

# DANFOSS AUDITING SYSTEM

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May15-02

# Responsibilities

- Jamie Countryman (SE) - Team Lead
- Zach Carlson (SE) - Web Master, Key Concept Holder
- Mitch Valenta (CPRE) - Communications

# Problem

- Auditing done on paper
- Time-consuming and prone to failure
- Incomplete audits

SHOP FLOOR AUDIT

Cell: A55

Date of Audit: 8/13/2014

Score: 75%

Auditor: Matt Johnson

WEEK 33

No	Description	Observation		Comments - should be given a "No" including improvement suggestion	Responsible and due date. Check off when done.	Where to audit	Audit adjust
		Yes	No				
<b>Safety</b>							
1	Are Near Miss / Safety Alerts posted on the Safety Board?					Safety Board	STABILIZATION
2	Are the minutes from the latest Safety Meeting posted on the Safety Board? (Weekly, Thursday)					Safety Board	STABILIZATION
<b>Performance Management System Board</b>							
3	Is Hourly Registration being updated according to SOP?					Performance Board	STABILIZATION
4	Is there a reason noted for red numbers on the Hourly Reg. Sheets?					Performance Board	STABILIZATION
5	Is the Worked Hours Chart being filled out each shift?					Performance Board	STABILIZATION
6	Are all KPI's updated on the PMS board? (Must Weekly)					Performance Board	PKS
7	Was the Daily Shift Meeting held at the start of the current shift?					ASK Operator	PKS
<b>Root Cause Problem Solving</b>							
8	Are the 4-Step documented according to SOP?			1 with no status		QC9 Board	STABILIZATION
9	Are Just do it tasks submitted according to SOP?					QC9 Board	STABILIZATION
10	Is there a status for each problem being worked?					QC9 Board	STABILIZATION
11	Is the Problem Solving KPI up to date? (Update Weekly)					QC9 Board	STABILIZATION
12	Is there a reason stated for all items in the "Standby" area?					QC9 Board	STABILIZATION
<b>Audit</b>							
13	Are results published for last Shop Floor Audit?					QC9 Board	STABILIZATION
14	Have the "NO's" from last weeks audit been addressed?			need wiped		QC9 Board	STABILIZATION
<b>5S / TPM</b>							
16	Are all non-production and personal items kept off of racks, shelves, work surfaces, & cabinet tops?					Entire Cell	FLOW
17	Are all items placed so that they do not extend into or block on aisle?					Entire Cell	FLOW
18	Is Gage Systems clean and free of machining dust and shavings?						
19	Is the floor free of oil, water, trash, etc?					Entire Cell	FLOW
20	Is all equipment clean? (check work surfaces, equipment, carts, shelves)					Entire Cell	FLOW
21	Is all documentation clean and readable? (Standard Work, TPM, MSA, IPC sheets)					Entire Cell	FLOW
22	Is Non-Conforming Material in the designated location?			8 parts in cell (pending rework)		Entire Cell	FLOW
23	Are all production tools, carts and reusable containers in designated location?					Entire Cell	FLOW
24	Are all parts & tools properly labeled?					Entire Cell	FLOW
25	Is Standard Work & training documentation in designated location?					Entire Cell	FLOW
26	Are Weather audits completed? (Pointed on the risk of the weather. Daily shifts)					Entire Cell	STABILIZATION
27	Is the TPM Board up to date?					Front Tool Board	STABILIZATION
28	Are all of the TPM tools present or properly checked out on the TPM Board?					TPM Tool Board	STABILIZATION
29	Has 6-138 tool change and Critical tool sheets been filled out?					Visual	STABILIZATION
<b>STANDARD WORK</b>							
30	Is the Standard Work posted?			SW 1351		Document and Operator	STABILIZATION
31	Is a JSA attached to the Standard Work?					Standard Work Document	STABILIZATION
32	Has the operator read and been trained with the Standard Work?					ASK Operator of Tool choice	STABILIZATION
<b>Total</b>		<b>24</b>	<b>8</b>				Responsible: Terry Brown

SHOP FLOOR AUDIT RESULTS

# Solution

- Create a web app
- Simplifies and centralizes the auditing process
- More powerful and accessible



# Specifications

- ASP .NET 4.0
- Windows Server
- Microsoft SQL
- Internet Explorer and mobile Safari



# What Changed?

- ASP .NET 4.0 MVC
- Active Directory authorization
- Deletion of audits
- Camera functionality

# Current Design

- MVC design changed to Web Forms

Pro: Most Danfoss solutions use this

Con: Unfamiliar technology

- Windows Communication Foundation (WCF) added

Pro: Consolidates business logic (ex. GetAllAudits())

Con: Restructuring implementation

# Current Design

- Disable audits / questions instead of deleting

Pro: Statistics information still held for viewing

Con: Database may fill with lots of data

- User roles handled in-app instead of with Active Directory

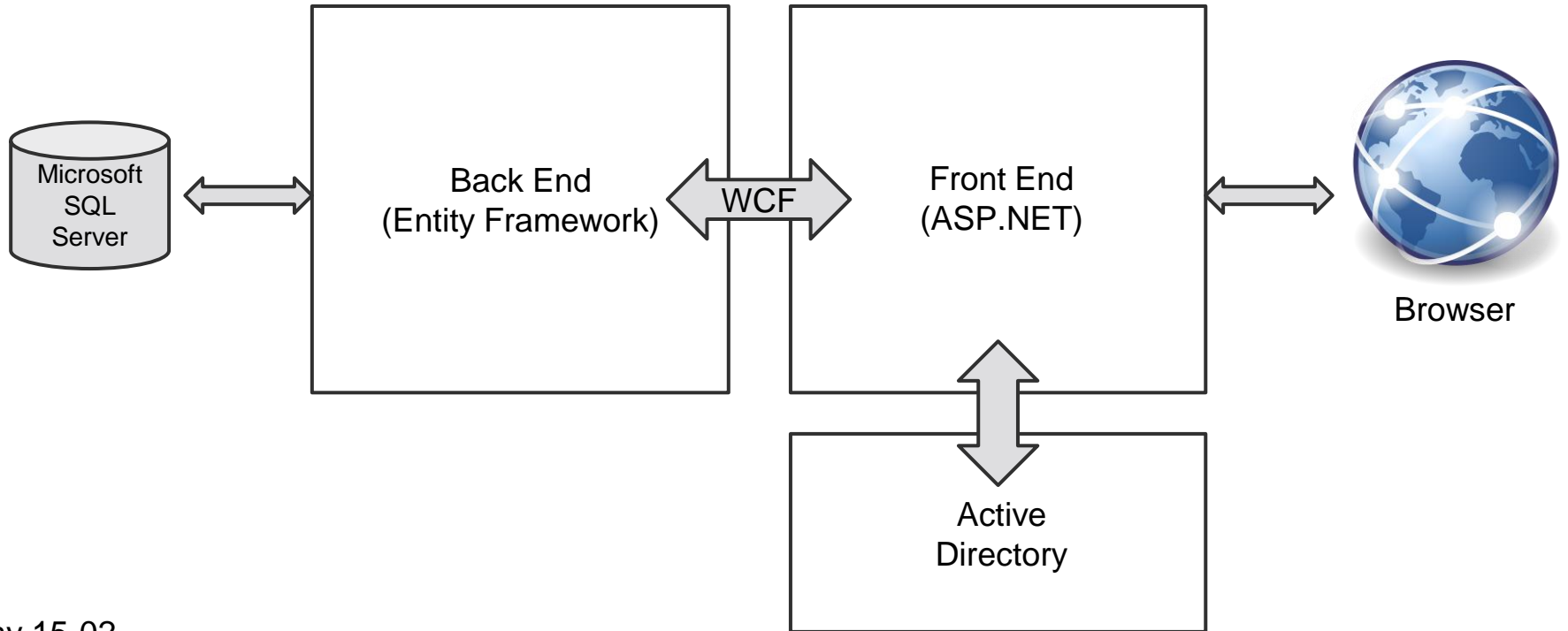
Pro: Faster than Active Directory (much less red tape)

Con: Had to roll our own authorization system

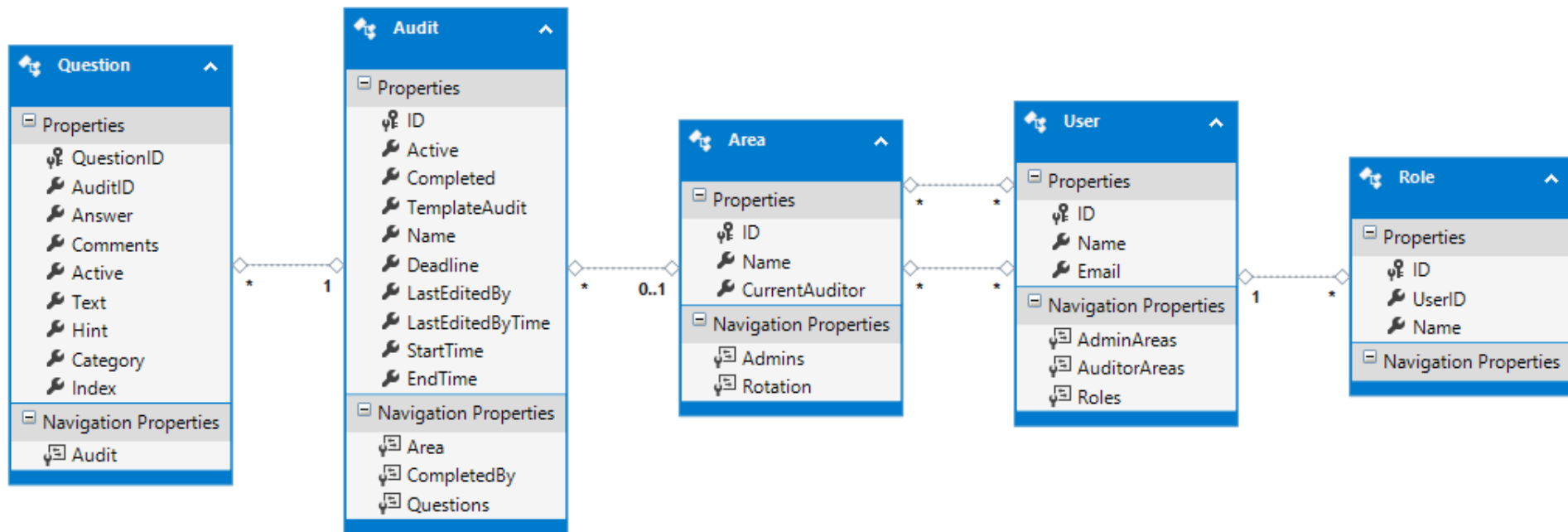


# Current Design

## Danfoss Auditing System



# Current Design



# Design Process

- Danfoss design principles
  - User roles in app
- Danfoss suggestions based on previous senior design projects
  - Design focuses—ASP.NET over Javascript
- Feedback from potential users
  - In-person meetings

# Trello

The screenshot shows a Trello board interface with a dark red header and a light red background. The board is titled "Senior Design" and is owned by "Zach Carlson". It features three columns: "To Do", "Doing", and "Done".

**Board Header:** Boards, Trello, +, ZC Zach Carlson, Show Menu

**Board Title:** Senior Design (with a star icon), Org Visible

**To Do Column:**

- Audit scheduling (MV)
- Email notifications (MV)
- i18n (with a progress bar and a user icon)
- Define administrator for Areas - email on non-completion
- Automatically print or email PDF of completed audits
- Max number of "no" answers for an audit
- Navbar link modification (with a user icon)
- Upload picture as part of hint (with a user icon)
- Plant and line selection for administrators

**Doing Column:**

- Admin page for disable/edit "Area"s (2 comments, MV)
- use stylecop (with a user icon, MV, ZC)
- Add Cancel button to "New Audit From Template" (with a user icon, ZC)
- Test using IE
- Add a card...

**Done Column:**

- Rename AdminSplash.aspx and make it the index page for the Admin directory (with a user icon)
- Add "Area" grouping for audits (MV)
- Edit buttons (on /Admin/Audits and /Admin/NewAudit) (2 comments, with a user icon)
- Save "additional comments" on questions (only a "no" answer) (with a user icon, ZC)
- Assign auditors to new audits (3 comments, with a user icon, ZC)
- Store Audit Answers and Data (with a date badge "Apr 1", MV)
- Assign auditors to existing audits (with a user icon, ZC)

**Right Side:** Add a list...

# Audit mapping

Danfoss Auditing

Home

Administration

Hello, jmcountr1

Log off

## A55 Shop Floor Audit (week of 3/1/2015)

### Safety

Are Near Miss / Safety Alerts posted on the Safety Board? 

Yes

No

Additional comments

Next

9/17/2014

SHOP FLOOR AUDIT

Cell: A55

Score: 75%

No	Description	Observation		Comments - should be given at "No" - including improvement suggestion
		Yes	No	
	<b>Safety</b>	(Good)	(Bad)	
1	Are Near Miss / Safety Alerts posted on the Safety Board?			
2	Are the minutes from the latest Safety Meeting posted on the Safety Board? (Weekly, Thursday)			
	<b>Performance Management System Board</b>	Yes	No	
3	Is Hourly Registration being updated according to SOP?			
4	Is the Worked Hours Chart being filled out each shift?			
5	Are all employees...			

# Example Auditor Use Case

- User logs in
  - List of available audits is presented
- User selects an audit to complete
- User answers each question in the audit with “yes” or “no”

# Example Administrator Use Case

- Administrator logs in and selects the “Administration” tab
- Administrator clicks the “New audit from template” button
- Administrator modifies template questions and clicks “Done”
- Administrator assigns auditors to the new audit



Audits - Danfoss Auditing x





localhost:59199/Admin/Audits

Danfoss Auditing Home Administration Hello, jmcountr! Log off

## Audits

[+ New audit](#) [+ New audit from template](#)

[See disabled audits](#)

Name	Deadline	Auditors	Questions	
Metal Carver Thing Audit	12/31/2015	DanfossUser 	2	<a href="#">Edit</a> <a href="#">Disable</a>
Paint Station Audit	5/5/2015	DanfossUser 	2	<a href="#">Edit</a> <a href="#">Disable</a>
Test Station Audit	9/2/2015	DanfossUser 	1	<a href="#">Edit</a> <a href="#">Disable</a>
A55 Shop Floor Audit	3/1/2015	jmcountr, zmcarlson, mvalenta 	29	<a href="#">Edit</a> <a href="#">Disable</a>

## Disabled Audits

Name	Deadline	Auditors	Questions	
Fire Station Audit	12/8/2015		1	<a href="#">Edit</a> <a href="#">Enable</a>

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Disabling an audit



The screenshot shows a web browser window with the URL `localhost:59199/Admin/Administrators`. The page title is "Danfoss Auditing" and the navigation menu includes "Home" and "Administration". The user is logged in as "jmcountri" and can click "Log off".

## Auditing System Administrators

Add an administrator

Username

Authorized administrators

Name	
jmcountri	<input type="button" value="✕ Revoke"/>
mvalenta	<input type="button" value="✕ Revoke"/>
zmcarlson	<input type="button" value="✕ Revoke"/>

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Adding and removing administrators

# Technical Challenges

- Active Directory login
  - Started with VirtualBox, switched to VMware
  - Setting up DNS and BIND
  - Difficult to pinpoint issues



vmware®

# Technical Challenges

- Testing on remote devices
  - Configuring IIS Express for our system was tricky
  - Involved opening ports for Windows Firewall

# Technical Challenges

- WCF
  - Retrofitting WCF required rearranging business logic
  - Added extra layers of complexity
  - Rewriting previously used statements

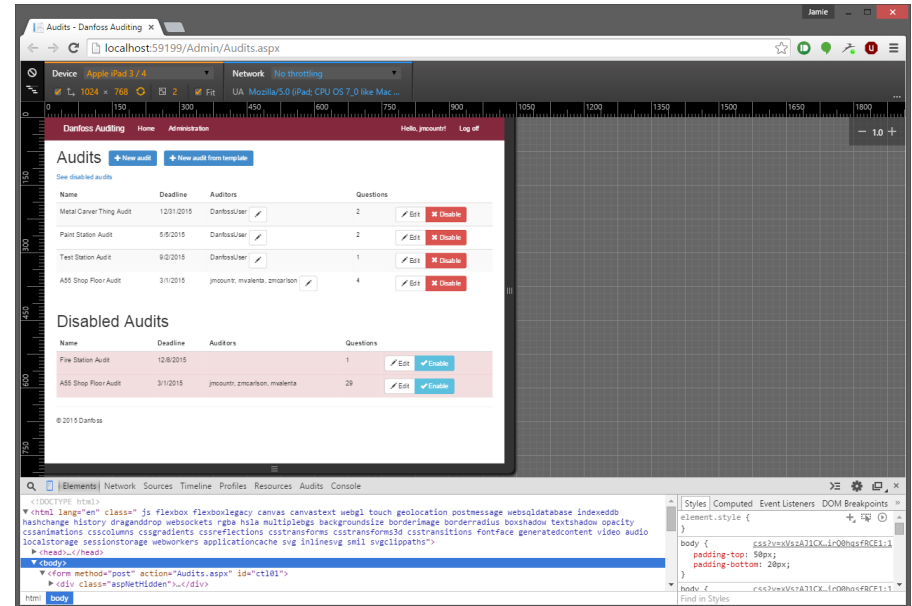


# Considerations

- Wifi disconnected on shop floor
  - System will operate after connection established
- Javascript injection
  - Sanitize user input

# Test Plan

- Operational profile testing
  - Ensuring typical use cases work correctly
- Integration testing
  - Ensure everything being committed works



# Test Plan

- Client feedback
  - Regular feedback on the system from Danfoss
  - Beta test
- Regression testing
  - Ensure nothing is broken by a commit

# QUESTIONS

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# Budget

Resource	Source	Estimated Cost
Visual Studio with Microsoft SQL Server	Provided by ISU through Dreamspark	\$0
StyleCop	Open Source	\$0
Development web server	IIS Express via Visual Studio	\$0
Windows server 2012	Provided by ISU through Dreamspark	\$0

# Development Schedule

Task	Completed
Admin / Home page content	Dec. 8
Active Directory Login	Feb. 15
Dynamic Audit Questions	Feb. 23
Audit Creation	Mar. 4
WCF integration	Mar. 12
Role-based Authorization	Mar. 16
Auditor assign to audit	Mar. 28
Audit answers save and results	Apr. 21
Area functionality	Apr. 22