

Workflow-Based Decision Support for Failure Mode and Effects Analysis

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Outline

Failure Mode and Effects Analysis (FMEA)

- Innovation by using a Decision Support System (DSS) for supporting the FMEA processes
- iDDesign – National Research Project

History and Context

- iDecisionSupport – Decision Support System developed by Ropardo
- iPortal – Web Portal developed by Ropardo

The FMEA worksheet approach

The (DSS) Grading process

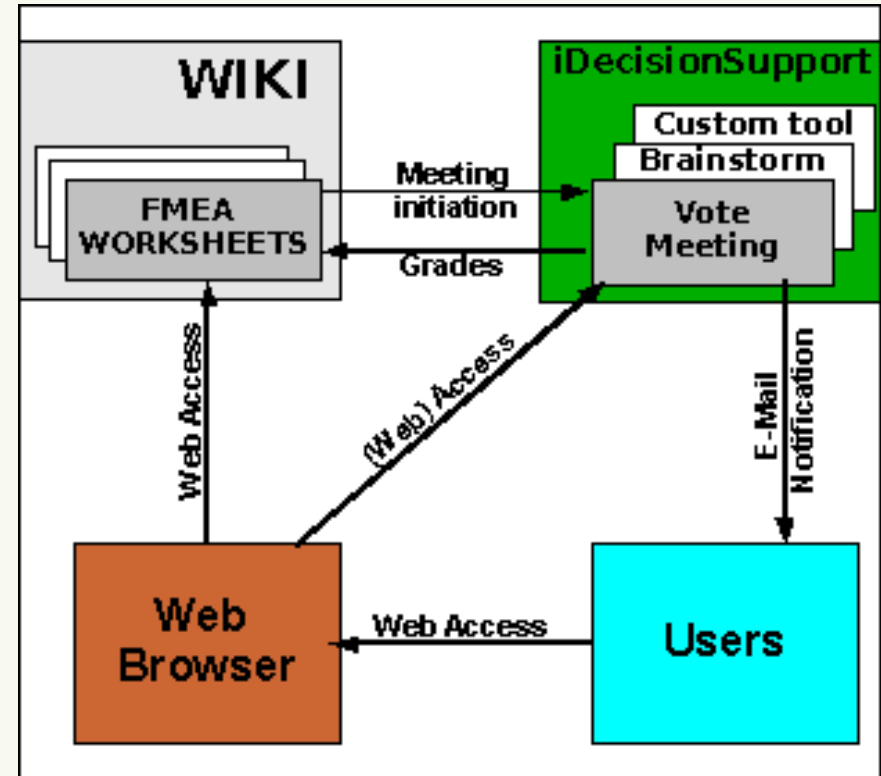
iDecisionSupport

- Architecture and tools

Workflows and experiences



- ❑ DSS System – iDecisionSupport
- ❑ Wiki Component
- ❑ Systems integration – *iPortal*
 - ❑ Workflow system
 - ❑ Document Management
 - ❑ CBR – Experince Database
- ❑ Web Access to the whole integrated system
- ❑ E-Mail Notifications



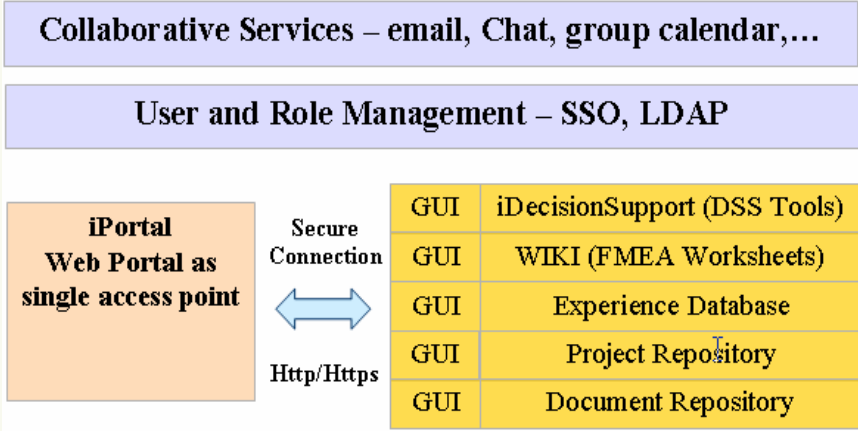
History and Context

iDecisionSupport

- Web based framework for decision support tools
- Collaborative environment where different software tools for decision making can be easily integrated
- Users can access them remotely and asynchronously
- Developed at Ropardo S.R.L. starting back in 2006 within the CEEEX – National Research Project

iPortal

- Software suite for:
 - Project management
 - Document management
 - Decision Support systems
 - Collaborative work
- WIKI component
- Web-interfaced access point.
- introduces the concept of “project-based” activities which focuses collaboration around projects.
- Developed at Ropardo S.R.L. starting from 2007



iPortal components

FMEA Worksheet

SC COMPA SA SIBIU	AMDE (FMEA) <input type="checkbox"/> PROIECT <input type="checkbox"/> PROCES	AMDE Nr. / Data AMDE Initial : _____ / _____	
Directia: _____	Produs: _____	Intocmit: Coordonator AMDE (seer. workshp): _____	Es: _____
At: _____	Subansamblu: _____	Verificat: Sef compartiment (seer. workshp): _____	
	Componenta: _____ <small>(Denumire) (Cod identificare)</small>	Echipa (seer. workshp): _____	

Ed. AMDE/ Data 02	MODIFICARI / REVIZUIRI PERIODICE Motivul analizei (modificare – explicare; revizuire periodică)	SINTEZA AMDE 03												Coordonator AMDE (nume complet):	
		Inainte aplicarea masurilor corective						Dupa aplicarea masurilor corective							
		U	S	30	50	75	100	U	S	30	50	75	100		
		Nr. potenta de detectare:													

- 01** Nr. AMDE este dat de nr. de Produs/Reperumat de o cifra ce indica varietatea de proces.
- 02** Perioada dintre doua analize corective trebuie sa fie de maxim 1 an. Dacă în decurs de 1 an nu au apărut probleme, atunci se face o revizuire AMDE.
- 03** Pentru produsele la realizarea cărora intervin mai multe procese, se va face o singură „Sinteză AMDE” proces pe formularul C COMPA 44-2-1001-2; A4; f. ed valabilă.

A M D E												Plan de masuri		Rezultatul actiunilor				
Nr. act	Piesa/subansamblu/procedura/funcie si pozitie si caracteristici	Mod potential de detectare (defectiuni)	Efectul potential al modului de detectare	C	Caz spec. (C ₁ , C ₂ , C ₃ , etc.)	Cauza potentiala a defectiei	F	Masuri de uniformare de proces	Masuri de uniformare de detectare	D	C	Măsurile de uniformare de proces	Efectivitate	Data verificării / Măsurile întreprise				
														G	F	D	C	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

G = valoarea garantiei; F = valoarea funciei; D = val de detectare; C = valoarea costului unitar de productie a unitatii (UP)
 (RPN = CxR; FPZ = CxRxF)
04 Valoarea RPN AMDE (din cauza unui defect sau modificari a produsului, a verificarii perioadei, etc) se trece în coloana ed. AMDE/data și defectul se trece în coloana defectiei.

05 defectiuni care la baza unui control manual sau tehnologic nu pot fi detectate => D = 6+10
 defectiuni care la baza unui sistem semi-automat => D = 3+5
 defectiuni care la baza unui sistem automat, tehnologic sau control automat => D = 1+2

06 G=9-30 si C>30 => se completeaza Plan de actiuni (coloanele 13,14)
 G=7+8 si C>50
 G=1+6 si C>100

FMEA Worksheet inside the system

- FMEA Worksheets as wiki pages inside iPortal
- Accessible via web browsers
- Communicates with the Experience Database component
- Auto-completing nomenclature of failure modes, causes, effects of different other information that can speed up the FMEA process
- Versioning (History)
- Comments
- Attachments

FMEA Worksheet

Last modified by [Alexandru Georgescu](#) on 2010/01/19 19:16

No.	Failure mode	Effect	Cause(s)	S
	Fill tub	High level sensor never trips	From Experience	3

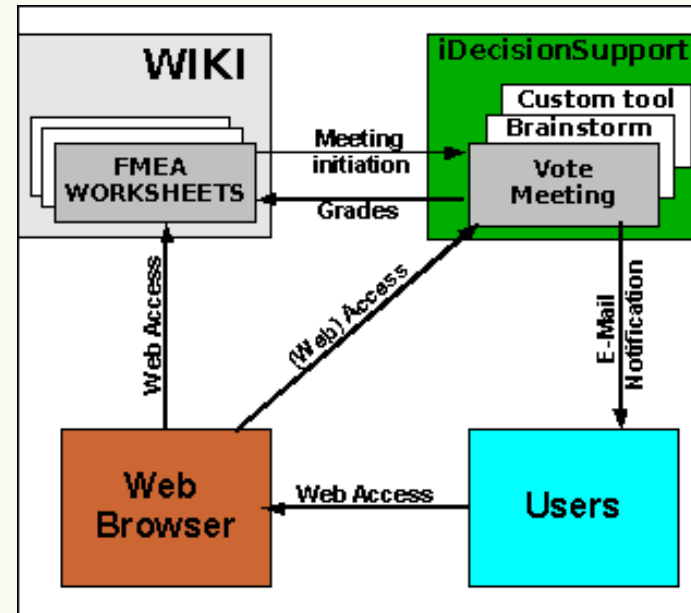
Direction: Product: Subset: Responsi
 At: Component: (Name) (Identification Code)

- G- gravitation index; F-frequency index; D- risks priority(IPR) (RPN-english RPZ-german) - (*6): when AMDE is resumed AMDE/ date and below the analysis dates.

FMEA Worksheet inside the system

The grading process

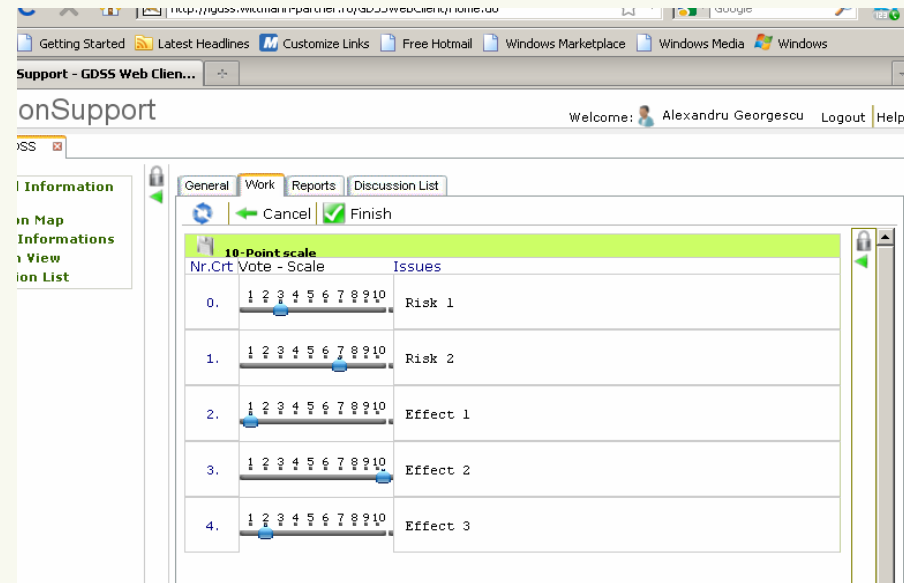
- The wiki component and iDecisionSupport can reside on two completely different machines:
 - Communicate through WS-APIs
 - This adds scalability to the system
 - Web-service for tools
- User access via web-browsers
 - Single Sign-On
 - E-Mail Notifications
- DSS Tools can also reside anywhere on the internet
 - Adds scalability



FMEA Components

DSS System architecture

- DSS Server
 - Handles business logic
 - Web-service for tools
 - WfMC/Wf-XML in workflow engine
 - Agents environment
- DSS Web Client
 - Provides web access to the DSS system
 - Single Sing-On (SSO) implementation
 - Open tools in it (Figure)
- DSS Tools
 - Default set of tools that can be combined to efficiently perform the grading process
 - Other custom tools can be developed and integrated in the system if necessary



Voting tool inside a vote meeting

DSS Tools

- Brainstorming
 - a decision support tool for voting (polling) activities
- Voting
 - another decision support tool that allows for electronic brainstorming meetings (sessions).
- Discussion List
 - tool that provides forum like discussion threads for different aspects that need to be discussed.
- Multi-criteria analysis (or voting)
 - is a tool that allows for grading different items relative to different reference points
- MindMap
 - tool for creating mind map diagrams for generating, classifying and visualising ideas
- Custom (Third Party Tools)
 - can be developed by or for any company that would like to implement this FMEA software approach.

Workflows and Experiences

- Workflows inside worksheets
 - Auto configuration of DSS meetings
 - Import results from previous meetings as new items
- DSS Workflow engine
 - Chains of meetings of different types that are started automatically
 - The result of a meeting can be the input of another in the chain
- Experience Database
 - Acts like an auto completing nomenclature of failure mode and effects
 - Implements the Black Box (BB) concept

Ropardo S.R.L. news



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Thank you !



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