Mr. Hallenbeck concluded his presentation with a discussion of three lessons that have been learned in Seattle. First, all agencies must be willing participants with a desire to cooperate on the project. Second, progress is made at the rate of the slowest participant in the system. Finally, you must be willing to dedicate the necessary resources and staff to the project—you need someone whose job it is to make the system work.

Implementation Issues

Philip Tarnoff
Farradyne Systems, Inc.

Mr. Tarnoff has been involved in numerous control system projects during his career. During his presentation, he discussed some of the implementation lessons learned from those projects.

- Previous experience with integrated systems suggests that the non-technical issues are invariably bigger problems than the technical ones. Those problems include such things as project administration, staffing, institutional issues, and funding. The technical problems and issues are typically more interesting, but they can usually be resolved with a competent staff.

- There are several lessons to be learned from the area of traffic signal systems, and they may be equally relevant to freeway systems. The signal system market is more mature in some respects, and as the freeway market continues to grow, many of the same opportunities and problems will arise.

- There are currently a number of standard signal systems available. Many cities conduct detailed surveys of the those systems for their own projects. Often, the conclusion is that a particular package meets their needs. Acquiring that package presents a problem when there is a policy for low-bid procurement. It generally means writing a proprietary specification that is blatantly obvious and may cause trouble. Even worse, a city may conclude that none of the systems exactly meet their needs, and produce a specification that includes the best features of all the systems, but no one can meet.

- Another problem for both signal and freeway systems is interfacing with various manufacturers' equipment. Agencies are often forced to deal with a single manufacturer of proprietary systems, or to hire consultants to develop specialized interface software. There is a real need for improved standardization of equipment. Other industries have demonstrated that standardization can be successful, and many of the arguments against it do not materialize.

- A third concern is the desirability of standardized software. It is hard to believe that every agency's problems are so unique that they require a completely customized system. There seems to be little appreciation for the costs of including long lists of unique features into an RFP. The costs are rarely traded-off against the benefits of those features.

- Finally, on most projects the design and implementation consultant cannot be responsible for the procurement of the equipment. Instead, the agency is responsible for procuring the equipment for the consultant. This is called systems management, and it is one way to avoid the problem of picking certain packages and then having to specify the sole source. The important point is that with agency-supplied equipment, it is necessary to consider the agency's procurement cycle. Otherwise, significant delays could result.

- There are also a few institutional issues with respect to implementation. Some integration projects have suffered because of the number of agencies that were involved. It is true that a project will only proceed as quickly as the slowest agency is willing or able to. In these projects it is critical to get commitments from all the participants. They must

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receive as much priority as other internal activities at each agency. Unfortunately, that is difficult because no single agency is responsible for the success of a cooperative project.

Mr. Tarnoff concluded by discussing a very common problem for traffic management systems: the lack of adequate internal staff to operate and maintain them. If internal staff is not available, the possibility of contracting out for support staff should be considered. It simply does not make sense to spend millions of dollars on systems that are not going to be properly operated and maintained.

Traffic Management Lessons

Colin A. Rayman
National Engineering Technology Corporation

Mr. Rayman has been involved with traffic management projects in several capacities. In his presentation he shared some perspectives on traffic management from personal experiences in the industry, as a client, and as a consultant. His comments are summarized below.

- One of the most important lessons in traffic management is that we never seem to learn. There are many valuable experiences out there, but we have failed to educate ourselves. That failure may be due to a competitive attitude among agencies, a lack of traffic management education at our universities, or some other reason. Whatever the reason, every time a system is implemented there is a struggle to justify its existence. There is a long history of experiences out there indicating that these systems do work.

- Integration represents a new era in traffic management systems. Because of this, there is a need for constant education and reeducation in traffic management. The program at Texas A&M University is a noteworthy effort to educate our young engineers in traffic management. The reeducation effort must also extend to our decision makers.

- While there are a lot of knowledgeable people in the field, there are also a lot of naive people. That includes agencies who think they want to implement a traffic management system, but don't really know what it involves. It also includes consultants who want to provide services, but are not capable of doing so. And finally, there are suppliers who don't know how their products can be applied effectively in traffic management systems.

- There are also some unrealistic expectations for traffic management systems. This problem exists in expectations about project costs and the implementation schedule. It is important to be very clear about what the expectations are, given the industry's capabilities.

- There is a growing assortment of exotic traffic management products. The potential exists to focus too much on the technology and lose sight of the true objectives of a traffic management system. This is a danger that we need to be aware of.

- As clients, agencies also need to be aware of exactly what they are purchasing, whether it is from a equipment vendor or a consultant. It really is common sense, but the concept of "buyer beware" needs to be emphasized.

- These systems require a champion within the agency for them to succeed. Knowledge of these systems and what they are capable of is not necessarily widespread. In order to implement and operate a system successfully, it takes someone who is willing to defend it continuously.

- It is necessary to think beyond implementation. That stage is often difficult, but one also must think about what is necessary to operate and maintain the system. In addition, there will be advances in the technology, which means continuous upgrades and changes. These projects do not end once they are operational, and that requires a long-term vision for the project.