



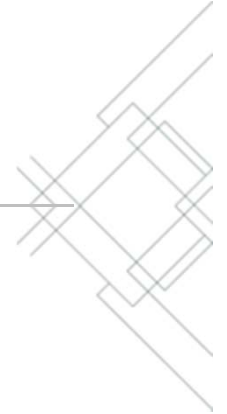
## MIT's HANA Enterprise Cloud Migration

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IS&T, Massachusetts Institute of Technology

Session: H-4



# Agenda



- Background: SAP @ MIT
- Why HANA?
- Project Structure & Milestones
- MIT / HEC Architecture & Integration
- Testing & Go Live
- Lessons Learned



## Background: SAP@MIT



- September 6, 1996 the journey begins on 3.1 with core financials
- April 2007 upgrade to ECC6.0
- December 2015 migration of ECC6.0, Ehp7 to HANA in the HANA Enterprise Cloud (HEC)
- Each and every year, support packs and enhancement packs



- Along the way we implemented ...
  - Procurement, asset accounting, project systems, sales & distribution, funds management, inventory management, plant maintenance, EHS, HR/Benefits/Payroll including self-service, training & events, enterprise learning, too many to include all
  - SAPweb, MIT's first portal integrated with SAP
  - Atlas, MIT's latest portal for community facing administrative app's



**SAPweb**

**Atlas** navigating your MIT world



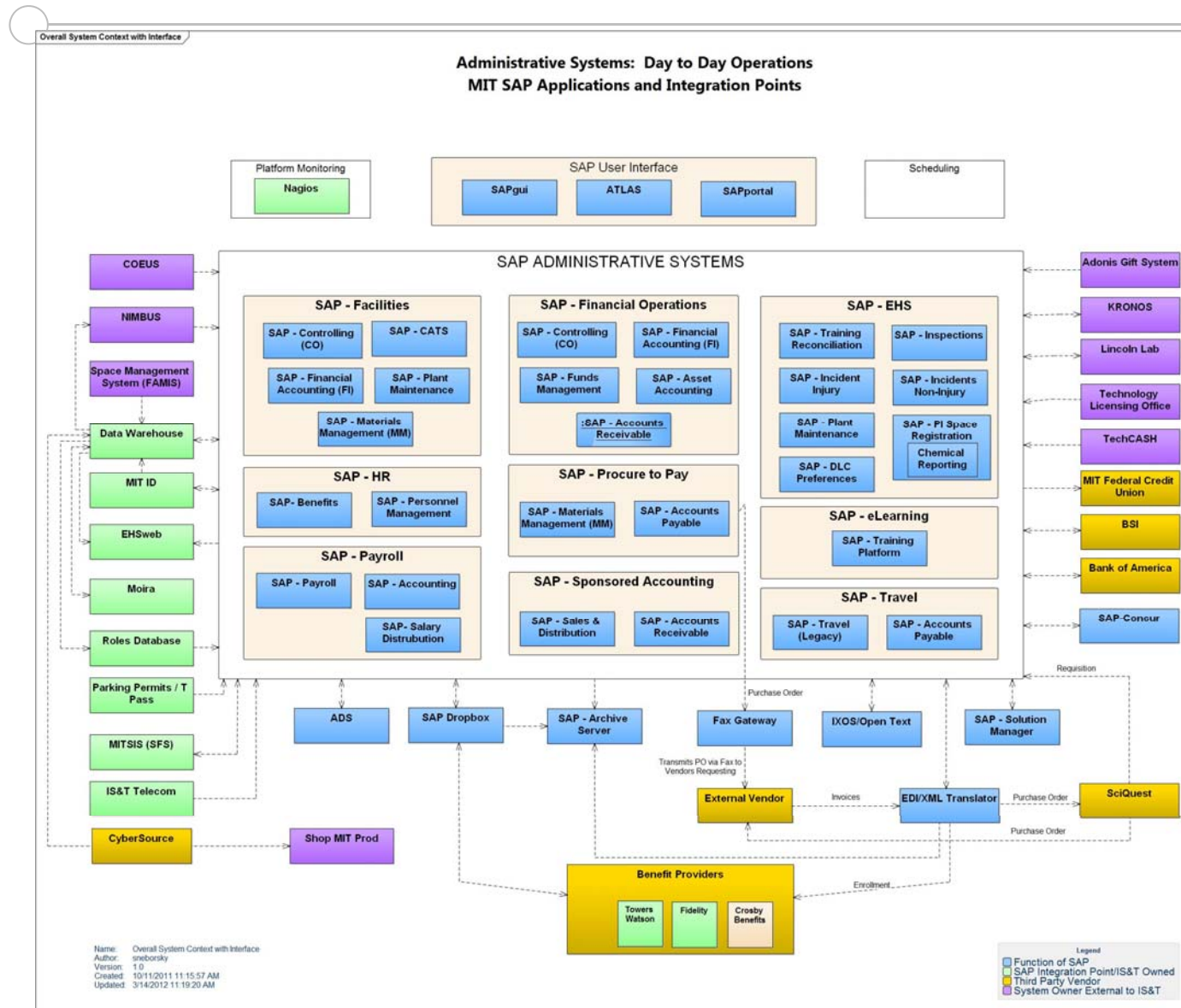
## Did we mention the hardware?



- Started on Tru64 on Unix
- Migrated to Solaris around 2004
- Migrated to Linux in 2010
- As part of Linux migration we virtualized our SAP environment

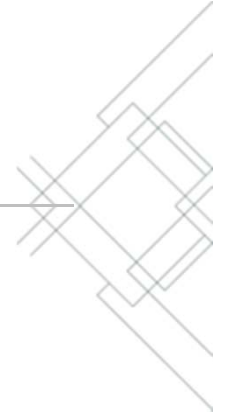


# SAP integrates with ... a lot





## SAP integrates with ... a lot



- SciQuest for procurement catalogs
- Nimbus for budget administration
- Quali Coeus for research administration
- Banner and others for student administration
- Adonis for gift recording
- Kronos, Concur, Open Text, BSI, the data warehouse ...
- SAP@MIT also sends and receives many feeds of financial and non-financial data to/from external partners via our custom middleware, the SAP Dropbox



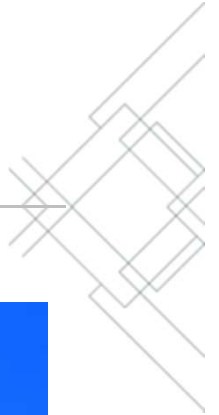
- All of this makes SAP@MIT a complex interplay of processes, systems, and tools, some standard and some homegrown, all embedded in day to day life at MIT

- And we wanted to move it to the cloud ...





# Why HANA?





## HANA DB - Motivations



- Lay foundation for future migration to S/4.
- Leverage HANA Data Services to improve Data Warehousing & Reporting environment – **work in progress.**
  - Eliminate complex ETL process / batch extract from ECC.
- Improve performance for remaining batch workloads.

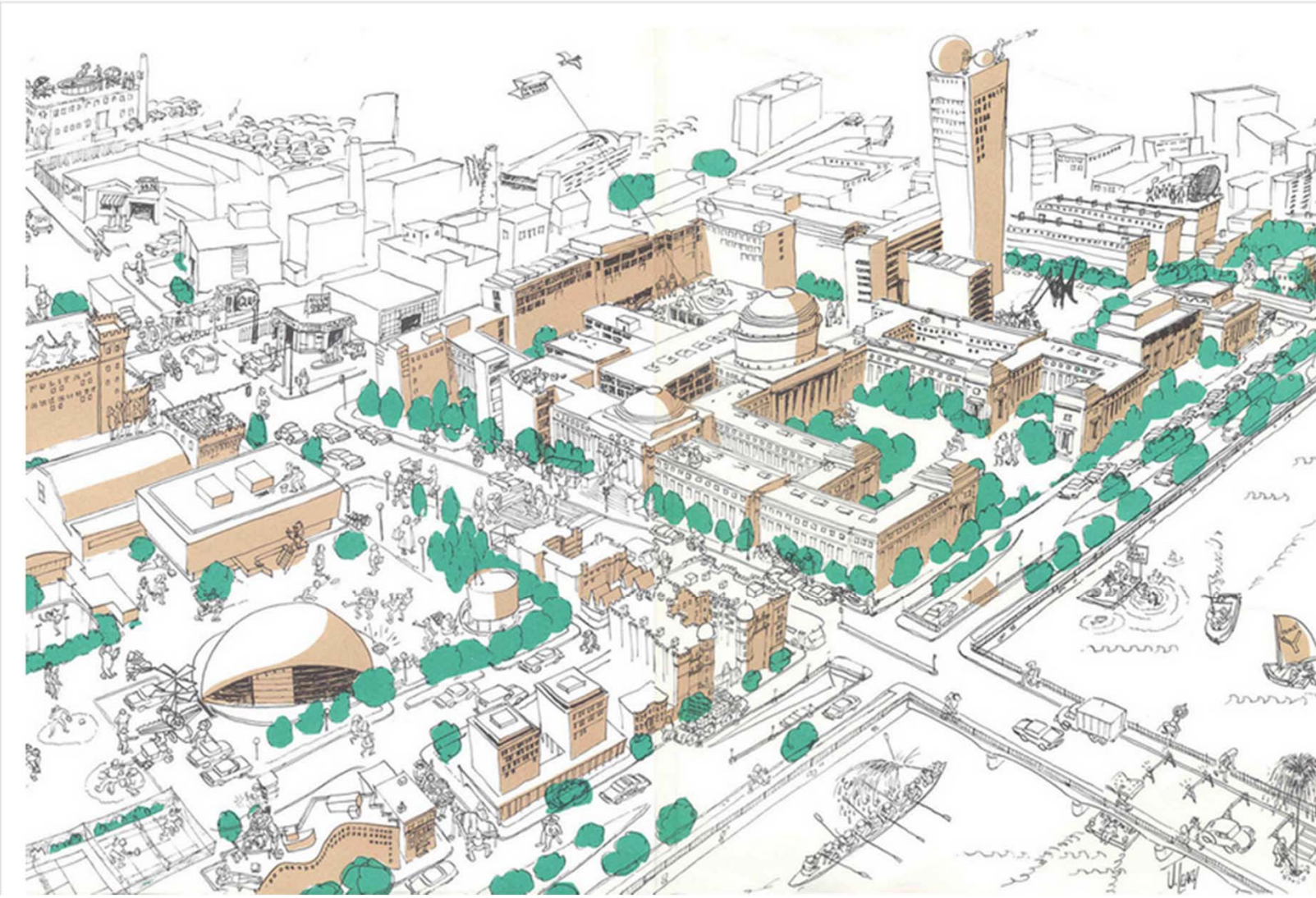


# HANA Enterprise Cloud - Motivations



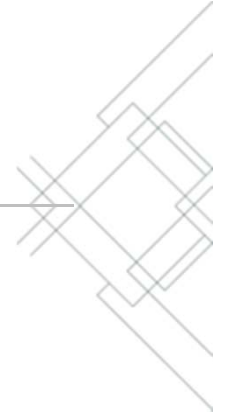
- Space is everything.
  - Reduce on-premises administrative computing footprint.
  - Prioritize limited data center capacity for research computing workloads.
- Increased resiliency: bi-coastal disaster recovery strategy.
  - Primary site: Sterling, VA
  - Secondary: Santa Clara, CA
- Transfer standardized and “off the shelf” work from MIT to vendor partner:
  - “rack and stack”, hardware maintenance.
  - OS installation.
- Enable staff to focus on MIT-specific, differentiated needs.
  - Integration with campus identity systems (AuthN, AuthZ)

# Project Structure & Milestones

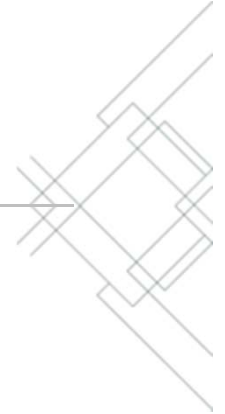




# Project Structure



- Planning
  - Workshops to define what it is we want to accomplish
    - Replace Oracle with HANA
    - Migrate our on premise data center to SAP's HEC service
  - Code remediation
  - Cycles
  - Support Packs
- Organization
  - Traditional PM
  - Scrum Framework



## ABAP Custom Code Remediation for SAP HANA

Analysis	Impacted Programs
Native SQL, Database Hints – Critical Statements	2
Check assumptions regarding implicit sorting during access to former pool and cluster tables	23
Check assumptions regarding implicit sorting during access to transparent tables	45

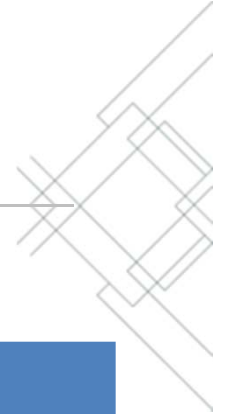
List of custom ABAP Objects identified that include Native SQL / Database Hints

No.	Object Name	Line No.	Critical Statement(s)	Type
1	LZHR_APPOINTMENT_PROCESSU31	62	EXEC SQL.	Native SQL
2	LZHR_HSA_INBOXF01	218	EXEC SQL PERFORMING add_username.	Native SQL

*Native SQL included in above objects is HANA-compatible; no change required*



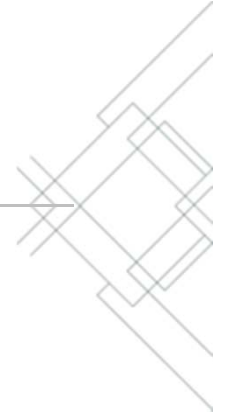
# The Project Cycles



Cycle 1	Proof of concept – staging environment
Cycle 2	Migrate on-premises development environment to SAP's HANA Cloud Enterprise (HEC)
Cycle 3	Repeat migration of on-premises development environment to HEC but include year-end support packs in the process
Cycle 4	Migrate QA / Test environment to HEC
Cycle 5	Mock Cutover - execute migration of production environment to HEC
Cycle 6	Dress rehearsal (Execute disaster recovery test)
Cycle 7	Execute production cutover



# Where HANA intersects with Support Packs

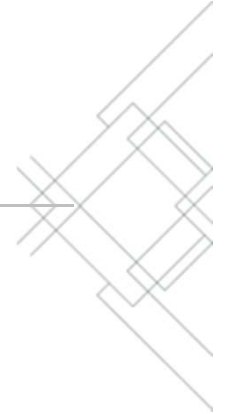


## Support Packs

- We all know what they are, periodic releases of system changes and corrections by SAP.
- Rather than apply these support packs when released we collect the Support Packs for a single installation at year end in an effort to minimize business interruption.
- The timing of our process is driven by SAP's release of its year end support pack, typically in mid-October, which contains the base level necessary for the successful execution of SAP's delivered year end tax reporting functionality (AP and Payroll) and stages the system for regulatory changes for the upcoming calendar year.
- Can we leverage the Support Pack testing window to limit the project's impact on business operations?



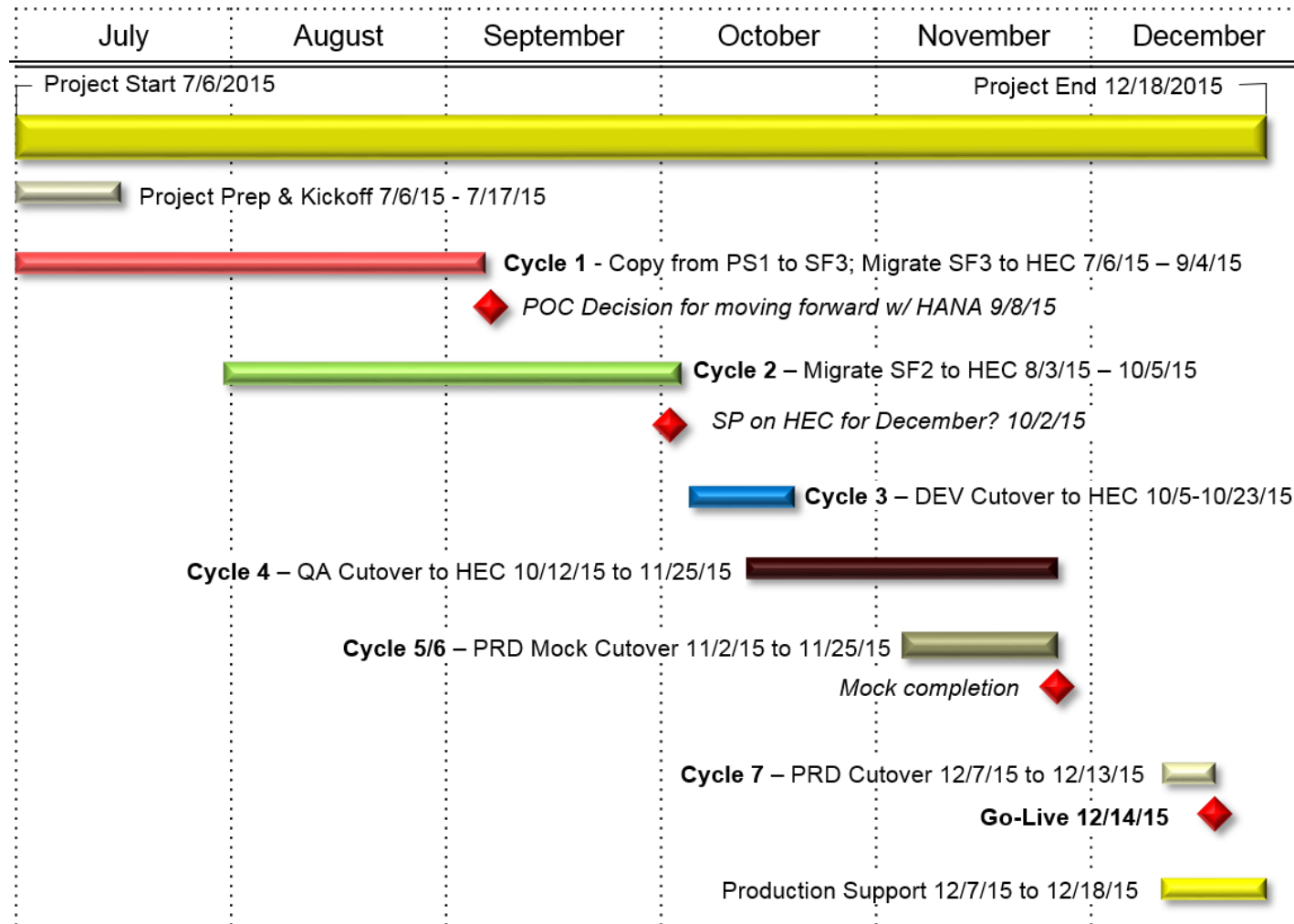
# Project Milestones



▪ **The proposed project schedule had four major milestones:**

1. Decision for December— Go/No-Go decision after our POC (Cycle 1). By 9/8/2015 make a decision if MIT's SAP landscape can be migrated to HEC by 12/14/2015
2. Support Pack Decision – Go/No-Go decision by 10/2/2015 (after Cycle 2) whether to apply Support Packs in HEC or on premise for production use after December
3. Successful mock-cutover before the Thanksgiving break
4. Go-Live date of 12/14/2015

# Timeline





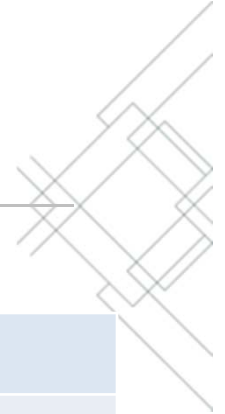
# Project Structure & Milestones



- What's in a name?
- Let the team decide
  - Greek themed
    - Scopas
    - Daedalus
    - Procrustes
  - Cloud themed
    - Nimbus
    - Cumulus
    - Cirrus
- Project name: HANA to Optimize (H2O)



# Project Charter



## PROJECT IDENTIFICATION

Project Name		Project Type (Implementation, Upgrade, Internal, other)
HANA to Optimize (H2O) ECC Migration	MIT	Technical Migration

## Vision

Stand up a functioning HANA ERP environment in HEC from which MIT may test functionality as it applies to MIT's long term vision of providing a platform as a service.

## Mission

The H2O ECC Migration Project Team is Responsible and Empowered to Migrate MIT's data to SAP's HANA Enterprise Cloud (HEC).

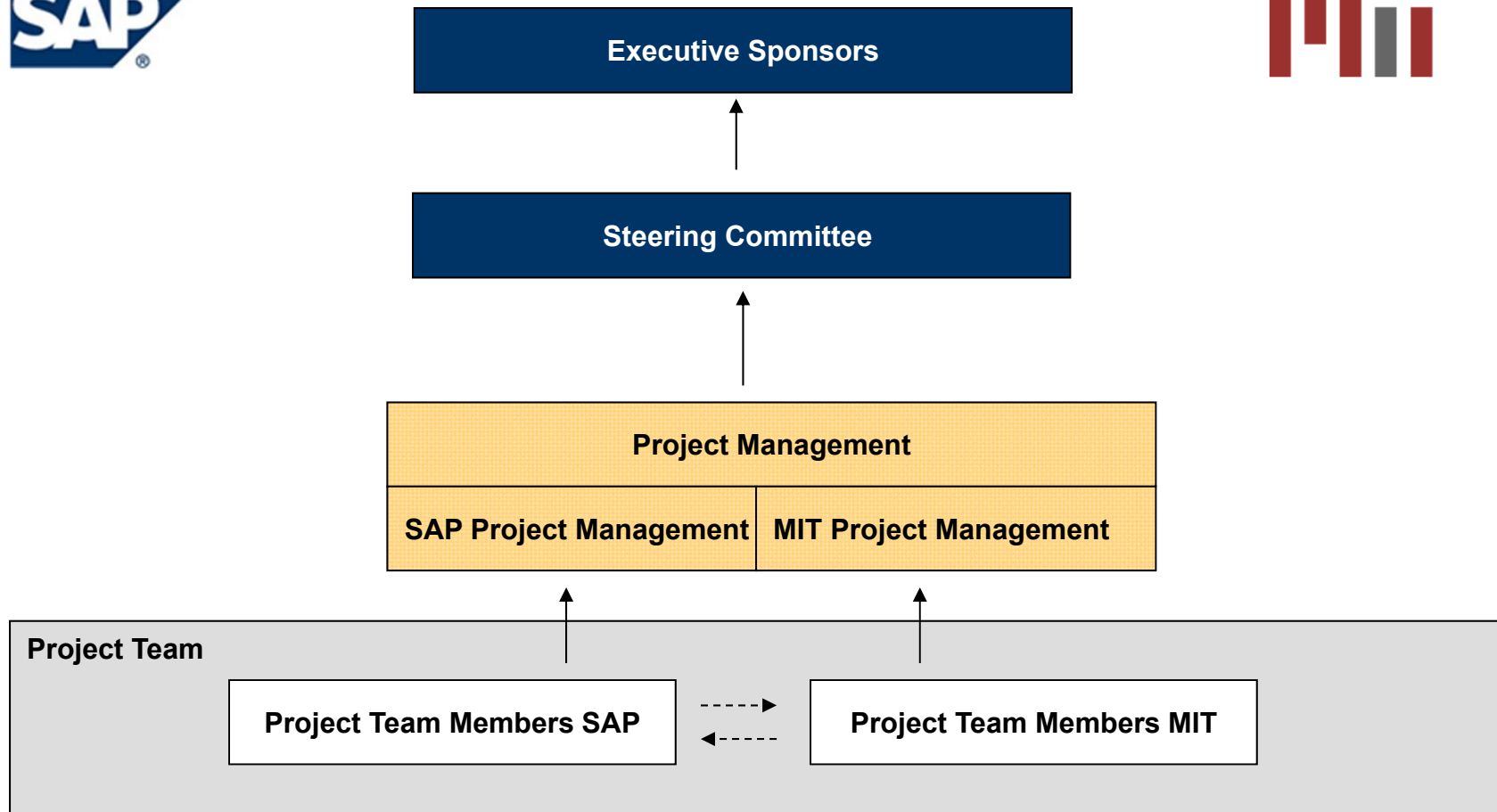
## Guiding Principles

- Technical migration only with no functionality added.
- Migrate Dev to HEC for Go/No-Go decision for a December Go-Live.
- Evaluate Support Packs (SPs) for Go/No-Go decision to determine if SPs will be applied to the migrated system in HEC.
- Migrate MIT's four (4) tiers environment to HEC.





# Project Structure



Reporting to/Escalating to: Information:



# Project Structure



## **MIT Team formed into 4 Scrum Teams**

- Infrastructure buildout and configuration management
- Human Resources, Payroll, and E-Learning
- Finance, Logistics, Plant Maintenance, and EHS
- Atlas and other web applications

## **Assigned Scrum Roles**

- Product Owners
- Scrum Masters
- Scrum Team Members

## **Daily Meetings (15mins)**

- Scrum Teams
- Product Owners



## Scrum Team Charge:

- Determine a comprehensive testing approach for all cycles
- Ensure the integrity of all critical applications and integration methodologies in use across the SAP landscape
- Capture/resolve/escalate identified issues



# Tools of the trade

Wiki

SAP Jam

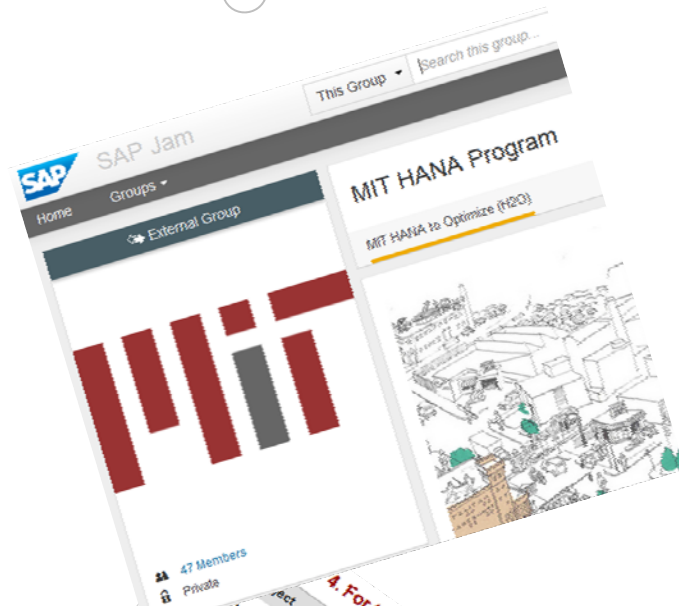
MS Project

Dropbox

Scrum boards

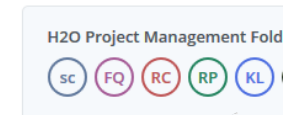
Burndown charts

RT

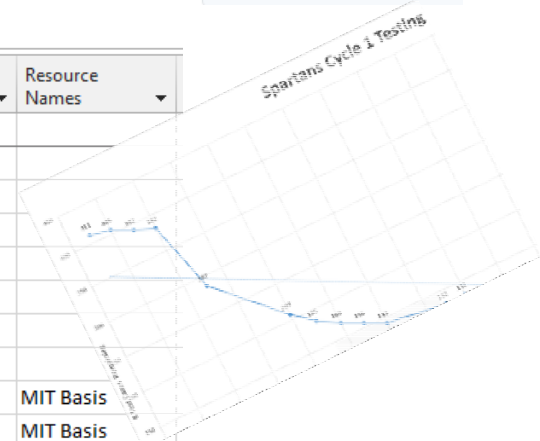


MIT > H2O Project Management

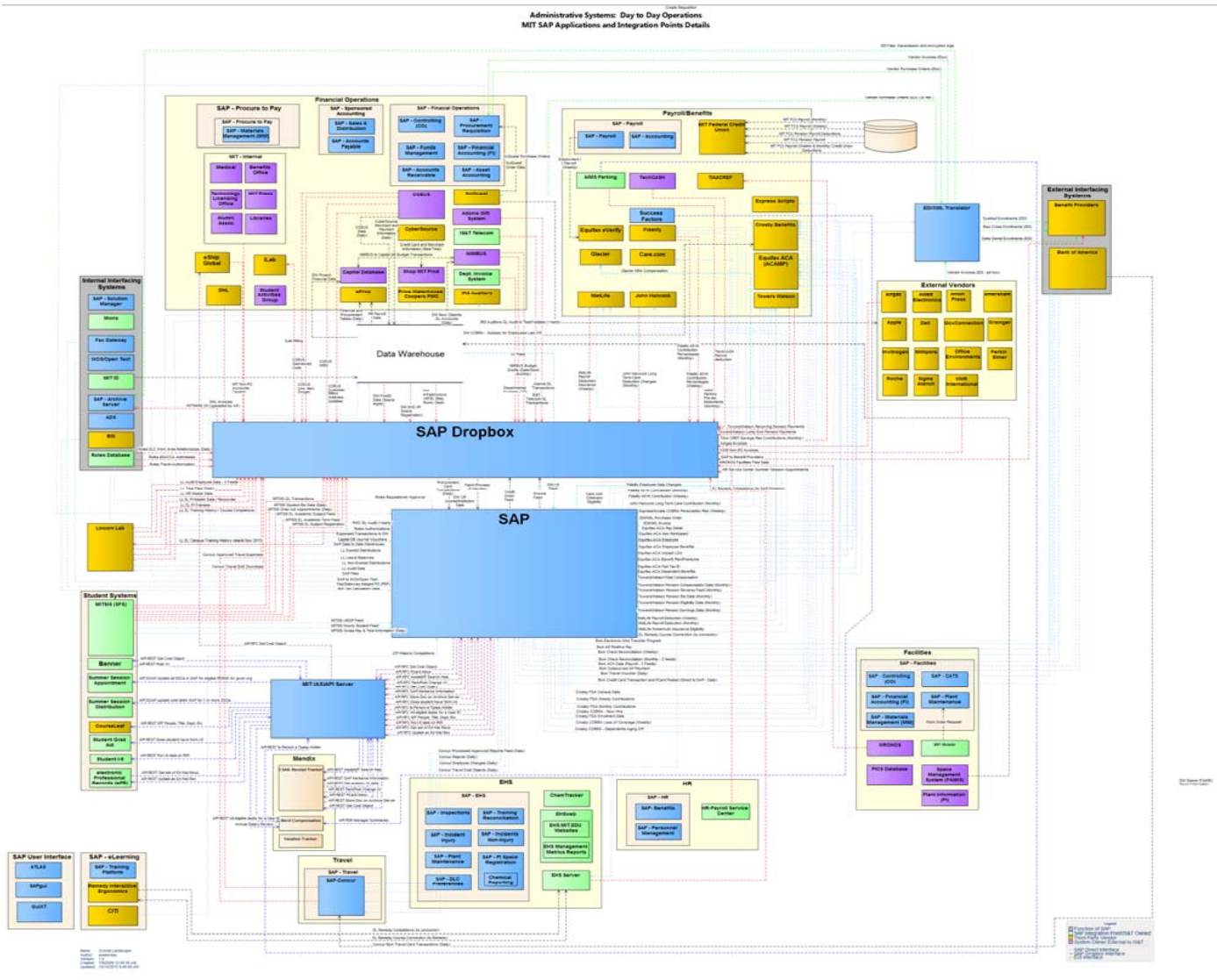
- Recents
- Personal
- MIT



	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	✓	▲ Cycle 1 - Copy PS1 to	46 days	Mon 7/6/15	Mon 9/7/15		
2	✓	MIT System Copy	5 days	Mon 7/6/15	Fri 7/10/15		
3	✓	XML Extract	3 hrs	Mon 7/13/15	Mon 7/13/15	2	
4	✓	Provision SF3 in H	5 days	Mon 7/6/15	Fri 7/10/15		
5	✓	▲ ECC (SF3)	33 days	Wed 7/8/15	Fri 8/21/15		
6	✓	▲ ECC Migration	18 days	Wed 7/8/15	Fri 7/31/15		
7	✓	▲ General Prep	4 days	Wed 7/8/15	Mon 7/13/15		
8	✓	▲ MIT	0.25 days	Mon 7/13/15	Mon 7/13/15		
9	✓	Pre-Mig	2 hrs	Mon 7/13/15	Mon 7/13/15	3	MIT Basis
10	✓	Update	2 hrs	Mon 7/13/15	Mon 7/13/15	3	MIT Basis
11	✓	Update	2 hrs	Mon 7/13/15	Mon 7/13/15	3	MIT Basis



# MIT / HEC Architecture & Integration





# Networking



- Strategy: extend MITnet to HEC data centers.
  - Assigned dedicated IPv4 address blocks to HEC: 18.4.128.0/24, 18.4.130.0/24.
- Two phase approach to connectivity:
  - Initial connectivity via IPSec VPN: able to deploy rapidly.
  - Dedicated network connections / peering to both Sterling and Santa Clara: **2 x 10Gbps**
  - Installed routing equipment in HEC data centers: “MITnet California”
- HEC environments appear as part of MIT’s internal network to other applications.





# DNS



- Delegated .hec.mit.edu domain to HEC.
  - 4 HEC operated DNS servers, 2 per site.
- .hec.mit.edu zone contains CNAME records pointed at currently active data center:
  - Sterling - .stl.hec.mit.edu
  - Santa Clara - .sac.hec.mit.edu
- DNS indirection facilitates disaster recovery process.
  - Region-specific names never exposed to end users or other systems.



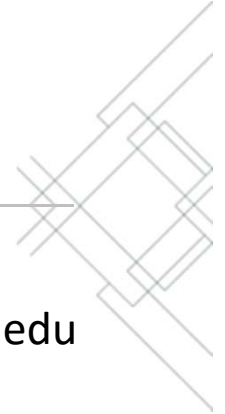
# Authentication



- MIT authenticates SAPGUI users using Kerberos / GSSAPI via SNC.
- HEC application servers provisioned with credentials from ATHENA.MIT.EDU Kerberos realm.
- Required extensive coordination with HEC technical staff:
  - Additional OS packages installed.
  - Changes to OS configuration (/etc/krb5.conf).
  - Changes to SAP instance profiles.
- **Key learnings:**
  - Be very explicit about your requirements in this area.
  - Be prepared to do the heavy lifting.



# Ancillary Systems



- Outbound email – HEC systems send via MIT’s primary SMTP relay: outgoing.mit.edu
  - Required coordination with HEC teams on Postfix configuration.
- OpenText Archive Server – migrated to HEC as **laaS**.
  - HEC-managed HANA DB instance for database backend.
- BSI TaxFactory – migrated to HEC as **laaS**.
  - Transitioned from Oracle to Sybase ASE.
  - Exploring use of SAP Application Management Services (AMS) for Sybase DBA work.
- SAP “Dropbox” (custom middleware) – migrated to HEC as **laaS**.
  - Provides shared storage via NFS to HEC application servers.
  - Required most modifications for use in new environment.
- All other MIT-managed systems (custom web portal, central authorizations DB, Data Warehouse, etc.) remain on premises.
  - Changes were limited to configuration updates for new environment DNS names / ports.



## Miscellany

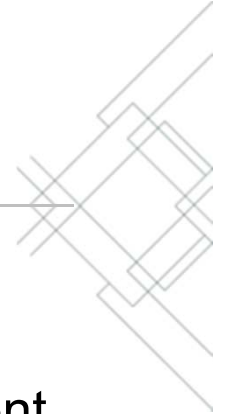


- SAPGUI – modified installer to distribute configuration files via HTTP from central location.
- Backups – IaaS systems are backed up as though they were on-premise.
  - All that network bandwidth comes in handy.
- Monitoring – Supplement HEC monitoring with MIT's existing enterprise monitoring.
  - No OS / shell access to HEC-managed systems.
  - Monitor systems at network (ping / nping) and application (HTTP / HTTPS) levels.





# Testing Approach



## **Testing will be managed by the 4 Scrum teams**

- Tectonics - Infrastructure buildout and configuration management
- Spartans - Human Resources, Payroll, and E-Learning
- Poseidon - Finance, Logistics, Plant Maintenance, and EHS
- Globetrotters - Atlas and other web applications

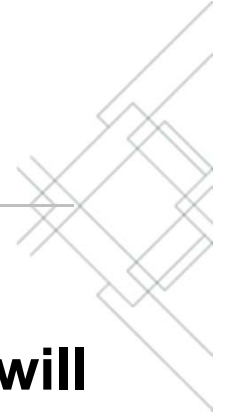
## **Test Plans**

- Each team will determine a comprehensive approach, based on past experience managing the SAP year-end support pack process and similar large-scale application updates, to ensure the integrity of all critical applications as well as testing all integration methodologies in use across the MIT system.





# Testing Approach



## **Specific areas of attention during the validation process will include:**

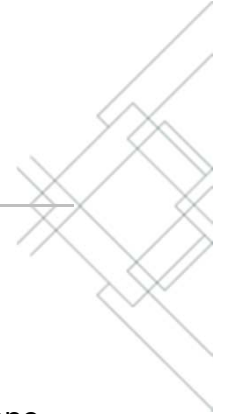
- Integration with MIT Kerberos for GSSAPI authentication
- Customized B2B solution enabling secure file transfers into and out of SAP (“SAP Dropbox”)
- Integration with MIT printing and network infrastructure
- Porting of MIT-specific notification mechanisms to ensure seamless e-mail and fax functionality
- Implementing MIT ERP and SAP ancillary components in the cloud while minimizing the need for ABAP code changes

## **Test Cases**

- Test cases from ALM/QC Repository will be leveraged where possible
- Automated test cases will be used in Cycles 3 and 4 (HP QTP)



# Testing – Cycles 1 - 4



## Cycle 1: **Proof of Concept Environment:**

- Test GUI, GUIXT, ITS, WDA and ATLAS, including integration with MIT authentication systems (Touchstone and Kerberos).
- Test data transfers / integration with MIT Data Warehouse.

## Cycle 2: **Development Environment (1<sup>st</sup> Pass):**

- GUI testing
- Full integration testing
- Dependent on completing testing of all integration solutions in PoC environment
- Includes Concur, ATLAS JV, & SciQuest outbound which couldn't be tested in the PoC environment
- Create cookbook/cutover plan version 1

==SPs=====SPs=====SPs=====SPs=====

## Cycle 3: **Development Environment (2<sup>nd</sup> Pass):**

- Migration of Frozen environment
- Application of Y/E Support Packs
- Support Pack Unit Testing

## Cycle 4: **QA/Test Environment:**

- Collaborative Business and IS&T integration and regression testing of Support Packs on HANA
- Testing includes GUI Transactions, GUIXT, ITS, WDA ,ATLAS, system feeds
- Approximately 35% of test cases are automated



# Testing – Where H2O intersects with Support Packs (Cycles 3 & 4)



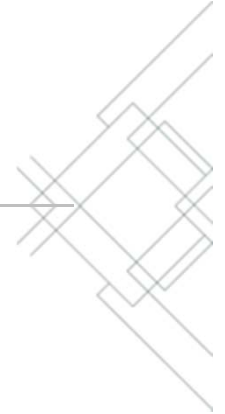
## High-Level Timeline

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- ✓ August thru the end of October - Plan, create/update test scripts in ALM/QC, move pending support & project work into production
- ✓ 10/02/2015 - Development Freeze begins
- ✓ 10/05/2015 - End of day production snapshot to be used to refresh test environments
- ✓ 10/08/2015 - SAP release of year end base level support pack
- ✓ 10/15/2015 - Last date to implement support & enhancement changes until freeze ends on 12/16/2015
- ✓ 10/19/2015 - Unit test
- ✓ 10/29/2015 - System Integration Test (10/29-30 controlled pay runs; regression test fixes: 11/24-25/2015)
- ✓ 11/25 – Mock Cut-over/Disaster Recover Test (cycle 5/6)
- ★ 12/11/2015 - Go-live weekend!
- ⓘ 12/16/2015 - Development Freeze ends
- 😊



# Testing Results

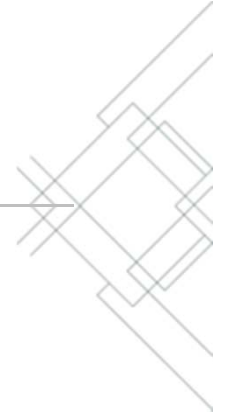


## ■QA environment: System Integration/User Acceptance Testing (Cycle 4)

Date	Time	Area	Failed	No Run	Not Comp	Passed	<Total>	Total Executed	Total % executed
12/2/2015	2:48:59 PM	E_Learning_Automated	0	0	0	46	46	46	100%
12/2/2015	2:49:01 PM	E_Learning_Manual	0	0	0	86	86	86	100%
12/2/2015	2:49:05 PM	HR_Automated	0	0	0	51	51	51	100%
12/2/2015	2:49:08 PM	HR_Manual	0	0	0	223	223	223	100%
12/2/2015	2:49:13 PM	VPF_HRP_Manual	0	0	0	115	115	115	100%
12/2/2015	2:48:20 PM	EHS - Automated	0	0	0	56	56	56	100%
12/2/2015	2:48:22 PM	EHS-Manual	0	0	0	56	56	56	100%
12/2/2015	2:48:25 PM	Facilities -Automated	0	0	0	162	162	162	100%
12/2/2015	2:48:33 PM	Facilities -Manual	0	0	0	52	52	52	100%
12/2/2015	2:48:36 PM	Finance - Automated	0	0	0	140	140	140	100%
12/2/2015	2:48:28 PM	Finance - Manual	0	0	0	300	300	300	100%
12/2/2015	2:48:41 PM	Logistics - Automated	0	0	0	114	114	114	100%
12/2/2015	2:48:47 PM	Logistics - Manual	1	0	0	247	248	248	100%
<b>Totals</b>			<b>1</b>	<b>0</b>	<b>0</b>	<b>1648</b>	<b>1649</b>	<b>1649</b>	<b>100%</b>



# Testing Results



Was it worth it?

Well, yes ...

Phases Issues were identified in ...			
(as of 12/2/15)			
<u>Issue type</u>	<u>Unit</u>	<u>SIT</u>	<u>Total</u>
Required an SAP fix	8	8	16
Required an MIT fix	12	13	25
Infrastructure Related	54	17	71
User/Data Error	1	8	9
Duplicate	4	2	6
Production Issue – to be addressed after SP	1	7	8
Totals	80	55	135



## Go Live Decision



### **Our criteria for recommending migrating the production environment to HEC was based on:**

- Successful migration of MIT's non-production SAP data to HEC-hosted environments.
- Validation of all critical SAP transactions / reports, including weekly and monthly payroll processing, summary statement, etc.
- Successful integration of HEC-hosted SAP environments with MIT's infrastructure: authentication (Kerberos, Touchstone) and authorization (Roles).
- Success integration of HEC-hosted SAP environments with ancillary business systems: SAP Dropbox, CUPS printing, Data Warehouse, etc.
- Disaster recovery for all existing SAP solutions (ECC, GRC, Solution Manager) and ancillary systems (SAP Dropbox, OpenText) designed and expected to be available by 11/2015.



# Cutover

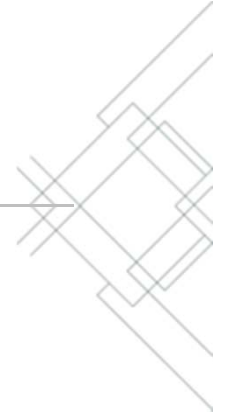


1. Preparation Work
2. System Isolation
3. Migration/Support Pack Application
  - i. Core cutover tasks
  - ii. HEC tasks
  - iii. High Availability tasks
  - iv. Disaster Recovery tasks
  - v. MIT web deployment tasks
4. Post Upgrade Processes (validations)
- 5. Go-live**





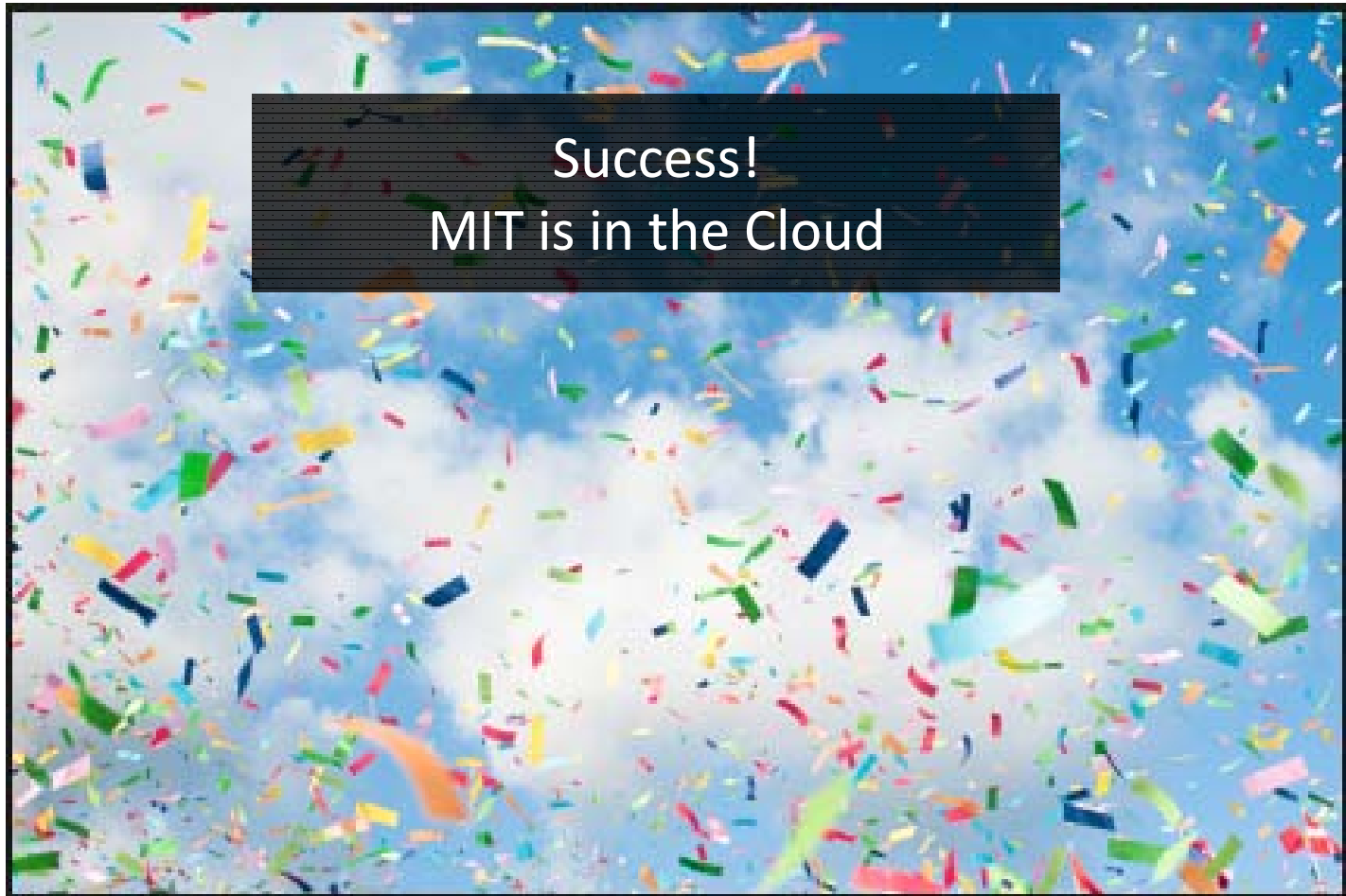
# HEC Cutover Plan



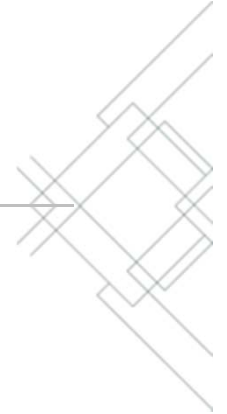
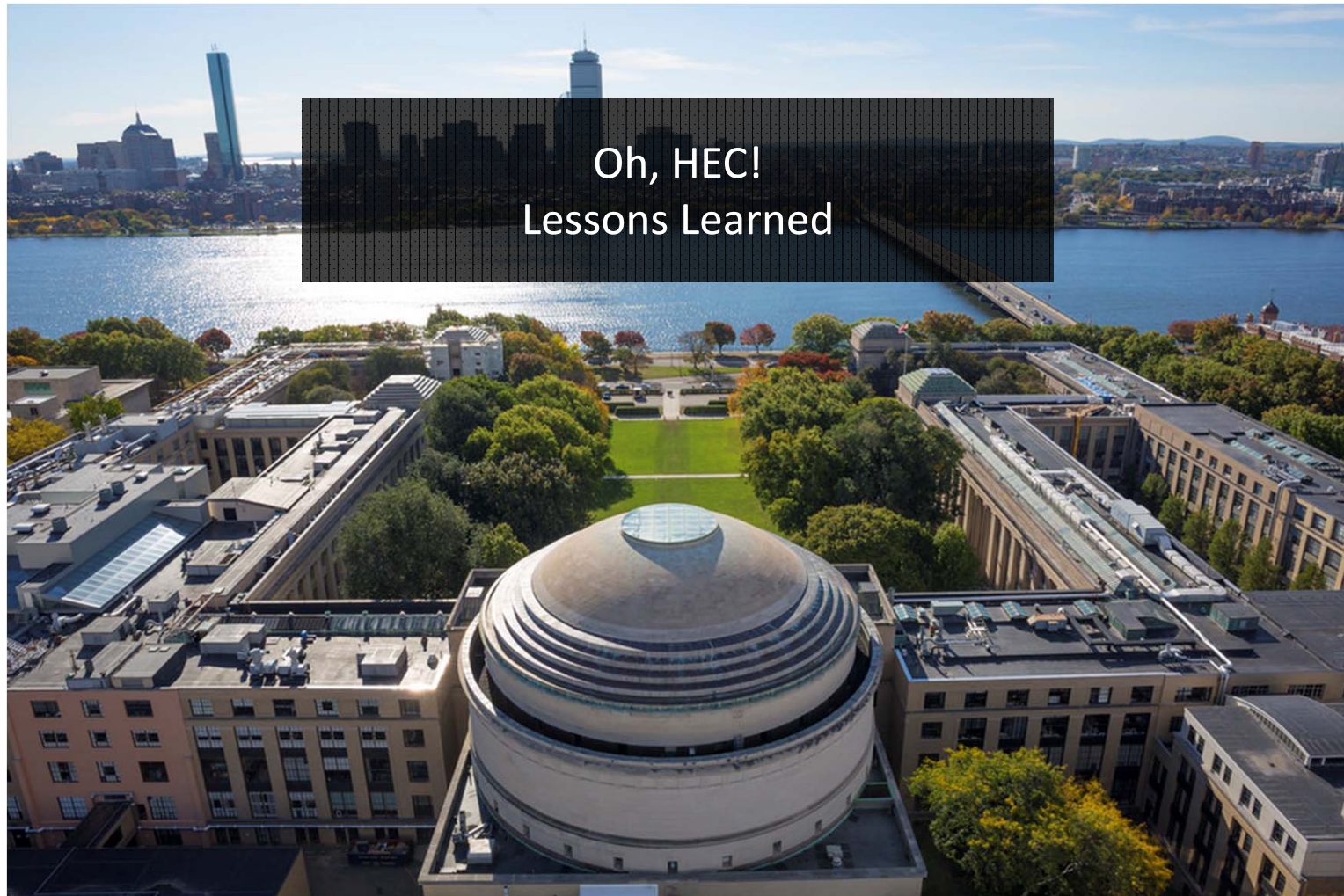
## ■Timing:

- Began uptime processing on December 8<sup>th</sup> in the morning
- Began system shutdown at 4pm on Friday December 11<sup>th</sup>
  - We have communicated with system owners of Banner, CSAIL, iLab, and e-Ship Global that their API connections to SAP will be impacted by this downtime
- Began export to HEC at ~6pm Friday night
- SAP had the system until noon on Saturday when we performed security and system verifications
- SAP then had the system again till 8pm Saturday night
- MIT completed transports and Part 1 of the action log from 8pm to ~2AM
- MIT and SAP tested High Availability and Disaster recovery failover from 2AM to 11AM
- MIT then completed action log items and began the process of reconnecting SAP to all it's ancillary systems
- IS&T BA's and Developers onsite performed tests as systems come online from noon to 2pm
- Business validations began at 2pm on Sunday December 13<sup>th</sup>
- The call to approve Go-Live planned for 5pm.

## End Result



# How did it go?





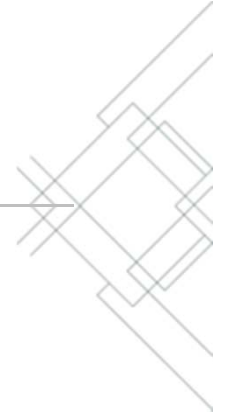
## Lessons Learned



- Do your project planning early
  - Sponsors, steering committee, stakeholders, communications plans, recurring meetings, all (and we mean all) project management processes
  - Do it early, you'll be too busy to do it on the fly
- Engage third party representation early
  - Include integrated product partners especially
  - We worked extensively with third parties like BSI, Open Text, BofA



## Lessons Learned



- Identify and organize your teams
  - Plan for work transitions, they're going to be busy
  - We organized around product teams
    - HR / Benefits / Payroll (Spartans)
    - Finance / Logistics / EHS (Poseidon)
    - Atlas portal and other web app's (Globetrotters)
    - Systems administration (Tectonics)
- Identify other potential participants
  - Use them when and as needed
  - Have a communications department / team? Use them to your advantage!



# Lessons Learned

- Identify your systems test list, assign an owner, and track them

System	Owner	Status	Due Date	Actual Date	SF3-H tested? Cycle 1	SF2-H tested? Cycle 2	SF2-H tested? Cycle 3	SH2-H tested? Cycle 4	Notes
DataWarehouse	Ron/Elena	Delivered	17-Aug		Yes	NA	NA	Yes	
ATLAS JCO applications	Dudley	Delivered	2-Oct		Yes	Yes	Yes	Yes	
ATLAS ITS	Mark P	Delivered	2-Oct		Yes	Yes	In progress	Yes	Issue with MSEXcel files displaying when using Chrome browser
ATLAS WDA	Elda	Delivered	2-Oct		Yes	Yes	Yes	Yes	
GUIXT	Lee/Sharon	Delivered	10-Aug		Yes	Yes		Yes	
SAP Gui Logon	Sarah Q	Delivered	3-Aug		Yes	Yes		Yes	
MITID	Ron	Delivered	4-Aug		Yes	Yes		Yes	
FaxServer	Ron	Delivered	4-Aug					Yes	
ADS	Qian	Delivered	17-Aug		Yes	Yes		Yes	
RolesDB	George	Delivered	17-Aug		Yes	Yes		Yes	
EDI/XML outbound	Elda/Ron	Delivered	17-Aug		Yes	In progress		Yes	
SAP Dropbox	Ron/Qian	Delivered	17-Aug		In progress	In progress		In process	
Archive Server	Ron/Qian	Delivered	17-Aug		Yes	Yes		Yes	
BSI (both SF3 and SF2)	Ron	Delivered	17-Aug	21-Sep	Yes	Yes		Yes	
OpenText	Ron/Garry	Delivered	28-Aug		Yes	Yes		In progress	Issues with SH2H install, waiting for OpenText consultant and R3 Admin
Apiserver/Mendix	Qian	in progress	24-Aug		NA	In progress		Yes	
Bank of America - Bottomline IP addresses	Bob Casey	Delivered	17-Aug		Yes	Yes		Yes	
Bank of America - Pcard transactions	Bob Casey	Delivered	17-Aug		Yes	Yes		Yes	
SciQuest	Elda	Delivered	24-Aug		Yes	Yes		Yes	
Concur	Ron/Qian	Cycle 3	17-Aug		NA	In progress		In process	Business wants a round trip test, being setup now
SAP Gui Logon (Community)	Sarah/Deepak	in progress	2-Oct		NA	NA		Yes	
SSH (zsend,scot,sFTP)	Ron/Qian/Garry	Delivered	17-Aug		Yes	Yes		Yes	
Transport Directory	Ron/Deepak	in progress	2-Oct		NA	NA	Planned	Yes	
Printing	Ron/Garry	Delivered	2-Oct	18-Sep	Yes	Yes		Yes	
MPLS/Router	Chris O'Brien	Delivered	5-Oct		NA	NA	Planned	Yes	
Cookbook	Bob Casey	in progress	2-Oct		NA	NA		In process	Drafted / in progress
MIT Cutover plan	Frank/Pat C	in progress	2-Oct		NA	NA		In process	Drafted / in progress
GRC	Sarah / Ron	in progress	2-Nov		NA	NA	NA	In process	Issues with logging into SH2H via ACTH, being worked by R3 Admin
Solution Manager	HEC	in progress	2-Oct		Yes	Yes		In process	
Disaster Recovery	Pat Casey	in progress	1-Dec		NA	NA	NA	In process	Continuing to test to confirm replication
Rustici (Learning Center web based training)	Kevin/Dudley	Delivered	28-Sep		NA	Yes		Yes	
SE1 migration to HANA	team	in progress	2-Nov		NA	NA	NA	Delayed	Discovery system for projects, to be scheduled after critical path tasks



# Lessons Learned



- Plan to test all customizations
  - Do any code remediation as early as possible
- Test execution
  - Document your test results for each cycle
    - It makes status reporting much easier
  - Full integration testing no later than UAT
    - We tested some integrations as early as unit testing
  - Identify existing production issues separately from project issues
    - Don't add to the scope of the migration in flight
  - Do true end to end landscape testing
- Schedule enough time to analyze and remediate integration issues



## Lessons Learned



- MPLS
  - Get it going early, it took us ~70 days from order to completion
- DNS
  - Agree on them and configure as early as possible
- Email
  - Agree early on HEC vs. on-premises SMTP relay
- Identify customizations or potential issues around system IDs, hard-coded server names, URLs & IP addresses
- Firewall configuration





## Lessons Learned



- OS level changes will impact your ability to resolve issues
  - HANA DB can behave differently
    - Indexes, sorts, order in which data is returned can be different than you're used to
  - SAP admins won't have the same access as before
- System monitoring
  - Proactive monitoring of systems as early as possible
  - 2 unscheduled outages during testing



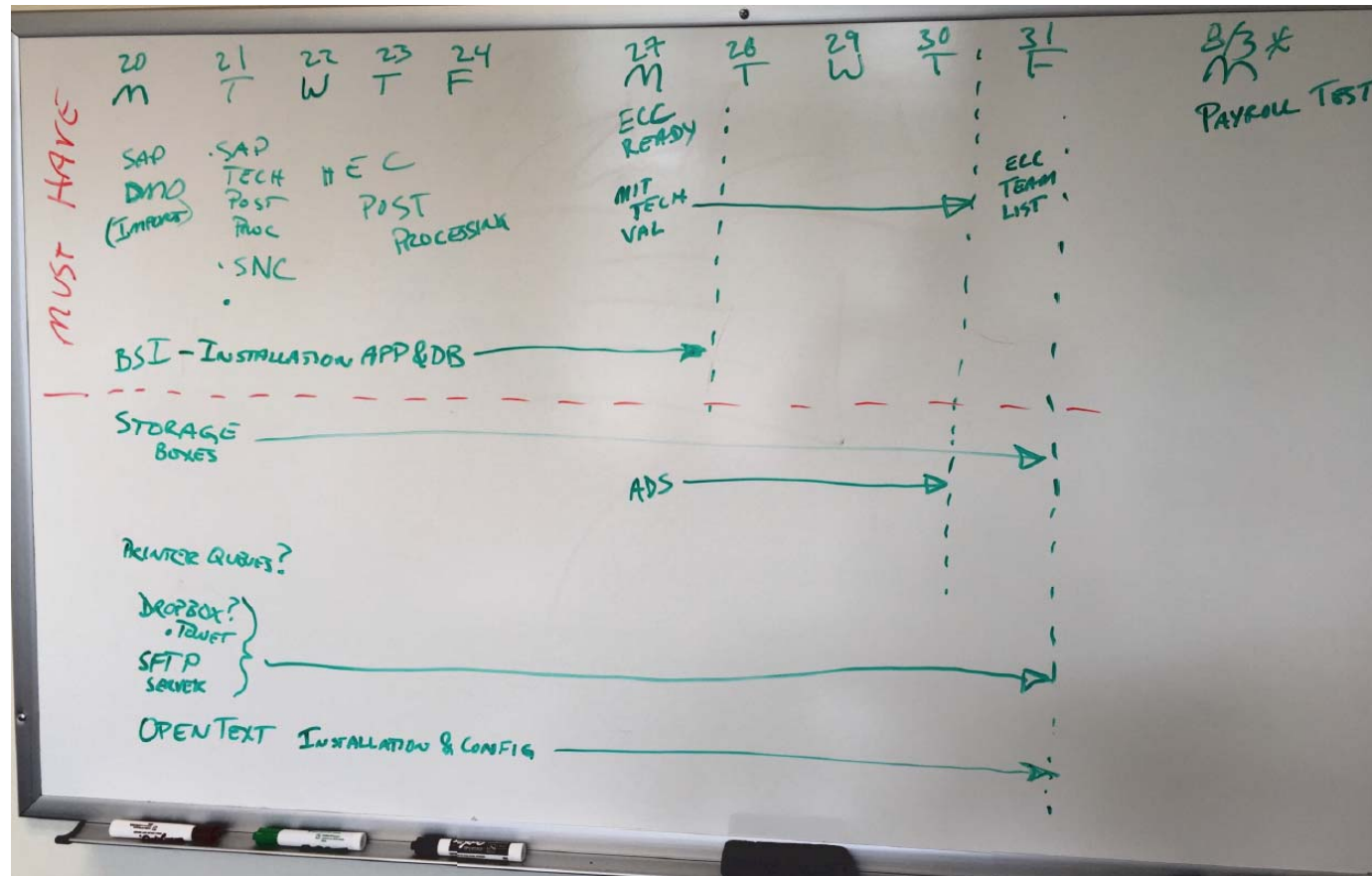
# Lessons Learned



- Go live
  - There's a lot to do, plan in shifts if necessary
  - Communicate early and often to everyone
  - Have a SWAT team, escalation plans, the works
  - Embed resources with the business, they're your eyes and ears during go live
  - Make sure you shut down your on premises systems – completely
- Finally, remember, stuff happens
  - FedEx lost the disc copy of the database, do both backups
  - We had SAP Gui issues on go live due to central \*.ini file change, not SAP system issues, seek out all references to local saplogon.ini files early

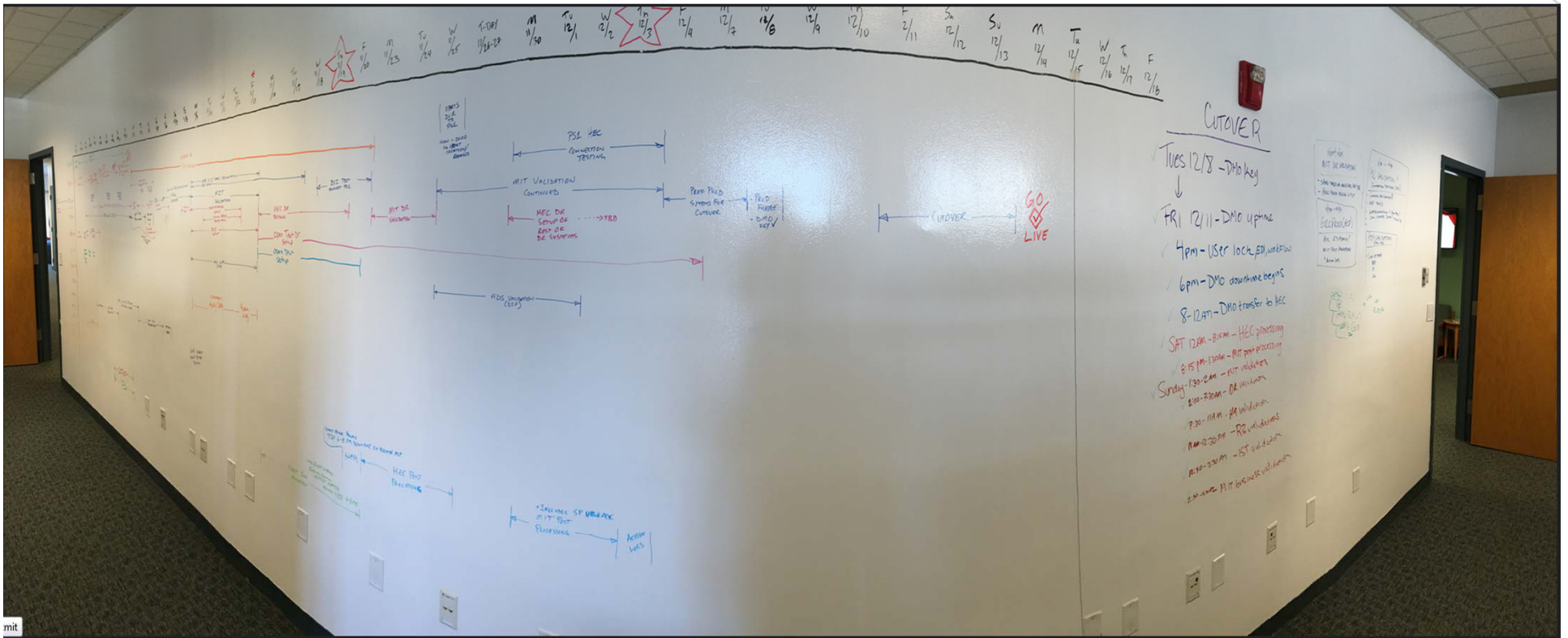
# What started like this ...

## ■ In July



# Turned into this ...

■ by October



And it was only half done



## By the numbers



**400+**

The number of standup meetings held during the course of the project by the 42 core team members across four scrum teams: Globetrotters (which handled everything on the front end), Tectonics (infrastructure), Poseidon (finance, logistics, and plant maintenance), and, yes, Spartans (HR, payroll, and e-learning).

The number of cycles that the SAP HANA project was divided into. The seven cycles ("[Sounds mythical](#)," said Spartans team lead) were:

**7**

Cycle 1 – Proof of Concept

Cycle 2 – Migrate on premise development environment to SAP's HANA Cloud Enterprise (HEC)

Cycle 3 – Repeat migration on premise development environment to HEC but include year-end support packs in the process

Cycle 4 – Migrate QA/Test environment to HEC

Cycle 5 – Execute migration of mock-cutover of production environment to HEC

Cycle 6 – Execute disaster recovery test

Cycle 7 – Execute production cutover

The busiest time of the project was Cycle 4, during testing and mock cutover. "[This was the most brutal time because we had five systems that had to be upgraded and tested simultaneously](#)," IS&T project lead.

**2,154**

The number of MIT community members using SAPgui client software which needed to be upgraded to v7.40 before they would be able to connect to SAP HANA. This required repeated reminders to users to upgrade before the final cutover was completed and time ran out.

## By the numbers continued ...



**84**

The number of steps in the plan for the final cutover to SAP HANA, which included more than 100 sub-tasks.

The final production migration commenced late in the afternoon of Friday, December 11th and was completed in time for the start of business the following Monday, exactly as planned.

**135**

The number of issues that had been identified by go-live, thanks to exhaustive testing during earlier cycles, including 1,649 test cases run during Cycle 4 alone. 80 of these issues surfaced during unit testing, while 55 were identified during systems integration testing. At the time the project went live, all but 5 (low-priority) issues had been resolved, which helped explain the smooth transition during the final cutover.



**1.7**

**“We did a tremendous amount of due diligence that luckily caught everything that was significant before we went into cutover,” PM said.**

The amount of data, in terabytes (TB), (stored in MIT's Oracle SAP database) that were migrated.

After the migration to HANA, those same data *only* took up .95 TB.

**155**

The total duration of the H2O project in days, from kickoff on July 13th to completion of production cutover on December 14th. That doesn't include post-project recovery time for team members.



Thank you

