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16. Abstract

In 2009, the Texas Transportation Institute produced for the Texas Department of Transportation a document called *Video over IP Design Guidebook*. This report summarizes an implementation of that project in the form of a workshop. The workshop was developed and presented as a pilot in Austin in 2010 and taught an additional four times in 2011 in Fort Worth, Lubbock, Houston, and San Antonio.

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# APPLYING THE SYSTEMS ENGINEERING APPROACH TO VIDEO OVER IP PROJECTS: WORKSHOP

by

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The United States Government and the State of Texas do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

# ACKNOWLEDGMENTS

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# INTRODUCTION

In 2009, the Texas Transportation Institute produced for TxDOT a document called *Video over IP Design Guidebook*. This report summarizes an implementation of that project in the form of a workshop. TTI developed and presented the workshop as a pilot in Austin in 2010 and taught an additional four times in 2011 in Fort Worth, Lubbock, Houston, and San Antonio.

Nearly 100 participants attended the five workshops. Most of the attendees were TxDOT employees. However, about a dozen were from other organizations including local governments, transit agencies, metropolitan planning organizations, and private consulting firms.

# COURSE DEVELOPMENT AND DELIVERY

Materials for the workshop were developed between February and August 2010. An initial pilot workshop was held in Austin to obtain feedback from TxDOT personnel on the usefulness of the workshop and how it should be changed for the final workshop presentations. Based on this feedback, the developer made minor modifications to the workshop materials for the four subsequent workshops.

Figure 1 shows the final agenda/outline that was developed for the workshop. The four workshops were held in the summer of 2011. Table 1 summarizes the attendance for all five workshops.
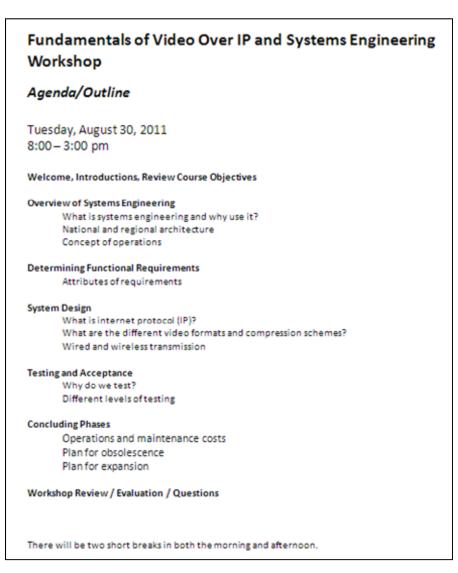


**Figure 1. Final Agenda/Outline for Workshop.**

**Table 1. Workshop Attendance.**

| Location | Date | Attendance |
|---|---|---:|
| Austin (pilot) | July 27, 2010 | 24 |
| Fort Worth | July 7, 2011 | 28 |
| Lubbock | July 21, 2011 | 18 |
| Houston | July 27, 2011 | 21 |
| San Antonio | August 30, 2011 | 5 |
| | | Total: 96 |

The workshop was designed using adult learning principles with a focus on interaction in the form of small group exercises, a mini-quiz, and group discussions. All participants received a copy of *Video over IP Design Guidebook* (and accompanying CD), a printout of the slide deck, and the workshop agenda. The slide deck was developed in Microsoft PowerPoint® and includes a full set of instructor notes.  Figure 2 is an illustration of the instructor notes.

**Key Message:**

Functional requirements should meet these criteria.

**Details:**

Necessary – Each requirement should trace back to a specific stakeholder need or a parent requirement.
Clear – Each requirement should be explicit in the needs listing, avoiding words and phrases that are subject to interpretation, such as "optimum" or "user-friendly".
Complete – Every stakeholder or need should trace to at least one requirement.
Correct – Requirements must accurately describe functionality and performance to be delivered without conflict to other requirements.
Feasible –Requirement must be feasible, or able to be met by system developers. Avoid word like 'instantaneous' which specify an unreasonable requirement.
Verifiable – Can meeting the requirement actually be demonstrated and confirmed? If so, then the requirement is verifiable.

**Key Questions:**

None.

**Other Information:**

None.

**Figure 2. Instructor Notes**

# EVALUATION SUMMARY

Following each workshop, feedback was solicited on a number of items related to the course and the instructor, as well as a self-assessment of learning. Tables 2–4 summarize the results.  Comments received by email included:

- "Thanks for the extra efforts and making the course enjoyable. I look forward in being in one of your courses in the future."

- "To say to you this class was 'excellent' is not a very good word but will do for now. To say to you the class was 'great' is not a very word but will do for now. But to say this class was the 'best' is the very word will use for now. What if everyone in the class were to say the same then you will understand how excellent, great and the best for the understanding, knowledge, and insight this class was for all the attendees. It was that kind of class."

**Table 2. The Course.**

(1 = Strongly Disagree <--> 5 = Strongly Agree)

| | Austin (Pilot) | Ft. Worth | Lubbock | Houston | San Antonio | All Non-Pilots |
|---|---|---|---|---|---|---|
| 1. Will help improve my job performance. | 3.7 | 4.0 | 3.6 | 4.3 | 4.5 | 4.0 |
| 2. Subject matter was well organized. | 3.9 | 4.4 | 4.3 | 4.4 | 4.8 | 4.4 |
| 3. Content was consistent with the course description and objectives. | 3.3 | 4.2 | 4.3 | 4.3 | 4.5 | 4.3 |
| 4. Content was relevant to my job. | 3.7 | 4.3 | 3.4 | 4.4 | 4.3 | 4.1 |
| 5. Exercises aided in my understanding and skill development. | 3.5 | 4.1 | 4.1 | 4.5 | 4.5 | 4.3 |
| 6. Provided opportunities for me to participate. | 4.3 | 4.5 | 4.2 | 4.5 | 4.8 | 4.5 |
| 7. Pace was appropriate for the amount of content covered. | 3.8 | 4.5 | 4.3 | 4.5 | 4.3 | 4.5 |
| 8. Training materials effectively presented the subject matter. | 3.8 | 4.4 | 4.3 | 4.5 | 4.5 | 4.4 |
| 9. Training materials were clear and legible. | 4.2 | 4.4 | 4.3 | 4.2 | 4.8 | 4.3 |
| 10. Was a satisfactory learning experience. | 3.9 | 4.5 | 4.2 | 4.4 | 4.5 | 4.4 |

**Table 3. Subject Matter.**

(1 = None, 2 = Little, 3 = Basic, 4 = Intermediate, 5 = Advanced)

| | Austin (Pilot) | Ft. Worth | Lubbock | Houston | San Antonio | All Non-Pilots |
|---|---|---|---|---|---|---|
| 11. My knowledge in the subject matter BEFORE the course could be rated as: | 2.9 | 3.3 | 3.1 | 3.2 | 3.3 | 3.2 |
| 12. My knowledge in the subject matter AFTER the course could be rated as: | 3.7 | 3.8 | 3.9 | 3.9 | 4.0 | 3.8 |

# Table 4. The Instructor.

(1 = Strongly Disagree <--> 5 = Strongly Agree

| | Austin (Pilot) | Ft. Worth | Lubbock | Houston | San Antonio | All Non-Pilots |
|---|---|---|---|---|---|---|
| 13. Clearly stated all learning outcomes. | 4.2 | 4.3 | 4.3 | 4.3 | 4.5 | 4.3 |
| 14. Made appropriate transitions and summaries throughout the course. | 4.2 | 4.3 | 4.3 | 4.5 | 4.5 | 4.4 |
| 15. Kept discussions focused on relevant topics. | 4.2 | 4.4 | 4.4 | 4.3 | 4.8 | 4.4 |
| 16. Consistently employed question and answer techniques. | 4.5 | 4.5 | 4.4 | 4.4 | 4.8 | 4.5 |
| 17. Provided for application of content through exercises. | 3.9 | 4.3 | 4.3 | 4.4 | 4.3 | 4.4 |
| 18. Provide positive feedback to the class. | 4.3 | 4.5 | 4.4 | 4.6 | 4.8 | 4.5 |
| 19. Encouraged participants to share work experience and background. | 4.3 | 4.5 | 4.4 | 4.7 | 4.5 | 4.5 |
| 20. Related the subject matter to my job. | 3.7 | 4.1 | 4.1 | 4.4 | 4.3 | 4.2 |
| 21. Used appropriate visual aids in support of learning outcomes. | 4.3 | 4.1 | 4.4 | 4.4 | 4.8 | 4.3 |
| 22. Clearly demonstrated subject matter expertise. | 4.1 | 4.2 | 4.4 | 4.4 | 4.8 | 4.3 |
| 23. Made effective use of time. | 4.3 | 4.4 | 4.4 | 4.5 | 4.5 | 4.4 |

| | Austin (Pilot) | Ft. Worth | Lubbock | Houston | San Antonio | All Non-Pilots |
|---|---|---|---|---|---|---|
| 24. Provided a positive learning environment. | 4.5 | 4.5 | 4.5 | 4.5 | 4.8 | 4.5 |
| 25. Was enthusiastic. | 4.7 | 4.5 | 4.6 | 4.6 | 5.0 | 4.6 |
| 26. Increased my interest in the subject. | 3.9 | 4.3 | 4.2 | 4.5 | 4.5 | 4.3 |
| 27. Provided a satisfactory learning experience. | 4.1 | 4.6 | 4.4 | 4.4 | 4.5 | 4.5 |

Overall, the workshop was very well received by those who attended. In all cases, the participants self-reported that their knowledge of the subject matter improved as a result of the workshop.

The evaluation asked a couple of open-ended questions about improving this course and other training desired. Several participants said they would like more advanced training on this topic with more specific details on video equipment, detailed case studies, and less emphasis on the systems engineering process.