The Requirement Development Process for Urban Transit System using Model Based System Engineering

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ABSTRACT: To develop and manage this complex system efficiently, system engineering methodology needs to be applied for entire life cycle from schematic plan. System engineering research in Korea is still in germ and applies limitedly to train system and the National Defense, even system engineering methodology is widely used for entire industrial areas in developed countries. For this study, effective method function analysis is investigated for standardization criteria through urban transportation standardization project

1 INTRODUCTION

The Urban Transit is complex system which consists of vehicle and infra such as electric power, signal, and track. The system is more complex introducing manless driving recently. Design mistakes might happen because system is complex, therefore, there is need to reduce error in a basic design stage. System engineering methods are introduced to reduce design errors in space-air, national defense research area, also system engineering methods are introduced to reduce design errors in railway engineering recently. Even there is application method of system engineering in ISO 15288, it is hard to follow ISO regulations as stated in ISO regulations because it requires much time and cost. To reduce time and cost unique system engineering methods for railway engineering should be applied and one of them is analysis of system requirements.

2. OPERATION SCENARIO OF INTELLIGENT MONITORING SYSTEM

For execute functional analysis, each scenario that base on system of unified data transmission in a subway and railway requirement and subsystem requirement is written.

2.1 Room image transmission

- System of unified data transmission in a subway and railway should transmit CCTV image of vehicle room to ground.
- Room observation digital image storage device(DVD or NVR) of vehicle should provide image observation function and ether-net interface.
- Room observation digital image storage device(DVD or NVR) of vehicle should be input subtitles for room image classification.
- Room observation digital image storage device(DVD or NVR) of vehicle should be transmit image channel from ground observation center.
- Onboard signally system should provide room observation digital image storage device(DVD or NVR) and ether-net interface.
- From onboard signally system transmitted room image data, wayside signally system should provide interface to observation center.

2.2 Emergency alert transmission scenario of platform and vehicle

- System of unified data transmission in a subway and railway should transmit alert of platform to

vehicle for transit emergency situation of platform and station.

- Onboard signally system should offer alert input interface of maximum 4 ports.
- System of unified data transmission in a subway and railway should transmit emergency situation on wayside.
- Onboard signally system should offer alert interface of maximum 2 ports.
- Alert of vehicle and wayside system should transmit through onboard signally system and control center in platform.
- Onboard signally system should print alert of vehicle in platform monitor.

3. FUNCTIONAL MODELING FOR INTELLIGENT MONITORING SYSTEM

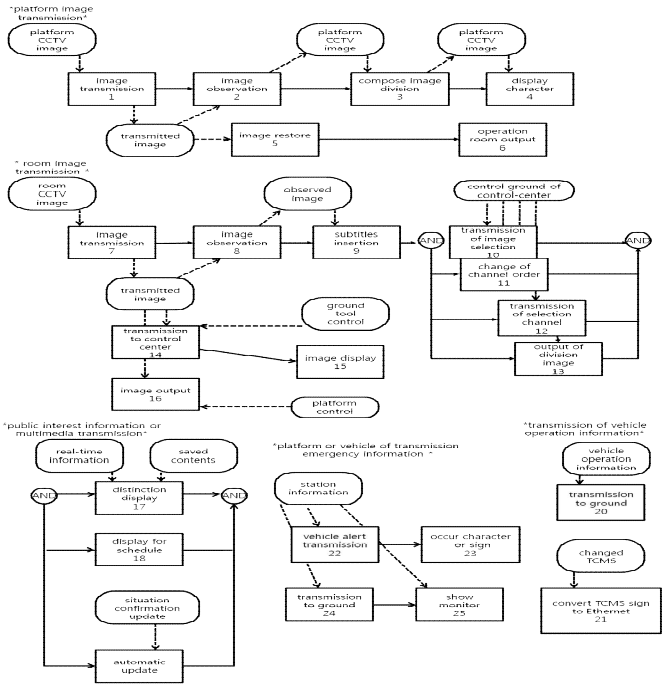

Fig1. Intelligent monitoring system EFFBD

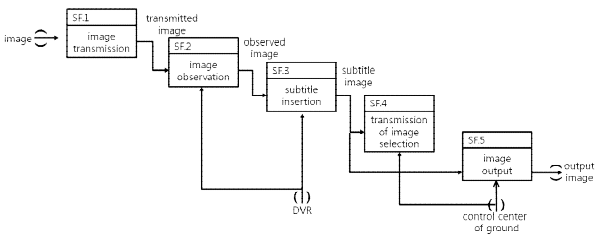

Fig2. Intelligent monitoring system IDEF0

4. REQUIREMENT CREATE AND VERIFICATION

In this paper, intelligent monitoring system requirement which is urban transit standardization research execute verification and test. It is deducted that 157 of requirement which is intelligent monitoring system by verification method.

Table1. Create requirement of verification

title	Requirement of verification	Method of verification
Function of alert observation	It should test applicability of alert observation function.	Test
Remote management	It should inspect system of remote management.	Inspection
Recycle velocity of channel	It should test recycle-velocity of sensor node.	Test
Function of roaming	It should test roaming function in vehicle.	Test

Table2. applied distribution chart of verification method

system	Method of verification	Num.	%
Intelligent Monitoring System	Inspection	79	50.4%
	Test	54	34.4%
	Demonstration	13	8.3%
	Measurement	10	6.3%
	Analysis	1	0.6%

For table2, intelligent monitoring system should use inspection verification method. As a result, intelligent monitoring system can assure both test and inspection that is a primary verification method.

5. CONCLUSION

The detailed requirements such as design, produce, test and operation requirements throughout the whole system life cycle need to be developed and analyzed based on analyzed requirements in the future, and the unique methods of requirement analysis for railway engineering need to be provided.

References

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