah

- Dashboard with top ideas, submitters, implementation rate etc.
- Identified Innovation Stewards with a mission of "Empowering our coworkers to discover their value through thinking, doing, and leading."
- Points are earned by submitters and points can be turned in for prizes or given to others.

Pennsylvania

- Annual luncheon to present top 10 awards for internal innovators and provide an award
- Utilize a paper form for field personnel
- Require 30-day response from reviewers on submissions
- Identified Idea Link Coordinators to push ideas forward

Wisconsin

- Collaborate with industry partners to move innovations forward
- Established an Innovation Review Committees in each functional group
 - o Innovation Review Committee Lead manages the committee in their own area to support the culture of internal innovation
- Developed 5 step process for an Idea: Incubate, Demonstrate, Pilot, Communicate, Implement
- Created an Innovation Library with basic information on the innovation and who to contact for implementation

Delaware

- Conducted an internal innovation day – looking to do bi-annually
 - o Looking at engaging High School and College students to support future workforce into future events
 - o Provide awards at the day
- Provide non-monetary awards

FHWA – Center for Acceleration Innovation

- Keep it simple
- Encourage Managers to be Space Makers and for Staff to be Risk Takers
- Create teams focusing on Challenge Topics
- Create an Innovation Day
- Create a dashboard showing progress

Upcoming Outreach in 2020

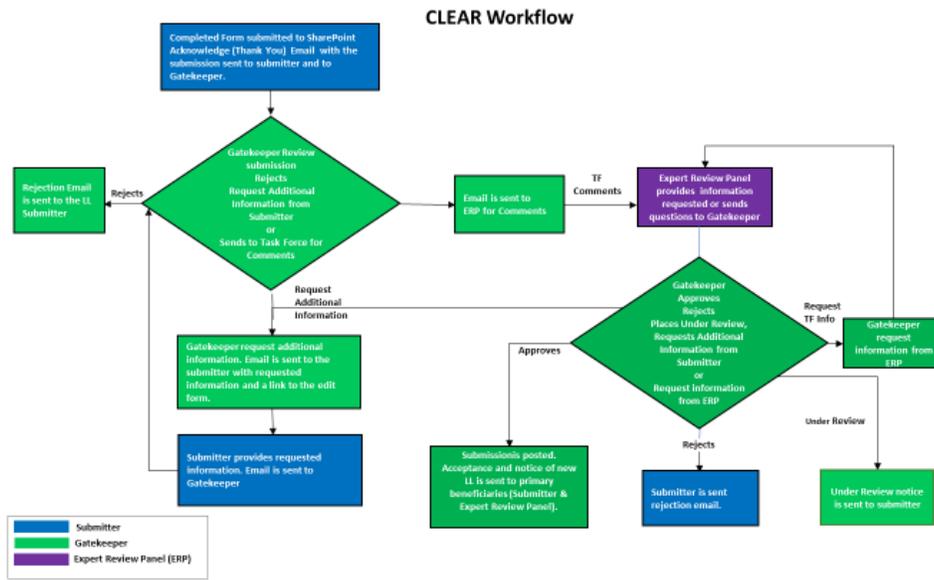
- Planning to engage with the following states on their internal innovation efforts: Kentucky, New Jersey, Idaho, California, Alaska, Arizona, Iowa, Wyoming
- Attend Peer Exchange hosted by FHWA in Utah to work on the programming around an internal innovation program
- Host the Annual FHWA Innovation Discussion, follow-up to Ohio in 2018 and Pennsylvania in 2019

Database

CLEAR, as a knowledge management system, is an online SharePoint database that has been developed but DIT. This database is accessible to all NCDOT employees, uses forms, lists, and workflows to manage the submissions and reviews of lessons learned, best management practices, or queries.

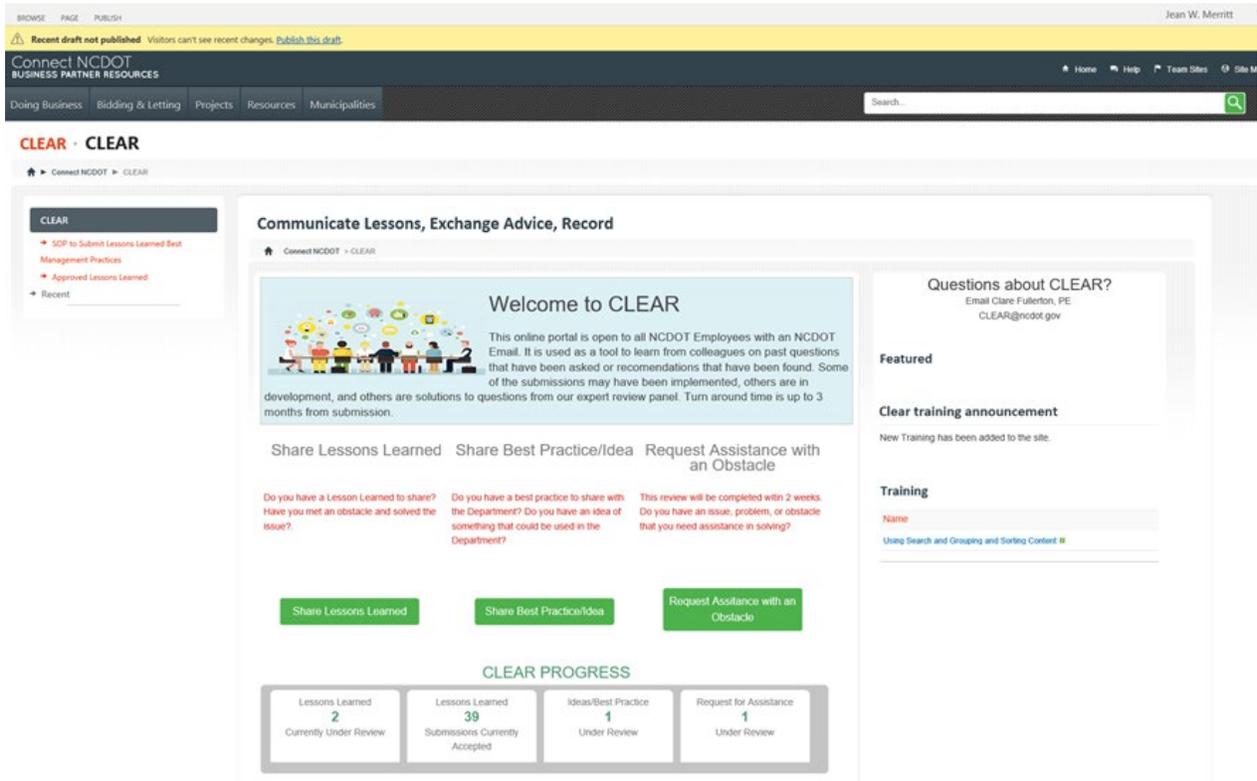
Workflow

The following workflow was established during 2019. This workflow is specifically how a submission is processed through the CLEAR database which is automated on SharePoint. All comments and reviews are completed on SharePoint. Multiple disciplines can be tagged to provide their comments. ERPs are able to set up personal views on SharePoint to keep track of the submissions they need to review in lieu of relying on the automated emails. Once a submission is Accepted with expertise applied, it is included in the Accepted List; no submission is made visible outside of the Gatekeeper or Expert until it has been vetted and officially accepted. This list can be searched using various Search Parameters as described below. A large image can be found in Appendix C.



Front Page

Below is a screen shot of the draft CLEAR portal home page. The updated page includes improved graphics and clearer descriptions.



Forms

In 2019, the program moved from one submission form to three submission forms. This was determined based on research of methods used in other states and was further discussed during the Risk Assessment. By moving to three forms, targeted questions could be used to guide submitters and shortened the forms. The workflow for each of the forms is the same. Screen shots of the forms can be found in Appendix C. The three forms are now:

Lesson Learned:

Past issues or obstacle that was overcome. Includes the problem description and solution.

Best Practice/Idea:

Possible best practice or idea that may have application in DOT.

Request Assistance with an Obstacle:

Technical assistance request with an obstacle or reoccurring issue.

Expert Review Panel

In 2019, the Department personnel who are experts in their relative disciplines were identified and the Expert Review Panel (ERP) created. As seen in the workflow above, their role is to provide their expertise and knowledge to submissions relevant to their disciplines – this is known as the Applicable Discipline in the submission forms. The Applicable Disciplines are identified during the workflow to ensure the submission is routed to the appropriate expert. In June 2019, a kick-off training was completed to walk the experts through the technical submission and review process. At the end of 2019 and into 2020, additional applicable disciplines and experts were identified. Additionally, this can be used a search parameter – i.e., hydraulics is an Applicable Discipline; it is possible to run a search and subsequent report on all submissions reviewed by hydraulics.

A complete list of Applicable Disciplines can be found in Appendix C. A list of the Experts is available on the website and updated as needed.

Search Parameters

Once a submission is Accepted (as seen in the workflow above), it enters the Accepted Submission List. This list can be searched by keywords. As the entries to the database grows and the search is utilized more, IT can complete coding that would identify commonly misspelled words and still allow the search to bring up the intended items. The list can be filtered by several items including the tagged discipline (see Expert Review Panel above), Division, Project attributes, STIP region, and more. Additionally, alerts can be made by individual users to be alerted when certain submissions are added to the database that are of interest. Other SharePoint functions such as report building, and data analytics are also a part of this program.

Implemented Innovation

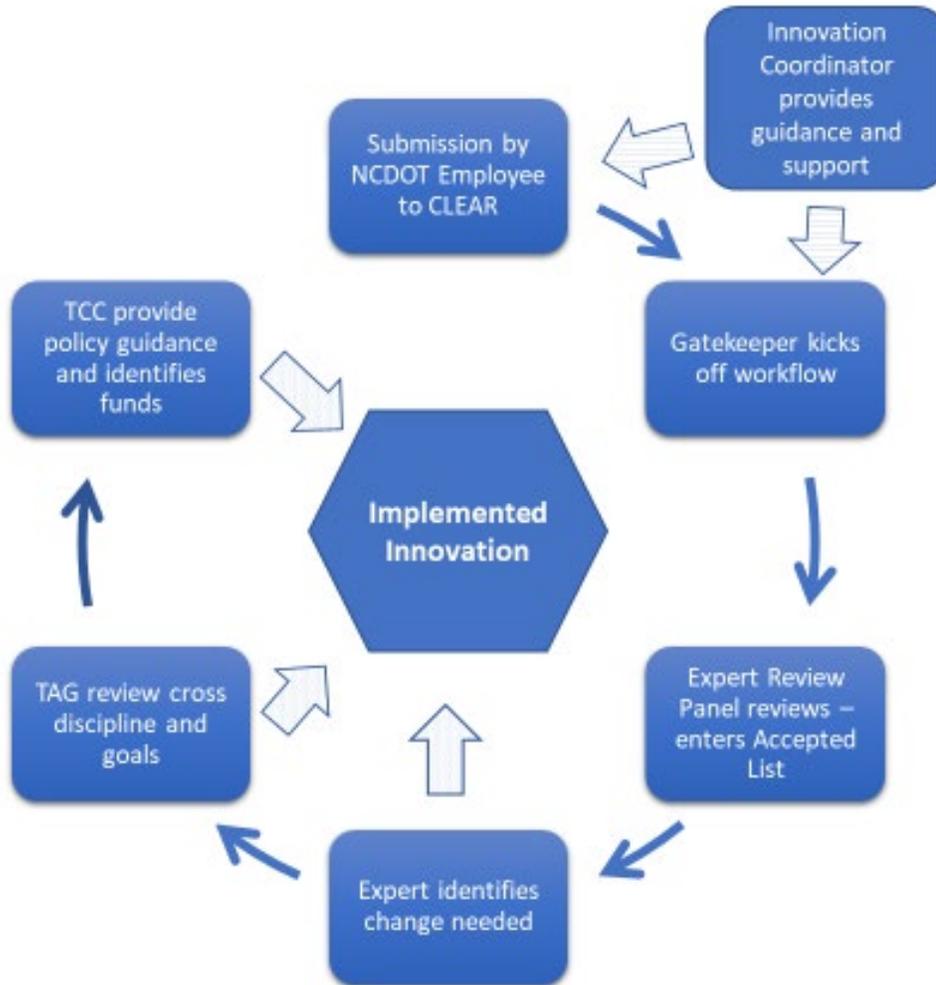
The following describes the overarching structure of what happens with a submission beyond being entered into the CLEAR Accepted List. For CLEAR to provide the benefits of learning about and implementing personnel driven innovations for the betterment of the Department, a structure is needed

to move the innovation from the Accepted List to Implementation. A formalized process flow and how-to-guide on innovation is being worked on for 2020.

Workflow

The following workflow shows the life cycle from submission idea to implemented innovation.

Depending on the submitted idea, the implementation could occur in three different avenues from a local unit implementation to a large-scale Departmental implementation. The innovation coordinators work to support Department personnel on sharing, submitting, and discussion innovative ideas.



Roles and Responsibilities

Submitter

Any DOT staff with an NCDOT email can submit into the CLEAR database and review any accepted submissions. For staff without an NCDOT email, a paper form is being developed to be utilized in different trainings and meetings. This form may also be installed as a survey on the kiosks throughout the divisions. A draft of the paper form can be found in Appendix D.

Innovation Coordinators

The Innovation Coordinators are a group of 25-28 people that represent different parts of the Department. The role of the coordinator is to provide support to staff in using the CLEAR database, engage with their group to encourage innovators to submit through CLEAR, and promote other internal innovation programming. Additionally, this person will engage in forum discussions with other innovation coordinators and troubleshoot how to encourage a culture of innovation. The coordinator will be provided with training on Change Management to help integrate CLEAR and the culture of internal innovation into the Department. Specific details on the roles and responsibilities as well as a list of the different areas being represented can be found in Appendix D.

Gatekeeper

The Gatekeeper is the first stop for a submission through CLEAR. The role of the Gatekeeper is to ensure the submission is in an appropriate location (not a Safety concern or HR complaint) and that it has been sufficiently filled out to provide the ERPs enough information to vet the submission.

A service account email for CLEAR was acquired by the Value Management Office to allow multiple personnel to support the program instead of all emails coming to one person. The email is CLEAR@ncdot.gov.

Expert Review Panel (ERP)

The ERP is made up of expert's in their respective fields that have been tasked with providing their expertise to any submissions that come through CLEAR that are in their respective field. A submission cannot be published with expert vetting. The ERPs are then grouped together into TAGs as explained below.

Technical Advisory Group (TAG)

Six Technical Advisory Groups (TAGs) have been formed and are made up of staff from the Expert Review Panels (described above). While all TAGs will look at the implementation of future technologies and innovations, these focus areas will allow targeted discussions related to the needs of the Department. The purpose of the TAGs is to provide a cross discipline and divisional approach to the review of CLEAR submissions as well as discuss topics related to the TAG's priority. The focus areas of the TAGs may change as needed to align with the goals of the Department. The TAGs are made up of multi-discipline and modal staff to provide an avenue for cross-divisional communication and collaboration. The TAGs will also be asked to propose Challenge Questions related to their priority that would be sent out to personnel to garner feedback on a particular challenge and engage at all levels. The first kick-off will take place in February 2020 with all TAGs together to explain the roles and responsibilities. A follow-up with the individual TAGs will occur in March. At this time, the particular goals of the individual TAGs will be more clearly defined.

The six TAGs are as follows:

- Program Delivery and Coordination
- Safety
- Mobility and Congestion
- Condition of Transportation Facilities
- Workforce Development in Transportation
- Communication and Outreach

A current draft list of the disciplines selected for each TAG can be found in Appendix D.

Technical Coordination Committee (TCC)

The TCC is the new iteration of the NCTIC committee. The committee is made up of NCDOT upper management for all modes of transportation, representative from the MPOs and RPOs, FHWA, ACEC, AGC, LTAP, and other external partners.

The TCC will assist on implementing internal innovations when the implementation reaches a level that requires engagement with external partners, executive level policy decisions, and identify funding opportunities as needed.

The TCC is also responsible for selecting the projects that will be awarded for STIC funding provided by FHWA annually.

Additional Resources

A list of different funding opportunities to implement innovations is being developed and updated continuously. This includes the different uses of USDOT funding, Research Opportunities, etc.

Culture of Innovation

The overarching goal of creating the structure of CLEAR is to integrate a Culture of Innovation into the Department. In addition to CLEAR, the following initiatives are being developed to support Internal Innovation.

Innovation Assessments

An innovation assessment is being developed to establish a baseline of where the Department is in terms of innovation so that an annual measurement on the growth of innovation and the success of the program can be taken. These metrics will be used to determine not only how the culture of internal innovation is growing but also help identify areas where additional resources or initiatives need to be applied to strengthen the culture. A copy of the draft innovation assessment can be found in Appendix E.

DOT Talks

DOT Talks is a TED-talk inspired speaker series that highlights innovation efforts occurring in transportation with a focus on internal efforts. The talk's will also engage with external partners as applicable. The format is a one-hour event that occurs every other month and includes multiple presenters. The possibility of providing PDHs is being explored in an effort to encourage personnel to engage in the DOT talks. The first event has been scheduled for February 21st with a focus on African American History Month. The following is a list of possible themes that will be used for 2020. The goal for the future is to rely on the Innovation Coordinators and TAGs to recommend possible themes and speakers. Additionally, professional development hours may be able to be provided.

- Resiliency
- Safety
- Human Resources
- Disasters

Innovation Day

Innovation day is an event to promote innovations taking place across the Department. The intent of Innovation Day is to engage with internal DOT staff on innovations that are taking place through internal efforts, research efforts, and external innovations in the transportation industry. Other state DOTs including Missouri and Delaware have utilized these events to support innovation throughout their Departments. The possibility of awards for top innovators is being explored.

Other Initiatives

During 2020, integrating the use of CLEAR into the Department will be the primary focus of Internal Innovation efforts. This will be a fluid process but the following potential initiatives have been identified:

- Presenting at conferences and workshops;
- Collecting submissions via paper form at Construction and Maintenance conferences, trainings, and workshops.
- Providing technical CLEAR training.

2020 Action Items

The following Action Items have been identified for 2020.

Research

Engage Technology Transfer person or team to develop implementation plan and establish metrics.

Provide technical training on the CLEAR Program.

Database

IT to finalize the workflows and new forms

Implemented Innovation

Kick-off TCC, TAG, and Innovation Coordinators

Develop Implementation Plan for Innovations

Culture of Innovation

Complete discussions with other state DOTs

Attend Peer Exchange in Utah

Identify other Peer Exchange opportunities

Conduct initial Innovation Assessments

Appendix A

What to do with a trend discovered through CLEAR?

How did we identify this trend?

During the lesson learned data gathering phase for the CLEAR program, a significant project concern for NCDOT related to utilities not being moved within the agreed timeframe, unknown utilities discovered during construction, or other unexpected utility conflicts leading to claims and supplementary agreements that ultimately increased the project cost and schedule.

What are some next steps to investigate a trend?

The team determined that next steps were needed after identifying the trend and requested further research to understand actual cost and schedule impacts and an identification of the root cause(s). The research team performed a careful analysis on utility claim data obtained from 1996-2018. Additionally, a literature review was performed to understand how other state DOTs mitigate potential utility issues on their projects. Feedback was also solicited from current NCDOT personnel on how utility-related issues were handled on a day-day basis. The data analysis revealed the following observations:

- Approximately 90% of projects with utility claims had one or two utilities related claims.
- Each division had at least 30 utility related claims during the study period.
- Smaller projects (up to \$5 million USD) were most affected by utilities claims forming roughly about three in four projects affected by utility claims.
- Claims pertaining to utility conflicts accounted for about 57% of all utility related schedule delays.
- For the projects affected by utility claims, project costs increased by about 2.4% with schedule delays by 70 days on an average.

Based on literature review and our discussions with NCDOT personnel, key mitigation strategies were identified as follows:

- Early and frequent communication with utility providers in order to have a shared sense of responsibility with NCDOT in relocating utilities.
- Constructability reviews with utility owners to minimize plan changes
- Exploring possibility of imposing liquidated damages on utility companies to ensure they do not default on agreed upon date for utility relocation.
- Performing comprehensive subsurface investigations on all projects to avoid encountering buried utilities

What can be done to implement this into a lesson remembered or make positive change in the Department?

This information will be provided to the NCDOT utilities group for further action. It is anticipated that this sharing of knowledge may lead to revising the contract language with utility providers, specifications to properly detect underlying utilities by ensuring proper subsurface investigation is performed on all projects--thus turning the lessons learned into lessons remembered. This will allow the NCDOT to be more efficient and effective in their workflow processes and lead to fewer utility-related claims on future projects. In this instance, it would be appropriate to consider a SIT (Strategic Implementation Team) to review the data, best practices from other states, and pilot some new initiatives to work on this ongoing issue.

Appendix B



North Carolina Department of Transportation
Value Management Office
Risk Assessment Program



CLEAR Program

Risk Assessment Study Report

Date of Final Report: January 10th, 2020

Date of Risk Study:
November 21st, 2019



Executive Summary

The North Carolina Department of Transportation (NCDOT) Value Management Office (VMO) performed a Risk Assessment Study (RAS) on the newly launched CLEAR (Communicate Lessons, Exchange Advice, Record) Program to improve the program's usefulness, departmental integration, visibility, and value to the Department by assisting in expediting future project delivery, enhancing communication, sharing and vetting internal innovations, and retaining lessons learned.

RAS Summary Numbers

- Number of Participants:** 21
- Total Risks Identified:** 60
- Total Risks Requiring Mitigation:** 51
- Very-High Risks:** 13
- High Risks:** 20
- Medium Risks:** 15
- Low Risks:** 3
- Very-Low Risks:** 0

During the CLEAR Program's recent inception, the Program Manager (PM) determined that the program would benefit from additional stakeholder involvement and internal promotion and requested VMO's assistance to identify the risks and opportunities that the program faces. This also gave VMO additional opportunity to test and refine the newly quantified Risk Assessment Program and its methods/tools being adopted by VMO for integration into the new IPD process as well as being an asset to the Department.

To meet the CLEAR Program's objectives, VMO held a RAS; during which the participants were divided into two teams to focus on two specific opportunities

for improvement: **1) How do we encourage employees throughout the Department to begin using the CLEAR database?** and **2) Systemic Program Integration and Improving our Innovative Culture-Long Term, how do we encourage DOT employees to search the database for lessons and keep users submitting to the database?** Each team approached and considered risks from two separate positions to stimulate ideas and maximize discourse. Both teams identified risks and opportunities that were then analyzed, quantified and assigned a mitigation strategy (if needed); all of which was documented in a Risk Register. Upon the completion of the RAS, the risks/opportunities mitigation control measures were then assigned to individuals/units as part of an implementation plan included in this report. Future monitoring and controlling of risks will commence after the conclusion of the RAS and is outside the scope of this report.





North Carolina Department of Transportation Value Management Office Risk Assessment Program



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North Carolina Department of Transportation Value Management Office Risk Assessment Program



1 Project Background and Selection

CLEAR is an acronym for Communicate Lessons, Exchange Advice, and Record. The CLEAR Program provides a communication database that receives lessons learned, potential ideas, or areas of concern from employees throughout the Department. Those submissions are then sent to the appropriate discipline/unit within the Department for expert review. The experts have the opportunity to approve the lesson, provide clarifying information or be notified of the need for a change. The submission, with expert comments, is then published in the CLEAR database and searchable by NCDOT employees. It is the goal of the CLEAR program to create communication feedback loops throughout the Department and to provide useful lessons that can be applied to future work activities.

The CLEAR Program was selected by VMO for a RAS for two primary purposes:

1. CLEAR is a new program that could benefit from additional stakeholder involvement and internal promotion, therefore the identification of the risks and opportunities that the program faces as well as mitigation plans will benefit the program during the initial rollout and
2. To test and refine the newly quantified Risk Assessment Program and its methods/tools after being adopted by the VMO for integration into the new IPD process

2 Team Members

The RAS teams were multi-disciplined teams formed based on the diverse NCDOT Units that are envisioned to use the CLEAR database. It was necessary to solicit input from a wide variety of disciplines to ensure that the CLEAR database is adapted and functional for all NCDOT business units. The purpose of two separate teams will be expanded upon in Section 4 of the report. The Program Manager, Clare Fullerton, PE, was present as an advisor to answer questions participants had regarding the CLEAR Program and gave an overview of the origin and function of CLEAR. The overall RAS Facilitator and VMO’s State Value Management Engineer, Alyson Tamer, PE, CPM, was present to facilitate the RAS and provide an overview of how the RAS would be conducted.

Team 1:

NAME	NCDOT UNIT
Haadi Sadaghiani (Team Lead #1)	Value Management
Dan Snoke, PE (Team Lead #2)	Value Management
Hon Young, PE	Division 2
Lisa Penny	Research and Development
Leigh Wing, PE	STIP
Stephen Morgan, PE	Hydraulics
Jean Merritt	Web Services (IT SharePoint Team)
Rebecca Gallas, PE	Highways
Sam Eddy	State Maintenance Operations
Siddharth Banerjee	NCSU (Research Project Consultant)

Team 2:

NAME	NCDOT UNIT
Steven Bolyard (Team Lead #1)	Value Management
Roe Brybag, PE (Team Lead #2)	Value Management



North Carolina Department of Transportation Value Management Office Risk Assessment Program



Cameron Richards, PE
Ray Lovinggood, PE
Ed Jaselskis, PhD
Krystal High
Jennifer Evans, PE
Patrick Doran
Curtis Bradley, PhD

Division 5
Hydraulics
NCSU (Research Project Consultant)
Chief Deputy Secretary's Office
Project Management
Web Services (IT SharePoint Team)
Research and Development

3 Risk Assessment Process

VMO's overall Risk Assessment Process consists of six phases; 1) Develop a **Risk Management Plan**, 2) **Identify** risks, 3) **Analyze** risks, 4) Develop a **Response/Strategy** to avoid or minimize the effects of risks, 5) Develop an **Implementation Plan**, and 6) **Monitor and Control** the Risks. A more detailed description of this process can be found in the VMO Risk Assessment Program IPD Process, NCDOT VMO guidelines and the PMBOK Risk Analysis Process.

As assistance was requested for the risk assessment of a project/program, VMO serves as the lead to develop Risk Management Plan (phase 1), hold a RAS to complete the next three phases (2-Identify, 3-Analyze, and 4-Response/Strategy), and prepare an Implementation Plan (phase 5) at the completion of a RAS. Steps to Monitor and Control risks (phase 6) will be completed by the PM based on the results of a RAS and proposed implementation plan; and therefore, will be conducted separately.

4 Risk Management Plan

Based upon the importance and scope of the CLEAR Program, VMO determined that it would be beneficial and enlightening to conduct a RAS as part of the Risk Management Plan. During the RAS, the PM receives input from a wide variety of disciplines to identify risks, analyze potential impacts, and develop risk responses/strategies (phases 2 through 4); instead of completing those phases independently. Since VMO holds a RAS on behalf of the PM, it was determined that post study, an Implementation Plan (phase 5) would be developed by the Risk Program Manager for the PM's use. Lastly, the CLEAR PM will use the results of the RAS and proposed implementation plan to monitor and control the risks (phase 6).

The Risk Register developed for use during the RAS, to document the results of the three main phases (2-Identify, 3-Analyze, and 4-Response/Strategy), included:

1. Risk Identification:
 - a. identified risk/opportunity
 - b. topic (used to classify the risks after all the risks are identified)
2. Analyzation of Risk:
 - a. probability of occurrence
 - b. severity (impact)
 - c. overall risk rating
3. Risk Response/Strategy:
 - a. decision/action (avoid, mitigate, accept)
 - b. mitigation control measure (if needed)
 - c. assignment column (individual or business unit)



North Carolina Department of Transportation Value Management Office Risk Assessment Program



5 Identify

During the Identify phase of the RAS, the participants were divided equally into two separate teams. Each team had a distinct viewpoint from which they were directed to consider risk/opportunities from.

- Team 1 - To Identify Risks Related to Initial Program Usage, and
- Team 2 - To Identify Risks related to Systemic Program Integration and Improving NCDOT's Organizations Innovative Culture

Participants were separated into teams for two reasons:

1. It would be logistically difficult to facilitate such a large diverse group of participants at one table, and
2. The facilitators wanted to glean as many risks as possible by approaching the program from two different and separate positions at once.

Additionally, in order to maximize the number of risks identified, once each team was finished with their initial task of risk identification, both teams were able to swap tables and brainstorm risks for the other team's point of view. During this time, neither team was shown the previous teams identified risks. This was very important since each team was able to develop risks independently of one another, resulting in a larger variety of perceived risks and opportunities. While these teams were identifying risks, the facilitators decided with the large number of risks identified, that an additional column (topic) needed to be added to the risk register to better sort through the data and condense/remove duplicate risks proposed by each team.

A complete version of the Risk Register is included in Appendix A. A total of 60 unique risks/opportunities were identified during this phase once duplicate entries were removed and condensed after the conclusion of the RAS by VMO staff.

6 Analyze

Once risks are identified, each one must be independently assessed for both its probability of occurrence and its severity (impact) upon a program/project, and then assigned an appropriate risk rating. The results of the analyzation are recorded for each risk in the Risk Register (See Appendix A).

In order to ensure conformity in assessments and final ratings, specific explanations are established for each probability, impact, and risk rating number. Table 1 correlates the chance of occurrence with each probability rating.



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Table 1: Probability (chance of risk occurring)

Very Low	< 10%
Low	10% - 19%
Medium	20% - 39%
High	40% - 59%
Very High	60% - 99%

Table 2 correlates impacts ratings for a program/project with regards to cost, time, quality, and other considerations.

Table 2: Quantification of Risk Impact

Ranking	Cost (increase)	Time (schedule impact)	Quality	Other Considerations
Very Low	< 1%	minimal schedule impact	Quality degradation barely noticeable	<ul style="list-style-type: none"> - Health or Safety - Regulatory Violation - Agency Reputation/Negative - Human Impact - Permit Change
Low	1% - 5%	2 - 4 week delay	No deficiencies apparent	
Medium	5% - 10%	1 - 6 month delay	Minimal deficiencies in constructability, operability, and safety	
High	10% - 15%	6 - 12 month delay	Major deficiencies in the technical adequacy of the final product	
Very High	> 15%	> 1 year delay	Final product not acceptable due to deficiencies	

Lastly, the traditional method for developing an overall risk rating for each identified risk is to multiply the probability (P) and impact (I) rating numerical scores to determine the Risk Rating ($P \times I = RR$). The table below depicts the risk ratings based on the possible combinations, as well as an assignment of a color gradient to easily visually determine the risk rating (level) for each identified risk.

Table 3: Probability and Impact Matrix Depicting Associated Risk Ratings

5	Very High	5	10	15	20	25
4	High	4	8	12	16	20
3	Medium	3	6	9	12	15
2	Low	2	4	6	8	10
1	Very Low	1	2	3	4	5
		Very Low	Low	Moderate	High	Very High
		1	2	3	4	5

Risk Rating
<i>Very High</i>
<i>High</i>
<i>Medium</i>
<i>Low</i>
<i>Very Low</i>

Impact

During the analyze phase, participants moved back to their initial tables, and the individual risks/opportunities that were recorded during the Identification phase were assigned both a probability of occurrence, and a severity of impact rating, if the risk event were to occur. For both probability and impact, values of 1 through 5 were assigned to each risk.



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These three tables were provided to participants during the RAS to ensure that such uniformity and clarity were applied by both teams for every risk identified and analyzed. For the CLEAR Program RAS, the primary determinate for impact was the quality column. Risks were analyzed based upon their perceived impact upon their potential quality decrease/increase to the CLEAR Programs primary functional purposes. These metrics were chosen by VMO after reviewing various state DOTs and federal guidelines; they introduce a component of subjectivity herein; the sensitivity of which was not investigated by VMO or the RAS participants.

7 Response/Strategy

After quantitative analysis of probability and impact, and determination of associated risk ratings are complete, the strategy to best addresses each risk and which risks warrant a response is determined. The three strategy choices are Mitigate, Accept, and Avoid.

Once each risk is assigned one of these strategies, for each risk that has been labeled “Mitigate,” a detailed mitigation (control measure) is determined and an individual or business unit is assigned to oversee/lead its mitigation. The results of the response/strategy are recorded for each risk in the Risk Register.

During the Strategize phase of the RAS, each team developed a strategy for each identified and analyzed risk. Participants were told to answer the question “*What should we do about this particular risk?*” There are three possible choices that participants could choose from; Avoid, Accept, and Mitigate. Risks listed as “avoid” or “accept” do not require further involvement via an implementation plan (Phase 5) due to their risk acceptance or avoidance acknowledge the existing of threat but no proactive action is taken. There were a total of four risks that were Accepted and it was decided that five risks would be Avoided.

The remaining 51 risks were all listed as mitigation, which therefore have corresponding mitigation control measures and associated individuals/business units to implement the measures assigned to them; which then need to be monitored and controlled.

8 Implementation Plan

Once all the risks have been identified, analyzed, and a response/strategy is assigned, an Implementation Plan is developed as to how best to mitigate the risks, and implement the opportunities. The PM will coordinate any implementation activities appropriate individuals or unit assigned to the mitigation plan.

Both teams independently discussed their respective risks, ratings, and control strategies. The tables listed below depict these risks in a compressed view due to sizing constraints, an unabridged version is listed in Appendix A. After reviewing the risks, seven reoccurring topics were identified, and the tables below list the risks grouped by the following identified topics:

1. **Collection** of data (Table 5)
2. **Integration** of data into the database (Table 6)
3. **Promotion** of the CLEAR Program Table 7)
4. **Recognition** of Information/Data Submitters/Users (Table 8)
5. **Search** Functionality (Table 9)



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6. **Sharing**/Visibility of the submissions (Table 10)
7. **Submitting** of information in the CLEAR database (Table 11)

Each of the seven tables is sorted by the highest rated risks to the lowest rated risks depending upon their risk ratings. Recall from earlier that for the tables below all the risks assigned an “Accept” or “Avoid” status are excluded, only “Mitigate” risks are included. A summary breakdown of risks by topic and risk rating is depicted below in Table 4.

Table 4: Summary of Risks Identified by Topic and Risk Rating

Topic	Very High	High	Medium	Low	Very Low	Total
Collection	6	5	4	0	0	15
Integration	3	3	1	2	0	9
Promotion	2	2	4	0	0	8
Recognition	1	2	1	1	0	5
Search	0	1	3	0	0	4
Sharing	1	4	1	0	0	6
Submitting	0	3	1	0	0	4
Total	13	20	15	3	0	51

Each individual risk topic table below contains the risk description, number, rating, control measure and an assigned column. Risks are arranged by risk rating from most severe to least for each topic.

The individuals/units listed in the “Assigned To” column below is abbreviated for brevity, each acronym is expanded below:

- IT – Information Technology Group that is developing the database on SharePoint
- T² – A Technology Transfer Request for Proposal that was announced through the NCDOT Research and Development Office to address these risks
- CEF – Clare E. Fullerton is the current VMO Program Manager for the CLEAR Program
- DOT CM – NCDOT Construction Management Office
- TAG – Technical Advisory Group(s) are VMO coordinated quarterly groups that review and address CLEAR submissions
- TCC – The Technical Coordination Committee, which is the official oversight committee for the VMO CLEAR Program



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8.1 Collection

The risks within the Collection topic are related to the generation of ideas from within the NCDOT. This could be related to the need for more Communication and Outreach to internal DOT stakeholders. Lack of program visibility and technical/logistical ability for users/submitters is most likely the greatest topic hurdle, and overall hurdle to appropriate program utilization, organization integration, and longevity.

Table 5: Risks Related to the Collection of Information

No.	<i>Risk / Event</i>	<i>Risk Rating</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	Currently there are three choices to submit, displayed as text hyperlinks. The risk is that the user does not know what to do and stops at homepage without submitting.	Very High	Homepage options should look more like buttons.	IT
2	Currently, the submitter needs to go to the CLEAR homepage to submit a lesson. The risk is that if you don't know CLEAR exists (or have the link) then you may not visit the page. May not know CLEAR = lessons learned, etc.	Very High	Have link to CLEAR within Preconstruction and Construction SharePoint site (left hand side, with Submittal Tracker, etc.).	DOT CM
3	User would be more likely to use if it is easier to report and if the user could get something out of the database. Risk is people do not see a benefit, then people may not use it to share information.	Very High	Annual Report will include top submissions; with back end of report having full listing of submissions. Research - Show how data can be queried and how it can be used for gap analysis. IT - May want information reported and attached to email. Overall - different ways that data can be pulled and used. Examples - technical use, department awareness, gap analysis. Reports and alerts can be made through SharePoint. Education on the different functions of SharePoint to personnel will solve a lot of this.	TAG
4	Have case studies to improve process - use examples of submitted lessons learned in communication	Very High	Identify early wins from the lessons learned - starts with incentives. This is being developed with the Utility Claims data as a part of the research project.	CEF
5	Get program feedback through large conferences	Very High	CAPA, TRB, IHEEP, ACEC, METTS, Preconstruction, Transportation Summit, Geotech, Innovation Summit, Transportation Engineers Academy	CEF



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6	Reach out to personnel with limited access ~quarterly, bi yearly (employees who have NCDOT email but they do not use it often)	Very High	Identify the programs and meetings that involve the target audiences. Comp time incentives.	CEF
7	Risk is that expert panel is not balanced by region. Is the expert familiar with specific region issues? For example, a discipline only has one reviewer assigned.	High	Looking to add 4 people for PM to cover Eastern as well. Evaluate other disciplines to see if regional reps need to be added.	IT
8	During design, innovations used are not submitted into CLEAR.	High	At 30/60/90 milestone a report is generated for the project and reviewed to make sure everything was captured. Reports and alerts can be made through SharePoint. Education on the different functions of SharePoint to personnel will solve a lot of this	CEF
9	If people see sharing designs that went wrong as a feeling of embarrassment (they did something wrong), risk to career, failure, then they may not want to discuss or document in CLEAR. See high IMPACT at beginning of program but would lower as people see success.	High	(Reminder that posting does not have a name. Culture where sharing is valued and rewarded. IT ... the project you save may not be your own ... your knowledge can save someone else)	T2
10	Reaching out to field personnel without NCDOT email	High	Identify the programs and meetings that involve the target audiences. Comp time incentives. Communicate with previous LL submitters	CEF
11	Utilize interns/TEAs to gather lessons	High	Hire interns over the summer to chase down solutions. Other units can use their interns to vet ideas and investigate. Parking lot of ideas and have them investigate and write up solutions.	CEF
13	Since a submitter needs an NCDOT email to submit, then consultants cannot directly submit. How are consultant ideas collected and learned from? They may have proprietary concerns. NCDOT employee can submit on behalf of consultant.	Medium	IT Medium - One-way anonymous form (you can submit but you do not need to provide email) IT Easy – Any risk also has a phone line in addition to online form. Employee would input call information into database. IT Easy/Medium - can tie CLEAR to NCID.	IT
15	OPPORTUNITY - Have workshops at project closeouts to collect innovations and lessons learned.	Medium	Plan project closeouts or partner with Resident Offices	CEF



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16	Can there be a way to pull issues highlighted in the "SITREP" weekly issues report into CLEAR? The report collects issues from all divisions. Information collected/reported on Inside NCDOT.	Medium	From an IT perspective, it is easy to flag project and automatically generate a CLEAR submission. Check with Rebecca/Krystal or TIC about report.	CEF
17	Forum to program discussion - related to request for a solution/recommendation.	Medium	Update SharePoint to accommodate; encourage use by highlighting top concern on a periodic basis. Separate library in the database. Forum based - free form submission - interactive. Focus on requests for information. Focused information blasts.	T2



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8.2 Integration

The risks within the topic of Integration are related to a culture shift and adaptation of the CLEAR database for use within departmental processes. This includes submissions as well as searching the database to retrieve information that could be applied to work activities.

Table 6: Risks Related to the Integration of Information into the CLEAR Database

No.	<i>Risk / Event</i>	<i>Risk Rating</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	OPPORTUNITY - Trends in submissions can be elevated to have policy changes, especially for issues that cannot be addressed by experts.	Very High	TCC handling	TCC
2	Standardize the process	Very High	Process has been standardized	CEF
3	Showcase the database on a pilot project through all phases	Very High	Identify a suitable project, find a willing division, possibly design-build or turnpike. Pick project milestones/completion %	T2
4	Information hoarding - people who are not excited to share information may not want to share and discuss "lessons learned" found in CLEAR. (May vary by culture of each group. Submissions would be skewed to certain groups)	High	Have message come from up high and then reinforced by middle management.	T2
5	OPPORTUNITY - Have a committee (cross discipline and other departments - aviation, etc.) to look at lessons and propose updates to guidelines and procedures. Quarterly, yearly, etc. Risk is increase turnaround time.	High	Flexible. Start with a Value Management identifying trends and bring attention to group. Then as discussions grow, may identify more groups that need to be involved. Groups are reviewing guidelines and reviews already, how to make checking CLEAR as part of the process. Find out frequency that reviews are completed and suggest interim reviews. (Example Hydro review 2016 and prior was 1999) TAG for TCC	TAG
6	Competition between Divisions/Units could help participation (similar to Wildflower program)	High	Think of one (brackets, public voting) and have a platform to present the award	T2



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7	OPPORTUNITY - Designers benefits from seeing installation and implementation of new ideas and procedures. Is there a way to notify design unit when idea is being implemented? Risk is that person's name is not attached to submission.	Medium	Maybe, but better if people regularly check the database and run report maybe. Reports and alerts can be made through SharePoint. Education on the different functions of SharePoint to personnel will solve a lot of this	CEF
8	Tie-in to EBS portal (add a tile); add link to bottom of inside NCDOT page	Low	Talk to SAP team. Talk to Communications office.	CEF
9	Applicable Disciplines - add Design, Other	Low	Add additional disciplines - train new disciplines etc.	CEF



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8.3 Promotion

The risks related to the promotion category are related to marketing and communication as well as information about the CLEAR database. When considering the promotional risks of the CLEAR program, one should consider the key motivation for users to both input and extract information from the database. How will this benefit them and why do they need to use it?

Table 7: Risks Related to the Promotion of the CLEAR Program

No.	<i>Risk / Event</i>	<i>Risk Rating</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	Not knowing about the program and its intent - marketing/promotion	Very High	Create and execute a communication strategy. Communications office newsletter. BOT monthly meeting. Podcast. NCDOT now. STIC. Marketing	T2
2	Have unit/direct management encourage use	Very High	Promote advantages of program, identify early wins, discuss at meetings.	CEF
3	Align videos to mission statements and goals. Need someone from field, office. See expert and use.	High	Research project for implementation to help with this.	T2
4	May be helpful to have a sample of how to highlight the 'lesson learned'. Have form ask questions in positive light. Form could be cumbersome and not intuitive-Ease of use.	High	Part of Research project ongoing. Make the reason for each item in the form clear and purposeful. Pare down the form.	CEF
6	On Inside Page, when you search, the results include lessons learned.	Medium	IT can force CLEAR to be included in the top results. Easy - direct to CLEAR homepage or lesson learned homepage. More work - have keyword search results posted. Provide words to IT to have first hit.	IT
7	Have people share testimonials on employee news to get people to the site and also on the CLEAR webpage (ratings and reviews for ideas). Risk is that people may not see CLEAR = lessons learned.	Medium	Announcement banner on CLEAR homepage. Have testimonials of NCDOT. Highlight units and individuals.	T2
8	Allow comments and reviews for ideas. Risk is if comments are not moderated then they may get out of control.	Medium	Explore how comments are posted - unit vs individual. Rating can be - is this helpful - yes or no? If no is selected, then there could be an opportunity to collect feedback (only to Clare).	T2



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9	How can metrics be established to show program is useful. Present dashboards on webpage to highlight impact.	Medium	Research project RFP was completed on how to capture indirect benefits.	T2
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8.4 Recognition

The risks within the category of recognition are related to employee incentives and rewards. Due to lack of funding this could be a challenge, however there are some ideas for recognition that are low/no cost. Remember that not employees consider money as the primary motivator, and therefore determining what motivates them to participate can be challenging.

Table 8: Risks Related to the Recognition of Users/Submitters

No.	<i>Risk / Event</i>	<i>Risk Rating</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	Build credibility of the program - helpful lessons from beginning.	Very High	As an option for reward (need to see if we can give comp time).	T2
2	Recognition from higher ups for stopping a bad idea from wasting funds (stopping the leaky faucet).	High	Discuss with TCC maybe	TAG
3	Benefit/reward program , such as Certificates as a recognition to highlight submitters in the office, award comp time, or award one-on-one face time with upper management as a reward. Allow conference attendance based on submittal(s)	High	Try to match specific audiences with most beneficial/preferred reward. Get leadership on board. As an option for reward (need to see if we can give comp time). Also, identify who would be the one-on-one. If no budget for awards. Could do certificates. Get leadership on board. Provide list of possibilities. Track submissions.	T2
4	Recognition at conferences? Highlight innovations; may not want to discuss 'dirty laundry' for lessons learned. There could be a conference just highlighting lessons learned.	Medium	We try to go to every conference	CEF
5	To get people to submit ideas, have recognition programs. Have Divisions are recognized for best or most ideas? Risk is that a submitter does not want their name associated with submission (publication)	Low	When submitting, asking if the submitter wants to be associated with idea. Recognition in newsletter, highlight overall savings.	T2



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8.5 Search

The risks related to the Search topic are about the ease of retrieving information from the system. This could be related to keyword suggestions as well as filtering capabilities.

Table 9: Risks Related to the Search Functionality of the CLEAR Database

No.	<i>Risk / Event</i>	<i>Risk Rating</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	Standardize searching key words	High	Update SharePoint to accommodate	CEF
2	Risk is that search tool is not user friendly nor helpful. Using CLEAR as a resource tool to prep and share during a meeting. Highlight applicable lessons. Set expectations for search results.	Medium	<ul style="list-style-type: none"> • Add dropdown menu that includes options that are available (categories). • Search based on STIP regions; east, west, central • keyword searches. (Do submissions get spell checked?) - Eventually search tool will learn to group in searches with bad spelling. IT looks over top searches and incorporates into search. 	IT
3	Improve landing page from a viewer perspective.	Medium	Coordinate with IT. Announcements. More engaging. How many website views. Use pictures and comments. Top 10 unsolved problems.	IT
4	Search engine querying and searching to find specific solutions	Medium	IT can make CLEAR submissions move to the top. Provide IT with query words.	IT



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8.6 Sharing

The risks within the Sharing category are related to showcasing the lessons learned within NCDOT after they have been reviewed and accepted; ensuring that employees are made aware of the information (eliminating the unknown unknowns).

Table 10: Risks Related to the Sharing of Information/Data

No.	<i>Risk / Event</i>	<i>Risk Rating</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	Newsletter, conferences to share specific submissions or program in general	Very High	See above. CAPA, TRB, IHEEP, ACEC, METTS, Preconstruction, Transportation Summit, Geotech, Innovation Summit, Transportation Engineers Academy	CEF
2	Risk is information is in CLEAR database and not searched. Communication of 'lessons learned' generated and shared with the entire team (design and construction). After design unit is done with project, the design unit typically does not hear about what goes on in the field unless there is an issue.	High	A report can be run by STIP number to see all comments related to that project from planning through construction. Pre-design meeting; can add a checklist item. "Have you checked the CLEAR database?" Varies on culture of group. Reports and alerts can be made through SharePoint. Education on the different functions of SharePoint to personnel will solve a lot of this	CEF
4	Is there a way to set up an alert for keywords and/or projects? IT can set up an alert that links to the website and highlights part of the submission.	High	Discuss with IT. Reports and alerts can be made through SharePoint. Education on the different functions of SharePoint to personnel will solve a lot of this	CEF
5	Showcase implemented ideas at BOT meeting	High	Use Innovative and Products Awareness Report, coordinate with Governance about possibly presenting at the meeting, present at subcommittee	CEF
6	Present to TEA's at each group orientation	High	Work through an example problem at (hackathon) the orientation - interactive. [Escape Room]	CEF
7	Have a 'lesson of the day' calendar that can be tailored to user group.	Medium	Can create a 'lesson of the month/quarter calendar' in outlook that people can link to their outlook.	CEF



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8.7 Submission

Contrary to the Collection category the submission category is related to the ease of submission for users of the database. The design and comprehensiveness of the form are key factors to consider.

Table 11: Risks Related to the Submission of Data/Information into the CLEAR Database

No.	Risk / Event	Risk Rating	Control Measures: What is required to reduce the risk to an acceptable level?	Assigned to
1	For submissions that request solution, responses will be framed as 'recommendation' or 'guidance'. Wording of 'solution' may need to be renamed 'recommendation'. Is there a way to link ideas (highlight similar ideas)	High	Form Change	IT
2	Attachment limits (limit to 5). Is there a concern? IT - can attach a zip file.	High	IT to work on.	IT
4	Procedure changes and policy changes need to be adjusted based on submissions.	High	These items would be elevated to the TCC and executive committee as applicable. Part of the plan to follow up.	TAG
5	The submittal process cumbersome (i.e. follow-ups - additional work that is needed to follow idea.)	Medium	Scaling out the issue and use additional resources as needed and necessary.	CEF

Table 12 is a summary of the risks categorized by Topic and Individual/Unit Assigned. Each number listed in the table below corresponds to the risk number in the individual topic tables listed above.

Table 12: Assignment Summary of Risks by Topic, Individual, and Risk Number

Topic	Individual / Unit Assigned					
	IT	T2	CEF	DOT CM	TAG	TCC
Collection	1,7,13	9,17	4,5,6,8,10,11,15,16	2	3	-
Integration	-	3,4,6	2,7,8,9	-	5	1
Promotion	6	1,3,7,8,9	2,4	-	-	-
Recognition	-	1,3,5	4	-	2	-
Search	2,3,4	-	1	-	-	-
Sharing	-	-	1,2,4,5,6,7	-	-	-
Submitting	1,2	-	5	-	4	-
Total Tasks Assigned	9	13	23	1	4	1



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- IT – Information Technology Group that is developing the database on SharePoint
- T² – A Technology Transfer Request for Proposal that was announced through the NCDOT Research and Development Office to address these risks
- CEF – Clare E. Fullerton is the current VMO Program Manager for the CLEAR Program
- DOT CM – NCDOT Construction Management Office
- TAG – Technical Advisory Group(s) are VMO coordinated quarterly groups that review and address CLEAR submissions
- TCC – The Technical Coordination Committee, which is the official oversight committee for the VMO CLEAR Program

With the control measures and responsible parties identified, the PM can assess what risks should be mitigated first. The PM will contact the units or individuals assigned to the tasks to discuss the control measures and their role in mitigating those risks.

9 Monitor and Control

Risks should be routinely monitored throughout the life cycle of the project with updates to the Risk Register based on the results and coordination with VMO, as necessary on a project/program level. It is recommended that the PM discuss the status of risks at future project/program meetings.

A copy of the risk register will be provided to the PM with this report. The PM can monitor the status of the implementations on the Risk Register and revisit any risks as needed, should the situation change in the future. The VMO will be available for support and/or questions as needed in the future.



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Appendix A. Complete Risk Register Listing

No.	<i>Risk / Event</i>	<i>Topic</i>	<i>Risk Rating</i>	<i>Accept, Mitigate, Avoid</i>	<i>Control Measures: What is required to reduce the risk to an acceptable level?</i>	<i>Assigned to</i>
1	Risk is that search tool is not user friendly nor helpful. Using CLEAR as a resource tool to prep and share during a meeting. Highlight applicable lessons. Set expectations for search results.	Search	Medium	Mitigate	<ul style="list-style-type: none"> • Add dropdown menu that includes options that are available (categories). • Search based on STIP regions; east, west, central • keyword searches. (Do submissions get spell checked?) - Eventually search tool will learn to group in searches with bad spelling. IT looks over top searches and incorporates into search. 	JEAN
2	Risk is that expert panel is not balanced by region. Is the expert familiar with specific region issues? For example, a discipline only has one reviewer assigned.	Collection	High	Mitigate	Looking to add 4 people for PM to cover Eastern as well. Evaluate other disciplines to see if regional reps need to be added.	JEAN
3	Information hoarding - people who are not excited to share information may not want to share and discuss "lessons learned" found in CLEAR. (May vary by culture of each group. Submissions would be skewed to certain groups)	Integration	High	Mitigate	Have message come from up high and then reinforced by middle management.	T2
4	During design, innovations used are not submitted into CLEAR.	Collection	High	Mitigate	At 30/60/90 milestone a report is generated for the project and reviewed to make sure everything was captured.	CEF

For more information regarding this Risk Assessment Study Report, please contact:
 Steven J. Bolyard at 919-707-6688 or sjbolyard@ncdot.gov
 Haadi Sadaghiani at 919-707-6681 or hsadaghiani@ncdot.gov



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5	<p>Risk is information is in CLEAR database and not searched. Communication of 'lessons learned' generated and shared with the entire team (design and construction). After design unit is done with project, the design unit typically does not hear about what goes on in the field unless there is an issue.</p>	Sharing	High	Mitigate	A report can be run by STIP number to see all comments related to that project from planning through construction. Pre-design meeting; can add a checklist item. "Have you checked the CLEAR database?" Varies on culture of group	JEAN
6	<p>Risk is that information (from Weekly Report) is not submitted into CLEAR in a timely fashion or may not be submitted at all. Can information be pulled from inspection reports? Weekly report currently collects innovation or issues but does not automatically generate a CLEAR submission.</p>	Collection	Medium	Avoid	Already has been investigated	
7	<p>Currently there are three choices to submit, displayed as text hyperlinks. The risk is that the user does not know what to do and stops at homepage without submitting.</p>	Collection	Very High	Mitigate	Homepage options should look more like buttons.	JEAN
8	<p>Currently, the submitter needs to go to the CLEAR homepage to submit a lesson. The risk is that if you don't know CLEAR exists (or have the link) then you may not visit the page. May not know CLEAR = lessons learned, etc.</p>	Collection	Very High	Mitigate	Have link to CLEAR within Preconstruction and Construction SharePoint site (left hand side, with Submittal Tracker, etc.).	DOT CM

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North Carolina Department of Transportation Value Management Office Value Engineering Program



9	User would be more likely to use if it is easier to report and if the user could get something out of the database. Risk is people do not see a benefit, then people may not use it to share information.	Collection	Very High	Mitigate	Annual Report will include top submissions; with back end of report having full listing of submissions. Research - Show how data can be queried and how it can be used for gap analysis. IT - May want information reported and attached to email. Overall - different ways that data can be pulled and used. Examples - technical use, department awareness, gap analysis.	TAG
10	If people see sharing designs that went wrong as a feeling of embarrassment (they did something wrong), risk to career, failure, then they may not want to discuss or document in CLEAR. See high IMPACT at beginning of program but would lower as people see success.	Collection	High	Mitigate	(Reminder that posting does not have a name. Culture where sharing is valued and rewarded. IT ... the project you save may not be your own ... your knowledge can save someone else)	T2
11	To get people to submit ideas, have recognition programs. Have Divisions are recognized for best or most ideas? Risk is that a submitter does not want their name associated with submission (publication)	Recognition	Low	Mitigate	When submitting, asking if the submitter wants to be associated with idea. Recognition in newsletter, highlight overall savings.	T2
12	Recognition at conferences? Highlight innovations; may not want to discuss 'dirty laundry' for lessons learned. There could be a conference just highlighting lessons learned.	Recognition	Medium	Mitigate	We try to go to every conference...	CEF
13	Could tying NCVIP encourage innovation ideas?	Submitting	Very Low	Avoid		
14	OPPORTUNITY - Trends in submissions can be elevated to have policy changes, especially for issues that cannot be addressed by experts.	Integration	Very High	Mitigate	TCC handling	TCC

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Haadi Sadaghiani at 919-707-6681 or hsadaghiani@ncdot.gov



North Carolina Department of Transportation Value Management Office Value Engineering Program



15	For submissions that request solution, responses will be framed as 'recommendation' or 'guidance'. Wording of 'solution' may need to be renamed 'recommendation'. Is there a way to link ideas (highlight similar ideas)	Submitting	High	Mitigate	Form Change	JEAN
16	On Inside Page, when you search, the results include lessons learned.	Promotion	Medium	Mitigate	IT can force CLEAR to be included in the top results. Easy - direct to CLEAR homepage or lesson learned homepage. More work - have keyword search results posted.	JEAN
17	Have people share testimonials on employee news to get people to the site and also on the CLEAR webpage (ratings and reviews for ideas). Risk is that people may not see CLEAR = lessons learned.	Promotion	Medium	Mitigate	Announcement banner on CLEAR homepage. Have testimonials of NCDOT. Highlight units and individuals.	T2
18	Allow comments and reviews for ideas. Risk is if comments are not moderated then they may get out of control.	Promotion	Medium	Mitigate	Explore how comments are posted - unit vs individual. Rating can be - is this helpful - yes or no? If no is selected, then there could be an opportunity to collect feedback (only to Clare).	JEAN
19	Attachment limits (limit to 5). Is there a concern? IT - can attach a zip file.	Submitting	High	Mitigate	IT to work on.	JEAN
20	Align videos to mission statements and goals. Need someone from field, office. See expert and use.	Promotion	High	Mitigate	Research project for implementation to help with this.	T2
21	Have a 'lesson of the day' calendar that can be tailored to user group.	Sharing	Medium	Mitigate	Can create a 'lesson of the month/quarter calendar' in outlook that people can link to their outlook.	CEF

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22	OPPORTUNITY - Have a committee (cross discipline and other departments - aviation, etc.) to look at lessons and propose updates to guidelines and procedures. Quarterly, yearly, etc. Risk is increase turnaround time.	Integration	High	Mitigate	Flexible. Start with a Value Management identifying trends and bring attention to group. Then as discussions grow, may identify more groups that need to be involved. Groups are reviewing guidelines and reviews already, how to make checking CLEAR as part of the process. Find out frequency that reviews are completed and suggest interim reviews. (Example Hydro review 2016 and prior was 1999) TAG for TCC	TAG
23	People may not realize who needs information since they are using info every day. Risk is people don't know who to share information with and that CLEAR can be used as a communication hub.	Sharing	High	Accept	We give you the place to go when you don't know where to go.	T2
24	Is there a way to set up an alert for keywords and/or projects? IT can set up an alert that links to the website and highlights part of the submission.	Sharing	High	Mitigate	Discuss with IT	JEAN
25	Since a submitter needs an NCDOT email to submit, then consultants cannot directly submit. How are consultant ideas collected and learned from? They may have proprietary concerns. NCDOT employee can submit on behalf of consultant.	Collection	Medium	Mitigate	IT Medium - One-way anonymous form (you can submit but you do not need to provide email) IT Easy - Anyrisk also has a phone line in addition to online form. Employee would input call information into database. IT Easy/Medium - can tie CLEAR to ncid.	JEAN
26	May be helpful to have a sample of how to highlight the 'lesson learned'. Have form ask questions in positive light. Form could be cumbersome and not intuitive-Ease of use.	Promotion	High	Mitigate	Part of Research project Tsquared. Make the reason for each item in the form clear and purposeful. Pare down the form.	T2

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North Carolina Department of Transportation Value Management Office Value Engineering Program



27	Opportunity - If there is a specific Supplemental Agreement across the Divisions that could be submitted by a Unit or Department to capture an overall course correction (instead of each Division submitting the same issue). Risk - poor quality of SA may result in poor CLEAR submissions.	Collection	Low	Avoid	Possible future project for interns or TEAs	CEF
28	Recognition from higher ups for stopping a bad idea from wasting funds (stopping the leaky faucet).	Recognition	High	Mitigate	Discuss with TCC maybe	TAG
29	OPPORTUNITY - As program grows, have someone do Division interviews. Consultants may be able to share lessons from non-DOT projects, other states, etc.	Collection	Medium	Accept	Future project for TEAs or Interns	
30	OPPORTUNITY - Have workshops at project closeouts to collect innovations and lessons learned.	Collection	Medium	Mitigate	Plan project closeouts or partner with Resident Offices	
31	How can metrics be established to show program is useful. Present dashboards on webpage to highlight impact.	Promotion	Medium	Mitigate	Research project RFP was completed on how to capture indirect benefits. Tsquared	T2
32	Can there be a way to pull issues highlighted in the "SITREP" weekly issues report into CLEAR? The report collects issues from all divisions. Information collected/reported on Inside NCDOT.	Collection	Medium	Mitigate	From an IT perspective, it is easy to flag project and automatically generate a CLEAR submission. Check with Rebecca/Krystal or TIC about report.	
33	OPPORTUNITY - Designers benefits from seeing installation and implementation of new ideas and procedures. Is there a way to notify design unit when idea is being implemented? Risk is that person's name is not attached to submission.	Integration	Medium	Mitigate	Maybe, but better if people regularly check the database and run report maybe.	JEAN

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North Carolina Department of Transportation Value Management Office Value Engineering Program



35	Not knowing about the program and its intent - marketing/promotion	Promotion	Very High	Mitigate	Create and execute a communication strategy. Communications office newsletter. BOT monthly meeting. Podcast. NCDOT now. STIC. Marketing	T2
36	Newsletter, conferences to share specific submissions or program in general	Sharing	Very High	Mitigate	See above. CAPA, TRB, IHEEP, ACEC, METTS, Preconstruction, Transportation Summit, Geotech, Innovation Summit, Transportation Engineers Academy	CEF
37	Have case studies to improve process - use examples of submitted lessons learned in communication	Collection	Very High	Mitigate	Identify early wins from the lessons learned - starts with incentives	CEF
38	Get program feedback through large conferences	Collection	Very High	Mitigate	CAPA, TRB, IHEEP, ACEC, METTS, Preconstruction, Transportation Summit, Geotech, Innovation Summit, Transportation Engineers Academy	CEF
39	Reach out to personnel with limited access ~quarterly, bi yearly (employees who have NCDOT email but they do not use it often)	Collection	Very High	Mitigate	Identify the programs and meetings that involve the target audiences. Comp time incentives.	CEF
41	Benefit/reward program , such as Certificates as a recognition to highlight submitters in the office, award comp time, or award one-on-one face time with upper management as a reward. Allow conference attendance based on submittal(s)	Recognition	High	Mitigate	Try to match specific audiences with most beneficial/preferred reward. Get leadership on board. As an option for reward (need to see if we can give comp time). Also, identify who would be the one-on-one. If no budget for awards. Could do certificates. Get leadership on board. Provide list of possibilities. Track submissions.	T2
42	Build credibility of the program - helpful lessons from beginning.	Recognition	Very High	Mitigate	As an option for reward (need to see if we can give comp time).	CEF
43	Reaching out to field personnel without NCDOT email	Collection	High	Mitigate	Identify the programs and meetings that involve the target audiences. Comp time incentives. Communicate with previous LL submitters	CEF

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North Carolina Department of Transportation Value Management Office Value Engineering Program



44	Have unit/direct management encourage use	Promotion	Very High	Mitigate	Promote advantages of program, identify early wins, discuss at meetings.	CEF
45	Competition between Divisions/Units could help participation (similar to Wildflower program)	Integration	High	Mitigate	Think of one (brackets, public voting) and have a platform to present the award	T2
46	Standardize the process	Integration	Very High	Mitigate	Process has been standardized	CEF
47	Submitter submit own recommendation/solution/response to their question after submitting a request for a solution.	Submitting	High	Avoid	Adjust SharePoint application. Can we move from a request for a solution to a lesson learned?	JEAN
48	Standardize searching key words	Search	High	Mitigate	Update SharePoint to accommodate	CEF
49	Showcase the database on a pilot project through all phases	Integration	Very High	Mitigate	Identify a suitable project, find a willing division, possibly design-build or turnpike. Pick project milestones/completion %	CEF
50	Focus on one of the secretary's pillars periodically to encourage submissions. Not too often.	Promotion	High	Accept	Quarterly emails, add the pillars to the form	TAG
51	Showcase implemented ideas at BOT meeting	Sharing	High	Mitigate	Use Innovative and Products Awareness Report, coordinate with Governance about possibly presenting at the meeting, present at subcommittee	T2
52	Forum to program discussion - related to request for a solution/recommendation.	Collection	Medium	Mitigate	Update SharePoint to accommodate; encourage use by highlighting top concern on a periodic basis. Separate library in the database. Forum based - free form submission - interactive. Focus on requests for information. Focused information blasts.	T2
53	Improve landing page from a viewer perspective.	Search	Medium	Mitigate	Coordinate with IT. Announcements. More engaging. How many website views. Use pictures and comments. Top 10 unsolved problems.	JEAN

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North Carolina Department of Transportation Value Management Office Value Engineering Program

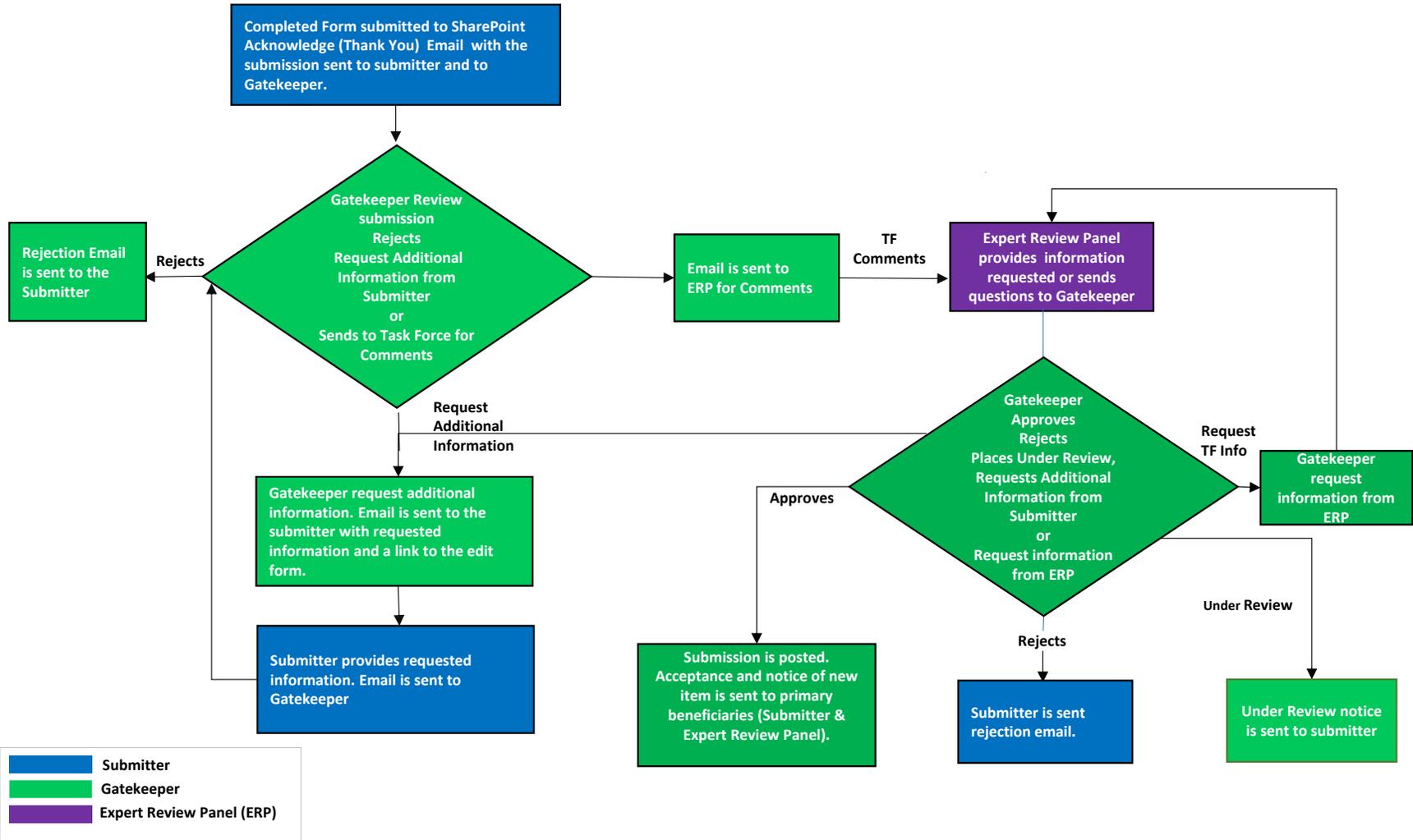


57	Present to TEA's at each group orientation	Sharing	High	Mitigate	Work through an example problem at (hackathon) the orientation - interactive. [Escape Room]	T2
58	Utilize interns/TEAs to gather lessons	Collection	High	Mitigate	Hire interns over the summer to chase down solutions. Other units can use their interns to vet ideas and investigate. Parking lot of ideas and have them investigate and write up solutions.	CEF
59	Search engine querying and searching to find specific solutions	Search	Medium	Mitigate	IT can make CLEAR submissions move to the top.	JEAN
60	Tie-in to EBS portal (add a tile); add link to bottom of inside NCDOT page	Integration	Low	Mitigate	Talk to SAP team. Talk to Communications office.	CEF
61	Procedure changes and policy changes need to be adjusted based on submissions.	Submitting	High	Mitigate	These items would be elevated to the TCC and executive committee as applicable. Part of the plan to follow up.	TAG
62	The submittal process cumbersome (i.e. follow-ups - additional work that is needed to follow idea.)	Submitting	Medium	Mitigate	Scaling out the issue and use additional resources as needed and necessary.	CEF
63	Applicable Disciplines - add Design, Other	Integration	Low	Mitigate	Add additional disciplines - train new disciplines etc.	CEF
64	A copy of the submission is never provided to the submitter	Submitting	Medium	Accept	Work with IT to develop an automatic PDF attached to the submitter. Can we make individual views for each submitter?	JEAN
65	Acknowledgement that some lessons may work for some but not others. Provide clarity on how the lessons can be applied.	Sharing	Very Low	Accept	Solutions and answers need to be specific in terms of applicability of submission.	CEF

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Appendix C

CLEAR Workflow



CLEAR

- SOP to Submit Lessons Learned Best Management Practices
- Approved Lessons Learned
- Recent

CLEAR Lesson Learned

Attach Here

Issue Reference Documents and Photos.
These will be displayed at the bottom of this form.

Name: *

Office: *

Email: *

Phone: *

*(Name, Office, Email, Phone) – For Gatekeeper to get back in case of needing additional information. Contact information will not be shared.

Describe the circumstances surrounding the obstacle or challenge you faced

Describe the issue, problem, or obstacle you encountered

Date Observed

If occurred multiple times, choose one date of occurrence and indicate number or frequency below

Occurrences Encountered

(Approximate number of occurrences or frequency this problem was encountered earlier)

Location

(Example: Intersection of HWY109 and US14 or 1 South Wilmington Raleigh NC or Near Exit 70 on I-85)

Division

Describe the solution provided for obstacle or challenge you faced

Solution to solve the problem

Provide a description of the solution used to deal with the issue described above.

Has this impacted the cost, schedule, and/or quality of your overall work or project?

Open Impact

Is this issue related to a construction or maintenance project?

Open related issue

Select which Disciplines you think need to review this issue to provide guidance.

Applicable Disciplines:

- Business Opportuni
- Construction
- Erosion Control
- Aviation
- Bicycle & Pedestrian
- Contract Standards
- Design-Build
- Division of Motor Ve

Do you have an idea on what next steps the Department should take to implement this submission?

Open next steps

Should this lesson require additional development and implementation - do you wish to be a part of this effort?

Do you wish to be a part of this effort?

CLEAR

- SOP to Submit Lessons Learned
- Best Management Practices
- Approved Lessons Learned
- Recent

CLEAR Solution Needed

Attach Here

Issue Reference Documents and Photos.
These will be displayed at the bottom of this form.

Name: *

Office: *

Email: *

Phone: *

(Name, Office, Email, Phone) – For Gatekeeper to get back in case of needing additional information. Contact information will not be shared.

Describe the technical issue, problem, or obstacle you need assistance in solving.

Describe the technical issue, problem, or obstacle you encountered

Date Observed 

If occurred multiple times, choose one date of occurrence and indicate number or frequency below

Occurrence encountered

(Approximate number of occurrences or frequency this problem was encountered earlier)

Location

Division

Select which Disciplines you think need to review this issue to provide guidance.

Applicable Disciplines

- Business Opportuni
- Construction
- Erosion Control
- Aviation
- Bicycle & Pedestrian
- Contract Standards
- Design-Build
- Division of Motor Ve

Add >

< Remove

Submit

Cancel

CLEAR

- SOP to Submit Lessons Learned
- Best Management Practices
- Approved Lessons Learned
- Recent

CLEAR Best Practice or Idea

Attach Here

Issue Reference Documents and Photos.
These will be displayed at the bottom of this form.

Name: *

Office: *

Email: *

Phone: *

*(Name, Office, Email, Phone,) – For Gatekeeper to get back in case of needing additional information. Contact information will not be shared.

Describe the Best Practice or Idea

Best Practice description or idea

Describe a best management practice or idea that could be used in the department

Examples of solution in practice

Have you seen this in practice in the Department? Have you seen this elsewhere in North Carolina? Have you seen this elsewhere in the Industry? Explain where and how, provide reference details.

Select which Disciplines you think need to review this issue to provide guidance.

Applicable Disciplines

- Business Opportuni
- Construction
- Erosion Control
- Aviation
- Bicycle & Pedestrian
- Contract Standards
- Design-Build
- Division of Motor Ve

Add >

< Remove

Next Steps Results

- Next Steps
- May result in a policy update;
 - May require Specification Change or Special Provision;
 - Possible New Product;
 - Could be developed with a Lean Six Sigma Project;
 - Additional research would further develop this submission;

Other

Should this lesson require additional development and implementation - do you wish to be a part of this effort?

Do you wish to be a part of this effort?

Submit

Expert Review Panel

Business Opportunity & Workforce
Development (BOWD)

Construction

Design-Build

Aviation

Division of Motor Vehicles (DMV)

Environmental Analysis

Erosion Control

Facilities Management

Ferry

Transportation Mobility & Safety

Hydraulics

Information Technology (IT)

Local Project

Photogrammetry

Procurement

Project Management

Public Transportation

Rail

Right Of Way

Roadside Environmental

Roadway Design

Safety & Risk

Maintenance

Structures Management

Training and Development

Turnpike Authority

Utilities

Location & Surveys

Materials & Tests

Pavement Design & Collection

Professional Services Management

Training and Development

Public Involvement

Communications

Disaster Recovery

ITS

Signals

Equipment Management

Environmental Policy

Transportation Planning

Traffic Management

Signing & Delineation

Geotech

Bicycle & Pedestrian

Contract Standards and
Development



Innovation Coordinators

Aviation

DMV

Ferry

Integrated Mobility

Rail

Highway Operations

Field Support

Technical Services

Mobility and Safety

FHWA

TEAs/Interns/YPO

Information Technology

Office of Civil Rights

Support Services

Division 1

Division 2

Division 3

Division 4

Division 5

Division 6

Division 7

Division 8

Division 9

Division 10

Division 11

Division 12

Division 13

Division 14

Appendix D

CLEAR Submission

Did you overcome a challenge in work, have a suggestion to solve an obstacle, or have a best practice to share?

Please fill out the form below so we can
... share your lessons learned, advice or best practice.
... make improvements based on your lesson learned, shared advice and best practices.

This will allow us to Communicate Lessons, Exchange Advice, and Record (CLEAR).

Hi Clare, when you submit this form, the owner will be able to see your name and email address.

* Required

1. Describe the challenge or obstacle you have encountered or witnessed.

Enter your answer

This will allow us to Communicate Lessons, Exchange Advice, and Record (CLEAR).

Hi Clare, when you submit this form, the owner will be able to see your name and email address.

* Required

1. Describe the challenge or obstacle you have encountered or witnessed.

Enter your answer

5. At which point of the project life cycle should to solution or best practice described in question 4, be applied to overcome the obstacle or challenge described in option 1.

- Planning
- Design
- Bid letting
- Construction

6. Your Location and the Location where the issue or obstacle was encountered.

Division, County, Office
(e.g. Division 3, Brunswick County, Maintenance)

Enter your answer

7. Should this lesson require additional development and implementation - do you wish to be contacted for further information?

6. Your Location and the Location where the issue or obstacle was encountered.

Division, County, Office
(e.g. Division 3, Brunswick County, Maintenance)

Enter your answer

7. Should this lesson require additional development and implementation - do you wish to be contacted for further information?

Submit

Innovation Coordinator Roles and Responsibility

Background

- Targeting Staff Engineer level staff- early to mid career professionals with good unit awareness
- Ability to effectively communicate with unit staff and peers
- Comfortable using SharePoint/MS Team Site
- Interest in driving organizational change around future transportation technology and innovations
- Available to participate for minimum 1-year term (through Dec 2020)

Roles & Responsibility

- Attend Kick-Off Workshop
- Availability to participate in quarterly innovation calls
- Engage staff and provide support in using the CLEAR program- training will be provided to coordinators
- Engage staff in brainstorming ideas and problems facing the unit for submission to CLEAR program
- Encourage existing innovators to share ideas and implemented successes with CLEAR
- Provide feedback and best practices on CLEAR program and other internal innovation programs

Benefits

- Networking opportunities with unit and larger NCDOT organization
- Drive organizational change, technology input, and innovations.
- Input into future of transportation at NCDOT

Improve Program Delivery and Reduce Cash Balance

Technical Services Offices
Construction
Design-Build
Procurement
Project Management
Right Of Way
Turnpike Authority
Environmental Policy
Contract Standards & Development
Transportation Planning
Professional Services Management
Public Involvement
Rail
Aviation

Safety

Construction
Aviation
Ferry
Integrated Mobility
Rail
Safety & Risk
Maintenance
Transportation Mobility & Safety
Traffic Management
Disaster Recovery
Equipment Management
Technical Services Offices
DMV

Mobility and Congestion

Design-Build
Integrated Mobility
Roadway Design
Transportation Mobility & Safety
Traffic Management
Signing & Delineation
ITS & Signals
Transportation Planning
Construction

Appearance and Condition of Transportation Facilities

Construction
Erosion Control
Facilities Management
Technical Units (as needed)
Materials & Tests
Pavement Design & Collection
Roadside Environmental
Maintenance
Structures Management

Human Resources and Workforce Development

Business Opportunity & Workforce Development (BOWD)
Construction
Division of Motor Vehicles (DMV)
Information Technology (IT)
Maintenance
Training and Development
Equipment Management
Aviation

Communications, Information Management and Outreach

Public Involvement
Communications
Information Technology (IT)
Integrated Mobility
Ferry
DMV
Aviation
Disaster Recovery

Appendix E

NCDOT Innovation Survey

At NCDOT, an innovation is more than an idea. It can be any process, material, method, technology, or tool that has the potential to add value and improve outcomes in transportation. At NCDOT, we are always looking to identify and implement innovations. When supported by a strong business case and a clear implementation plan, these innovations can benefit our organization and promote an innovative work culture. As NCDOT creates new pathways for advancing innovation, we would like to hear your thoughts on current, past and future innovation at NCDOT. This survey will take from ten to twenty minutes to complete.

INNOVATION

Innovation refers to the introduction of ideas, methods, devices or emerging technologies that are new to the operations of an agency. For State DOTs, these innovations could involve the introduction of new processes, materials, methods, technologies, or tools to improve results and outcomes. These tools may be brand new and require validation and testing, or they may have already been tested or proven at other agencies or in another business unit within the agency and are ready for adoption in this application.

* Required

Innovation Culture Assessment

1. How well does the definition below capture your understanding of the term? *

Innovation - the introduction of ideas, methods, devices or emerging technologies that are new to the operations of an agency. For State DOTs, these innovations could involve the introduction of new processes, materials, methods, technologies, or tools to improve results and outcomes. These tools may be brand new and require validation and testing, or they may have already been tested or proven at other agencies or in another business unit within the agency and are ready for adoption in this application.

Ranking from 1-5, where 1 is "does not capture your understanding" and 5 is "perfectly captures your understanding"

- 1 2 3 4 5

2. What do you see as the value of innovation for transportation? *

- Cost Savings
- New Service
- Improved Service
- Faster Integration of technology
- Improved Project Delivery
- Innovation has no value for transportation

3. Which aspects of innovation do you see as most important to NCDOT? *

Routine Innovations - the introduction of new tools, processes or materials into ongoing work to improve outcomes

Department-wide Innovations - changes to internal structure, protocols or decision-making processes to streamline organizational work

External Innovations - application of new technologies, ideas or materials for use by customers or the public

- Routine Innovations
- Department-wide Innovations
- External Innovations
- Innovation is not important to NCDOT
- Other

4. Based on the definitions of innovation above, do you see NCDOT as an innovative agency? *

- Yes
- No

5. Please explain your reason for choosing either YES or NO in question 4.

If you answered yes, why? In what ways do you see NCDOT as an innovative agency?

If you answered no, why not? In what ways do you not see the NCDOT as an innovative agency?

Enter your answer

6. Do you feel encouraged to be innovative in your daily work? *

- Yes
- No

7. Please explain your answer to question 6 above.

Enter your answer

8. What tools or resources might help you be more innovative each day?

Enter your answer

9. If given the opportunity, would you participate in any of the following programs? (Select all that apply) *

- Small working group looking for innovative solutions
- Innovation hour (designated time to create/focus on developing new ideas)
- Offsite experiences during non-work hours geared towards increasing your exposure to new people, technologies, or methodologies
- Lunch & learn during the work day featuring leading innovators
- Department-lead challenges or competitions to showcase innovative products or ideas
- I would not participate in any innovation programs
- Other

10. Please describe your interest level in participating in innovation related work: *

- Very Interested (I would participate in helping to build NCDOT capacity for innovation)
- Interested (I would participate in a project team working on a specific innovation)
- Neutral (I don't have the time to participate but see the value in innovation, or don't have strong feelings either way)
- Disinterested (I don't want to participate in innovation work)
- Very Disinterested (I do not think NCDOT should be pursuing initiatives around innovation)

11. How do you most frequently learn about innovations in transportation? (Select all that apply) *

- Workshops and Summits
- Technical Articles (ENR, etc)
- Participation in National Committees (e.g., AASHTO, TRB and other)
- Research Reports (NCHRP, NCDOT Research, TRB etc)
- Webinars
- Word of Mouth
- I do not learn about innovations in transportation
- Other

Next

* Required

NCDOT Innovations

12. What innovations have you seen developed and implemented within NCDOT?

Enter your answer

13. NCDOT is most focused on developing innovations in eight topic areas (listed below). Which topics do the innovations you have seen developed at NCDOT represent? *

- Prepare for future technologies
- Improve Program Delivery
- Safety
- Mobility and Congestion
- Condition of Transportation Facilities/Infrastructure
- Finance and Sustainable Revenues
- Human Resources and Workforce Development
- Communication

14. Have you seen innovation developed and implemented by NCDOT have an impact on your work, NCDOT overall and/or the public? *

- Yes
- No

Back

Next

* Required

Internal Innovation Process

15. Have you developed something innovative at NCDOT? Please describe your innovation, its application, and impact at NCDOT.

16. Please describe your experiences throughout the life cycle of developing an innovation at NCDOT (idea sharing, development, testing, communication, implementation, etc).

17. Please describe your experiences throughout the life cycle of developing an innovation at NCDOT (idea sharing, development, testing, communication, implementation, etc).

16. Please describe your experiences throughout the life cycle of developing an innovation at NCDOT (idea sharing, development, testing, communication, implementation, etc).

- NCDOT Research Program
- Value Engineering Studies
- New Product Program
- I have not accessed innovation support services
- Other

18. Have you experienced any barriers to creating and implementing innovative practices at

19. What were those barriers, and how could they be reduced or eliminated?

20. How could NCDOT best support you in generating innovative ideas, processes and products? (Select all that apply) *

- NCDOT does not need to support me in generating innovations
- Other

Non-NCDOT Innovations and Perceptions

21. Do you think NCDOT is viewed as an innovative agency by our partners and the public?

Yes

No

22. What differences exist between the ability of NCDOT employees and private sector employees to develop and implement innovative practices?

Enter your answer

Back

Next

* Required

Demographic Questions

23. Please select your job description: *

- Engineer (Design)
- Engineer (Construction, Maintenance, Ops)
- Engineering Technician (Design)
- Engineering Technician (Construction, Maintenance, Ops)
- Planner
- Environmental Specialist
- GIS Specialist
- Maintenance Transportation Supervisor or Worker
- Program Manager
- Human Resources
- Finance
- Administration
- IT
- Communications
- Other

24. Please select how long you have worked at NCDOT: *

- Less than 2 years
- 2-5 years
- 5-10 years
- 10-15 years
- 15-20 years
- More than 20 years

25. Please select if you are a full time or part time employee: *

- Full-Time
- Part-Time

26. Please Indicate whether you manage staff: *

- Yes, I manage staff
- No, I do not manage staff

27. Please provide your email address if you would like to be contacted for follow up on this survey:

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Submit

Innovation Culture Index

Office: _____

Date: _____

Maturity Level Definitions	
No Activity/Initial	Little or no activity has been conducted to support the measure.
Developing	Activities to support the measure are being planned or have begun.
Defined	An activity, process, or framework to support the measure has been conducted and/or formally put into place.
Functioning	Activities, processes, or frameworks to support the measure are well-established and operating as intended. The measure has matured.
Sustained	Activities, processes, or frameworks to fully support the measure have become standard practice. The measure is ingrained into the innovation culture of the State.

What maturity level is the State in each of the following measures?	Level <small>(Use drop down to select response)</small>
<p>1. A champion is formally established to focus on evaluating and deploying innovation - There is an identified point person in your office/unit/Department to help support innovative ideas and bring them through implementation.</p>	
<p>2. Innovation is regularly discussed at staff meetings - Routine discussion at meetings allow decision-makers and stakeholders to create synergy and to remain actively engaged in providing direction and tracking progress of innovation deployment efforts. Sources of innovation and resources to assist in deployment become available at various times, so regular check ins meetings allow the champion to be nimble in decision-making regarding innovation deployment activities.</p>	
<p>3. An appropriate and wide range of personnel are engaged in the evaluation and deployment of innovation - A diverse and well-rounded group of personnel is in a better position to determine the applicability of innovations.</p>	
<p>4. A formal process has been established in the Department to evaluate and select innovations for advancement. This process is being followed. - To complete items 1 - 3 above, the formal process provided by the Department is followed to achieve implementation of an innovation.</p>	
<p>5. Performance metrics are established to measure success of each implementation - Define the outcome being sought through the implementation of selected innovations. Setting an impact goal for the benefits expected from an innovation's deployment provides supporting data that may encourage acceptance and implementation.</p>	

