

APPLYING LESSONS LEARNED IN IMPLEMENTING AUTOMATED WORKFLOWS IN AN ACADEMIC PEDIATRIC RADIOLOGY DEPARTMENT

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COI: Drs Sammer and Sher, uncompensated references for Nuance Communications, Inc

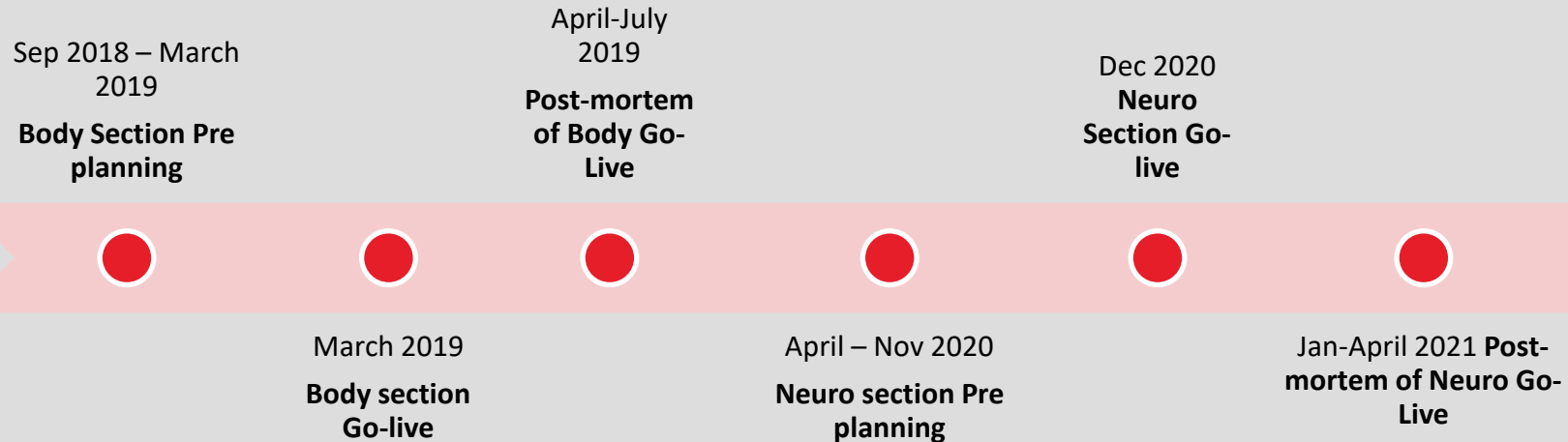


BACKGROUND

- Automating radiology department workflows can provide quality improvement. However, deploying new workflows can also pose risks of harm, in part depending on operationalization. Furthermore, radiologists may not embrace the use of automated workflows
- A framework for pre-planning workflow changes is proposed, based on lessons learned from deploying automation in our department
- Specifically, here, post-mortem analysis from an earlier Body Division workflow automation deployment to prevent backlogs of radiographs was applied for a *different* subsequent operational workflow change to balance wRVU workloads in the Neuroradiology Division

LOCAL SETTING

- Academic, diagnostic work compartmentalized into Body and Neuroradiology (Neuro) Divisions



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PHASES WITH KEY SUCCESS METRICS

- Planning – Establish engaged multidisciplinary team
- Building – Apply lessons learned from initial deployment to subsequent section
- Testing – Create simulation program using real workflow data to analyze potential changes in workflow based on automated algorithm options
- Data Analysis – Run program in background to allow data gathering for analysis prior to go-live
- Full Operationalization – Capitalize on trust created from prior steps to ensure buy-in to culture change

PLANNING: *ESTABLISH ENGAGED MULTIDISCIPLINARY TEAM*

- Ensure stakeholder input maximized with multiple perspectives, indicated by example (ex) priorities below



CLINICAL RADIOLOGISTS

EX: SOLUTION SHOULD DECREASE "CLICKS & CALLS"



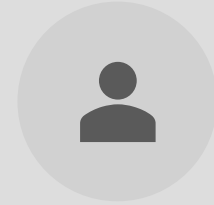
LOCAL INFORMATION SERVICES SPECIALISTS

EX: SOLUTION SHOULD NOT REQUIRE MAJOR INFRASTRUCTURE OVERHAUL



DEPARTMENTAL LEADS

EX: SOLUTION SHOULD TRACK AND REPORT METRICS TO ENSURE RVU WORKLOAD BALANCING EQUITABLE



VENDOR PRODUCT MANAGEMENT AND SOFTWARE ARCHITECT

EX: SOLUTION SHOULD BUILD ON EXISTING PRODUCT LINES

BUILDING

APPLY LESSONS LEARNED FROM INITIAL DEPLOYMENT TO SUBSEQUENT DEPLOYMENT

- Urgent need for improved audit function for troubleshooting
- Vendor added functionality for real-time analytics, which had not been available in the previous software solution go-live

Home - Rules Exam Distributions ▾ Restrictions / Rotations ▾ Distribution Details ▾ Reports ▾

Reports


Exams Not Read On Time

Daily Distributions Grouped by Rule and Filter

Average Daily Target Full Time

Home - Rules Exam Distributions ▾ Restrictions / Rotations ▾ Distribution Details ▾ Reports ▾

Exam Histories

Exams (0) 

Show entries

Accession ExamStatus RuleName TargetName CurrentDistributionStatus DistributionDt CompletedDt FinalDt Details

Details

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TESTING CREATE SIMULATION PROGRAM TO PREDICT IMPACT AT OPERATIONALIZATION

- Virtual Distributor simulation was created to analyze historical workflow data and optimize intended changes in workflow based on different automated workflow algorithm options

	A	B	C	D
1	Accession	Destination	DistributionDt	fDateTime
2	a100	Rad4	2:04:00 PM	2:26:00 PM
3	a101	Rad4	2:42:00 PM	3:05:00 PM
4	a102	Rad4	2:52:00 PM	3:20:00 PM
5	a103	Rad4	5:09:00 PM	5:33:00 PM
6	a104	Rad4	5:09:00 PM	5:44:00 PM
7	a105	Rad4	5:16:00 PM	5:38:00 PM
8	a106	Rad4	6:21:00 PM	6:42:00 PM
9	a107	Rad1	9:07:00 AM	9:35:00 AM
10	a108	Rad1	9:24:00 AM	9:52:00 AM
11	a109	Rad1	9:38:00 AM	10:03:00 AM
12	a110	Rad1	9:55:00 AM	10:24:00 AM
13	a111	Rad1	10:15:00 AM	10:49:00 AM
14	a112	Rad1	10:29:00 AM	10:56:00 AM
15	a113	Rad1	10:50:00 AM	11:22:00 AM
16	a114	Rad1	11:17:00 AM	11:41:00 AM
17	a115	Rad1	11:31:00 AM	11:52:00 AM



```
Private Sub SortObjects(ByRef userList As Collection, currentTime As Variant, sortingAlgorithm As Integer)
    Dim it As Radiologist
    Dim arrList As Object
    Dim comp As New MyComparer

    Set arrList = CreateObject("System.Collections.ArrayList") 'Create the ArrayList

    For Each i In userList
        arrList.Add i 'userList.Item(i)
    Next i
    ' set MyComparer object to sort by ID
    comp.setCurrentTime (currentTime)
    'Dynamic Algorithm Sorting
    If (sortingAlgorithm = 1) Then
        comp.SetSortingField SortBy.numStudiesUnread
    ElseIf (sortingAlgorithm = 2) Then
        comp.SetSortingField SortBy.numStudies
    ElseIf (sortingAlgorithm = 3) Then
        comp.SetSortingField SortBy.FairDistribution
    Else
        MsgBox "Error choosing sorting algorithm"
    End If
    ' perform sorting
    arrList.Sort_2 comp

    Dim tempRadsCollection As New Collection
    Dim currentNumDistro As Integer
    i = 1
    If (sortingAlgorithm <> 1) Then
        For Each it In arrList
            'Sorted by algorithm
            Debug.Print currentTime & " = " & it.getUser() & " Num Distro = " & it.getNumberDistributedStudies() & _
                " Num Threads = " & it.getNumberThreadStudies(currentTime)
            tempRadsCollection.Add it, it.getUser
        Next
        Set userList = tempRadsCollection
    Else
        '
    End If
End Sub
```

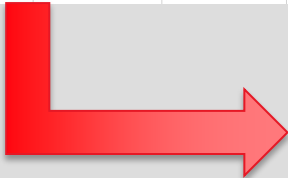
DATA ANALYSIS

RUN PROGRAM IN BACKGROUND TO ALLOW DATA GATHERING FOR ANALYSIS PRIOR TO GO-LIVE

- By running the automation program in background, different algorithms could be compared, bugs can be identified and fixed prior to go-live

	A	B	C	D
1	Rad	StartTime	EndTime	Weighted Speed
2	Rad1	9:00 AM	5:00 PM	1
3	Rad2	9:00 AM	5:00 PM	5
4	Rad3	7:00 AM	3:00 PM	15
5	Rad4	2:00 PM	10:00 PM	1

Run Virtual Distributor



fixed prior to go-live

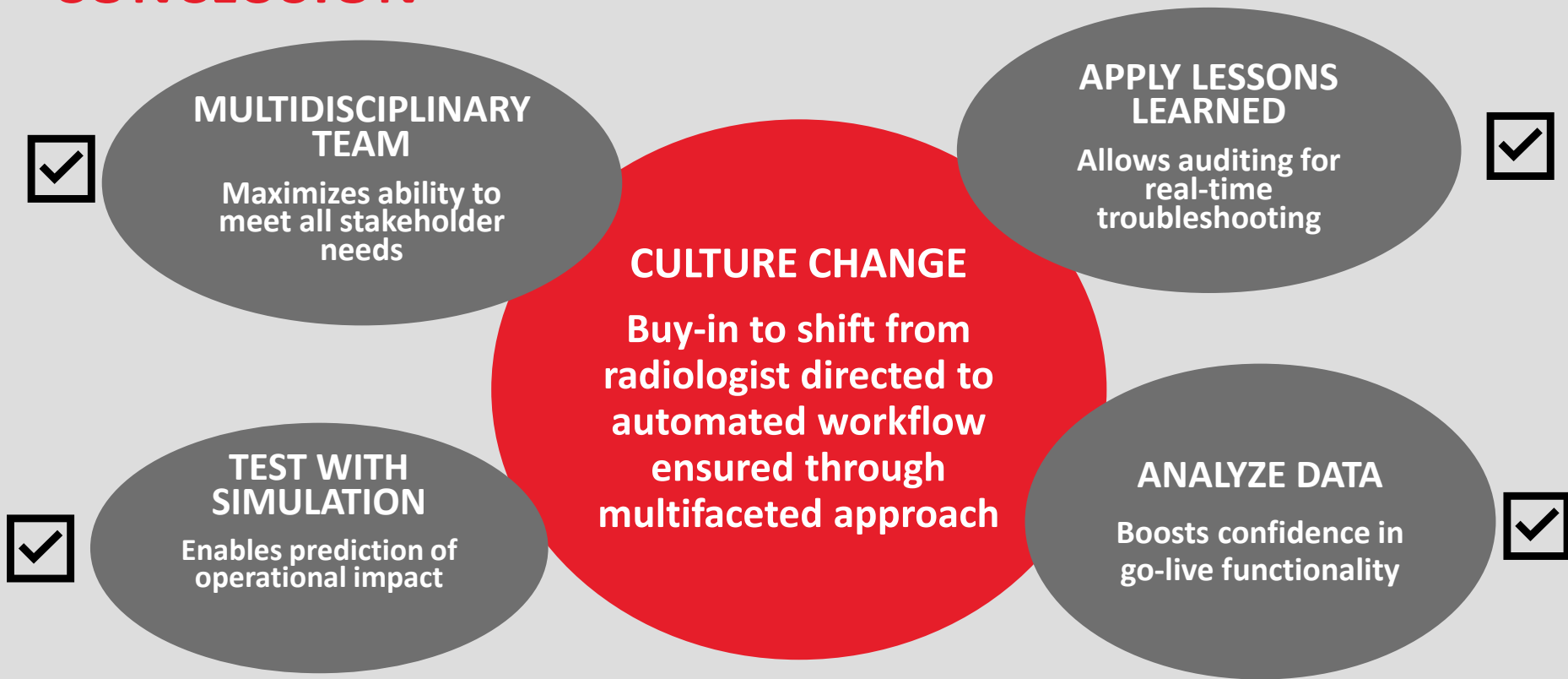
Num Studies					Least Busy					Fair Distribution								
Count of Accession	Column Labels				Count of Accession	Column Labels				Count of Accession	Column Labels							
Row Labels	Rad1	Rad2	Rad3	Rad4	Grand Total	Row Labels	Rad1	Rad2	Rad3	Rad4	Grand Total	Row Labels	Rad1	Rad2	Rad3	Rad4	Grand Total	
@ 7 AM	9				9	@ 7 AM	9				9	@ 7 AM	9				9	
@ 8 AM	2				2	@ 8 AM	2				2	@ 8 AM	2				2	
@ 9 AM		6	5		11	@ 9 AM		7	4		11	@ 9 AM		2	4	5	11	
@ 10 AM		3	3		6	@ 10 AM		5	1		6	@ 10 AM		1	3	2	6	
@ 11 AM						@ 11 AM						@ 11 AM						
:07			1		1	:07		1			1	:07		1			1	
:14		1			1	:14			1		1	:14			1		1	
:17			1		1	:17		1			1	:17		1			1	
:24		1			1	:24			1		1	:24			1		1	
:31			1		1	:31		1			1	:31		1			1	
:34			1		1	:34		1			1	:34		1			1	
:38		1			1	:38			1		1	:38			1		1	
:48		1	2	2	5	:48		3	2		5	:48		2	2	1	5	
@ 12 PM		2	1	2	5	@ 12 PM		5			5	@ 12 PM		1	2	2	5	
@ 1 PM		3	3	2	8	@ 1 PM		2	3	3	8	@ 1 PM		3	3	2	8	
@ 2 PM				6	6	@ 2 PM				4	6	@ 2 PM		1	2	3	6	
@ 5 PM				3	3	@ 5 PM				3	3	@ 5 PM				3	3	
@ 6 PM				1	1	@ 6 PM				1	1	@ 6 PM				1	1	
Grand Total		18	18	17	10	63	Grand Total	13	29	13	8	63	Grand Total	23	16	17	7	63

FULL OPERATIONALIZATION

CAPITALIZE ON TRUST CREATED FROM PRIOR STEPS TO ENSURE BUY-IN TO CULTURE CHANGE

- Prior to go-live date for automated workflow, transparent communication to radiologists regarding the stepwise process used throughout planning and execution phases
- Included schematic illustrations of new workflow, as well as reasoning behind change to RVU workload balancing and projected changes in workloads
- On go-live date, all hands-on-deck to ensure ease of communication and real-time analytics

CONCLUSION



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