Case Study: Migrating a 60 TB BW System to SAP BW 7.4 on SAP HANA — McKesson’s Lessons Learned

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McKesson
In This Session

• Understand McKesson’s motivation for migrating to SAP BW on HANA

• Hear how the company used the direct database migration (DMO) tool to migrate from Oracle to SAP HANA, upgrade from SAP BW 7.3 to SAP BW 7.4, and convert Unicode

• Understand the preparations and pre-checks on the BW system, such as cleanup of queries, to ensure a smooth upgrade and migration

• Review lessons learned from McKesson’s migration
About McKesson

- One of the largest pharmaceutical distributors in North America
- More than 37,000 employees dedicated to healthcare
- Oldest U.S. healthcare company
- Established in 1833
- Deep clinical, IT, and process expertise
- Headquarters located in San Francisco, California
What We’ll Cover

- Challenges and requirements
- SAP at McKesson
- Considerations for moving to SAP BW on HANA
- McKesson solution overview
- Wrap-up
Updating the SAP Landscape

• Need to modernize SAP landscape to achieve operational excellence and enable planned volume growth with SAP HANA

• Business Problem
  - Current system landscape creates unnecessary complexities on an aging, batch-process-oriented platform and is the primary reason that many of the current pain points exist
  - Landscape requires technology upgrades to sustain the current and planned volume of transactions flowing through the enterprise
  - We are asking different business questions today, that are much more complex and time sensitive in nature
    ➤ This requires systems that have the ability to answer complex questions in real time
Updating the SAP Landscape (cont.)

- Use Case/Solution: Update US Pharma SAP and BI Landscape with SAP HANA

- BI Rationalization – Transition reporting in BW to HANA
  - Enable existing duplicate BI assets to be retired
  - Enable data to be handled as a single source

- Infrastructure Modernization – Physical ➔ Logical (IAAS)
  - Utilize internal cloud service to provide ability to provision SAP Landscape in days not weeks
  - Reduce cost of SAP non-production assets

- SAP Renovation – ECC on HANA
  - Ability to simplify SAP configuration tuned to meeting Order flow
  - Ability to provide real-time reporting and analytics from ECC
Updating the SAP Landscape (cont.)

- **Risks Mitigated**
  - BI Rationalization
    - Asset reduction
  - Infrastructure Modernization
    - Remove cost and complexity and improve service
  - SAP Renovation – ECC on HANA
    - Provide scalability, reliability, and speed

*Note*

Increase the useful life and operational excellence of core SAP and Business Intelligence Assets
What We’ll Cover

• Challenges and requirements
• **SAP at McKesson**
• Considerations for moving to SAP BW on HANA
• McKesson solution overview
• Wrap-up
US Pharma and SAP Background

• Where have we been and where are we going?

1999

McKesson expands SAP use beyond Financials (OTP Project):
- Adopted SAP to be source of core financials
- Reduced Order-to-Cash cycles
- Reduced Financial Close duration
- Mitigated risk of Y2K

ERP

FY06

McKesson extends relationship with SAP (Enterprise Agreement):
- Supported US Pharma application rationalization
- Moved Contracts and Chargebacks to SAP
- Reduced cycle time for Order-to-Cash, Procure-to-Pay, and Financial Processes

Business Process Optimization and Basic Analytics

FY13

Upgrade SAP environment with HANA:
- Enable scalable platform to sustain growth
- Answer more complex and detailed business questions across a growing data set
- Maintain competitive advantage

Scalability and Real-Time Analytics
SAP HANA Initiative at McKesson Is Named Aurora Program, an IT-Driven Initiative

- Overall requirements of the program are based on three pillars:
  - Infrastructure Modernization
    - Reduce system landscape complexity and data redundancy
  - BI Rationalization
    - Deploy foundational in-memory platform, migration of existing SAP BW application, upgrade SAP BusinessObjects applications
  - ECC on HANA
    - Improve ability to handle the growth in transaction volume in SAP ECC (target is 1m orders a day)

Focus of HANA Program is to ensure we deliver successfully while minimizing business disruption, including minimum downtime of systems and applications
Aurora Program Pillar: BI Rationalization

- McKesson’s HANA Program Pillar BI Rationalization has the following major objectives:
  - Simplify the overall BI System Landscape
  - Establish SAP HANA platform as foundation for McKesson’s BI applications
  - Reduce Data Redundancy and promote real-time reporting and analytics
  - Enable a reduction of operating costs via Asset retirement and decrease of storage needs to support the current environment
  - Introduce improved ETL mechanisms with SAP Data Services

Increasing business need for near real-time information (business insight not hindsight)
McKesson BI Landscape

- ECC is the central transactional system and considered the system of record
- BW is a 7-year-old system that was primarily developed as a financial reporting application
- IW application is an Oracle-based data warehouse built throughout 20 years. It supports primarily sales and logistics.
- IBM Data Stage application is currently the central ETL component for data movements between McKesson’s landscape. Data Stage is out of support.
- BW never archived since go-live
- 1 in 10 report users rely on BW data
- 9 in 10 report users rely on IW data
Work Stream — BI Rationalization: Objectives

As Is
- BEx 3.0 Queries
  - BOBJ Reports
  - BW 7.0
  - IW
    - Data Stage
    - ETL Improvements
- ECC
  - Other Sources

To Be
- BOBJ Upgrade
  - BW on HANA
  - IW : HANA Modelling
  - Technical Team
  - HANA Views
  - SAP Extractors
  - Data Services
  - Other Sources

Real-time Analytics; standardized on SAP BusinessObjects; integrated, not batch-driven
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Key Consideration for Upgrading to BW on HANA – Test, Test and Then Test Again

- **Use SAP’s Database Migration Option (DMO) tool to:**
  - Migrate (HANA), Upgrade (BW 7.3 to 7.4), and Convert (Unicode) in one step
  - **Test Strategy**
    - Technical Tests – Testing DMO tool
    - Functional Test – Creating test scripts for each cycle including (UAT) and validating the system build
    - User Acceptance Test (UAT) – User testing BW on HANA
  - **Change Management**
    - Landscape cutover approach
  - **Vendor Management**
    - New technologies required more collaborative effort and integration with multiple parties
Key Consideration — Testing Strategy

• Technical tests for the migration were conducted using the SAP Database Migration Option (DMO) tool:
  ♦ 7 cycles were planned
    ▶ Cycles 2-5 build the HANA path to production landscape (Dev, QA, Cons, and Performance)
  ♦ A detailed runbook was established and refined with each cycle execution
    ▶ Runbook was used for knowledge transfer and transition to Basis team and support
  ♦ Comprehensive technical testing
    ▶ Unit test, performance test, syndication, inbound/outbound, string (end-to-end) testing for all BW Production and non-Production environments
• Testing/Validation Activities for all Cycles
  ▶ Functional – Validate Queries, workbooks to ensure the configuration and flow of data supports all BW related functions and integrated processes
  ▶ Technical: Record count, Check Sums, $/Qty Totals for sample of critical reports
Key Consideration — Testing Strategy (cont.)

- Technical tests for the migration were conducted using the SAP Database Migration Option (DMO) tool: (cont.)
  - Checkpoints to review progress prior to Go-Live/Cutover
    - Verify successful production split
    - Complete preparation activities prior to starting the DMO (Migrate, Upgrade, and Convert, aka MUC)
    - Verify HANA is ready to receive data from Oracle across the production network
    - Verify the technical migration is complete (run system health check, start post-processing)
    - Verify readiness to start daily parallel operations
Key Consideration — Testing Strategy (cont.)

- Technical tests for the migration were conducted using the SAP Database Migration Option (DMO) tool: (cont.)
  - User Testing
    - UAT 1: Basic BW Functionality
      - Execute and validate business critical BW queries and workbooks, and test BW on HANA interfaces with other downstream applications
    - UAT 2: Create and Compare test cases in Phase 1 and:
      - Compare results from both systems (BW Oracle/HANA) to identify any anomalies and/or deltas
  - Performance Test
    - Ensure the system performs as expected and meets the standards/SLAs with our business partners
  - Integration Tests
    - Thorough integrated regression testing of business processes in order to identify any issues and resolve prior to the release operations
Change Management Considerations

- **Challenge**: Migration from Oracle to HANA requires two parallel production systems to be kept in sync
  - Proposal to implement an extended freeze period to minimize system changes during the time with parallel production systems
  - Impact to planned projects for FY15 Q2/Q3 deployment schedule
  - The parallel production systems during DRY and FINAL migration require an extended freeze period
  - Projects and Change Requests targeted for deployment after database split (Oracle to HANA) should be developed in BW on HANA (BDA development system)
Upgrade and Migrate Test Considerations

• **Functional Test**
  - Key elements of test strategy include:
    - **Scope, Approach, Objectives, Cycles, Preparation, Execution**
  - **Test Objectives**: Fulfill the main test objectives
    - Guarantee operational stability
    - Verify data integrity
    - Guarantee no performance degradation
    - Ensure continuity of current BW development projects and development landscape – no impact!
Test Approach

• Test Teams: Divide test scope among test sub-teams based on the volume of test elements within each HANA test stream
  - Four (4) test sub-teams: LO, SD/IP/CRM, MTS, FI/MD

• Test cycles and scripts: Validate test elements via test cycle scripts
  - Data integrity, Performance, Regression, Special Cases (7.4 Upgrade, Delta catch-up, HANA Migration, Unicode Conversion), UAT

• Test Results Validation
  - Solution Manager used for capturing test results within the relevant results templates
  - Final results to be combined into a summary report and dashboard for executive readout
BI Rationalization: HANA Landscape Migration

BW Landscape

HANA Project Landscape

Cycle 4

BWD

Cycle 5

BWQ

Cycle 3

BWC

Cycle 6

BWH

Cycle 7

BWP

迁移周期

Development

Quality Assurance

Consolidation

Performance

Production

Oracle Project Landscape (there was actually a 3rd landscape for support)

BDA

BQA

BCA

BHH

BPH

Pre-test, non-production Performance

Copy

BW HANA Landscape
BW on HANA: Simplistic Landscape View

Non –Production Landscape

Production Landscape
Landscape and Cutover Approach

### BW on AIX/AIX-Oracle
- Jan 2014: BWD to BWC, BWH, BWP
- Feb 2014: Copy w/PCA BWD to BDA
- Mar 2014: Copy w/PCA BWQ to BDA
- Apr 2014: Copy w/PCA BWH to BDA
- May 2014: Copy w/PCA BWP to BDA
- Jun 2014: Copy w/PCA BDB to BDA
- Jul 2014: Copy w/PCA BWC to BDA
- Aug 2014: Copy w/PCA BWQ to BDA
- Sep 2014: Copy w/PCA BWH to BDA
- Oct 2014: Copy w/PCA BWP to BDA

### Interim BW on Linux/AIX-Oracle
- DMO1: BDA
- DMO2: BDA
- DMO3: BDA
- DMO4: BDA
- DMO5: BDA
- DMO6: BDA
- DMO7: BDA

### BW On Linux/Linux-HANA
- BDA
- BHH
- BHA
- BQA
- BHP

**Soft Freeze**
- Soft Freeze
- Dual Maintenance
- Prepare BWD and BWH for DMO
- Copy BWD→BDA and BWH→BHH with PCA
- Start BDA and BHH migration using DMO
- Dual maintenance starts

**Hard Freeze**
- Start BHH final migration
- Complete BWP final migration
- Catch up delta
- Switch to BHP as production

**Dry Run**
- DRY run for BWP
- Optimize DMO execution
- Complete DRY run migration
- Delta catch up test
- Prep BWP for final migration

**Shutdown**
- Complete BWP final migration
- Retrofit

**Prepare BWD and BWH for DMO**
- Copy BWD to BDA and execute PCA
- BDA on Linux ASCS,PAS,AAS
- Execute DMO test 1

**Start BWQ for migration**
- Copy BWQ to BQA with PCA
- Execute BQA migration using DMO
- Go-live of Vistex BWD becomes prod support

**Optimize BHH Throughput**
- Optimize BHH Throughput

**Complete BWP final migration**
- Complete BWP final migration
- Retrofit

**Go-live of Vistex BWD becomes prod support**
- Go-live of Vistex BWD becomes prod support

**Build BCA as copy of BQA**
- Build BCA as copy of BQA

**Execute DMO test 2**
- Execute DMO test 2

**Execute BQA migration using DMO**
- Execute BQA migration using DMO

**Go-live of Vistex BWD becomes prod support**
- Go-live of Vistex BWD becomes prod support

**Start BWP final migration**
- Start BWP final migration

**Complete BWP final migration**
- Complete BWP final migration

**Catch up delta**
- Complete BWP final migration

**Switch to BHP as production**
- Complete BWP final migration

**.delta catch up test**
- Complete BWP final migration

**Prep BWQ for migration**
- Prep BWQ for migration

**Optimize BHH Throughput**
- Optimize BHH Throughput

**Complete BWP final migration**
- Complete BWP final migration

**Switch to BHP as production**
- Complete BWP final migration

**Go-live of Vistex BWD becomes prod support**
- Go-live of Vistex BWD becomes prod support
What We’ll Cover

- Challenges and requirements
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  - McKesson solution overview
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BI Rationalization Approach

- **Key elements of the solution**
  - Moving Current SAP BW environment from running on Oracle/SAP BIA in-memory hybrid database solution to a full-featured SAP HANA in-memory database
  - Redirecting SAP BusinessObjects reports, and in some cases, refining the same to make better use of SAP HANA and/or new SAP BusinessObjects capabilities
  - Introducing new methods of data acquisition and transformation, moving from IBM Data Stage to SAP Data Services (Batch-oriented – Data Services) products
  - Developing new HANA models replacing existent IW and R&A content
## Test Approach migrating to BW on HANA

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Test Objective</th>
<th>Test Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>DMO Test</td>
<td>Technical Tests: Data Integrity Scripts, Regression Scripts, Special Cases, Performance Scripts</td>
</tr>
<tr>
<td></td>
<td>DMO Test 2</td>
<td>Compatibility Checks: Data Integrity Scripts, Regression Scripts, Special Cases, Performance Scripts</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>DMO Test with PCA &amp; Test Scripts dry run</td>
<td>Special Cases: 7.4 new/obsolete functionality, Unicode conversion, HANA IMO, Delta catch-up</td>
</tr>
<tr>
<td>Cycle 3</td>
<td>DMO Test</td>
<td>Performance Scripts</td>
</tr>
<tr>
<td>Cycle 4</td>
<td>DMO Test</td>
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</tr>
<tr>
<td>Cycle 5</td>
<td>QA Migration</td>
<td>Performance Scripts</td>
</tr>
<tr>
<td>Cycle 6</td>
<td>PRD Dry Migration</td>
<td>Performance Scripts</td>
</tr>
<tr>
<td>Cycle 7</td>
<td>PRD Migration</td>
<td>Performance Scripts</td>
</tr>
</tbody>
</table>

- **Cycle 1:** DMO Test 1
  - BWD -> BDA
- **Cycle 2:** DMO Test 2
  - BWD -> BDA
- **Cycle 3:** DMO Test with PCA & Test Scripts dry run
  - Operational Stability, Data Integrity, BW Dev Landscape Sync
- **Cycle 4:** QA Migration
  - BWQ -> BQA
- **Cycle 5:** PRD Dry Migration
  - BWP -> BPH
- **Cycle 6:** PRD Migration
  - BWP -> BPH
- **Cycle 7:** PRD Cutover
  - User Cutover

**Test Activities:**
- Technical Tests
- Compatibility Checks
- Special Cases
- Performance Scripts

**Cycle 3:**
- PRD Dry Run Migration
  - BWH -> BHH
  - Operational Stability, Data Integrity, BW Dev Landscape Sync
  - Data Integrity Scripts
  - Regression Scripts
  - Special Cases: 7.4 new/obsolete functionality, Unicode conversion, HANA IMO, Delta catch-up
  - Performance Scripts

**Performance:**
- Oracle vs. HANA
  (leveraging delta volume testing)

**Cycle 3 Cutover:**
- Go/No Go

**Cycle 3 DMO Go/No Go:**
- Go
The Migration to the HANA Platform Has Been an Iterative Approach (It’s Just an Upgrade, Right?!)

- Lift (copy) the current BW Production (BWP) Oracle platform and shift to SAP BW on HANA (BHP)
  - Test Cycles – The goal was to complete the implementation in 6 cycles but 7 cycles were planned
- Cycle 1 – We were the first ship for the DMO tool (literally, the engineer flew from Germany with the tool on a USB). So the first test was to confirm that DMO would work. This was our first Go/No-Go checkpoint.
  - Dry run of DMO migration without PCA
  - Used to test and confirm feasibility of using DMO to upgrade to 7.4 and migrate to HANA
  - Also used to test potential compatibility issues of current BW environment with 7.4 functionality
Cycle 6: System Readiness

- Lessons Learned: System Readiness
  - System Readiness was embedded in Cycle 6. Program (Operational) readiness had been the focal point during Cycle 6. We encountered system issues with the new technologies (HW and SW).
  - Prior to the failure we had made the following achievements:
    - Technical and Functional Verification of HANA System
    - Completion of Delta Catch-Up – 26 million sales orders processed in 4 hours
    - Preparing for next major milestone
      - Parallel execution of Maestro batch job run
      - Validation of Parallel systems in preparation for UAT
      - System Readiness Tests (HA/DR, Backup, Recovery)
Cycle 6: System Readiness (cont.)

• Lessons Learned: System Readiness (cont.)
  - System Readiness completion became a prerequisite to start Cycle 7. Twice daily check-in meetings were established and continued through Cycle 7 (Go-Live).
  - As a result of the system challenges we updated the overall program readiness and split into two distinct categories
    ➤ System Readiness
      - System Monitoring and Alerting
      - System mandatory components are complete (Backups and Restore, SLAs, Change Management, and Security)
    ➤ Resource Readiness
      - Tiered support includes project team resources
      - Triage Team during Early Life Support
Cycle 7 Iterative (Cyclical) Implementation Approach for Test

- **Cycle 7**
  - 7.4 and HANA
  - System checkout and validation by limited set of users
  - Focused on data integrity and cutover
  - Focused on Program (Operational) Readiness
  - User Acceptance Testing
  - Dual Operations Standard Operating Procedures

### Timeline

- **11/5**
  - SC Readiness Assessment

- **11/7**
  - Operational Readiness Checkpoint

- **11/11**
  - SV&T Certification

- **11/17**
  - BHP Testing Results Approval

- **11/19**
  - IT Leadership Review

- **11/21**
  - Production Readiness Checkpoint

- **11/24**
  - BWP / BHP User Cutover
  - End User Cutover Communications

- **11/26**
  - 11/24 – 11/26 Parallel Production Environments

- **12/22**
  - ELS

- **02/01 – 03/15**
  - Outbound Integrations rollout
  - 120 outbound integrations rolled out post DR exercise

- **12/21**
  - Post-ELS
BHP Landscape (Primary) IBM X6 (11 x 2TB)

Bhpci.Instance #: 90
- Fault Tolerance
- 4 GB RAM
- 1 CPU Core
- Virtual Infra
- SUSE Linux 11.2

Bhpapp01.Instance #: 90
- V-Motion Support
- 16 GB RAM
- 4 CPU Core
- Virtual Infra
- SUSE Linux 11.2

bhpapp02 to bhpapp05. Instance #: 90
- V-Motion Support
- 16 GB RAM
- 4 CPU Core
- Virtual Infra
- SUSE Linux 11.2

BHP HANA DB Appliance
- Physical (Scale Out)
- 2TB RAM per node
- 240 CPU per Node
- SUSE Linux 11.3
- 175 TB Persistency Store

Host: esshanap10. (Primary Master)
- esshanap11. (Secondary Master)
- Esshanap12. (Worker)
- Esshanap13. (Worker)
- Esshanap14. (Worker)
- Esshanap15. (Worker)
- Esshanap16. (Worker)
- Esshanap17. Worker
- Esshanap18. (Worker)
- Esshanap19. (Standby)
- Esshanap20. (Standby)

Instance #: 80

BHP ASCS
- 16 GB RAM
- 4 CPU Core
- Virtual Infra
- SUSE Linux 11.2

BHP PAS
- V-Motion Support
- 16 GB RAM
- 4 CPU Core
- Virtual Infra
- SUSE Linux 11.2

BHP AAS
- V-Motion Support
- 16 GB RAM
- 4 CPU Core
- Virtual Infra
- SUSE Linux 11.2

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BW on HANA Results

• Executed project in 11 ½ months
  • Delivered in-memory analytics capability – 21x improvement in response time for users
    ▶ Improved user satisfaction – Initial feedback and adoption metrics have been very positive

Note:
The enhancement to system performance is very noticeable. One report I run very often would take up to 30 minutes in the old BW environment, now the query produces results in less than one minute.

• Operational efficiencies
  ▶ Reduction of nightly batch schedule – 30%
  ▶ Data load into BW – 30-40% reduction
  ▶ Improved operational capacity by reducing IT processing time that allows for improved maintenance window capacity and de-risks outage impacts
## Performance Test Results

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<th>Pre-Production (BHH vs. BWH)</th>
<th>Production (BHP vs. BWP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Queries Tested</td>
<td>65</td>
<td>135</td>
</tr>
<tr>
<td>Average improvement of Query execution</td>
<td>13.6 times faster</td>
<td>21 times faster</td>
</tr>
<tr>
<td>Number of Process Chains Analyzed</td>
<td>100 longest running PCs</td>
<td>1764 Maestro PCs</td>
</tr>
<tr>
<td>Average Data Throughput</td>
<td>3 times faster average</td>
<td>2 times faster on average</td>
</tr>
<tr>
<td>Average Data Load Performance Improvement</td>
<td>50% improvement</td>
<td>35% improvement</td>
</tr>
</tbody>
</table>
BW on HANA Results — BW on HANA Growth

- **Lessons Learned: Data Volume Management**
  - BW/Oracle growth exceeded our initial projections
    - After Migration to HANA, BHP DB size is approximately 8TB
  - Implementing data management strategy to eliminate performance degradation, need for additional hardware, and accommodate future programs

- **Post-Go-Live activities: Data technology and data rationalization**
  - Quick Win – DSO and InfoCube optimization
BW on HANA Go/No-Go Success Criteria

- Go/No-Go criteria was met, with a 3-month dual operations period
  - Program Recommendation:
    - Go/No-Go Criteria/Assessments/Sign-Offs
      - Subset of users for CO-PA, GL and AR will be required to validate September and October close prior to Go-Live
        - September close will be completed prior to UAT 2 and users can validate the reports
      - Success Measurement: If month-end close validation is successful for September and October during UAT
        - Execute November month end close on BW on HANA in December

- Key Milestones
  - Vendor Certification – 11/05 (Steering Committee Meeting)
  - Decision to extend dual operations for 5 months
Key Elements of the Company’s Solution

• **Lessons Learned: Dual Operations**
  
  - **Strategy and Approach**
    - Requires processes to remediate BW-related system issues and preserve data currency
      - *Need to understand user maintained content and determine procedures to export from Oracle to HANA*
    - **System Procedures**
      - **Full Roll Back**
        - If extended outage due to hardware/software instability (timing of the outage may be a key factor in deciding when it is triggered)
      - **Partial Roll Back**
        - Based on end user feedback that data is incorrect in BW on HANA, but correct in BW on Oracle
What We’ll Cover

- Challenges and requirements
- SAP at McKesson
- Considerations for moving to SAP BW on HANA
- McKesson solution overview

- Wrap-up
Where to Find More Information

- **www.SAP-press.com**
  - Visit for latest books on BW, HANA, Implementing HANA, etc.

- **www.experiencesaphana.com**
  - SAP HANA Homepage
    - Content focused on SAP HANA and customer experiences

- **www.SAP.com/hanaspotlight**
  - SAP HANA Customer Spotlight Virtual Briefing Center
7 Key Points to Take Home

• This is a journey, not a start and end. (It may seem cliché but it’s not.)
• Engage and educate the most innocuous support teams early
• It may be over ambitious to run 3 major projects under 1 program
• Continually remind leadership team that new technology will be challenging and that there may not be immediate resolutions
• Keep your vendor partners accountable and challenge them on even the most minute items (the devil is in the details)
• Clarify the difference between decommissioning vs. disposal of an asset (costs may continue for a decommissioned asset if it’s not repurposed and/or disposed of)
• If possible, use both solutions in parallel to allow for a smooth transition (and leverage as an insurance policy post-go-live)
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