2023 INTERNET2 TECHNOLOGY exchange

IAM Archaeology

Christopher Bongaarts, IAM Architect – University of Minnesota
Kellen Murphy, Identity Architecture and Solutions Engineer – University of Virginia

September 19, 2023

DIGGING UP LESSONS FROM OUR LATEST ATTEMPT AT LEGACY SYSTEM ABATEMENT AT THE UNIVERSITY OF MINNESOTA

Disclaimer

- Advice, conclusions, representations are my own and should not be construed as “official” positions of our IAM team or the University of Minnesota
  - One of the benefits of having a larger team is a diversity of views on how IAM should work
    - Both from philosophical as well as role viewpoints
    - BA – why, developer – how, project manager – when/who

About the University of Minnesota

- Large public R1 institution
- ~68K students, 27K faculty/staff
- ~4.2M identities in IAM system
- IAM team ~30 full time staff

The history lesson

- Once upon a time (1992 or so), we built an IAM system
  - Central (academic) Computing needed staff and student data for first campus-wide email service
  - Anticipated similar data need for new ID card project
  - Got data from mainframe-based student and HR systems (later, Alumni Assoc.)
  - Provisioned to central email (UNIX) and enterprise directory (X.500, later LDAP)
  - Later, provisioned Active Directory “people” tree
  - This system was internally referred to as “The Database” or “Kevin’s Stuff” (later as “X.500”)
  - **LESSON: It’s better to actually create something that works and build off it than to try to design the One True System right from the beginning.**

History lesson continued

- Around 2007, reorg splits team of 8 leaving just 2 “identity” team members
- Management shift away from custom-built software
  - Still OK with open source as long as we don’t have to write it
  - Deployed Shibboleth IdP (replaced locally written SSO), Grouper
- Purchased Oracle Identity Manager in 2009, but postponed implementation due to Enterprise Systems Upgrade Project (Peoplesoft split)
- Eventually implemented OIM 2016-present
  - Data sources: PS CS (students) and HR (fac/staff), Foundation/Alum Assoc
  - Provisioning targets: LDAP, AD, Foundation, PS, Duo
- Team grows, split off into independent directorate
- Original IAM system author retired in 2018
- Soon (spring 2024?): Okta to replace OIM (and probably other stuff)

Know thyself

- Know **WHY** you do what you do.
  - You can always figure out WHAT a system does and HOW based on the code, but it doesn't tell you **WHY** it does what it does, **who** asked for it, or who is currently **depending on it** to work that way.
  - Comments in code/commit messages can be good for this
- **Requirements drift** over time
  - Periodically **review** them to ensure you're delivering the right services in the best way
  - Need to keep contacts current at a minimum

Know thyself

- Understand the **business value** of your stuff.
  - A system that is “good enough” but not ideal may be worth keeping around
  - This is the flip-side of agile's “minimum viable product” – maximizing delivered value
  - One simple standalone system that does one or a few things very well or is well adapted to business needs, and is easily understood by a newcomer because it is small/simple/self-contained - do you really want to trade this for a One-Sprint Wonder in that big app suite that no one understands?

Know thy customers

- **IAM is not an end in itself**, but a means to securely enable applications
  - Meet applications halfway - support the protocols they support (but indicate your preferences)
- **Build relationships** with both the business *and* technical people who manage the systems you need to interact with
- **Learn how the other side works**, at least a little bit
  - Helps build compassion for the app owners
  - Makes you less likely to accidentally break them
- **Don't ignore the little guys**
  - Enterprise apps affect a lot of people in your institution, but smaller apps (think LIGO) may have a bigger impact on humanity as a whole
  - You can’t always predict which will be which

Know thy customers

- Untangling decades-old IAM solutions requires **effort**
  - Original requester is often no longer around (retired, promoted, demoted, won the lottery, etc.)
  - Current business owners may have no idea how access was originally structured
  - Current technical administrators may not know current requirements
  - This will likely impact your schedule – this **takes a lot of time** to work through
  - Don’t underestimate the ignorance of your customers
  - If you need to push, be sure you have cover from higher-ups (CIO or CISO)
  - Security can be a stick (wish I had more carrots though)

Know thy customers

- Pay attention to **new business processes or teams** that are now central players
  - Integrations and Data Management teams became very central to our work
  - Built processes fundamental to our retirement projects that were not necessarily on our radar at the start
  - Respect, collaboration, making room for other stakeholders is vital to getting the work done

Know thy customer

- **Helpdesk is a customer** of yours if they need to use identity tooling to support users (password resets!)
  - **Listen** to them!
  - **Lurk** on their chat channels
  - **Meet** with their management regularly
  - Understand their pain points and **prioritize making life better for them**
  - Making them happy will pay off when you want to “shift left”

Know thy data

- Centralize data governance
  - IAM does not own most of its data*
  - Ensure it's easy for apps to get data owner approval to make use of IAM data
- Simple **provenance is not enough** to understand your data
  - Also need to understand the **selection** and **transformation** of data
  - Both on the way **in** AND the way **out**
- IAM **may need more data** than the source systems keep around
  - Example: ESUP did not convert older staff data
  - No way to identify “campus” for retirees for determining library privileges

Know thy data

- **Build relationships** with the data owners and experts
- Helps understand what their data means and how it fits into the Big Picture
- Facilitates getting help when the data gets weird
- Also helpful for getting buy-in for **moving logic out of IAM** and into source systems

Know thy peers

- Talk to other institutions at Internet2 TechEx and other meetings/fora
  - Be amazed at how far ahead *and* behind you are simultaneously
  - Great source of ideas for improving IAM services
  - Recycle, reuse, reinvent (mostly the first two)
  - Anticipate challenges that aren't at your campus yet, but may be soon
  - Higher Ed often faces common challenges – lots of approaches to solutions

Architect for resiliency

- Create/implement well-defined **interfaces** for interactions
  - Then swap out parts of your architecture as needed
  - Helps with disaster recovery - what happens if various parts of your IAM setup were to be vaporized by an asteroid, or encrypted by Bad People?
- **Testing** can be tricky
  - Old X.500 could generate LDAP directory at will
  - Easy to validate changes to LDAP generation code - run with old, run with new, diff
  - OIM can't do that – much harder to check (and hard to make changes effective across population)
  - **Cross-product of test** instances across systems (sorry, can't help here)

Architect for resiliency

- Let other people do the work when possible
  - Move **logic into source systems** where appropriate
  - Build/leverage **self-service** systems
  - Be transparent/share documentation widely; the more people know about how the system works, the more effectively they can use it and understand how to resolve problems
- Higher Ed IAM has high-touch/high-volume change events multiple times a year
  - Semester start/end, professional/admin staff annual contract renewal
  - Easy to accidentally build a system that takes way too long to converge after those events

Architect for resiliency

- Try to be **state-driven** rather than exclusively event-driven (credit Mary McKee)
  - OIM strategy – get updates from PS IB (events), but ignores contents - pulls data in fresh
  - Avoids event ordering requirements
  - Easy reconciliation of sources if updates missed
- Know how the parts of your system **impact uptime**
  - SSO probably needs 7x24x365.25
  - Password changes can probably tolerate longer downtime
  - Batch processing can probably tolerate even more (if done right)
  - Minimize dependencies between systems to optimize this

Keep it clean, but not *too* clean

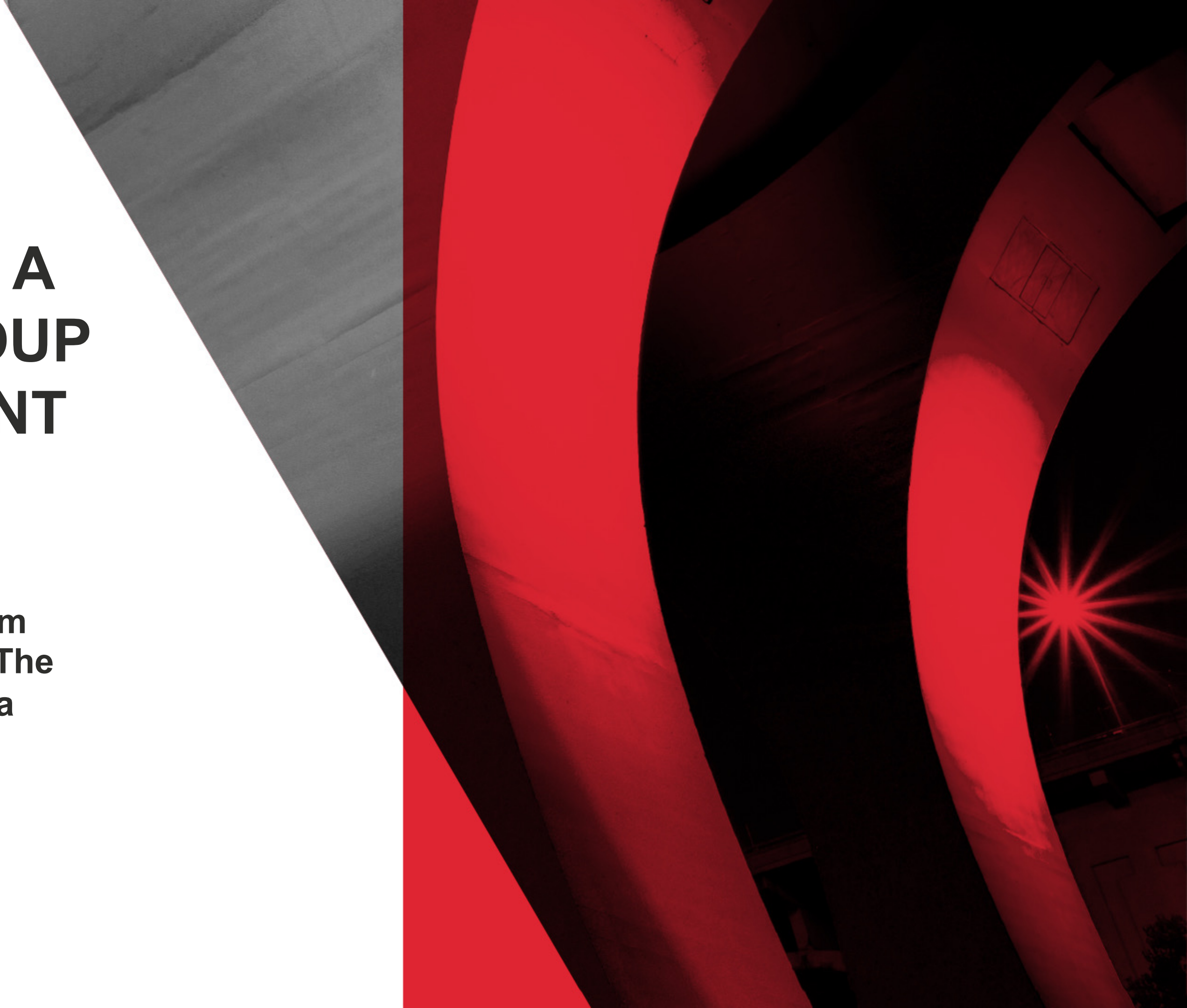
- Periodically (or continuously – automate it!) **tidy up**
  - If no one is using X any more, get rid of it
  - Less stuff to deal with at the next migration
- **Avoid short-sighted shortcuts** when migrating IAM systems
  - Example: not importing all accounts from legacy system to new system
  - Still dealing with the fallout from that choice 7 years later…
- Good **logging** is essential
  - Good log analysis tools/SIEMs are a big win
  - Storage is cheap these days -- keep copies of transaction data, batch feed files, etc. for a reasonable time (automate deletion)
    - Facilitates debugging
    - Fix-by-replay possible

The moral of the story

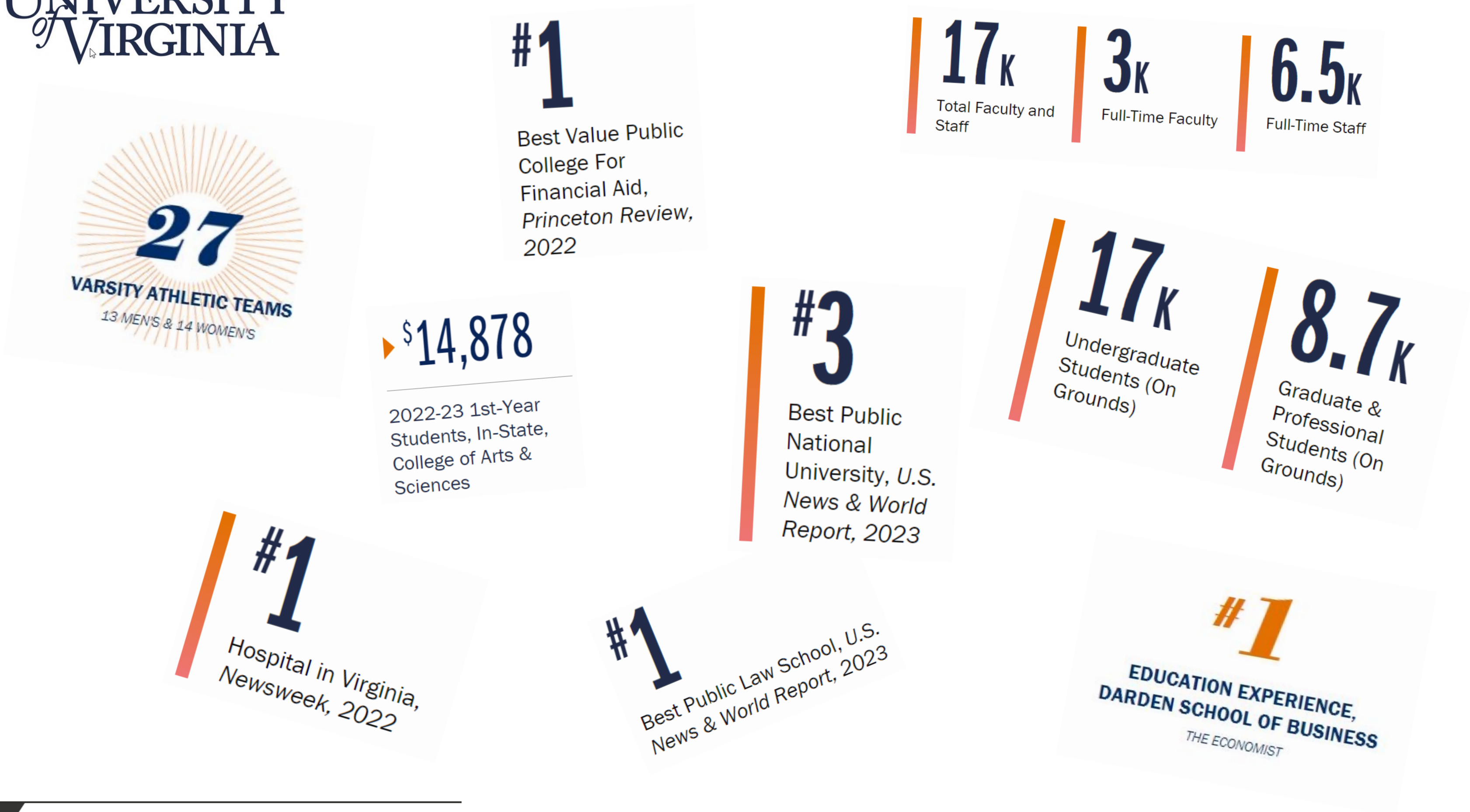
- Know why you do what you do, and who you're doing it for, and keep in touch with them.

REPLACING A LEGACY GROUP MANAGEMENT TOOL

Lessons Learned from Deploying Grouper at The University of Virginia



University of Virginia



27

VARSITY ATHLETIC TEAMS

13 MEN'S & 14 WOMEN'S

#1

Best Value Public College For Financial Aid, *Princeton Review*, 2022

$14,878

2022-23 1st-Year Students, In-State, College of Arts & Sciences

17K

Total Faculty and Staff

3K

Full-Time Faculty

6.5K

Full-Time Staff

#3

Best Public National University, *U.S. News & World Report*, 2023

17K

Undergraduate Students (On Grounds)

8.7K

Graduate & Professional Students (On Grounds)

#1

Hospital in Virginia, *Newsweek*, 2022

#1

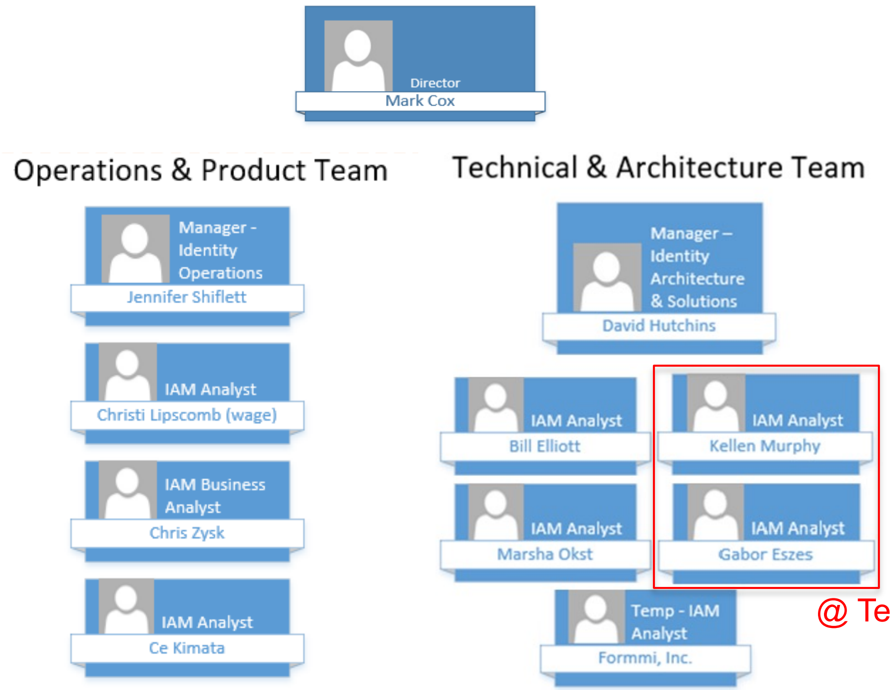
Best Public Law School, U.S. News & World Report, 2023

#1

EDUCATION EXPERIENCE, DARDEN SCHOOL OF BUSINESS

THE ECONOMIST

Identity & Access Management at UVA



Director
Mark Cox

Operations & Product Team

Manager - Identity Operations
Jennifer Shiflett

IAM Analyst
Christi Lipscomb (wage)

IAM Business Analyst
Chris Zysk

IAM Analyst
Ce Kimata

Technical & Architecture Team

Manager – Identity Architecture & Solutions
David Hutchins

IAM Analyst
Bill Elliott

IAM Analyst
Kellen Murphy

IAM Analyst
Marsha Okst

IAM Analyst
Gabor Eszes

Temp - IAM Analyst
Formmi, Inc.

@ TechEx

- What do we do?
  - Manage approximately 1.25M identities using Fischer Identity for IGA
    - Password Management
    - Role Management
    - Policy Management
    - Policy Enforcement
    - Duo Management

- What do we *not* do?
  - “Infrastructure”
    - Active Directory / Azure AD
    - LDAP
  - Email List Management
  - Authentication
    - Shibboleth SSO **
  - *Group Management* *
  - Email Alias Management *
  - Non-person Identities **
  - Social Identities **

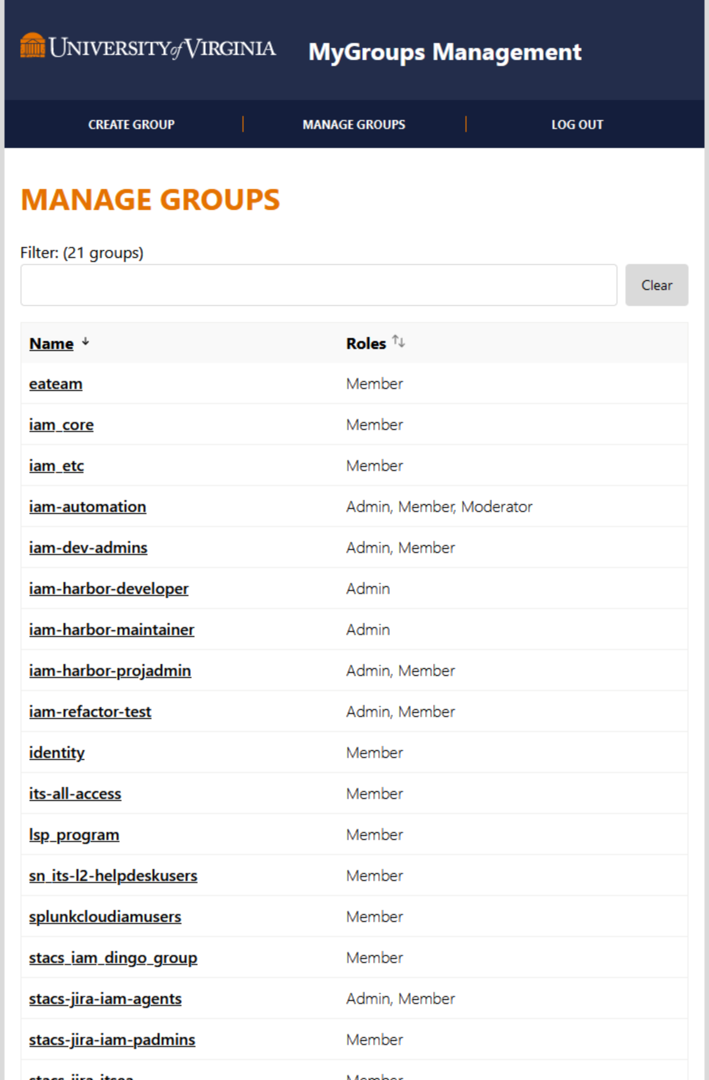
So how did this all start?

- Project was conceived (draft) in 2020. Plan was to find something that would allow for “secure groups” (primary use: VPN access).
  - Tighter controls, etc. would be needed for these vs. MyGroups.
- COVID hit and everything basically stagnated for *years.*
  - Hybrid learning shifts lead to realizations of many use-cases for Groups for which MyGroups was not suited.
- Project “resumed” in May 2022.

Current Group Solution

- UVA MyGroups
  - Originally launched ca. 2006
  - Developed internally.
  - Maintained / managed by Enterprise Infrastructure team.
  - Group memberships go only to Active Directory & LDAP

- “Facelift” in mid-2022 to current user interface.
  - Positively received, didn’t deliver the “upgrade” that people wanted.
  - People still getting used to the “new” UI.
  - Cleaned up the codebase but quickly realized we would have too much work to deliver the product that people really wanted.

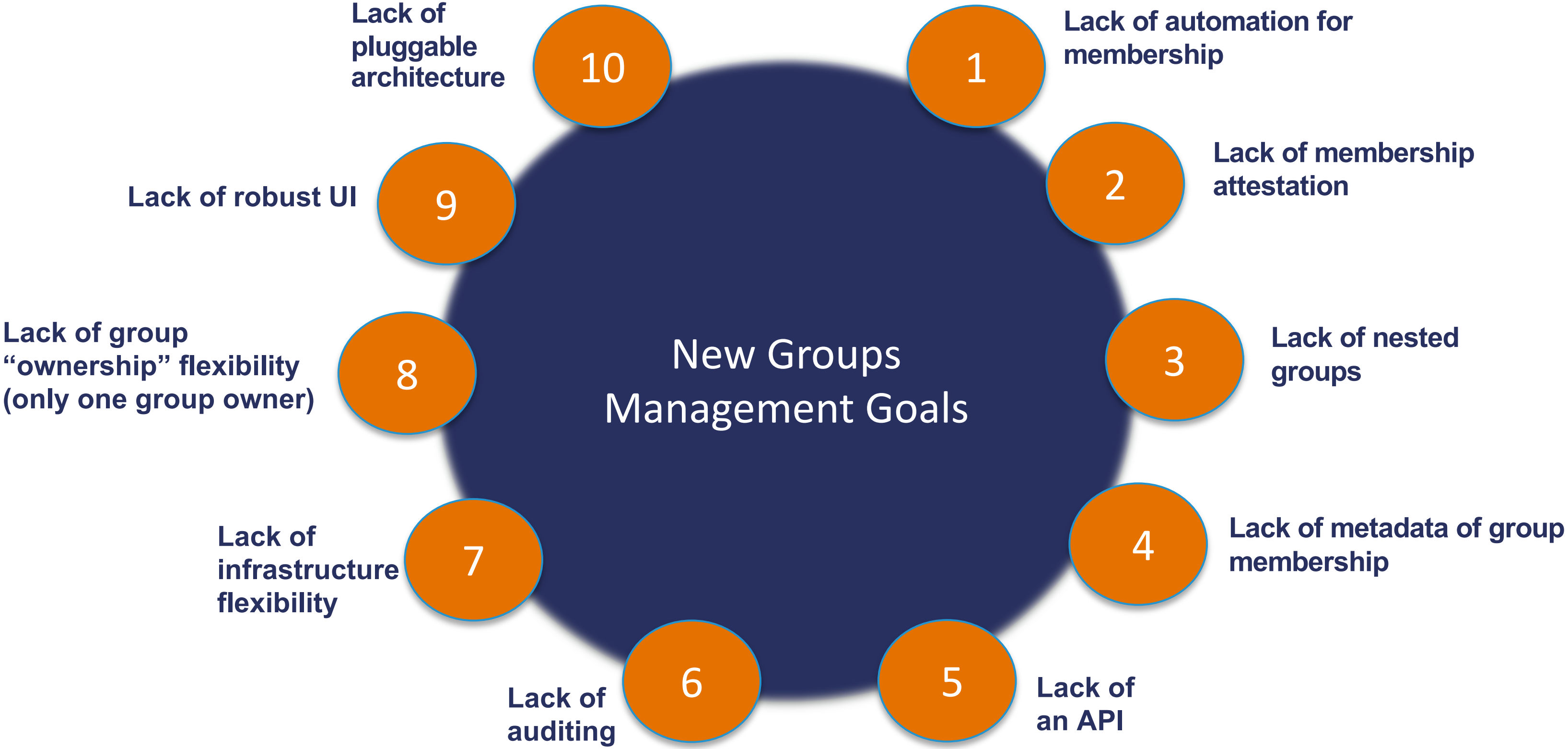


MANAGE GROUPS

Filter: (21 groups)

Name ↓	Roles ⇅
eateam	Member
iam_core	Member
iam_etc	Member
iam-automation	Admin, Member, Moderator
iam-dev-admins	Admin, Member
iam-harbor-developer	Admin
iam-harbor-maintainer	Admin
iam-harbor-projadmin	Admin, Member
iam-refactor-test	Admin, Member
identity	Member
its-all-access	Member
lsp_program	Member
sn_its-l2-helpdeskusers	Member
splunkcloudiamusers	Member
stacs_iam_dingo_group	Member
stacs-jira-iam-agents	Admin, Member
stacs-jira-iam-padmins	Member
stacs-jira-itsoa	Member

Grouper Project Goals – Top 10 List



New Groups Management Goals

1 Lack of automation for membership

2 Lack of membership attestation

3 Lack of nested groups

4 Lack of metadata of group membership

5 Lack of an API

6 Lack of auditing

7 Lack of infrastructure flexibility

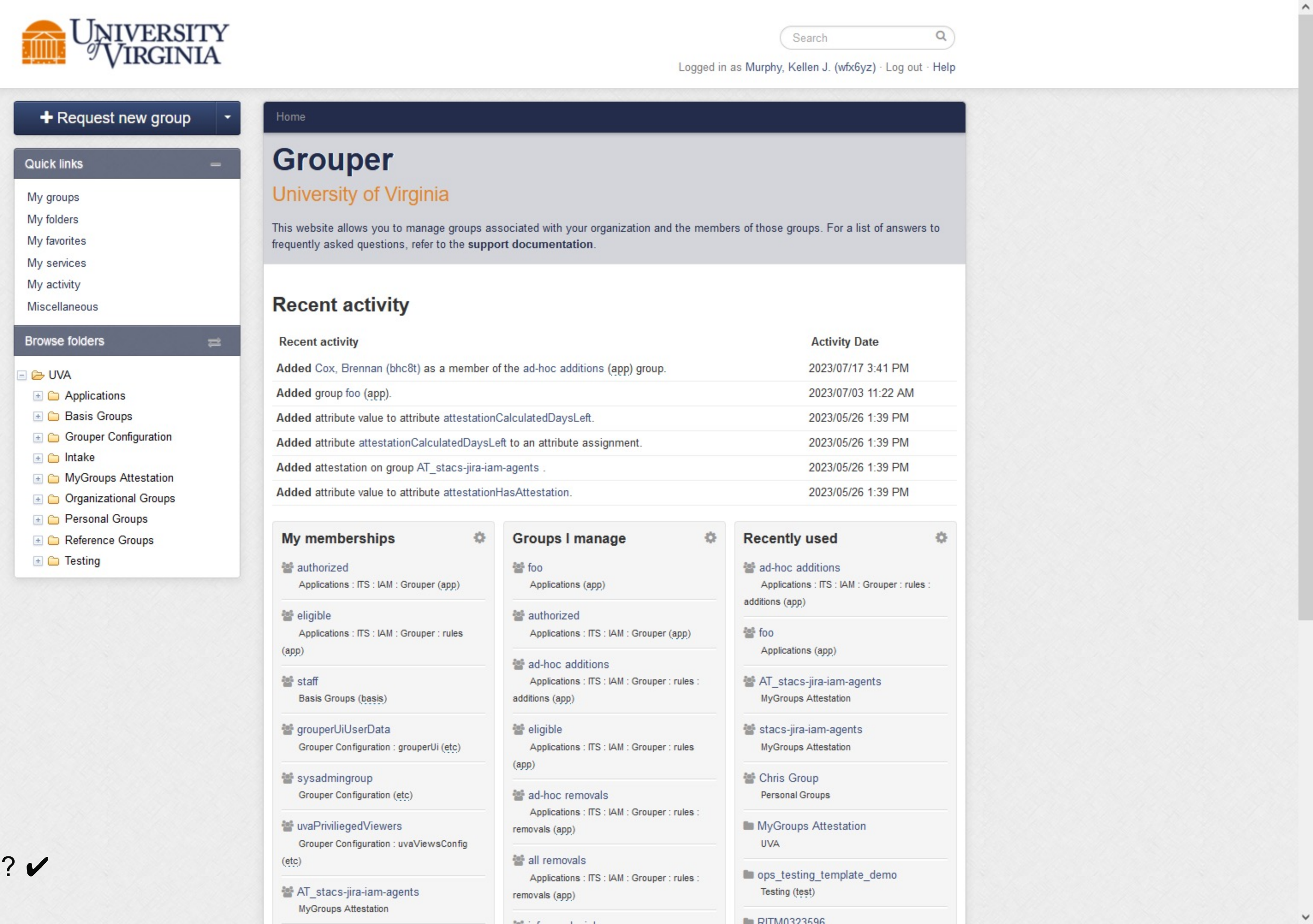
8 Lack of group “ownership” flexibility (only one group owner)

9 Lack of robust UI

10 Lack of pluggable architecture

Grouper Does (Almost) Everything

- Automation ✔
- Attestation ✔
- Folder structure ✔
- Metadata ✔
- API ✔
- Auditing ✔
- Containerized ✔
- Permissions ✔
- Nice UI ✔
- Pluggable Architecture? ✔



UNIVERSITY of VIRGINIA

Search

Logged in as Murphy, Kellen J. (wfx6yz) · Log out · Help

+ Request new group

Quick links

- My groups
- My folders
- My favorites
- My services
- My activity
- Miscellaneous

Browse folders

- UVA
  - Applications
  - Basis Groups
  - Grouper Configuration
  - Intake
  - MyGroups Attestation
  - Organizational Groups
  - Personal Groups
  - Reference Groups
  - Testing

Home

Grouper

University of Virginia

This website allows you to manage groups associated with your organization and the members of those groups. For a list of answers to frequently asked questions, refer to the **support documentation**.

Recent activity

Recent activity	Activity Date
Added Cox, Brennan (bhc8t) as a member of the ad-hoc additions (app) group.	2023/07/17 3:41 PM
Added group foo (app).	2023/07/03 11:22 AM
Added attribute value to attribute attestationCalculatedDaysLeft.	2023/05/26 1:39 PM
Added attribute attestationCalculatedDaysLeft to an attribute assignment.	2023/05/26 1:39 PM
Added attestation on group AT_stacs-jira-iam-agents .	2023/05/26 1:39 PM
Added attribute value to attribute attestationHasAttestation.	2023/05/26 1:39 PM

My memberships

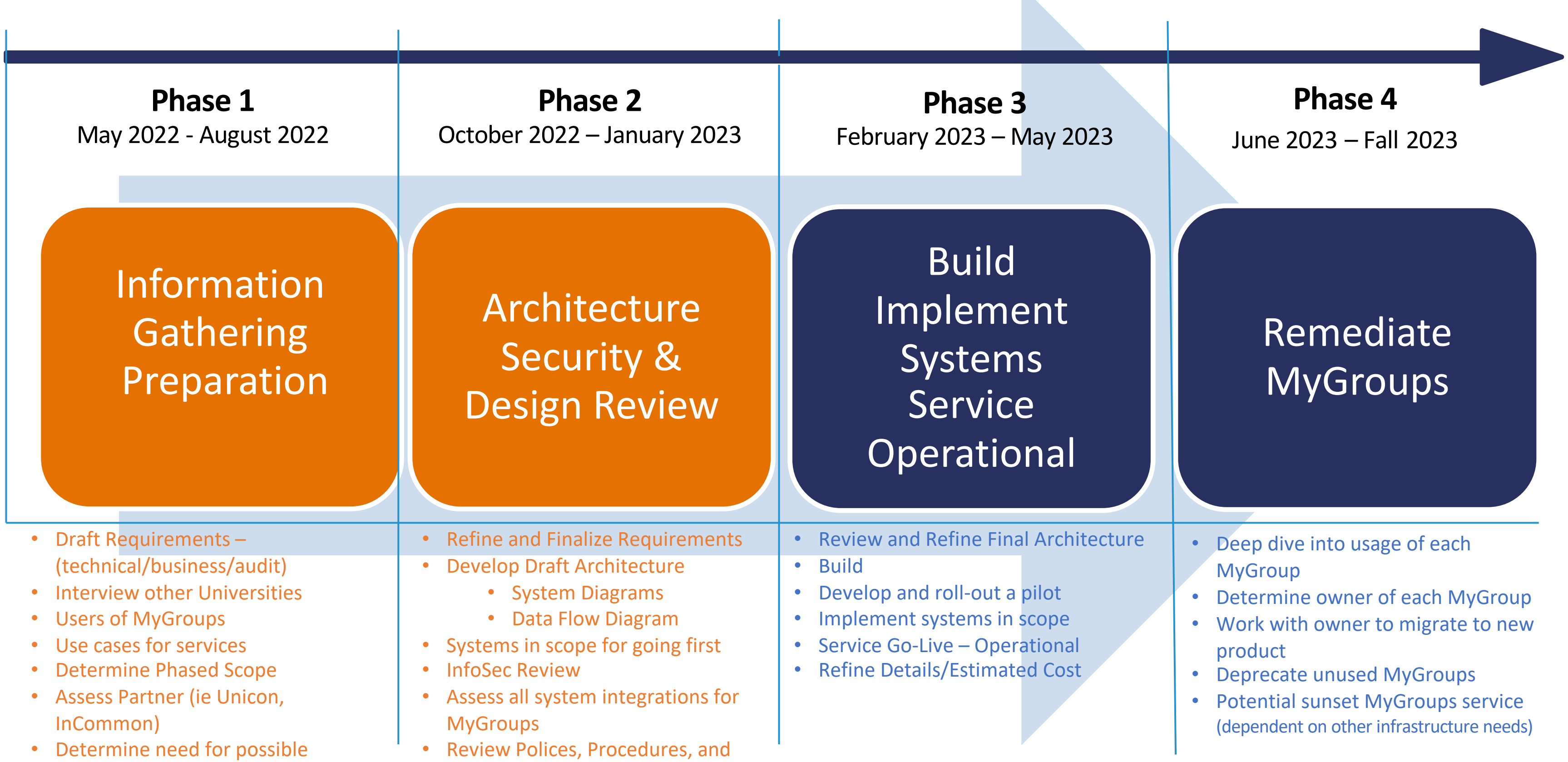
- authorized
  Applications : ITS : IAM : Grouper (app)
- eligible
  Applications : ITS : IAM : Grouper : rules (app)
- staff
  Basis Groups (basis)
- grouperUiUserData
  Grouper Configuration : grouperUi (etc)
- sysadmingroup
  Grouper Configuration (etc)
- uvaPriviliegedViewers
  Grouper Configuration : uvaViewsConfig (etc)
- AT_stacs-jira-iam-agents
  MyGroups Attestation

Groups I manage

- foo
  Applications (app)
- authorized
  Applications : ITS : IAM : Grouper (app)
- ad-hoc additions
  Applications : ITS : IAM : Grouper : rules : additions (app)
- eligible
  Applications : ITS : IAM : Grouper : rules (app)
- ad-hoc removals
  Applications : ITS : IAM : Grouper : rules : removals (app)
- all removals
  Applications : ITS : IAM : Grouper : rules : removals (app)

Recently used

- ad-hoc additions
  Applications : ITS : IAM : Grouper : rules : additions (app)
- foo
  Applications (app)
- AT_stacs-jira-iam-agents
  MyGroups Attestation
- stacs-jira-iam-agents
  MyGroups Attestation
- Chris Group
  Personal Groups
- MyGroups Attestation
  UVA
- ops_testing_template_demo
  Testing (test)
- RITM0323596



Phase 1
May 2022 - August 2022

Information Gathering Preparation

- Draft Requirements – (technical/business/audit)
- Interview other Universities
- Users of MyGroups
- Use cases for services
- Determine Phased Scope
- Assess Partner (ie Unicon, InCommon)
- Determine need for possible Advisory Committee
- Estimated Cost

Phase 2
October 2022 – January 2023

Architecture Security & Design Review

- Refine and Finalize Requirements
- Develop Draft Architecture
  - System Diagrams
  - Data Flow Diagram
- Systems in scope for going first
- InfoSec Review
- Assess all system integrations for MyGroups
- Review Polices, Procedures, and Standard for potential updates
- Refine Details/Estimated Cost

Phase 3
February 2023 – May 2023

Build Implement Systems Service Operational

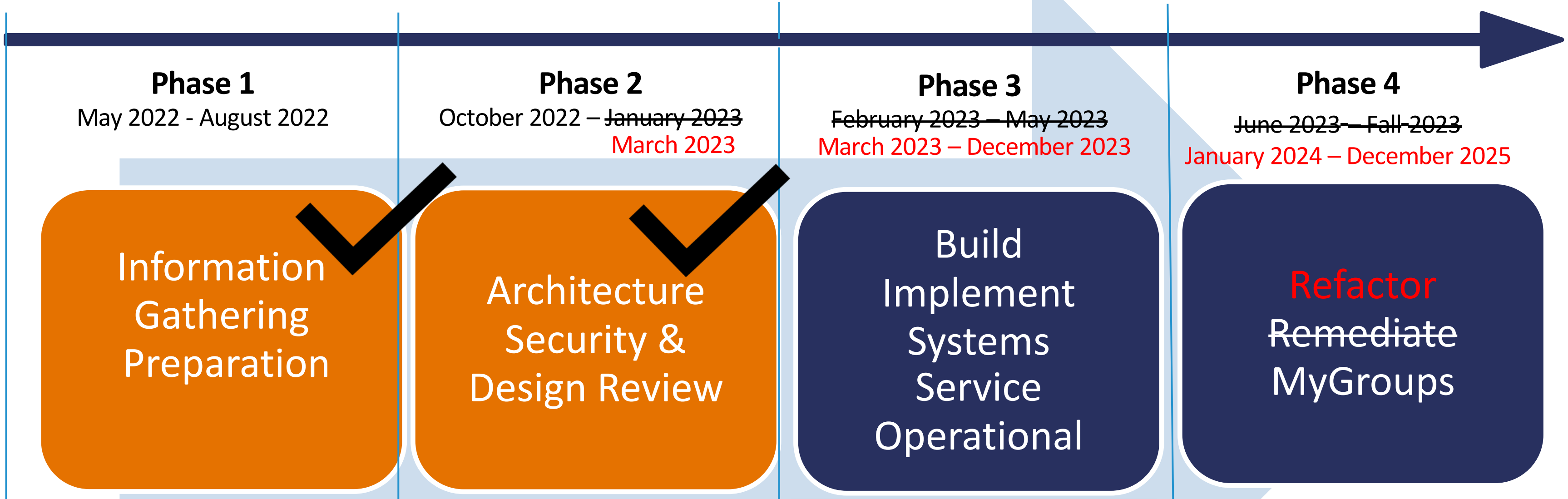
- Review and Refine Final Architecture
- Build
- Develop and roll-out a pilot
- Implement systems in scope
- Service Go-Live – Operational
- Refine Details/Estimated Cost

Phase 4
June 2023 – Fall 2023

Remediate MyGroups

- Deep dive into usage of each MyGroup
- Determine owner of each MyGroup
- Work with owner to migrate to new product
- Deprecate unused MyGroups
- Potential sunset MyGroups service (dependent on other infrastructure needs)

**Any significant architectural re-design of integrated systems (i.e. Sympa or AMS), would require re-evaluation and new dependent projects or scope changes.



Phase 1

May 2022 - August 2022

Information Gathering Preparation ✓

- Draft Requirements – (technical/business/audit)
- Interview other Universities
- Users of MyGroups
- Use cases for services
- Determine Phased Scope
- Assess Partner (ie Unicon, InCommon)
- Determine need for possible Advisory Committee
- Estimated Cost

Phase 2

October 2022 – ~~January 2023~~ March 2023

Architecture Security & Design Review ✓

- Refine and Finalize Requirements
- Develop Draft Architecture
  - System Diagrams
  - Data Flow Diagram
- Systems in scope for going first
- InfoSec Review
- Assess all system integrations for MyGroups
- Review Polices, Procedures, and Standard for potential updates
- Refine Details/Estimated Cost

Phase 3

~~February 2023 – May 2023~~
March 2023 – December 2023

Build Implement Systems Service Operational

- Review and Refine Final Architecture
- Build
- Develop and roll-out a pilot
- Implement systems in scope
- Service Go-Live – Operational
- Refine Details/Estimated Cost

We are here.

Phase 4

~~June 2023 – Fall 2023~~
January 2024 – December 2025

Refactor ~~Remediate~~ MyGroups

- Deep dive into usage of each MyGroup
- Determine owner of each MyGroup
- Work with owner to migrate to new product
- Deprecate unused MyGroups
- Potential sunset MyGroups service (dependent on other infrastructure needs)

**Any significant architectural re-design of integrated systems (i.e. Sympa or AMS), would require re-evaluation and new dependent projects or scope changes.

Things that <u>should've</u> happened during Phase 1 and <u>didn't</u>.

- We should have paid much closer attention to gathering SMART requirements.
  - Specific: there should be no ambiguity, and it should be clear to all stakeholders.
  - Measurable: it's possible to define a "success" criteria.
  - Attainable: can the requirement actually be achieved during the course of the project?
  - Realistic: are the requirements coherent in the context of the project?
  - Traceable: Can be tracked easily with clear dependencies.

Things that happened during Phase 1 and shouldn't have.

- We engaged with contractor(s) way too early.
  - Brought in outside contractor to gather information about existing MyGroups.
    - How are these groups used?
    - How can they be automated?
    - Who needs help with integrations?

Problem

The questions that we wanted answered were vague, but more importantly, we weren't prepared for WHY we wanted this information?

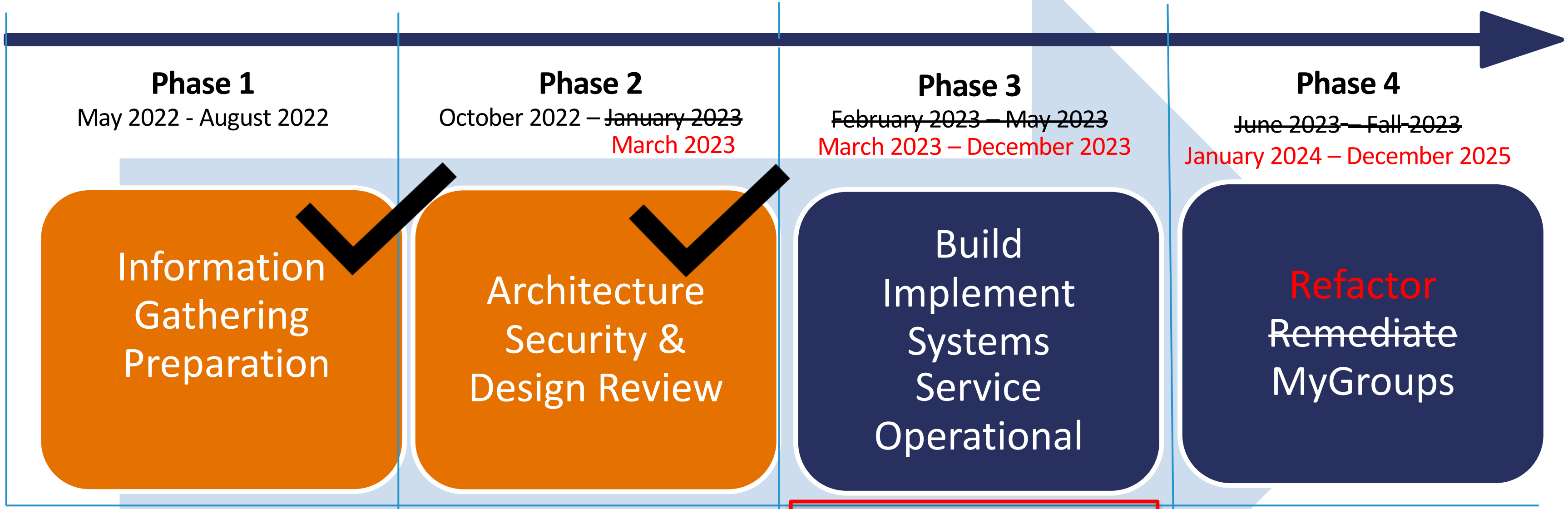
Why hire someone to "gather" info if you don't have a plan for how to use the data?!

Takeaways:

- Focus early on requirements. They drive the project.

- Requirements aren’t JUST for this project…
  - Don’t underestimate the impact on other teams and their priorities.
  - This is really just communication.

- Clarity and conciseness is key.
  - If you have to spend hours arguing about / interpreting a requirement… it’s not a good requirement.



Phase 1

May 2022 - August 2022

Information Gathering Preparation ✓

- Draft Requirements – (technical/business/audit)
- Interview other Universities
- Users of MyGroups
- Use cases for services
- Determine Phased Scope
- Assess Partner (ie Unicon, InCommon)
- Determine need for possible Advisory Committee
- Estimated Cost

Phase 2

October 2022 – ~~January 2023~~ March 2023

Architecture Security & Design Review ✓

- Refine and Finalize Requirements
- Develop Draft Architecture
  - System Diagrams
  - Data Flow Diagram
- Systems in scope for going first
- InfoSec Review
- Assess all system integrations for MyGroups
- Review Polices, Procedures, and Standard for potential updates
- Refine Details/Estimated Cost

Phase 3

~~February 2023 – May 2023~~
March 2023 – December 2023

Build Implement Systems Service Operational

- Review and Refine Final Architecture
- Build
- Develop and roll-out a pilot
- Implement systems in scope
- Service Go-Live – Operational
- Refine Details/Estimated Cost

We are here.

Phase 4

~~June 2023 – Fall 2023~~
January 2024 – December 2025

Refactor ~~Remediate~~ MyGroups

- Deep dive into usage of each MyGroup
- Determine owner of each MyGroup
- Work with owner to migrate to new product
- Deprecate unused MyGroups
- Potential sunset MyGroups service (dependent on other infrastructure needs)

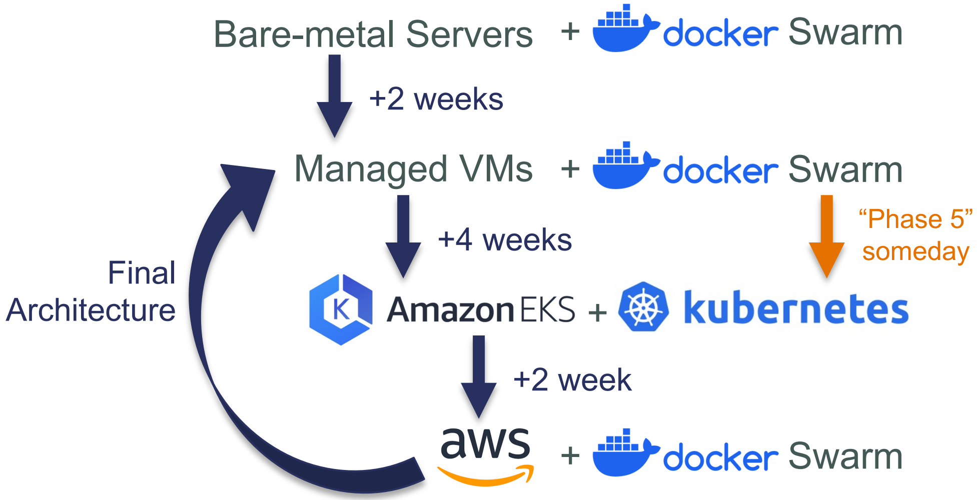
**Any significant architectural re-design of integrated systems (i.e. Sympa or AMS), would require re-evaluation and new dependent projects or scope changes.

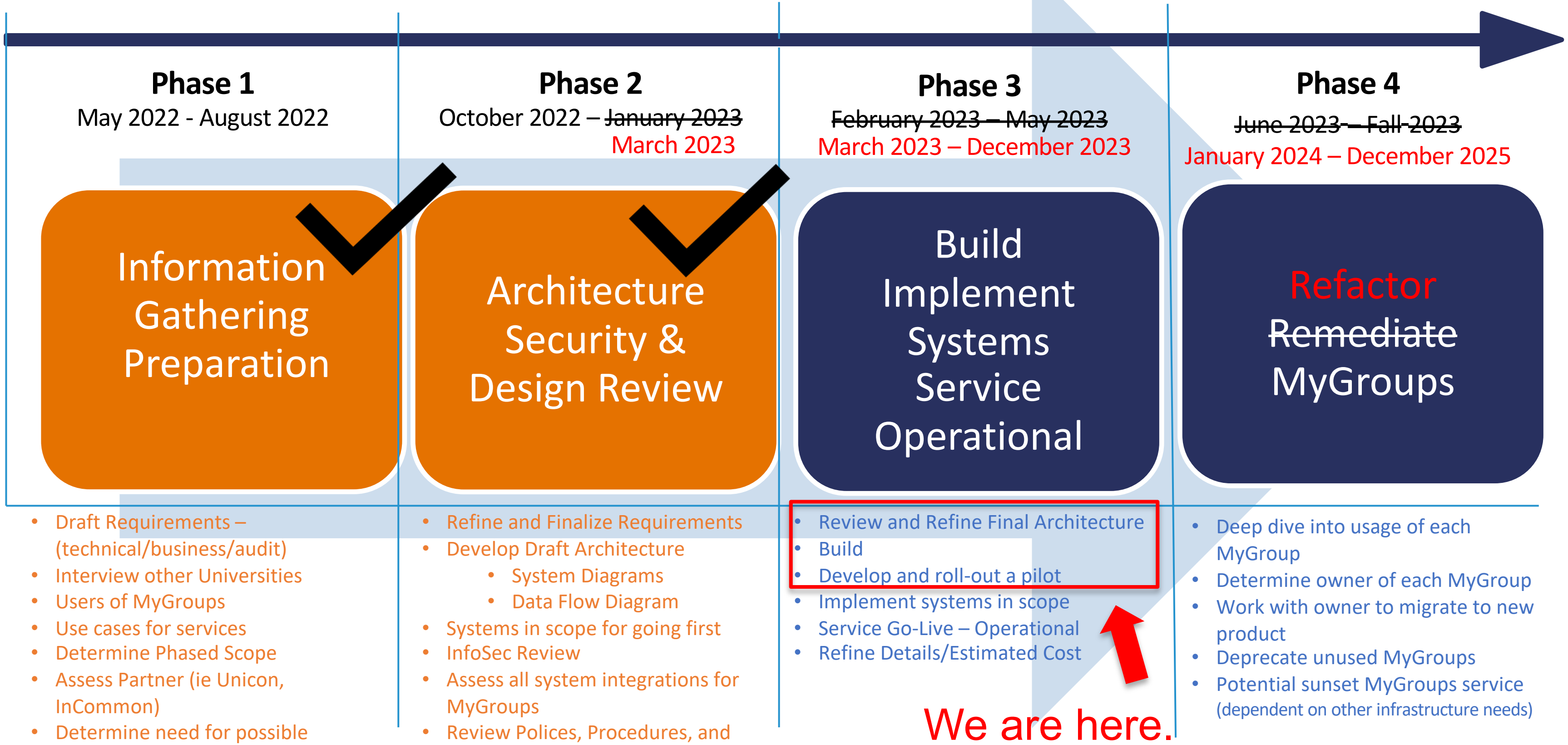
Phase 2 – Architecture

Major architectural changes occurred several times because of the requests / demands from other teams.

Takeaway:

We could have worked more closely and communicated better with our partners on other teams to validate some of our earliest architectural decisions (like bare metal) and probably landed on the ultimate solution much, much faster.





Phase 1

May 2022 - August 2022

Information Gathering Preparation ✓

- Draft Requirements – (technical/business/audit)
- Interview other Universities
- Users of MyGroups
- Use cases for services
- Determine Phased Scope
- Assess Partner (ie Unicon, InCommon)
- Determine need for possible Advisory Committee
- Estimated Cost

Phase 2

October 2022 – ~~January 2023~~ March 2023

Architecture Security & Design Review ✓

- Refine and Finalize Requirements
- Develop Draft Architecture
  - System Diagrams
  - Data Flow Diagram
- Systems in scope for going first
- InfoSec Review
- Assess all system integrations for MyGroups
- Review Polices, Procedures, and Standard for potential updates
- Refine Details/Estimated Cost

Phase 3

~~February 2023 – May 2023~~
March 2023 – December 2023

Build Implement Systems Service Operational

- Review and Refine Final Architecture
- Build
- Develop and roll-out a pilot
- Implement systems in scope
- Service Go-Live – Operational
- Refine Details/Estimated Cost

We are here.

Phase 4

~~June 2023 – Fall 2023~~
January 2024 – December 2025

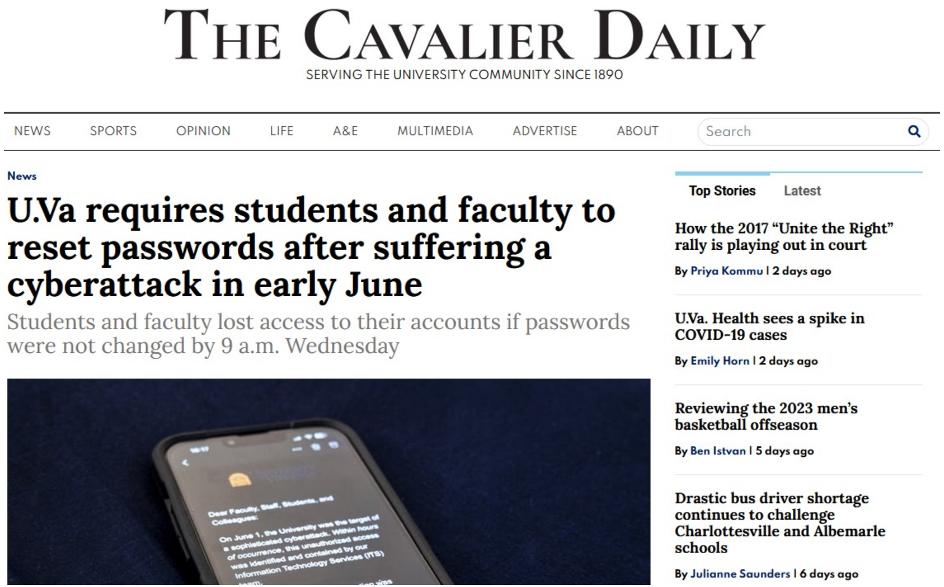
Refactor ~~Remediate~~ MyGroups

- Deep dive into usage of each MyGroup
- Determine owner of each MyGroup
- Work with owner to migrate to new product
- Deprecate unused MyGroups
- Potential sunset MyGroups service (dependent on other infrastructure needs)

**Any significant architectural re-design of integrated systems (i.e. Sympa or AMS), would require re-evaluation and new dependent projects or scope changes.

Phase #3 – If you build it, they will come.

But don’t have a major cybersecurity incident. Just my suggestion.😥



THE CAVALIER DAILY

SERVING THE UNIVERSITY COMMUNITY SINCE 1890

NEWS SPORTS OPINION LIFE A&E MULTIMEDIA ADVERTISE ABOUT Search

News

U.Va requires students and faculty to reset passwords after suffering a cyberattack in early June

Students and faculty lost access to their accounts if passwords were not changed by 9 a.m. Wednesday

Dear Faculty, Staff, Students, and Colleagues:

On June 1, the University was the target of a sophisticated cyberattack. Within hours of occurrence, this unauthorized access was identified and contained by our Information Technology Services (ITS) team.

Top Stories Latest

How the 2017 “Unite the Right” rally is playing out in court

By Priya Kommu | 2 days ago

U.Va. Health sees a spike in COVID-19 cases

By Emily Horn | 2 days ago

Reviewing the 2023 men’s basketball offseason

By Ben Istvan | 5 days ago

Drastic bus driver shortage continues to challenge Charlottesville and Albemarle schools

By Julianne Saunders | 6 days ago

Our team was responsible for facilitating reset of ~80k creds, scrambling another ~200k, ensuring remaining ~1M accounts couldn’t reactivate with compromised credentials.

- our time was lost
- hard to work with others
- change freezes
- still feeling an impact

Phase 3: Build Phase Problems

- Nearly universally what slows us down *now* is stuff we “forgot” in some way.
- Problems we should have architected around much, much sooner:
  - Sympa Decoupling
  - Grouper Authentication
  - Refactoring MyGroups groups into Grouper Groups
- Delays were completely reasonable, but the reasoning behind these delays weren’t always <u>communicated</u> to leadership clearly.

Final Thoughts

- Retiring a legacy system means addressing years (or decades) of technical and organizational debt.

- Communication – did you notice how it was always underlined? That’s because every issue we ever faced could be traced back to poor communication somewhere within our project team.

- Also… innovation comes with challenges:
  - First major IAM application running in a containerized fashion.
  - Fully implementing a CI/CD workflow for deployments.
  - No dev environment – each developer has an entire dev environment on their workstation with Vagrant VM; deploy to dev VM using same scripts as higher environments.

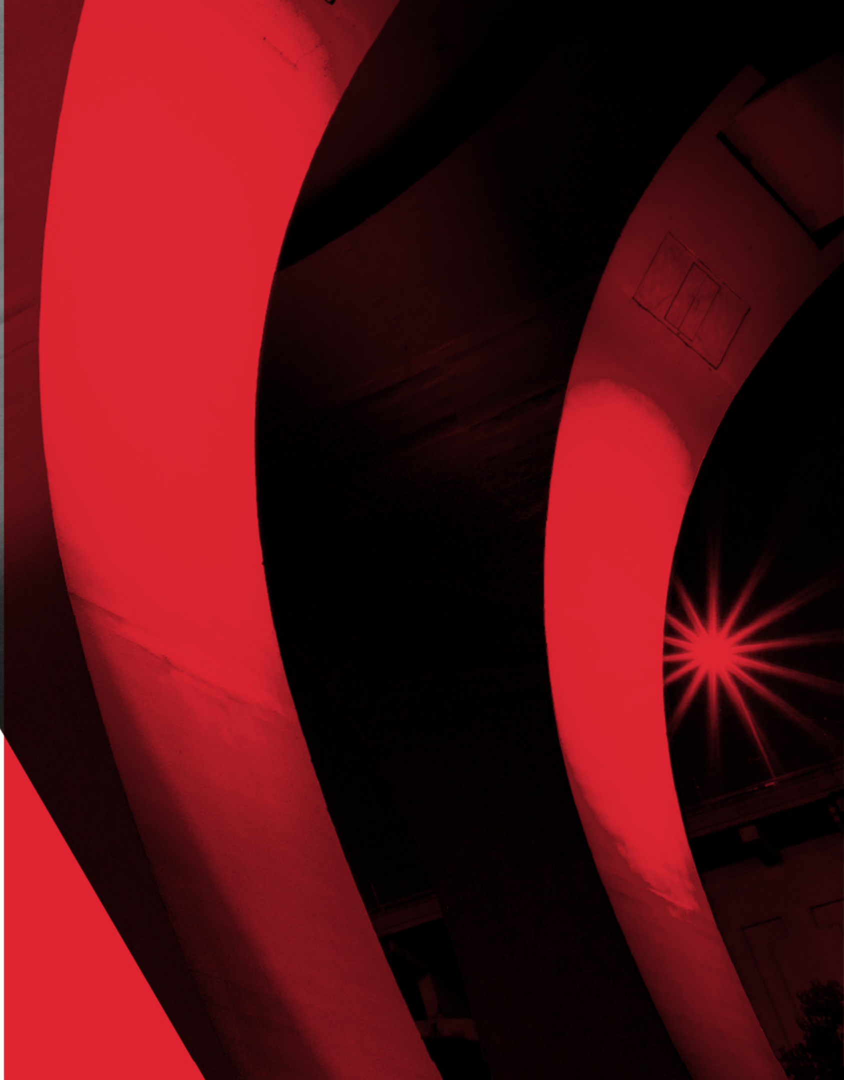
ACAMP

QUESTIONS - DISCUSSION

Contact:

Christopher Bongaarts – cab@umn.edu
Kellen Murphy - wfx6yz@virginia.edu

Thanks for listening!



Drive the Bus!

Leadership and Advisory Groups

Leadership opportunities for community members who contribute their insights, expertise, and talents within Identity & Access Management

Taking nominations now through October 1!

InCommon Steering Committee

InCommon Technical Advisory Committee (TAC)

InCommon Community Trust and Assurance Board (CTAB)

Community Architecture Committee for Trust and Identity (CACTI)

eduroam-US Advisory Committee

Please visit the Advisory Committee poster in TechEX foyer for more information and submit a nomination.
Otherwise, you may click this link to submit a nomination.