

SMART

Conceptual Design of SMART Computerized Operator Support System

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(Computerized Operator Support System)

SMART

SMART(System-integrated Modular Advanced Reactor)

Abstract

Since the mid-1980, Computerized Operator Support System (COSS) has been developed in the world to support monitoring and diagnosing of NPP. This research provides design concept for the SMART (System-integrated Modular Advanced Reactor) COSS by reviewing the state-of-the-art of COSS and its application. Specially, it is derived from design considerations such as range of computer-based procedure, the role of operator, display devices of procedure, function allocation, prioritizing of procedures actions and the scope of hard-copied procedures as a backup. This thesis provides plan of SMART COSS development and design concept to function, display design, man-machine interfaces, and computer-based procedure supporting COSS.

1.

TMI

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가 .

SPDS(Safety Parameter Display System)

[1].

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80 가 [2].
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SMART

. 1)

, 2)
, 3)

4) SMART

2.

2.1

가 . 1
4가 가 [3].
1 가 ,
, , , .

가 , .

2.2

. IAEA

2.3

가,

가

가

가

3.

3.1

가,

2

[4].

가.

COSS

MMS-NPP,

DIAREX,

INS, JAERI

DISKET

Tsuruga 2

KWU

PRINS

Brokdorf

KWU

PRINS

가

EDF

N4

DIVA, 가

ALPA

EPRI

가

PLEXSYS

DASS

가

DISYS/DICON

3.2

SPDS

1) SPDS

, 2)

TMI Task Action

Plan

가

, 3)

가

1)

(KOSSN)

2)

3)

가

4)

가

가

4.

4.1 (Computer Based Procedure)

가. (EOPTS: Emergency Operating Procedure Tracking System)
EOPTS BWR EPRI Taiwan Power Company

[5].

(COMPRO: COMputerized PROcedure)

COMPRO

. COMPRO

가

. COMPRO

가

. COPMA

COPMA

가

. ADPA (Accident Diagnosis & Prognosis Aids)

ADPA

Technology Application

. TCS (Transition Control System)

TCS

4.2

COMPRO

[6].

5 가

가.

[7].

가

EPRI EOPTS
, EdF

가

가.

가

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(LDP: Large Display Panel)

(procedure actions)

5. SMART

5.1

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SMART

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MMI

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가

, 가 (CRT,)

5.3

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SMART

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SMART COSS

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NUREG-0696

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가

가

가

가

가

가

NUREG-0700

(global variable)

가

가

(flow charts)

가

가

가

가

가

가

5.4

가

CAI(Computer-Aided Inspection)/CBT(Computer-Based Training)

PDM(Product Data Management)

CALS(Computer-Aided Logistics Support)

, SMART

가

6.

SMART

SMART

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Acknowledgement

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- [1] IAEA-TECDOC-529, User Requirements for Decision Support Systems Used for Nuclear Power Plant Accident Prevention and Mitigation, IAEA, VIENNA, 1989
- [2] , , KAERI/CM-022/93, , 1987
- [3] Technical Reports Series No. 372 : Development and Implementation of Computerized Operator Support Systems in Nuclear Installations, IAEA, VIENNA, 1994
- [4] John A. Bernard, Expert Systems Application within the Nuclear Industry, American Nuclear Society, 1989
- [5] EPRI NP-5250M: Emergency Operating Procedures Tracking System, 1994, 6
- [6] C.R.Hardy, A Real-time Expert System for the Detction and Diagnosis of Abnormal Conditions in Nuclear Power Plants, Proc. Of AI 91, Whoming, 1991, 9
- [7] Barnes, V., Desmond, P., and Moore, C., Preliminary Review Criteria for Evaluating Computer-Based Procedures(BNL Technicla Report E2090-T4-2-0/96), Upton, New York: Brookhaven National Lab., 1996

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		EXTRA	
	CRT	HALO	
			Westinghouse
		DMA	Dupont
		AFS	EG&G Idaho
	HFIR		Oak Ridge National Lab.
		DVS	Ohio Univ.
			JAERI,
	PC		
		REACTOR	EG&G
		REALM	EPRI
	가	RSAS	Idaho Lab.
	가	EP	
	가	AMES	Idaho Lab.
	가	Response Tree System	EG&G
	가	ICS-EXPERT	EPRI
		GDS	CE
		ERDS	NRC
		DISKET	JAERI
	가	PLEXSYS	EPRI
		GDS	CE
			EPRI
:		ACCINAL	
	PWR		
	가	SEXTANT	
		GRADIENT	ESPRIT

		IDA	FRG
		SAAP-2	GDR
:	BWR COSS	COSS	NAIGC
		COSS	
		MMS-NPP	
		MMS-NPP	
	가	DIAREX	NAIGC,
	BWR	INS	
		DISKET	JAERI
	FRG		NAIGC,
:		DASS	EPRI
		DISYS/DICON	Westinghouse
	가	COPILOT	Pickard
			EPRI
		CIAS	Agonne Lab.
		MOAS	Maryland Univ.
:		Operator Companion	
	AI	KIT-1	NAIG
		FTCA	Expert-EASE System
		CRSL	Ohio Univ.
	-	ER	Westinghouse Hanford Company
	, , 가		FRG
	(STAR-GENERIC)		
		SMART	EPRI
	가 "C"	TRESCL	EPRI
		ADPA	Tech. App.
		DPMS	Ohio Univ.
			Hanford
			Hanford
		COMPRO	Westinghouse
		EOPTS	EPRI, Taiwan
		OPA	Tractebel
		COPMA	
			Perceptronics
	가		
			Westinghouse
			Westinghouse
	가	ALPA	

	가 가		
	가		Westinghouse
	SNR-300 가	TEX-1	FRG Interatom
			EPRI
(PRA) 가	가	PREDICTOR	Tech. App.
	PRA 가	PRISIM	Oak Ridge National Lab., NRC
	PRA		Califo. Univ.
	가	EXPRESS	
		CLEF	
		SYREP	
		FOCUS/CERBERE	
	가	DEFECT DETECTIVE	
	가	FUELEM	
	가		Ohio Univ.
			Tohoku Univ.
		TSMS	CE
			NAIGC
	BWR		EPRI
-		GenAID	Westinghouse
		DIVA	