EdgeX Planning Conference (virtual meeting)

Kamakura Release

Nov 1-4, 2021

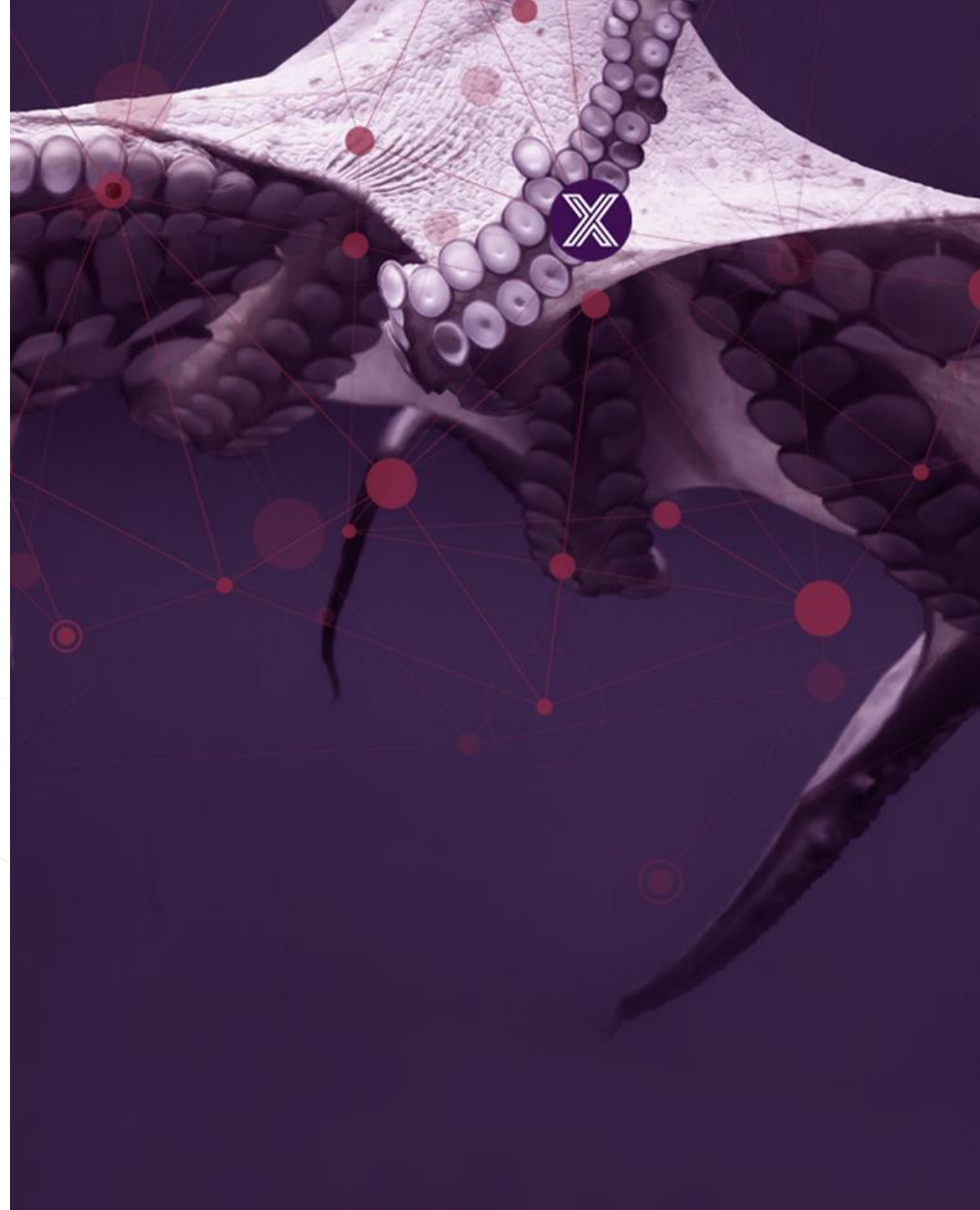edgexfoundry.org | @edgexfoundry

Conference Agenda

- Nov 1, Monday, 7am
  - Business Topics
  - Architectural Tee-up
- Nov 2, Tuesday, 10am
  - Cadence & Process
  - Architectural issues
- Nov 3, Wednesday, 7am
  - Kamakura Scoping
- Nov 4, Thursday, 10am
  - Finish scoping and architectural issues
  - Jakarta lessons learned
  - Long term road mapping
- Nov 5, Friday, 8am
  - Unconference & Training

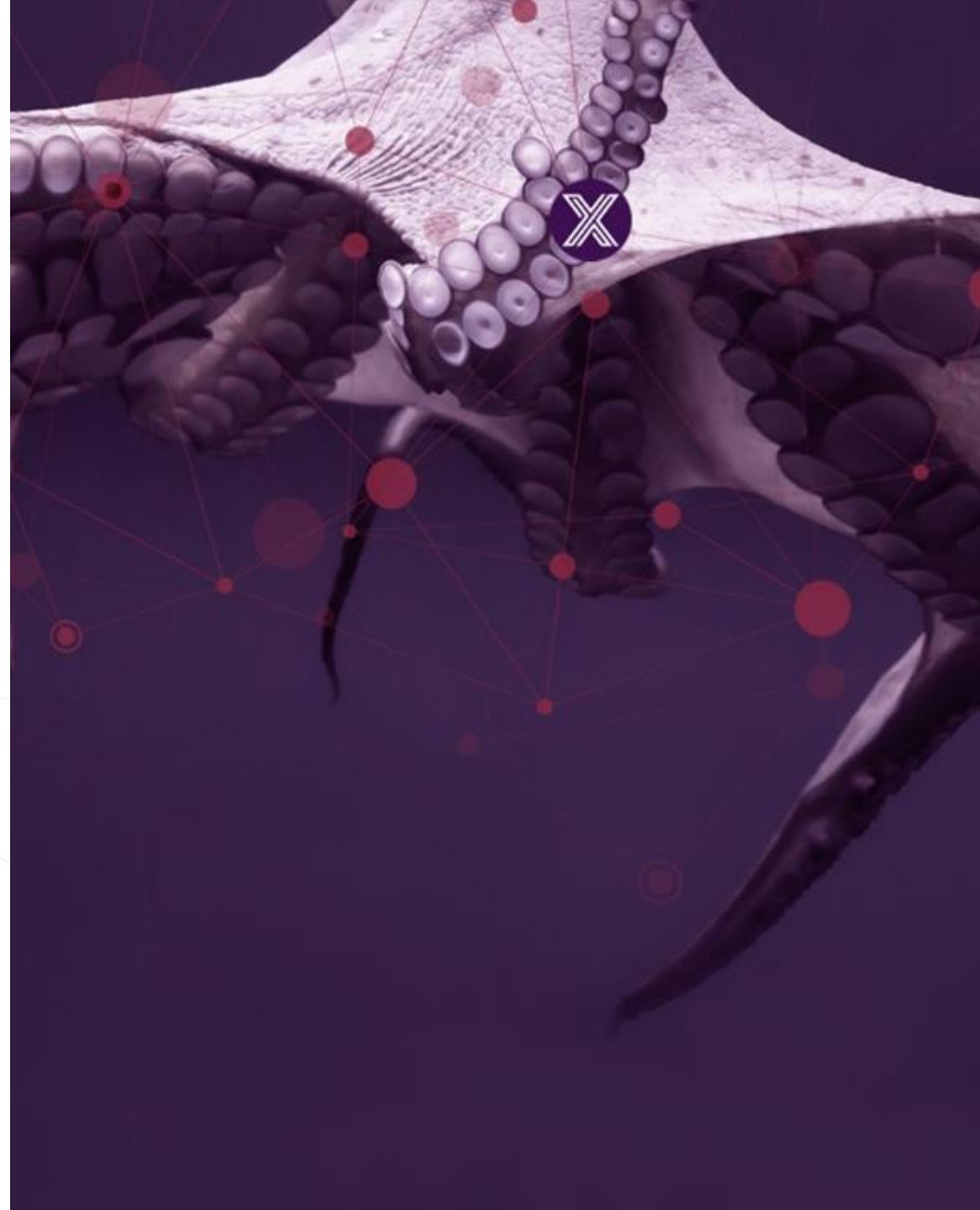# EDGE**X**FOUNDRY™

Intros

Name, rank, serial number please

EDGE X FOUNDRY™

Day 1

Nov 1

Conference Agenda – Day 1

- Nov 1, Monday (all times in PDT; all times tentative and fluid)
- 7am PDT Introductions & Logistics
- 7:15am Kamakura release
- 7:30am Business Topics
- 9:00am Architecture topic tee-up
- 11am day 1 adjourn

Kamakura Release

- Version 2.2?
  - Must still be backward compatible
  - Can add, but not remove deprecated items yet
  - Not LTS, but must consider we have LTS now on the books
- Major additions under consideration
  - North to south message bus
    - App service to command to start??
  - Metrics (per ADR)
  - UoM
  - Record and replay DS
  - Better (native) Windows support

Business Topic Agenda

- Web Site (Andy/Gavin & Melvin on China site)
  - Website funding
  - Stats from Chinese site
- Developer Evangelism (Rodney/Jim)
  - EdgeX Ready
  - Developer Badging
  - EdgeX Smart * Challenge 2020
- Project and community offering promotion
  - EdgeX Certified
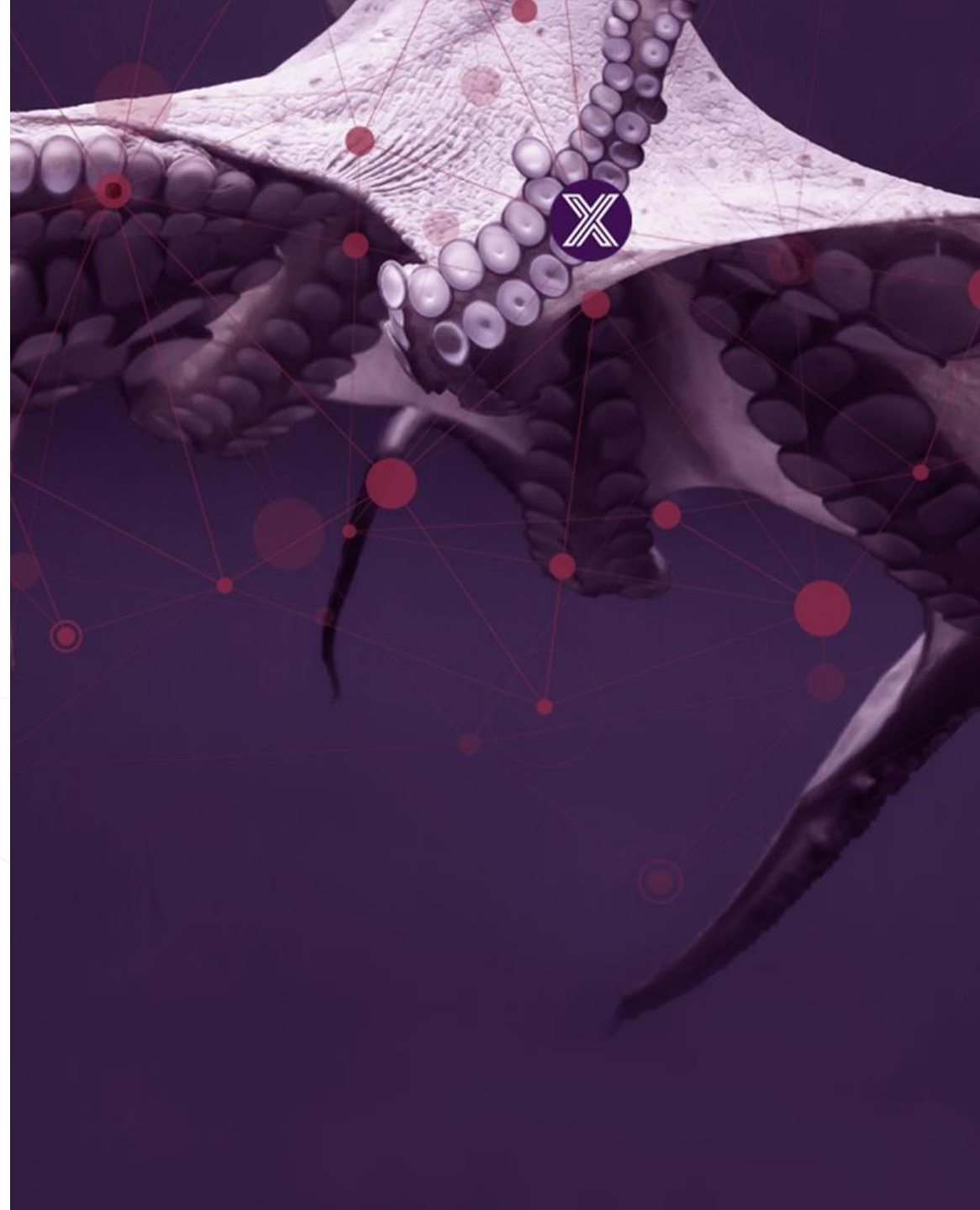- Vertical Solutions and Liaison
  - Adopter Series

Outreach

- EdgeX badging – trial and eval in 2022
- EdgeX Ready – eval by early 2022
- EdgeX Certified – on hold
- Regular Web site and download stats production
- Hackathon (English)
- Regular blog/vlog posts
- Adopter series – time to make it ad hoc

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Architecture Tee Up

Kamakura Major Themes and Objectives

- Dot release

- Major additions under consideration
  - North to south message bus
    - App service to command to start??
  - Metrics (per ADR)
  - UoM
  - Record and replay DS
  - Better (native) Windows support

Scoping

- Categories used in our pre-wire
  - In scope
    - It is "In scope" – must be done; no debate; near unanimous consent
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  - Out of scope
    - Not being discussed in this meeting

Architect's Topics list

- In scope
  - Dynamic profiles (ADR)
  - Metrics collection (ADR)
    - Control plane events too?
  - UoM implementation (ADR)
  - Tracking project decisions (small to the large)
    - To be discussed in full on Monday time permitting

- Under Consideration
  - North-South message bus
    - Allow cloud or north side system to message command
    - Allow command to message device services
  - Moving Command API into Metadata service
  - K8s what's next
  - Things provisioning
    - More autonomous
    - Better device services

- Windows Support
  - ZMQ prohibits native support (how to provide option to remove ZMQ)
  - Package support (MSI)
- REST/SOAP inside a device service
- Global configuration
  - Remove duplication across configuration

- On the fence
  - Reducing EdgeX Size
    - Research only this release
  - Getting rid of SMA (already deprecated)
    - What replaces start/stop/continue, config, service metrics
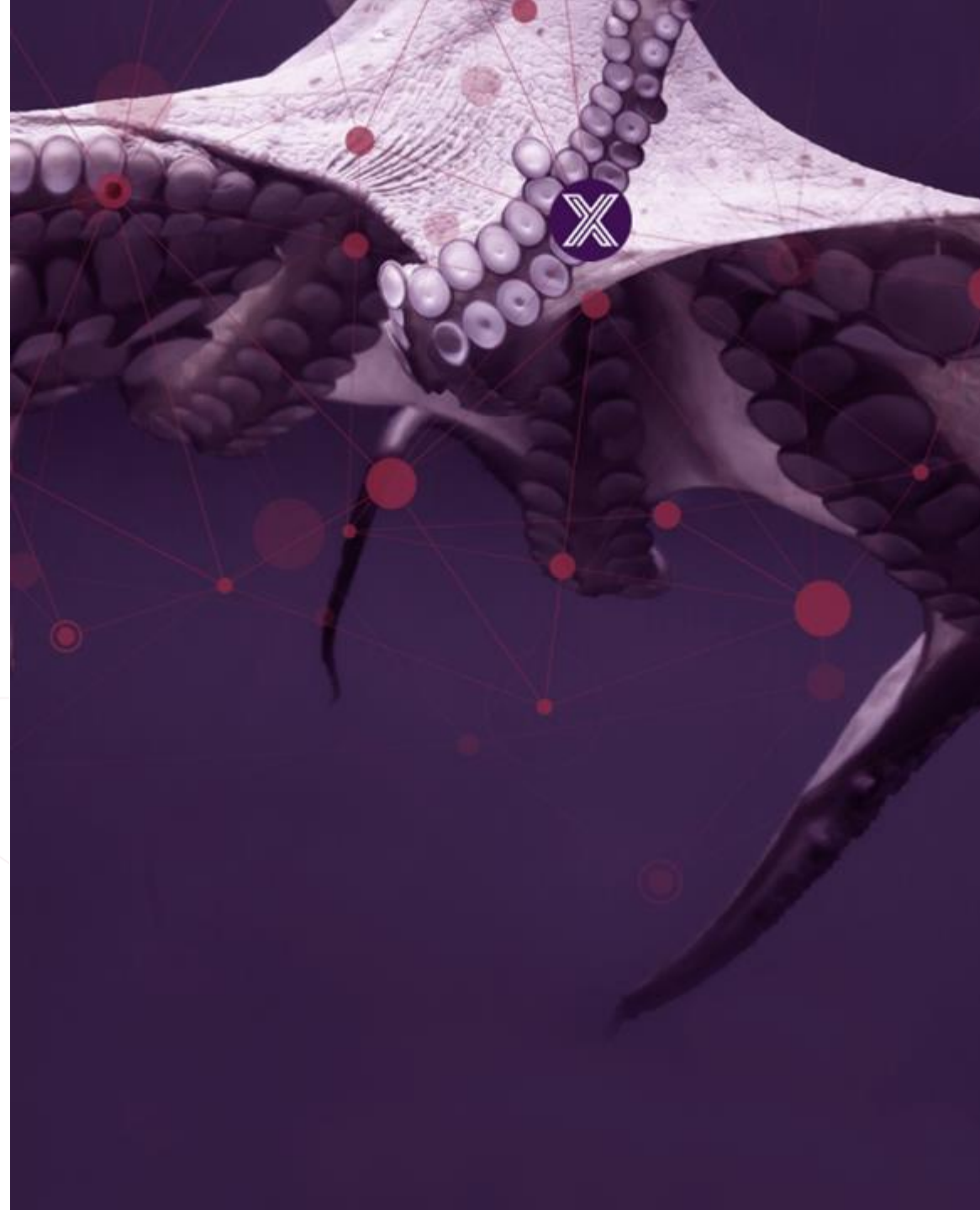 - Expand notifications
    - Allow other protocols (SMS, messages, websockets)
    - Alarm based on metrics/resource usage

Details in slides for Day 2

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Day 2

Nov 2

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Conference Agenda – Day 2

- Nov 2, Tuesday (all times in PDT; all times tentative and fluid)
- 10am PDT Meeting Start
- 10:15am Release cadence check & release naming
- 11am Architecture topics discussion and decisions
  - Topics relevant to upcoming release having priority, discussion of architectural design - with goal of making decisions that are particularly relevant and impactful to upcoming release
- With any remaining time, we will start to explore Kamakura scope
- 1pm day 2 adjourn
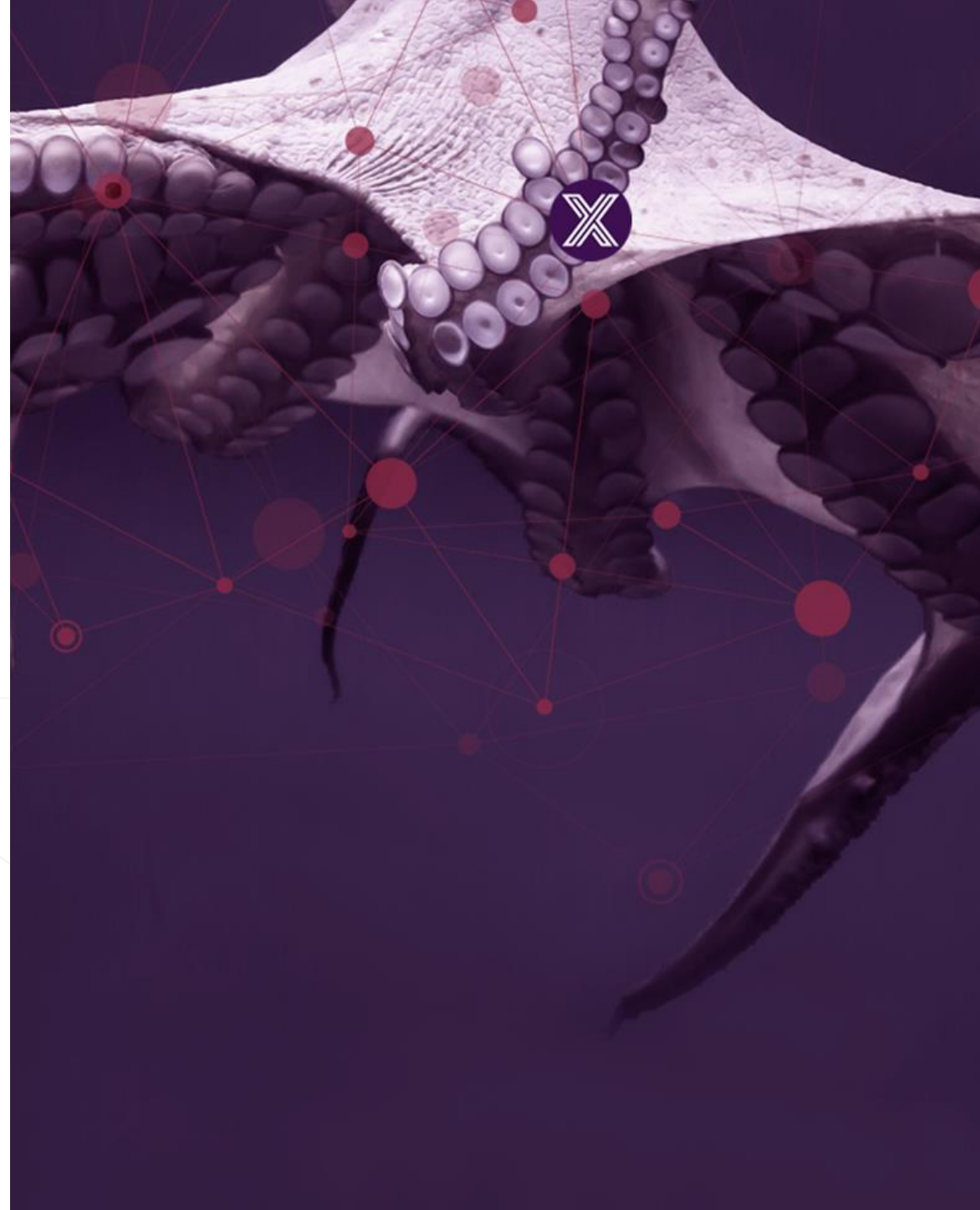
Cadence Check

- April & Oct/Nov remain target release months
  - Kamakura release – May 2022
  - Levski release – Oct 2022
  - Minnesota release – May 2023
  - N release – Oct 2023

- Venue for next F2F Meeting (April 2022)
  - With travel restrictions lifted – everyone in favor or a F2F
  - Volunteers, suggestions on where to hold this meeting?

- Conferences – marketing committee update
  - Per Outreach planning, looking at mid-2022
 - On hold for now

N release named by ?

Release Detail Timing

- Given circumstances of the last few releases, we have been flexible
  - Should we try to standardize the release timeline a bit for everyone's expectations and planning?
- Formalizing this for future releases (**Proposed**)
  - Release date selected (attempt to select 2 months in advance of release)
    - Wednesday / mid week target
    - September for fall
    - March for spring
  - Freeze date selected off the release date
    - Wednesday target to match release date
    - 3 weeks prior for substantial major release or LTS
    - 2 weeks prior for minor release
  - Planning meeting
    - Monday – Thursday virtual or Tuesday/Wednesday when in person
    - 2.5 weeks prior to a major or LTS release
    - 1.5 weeks prior to a minor release
  - Pre-wire meeting
    - Wednesday or Thursday prior to the Freeze date

Formalized Planning (Proposal)

**Example Calendar for Major/LTS Release**
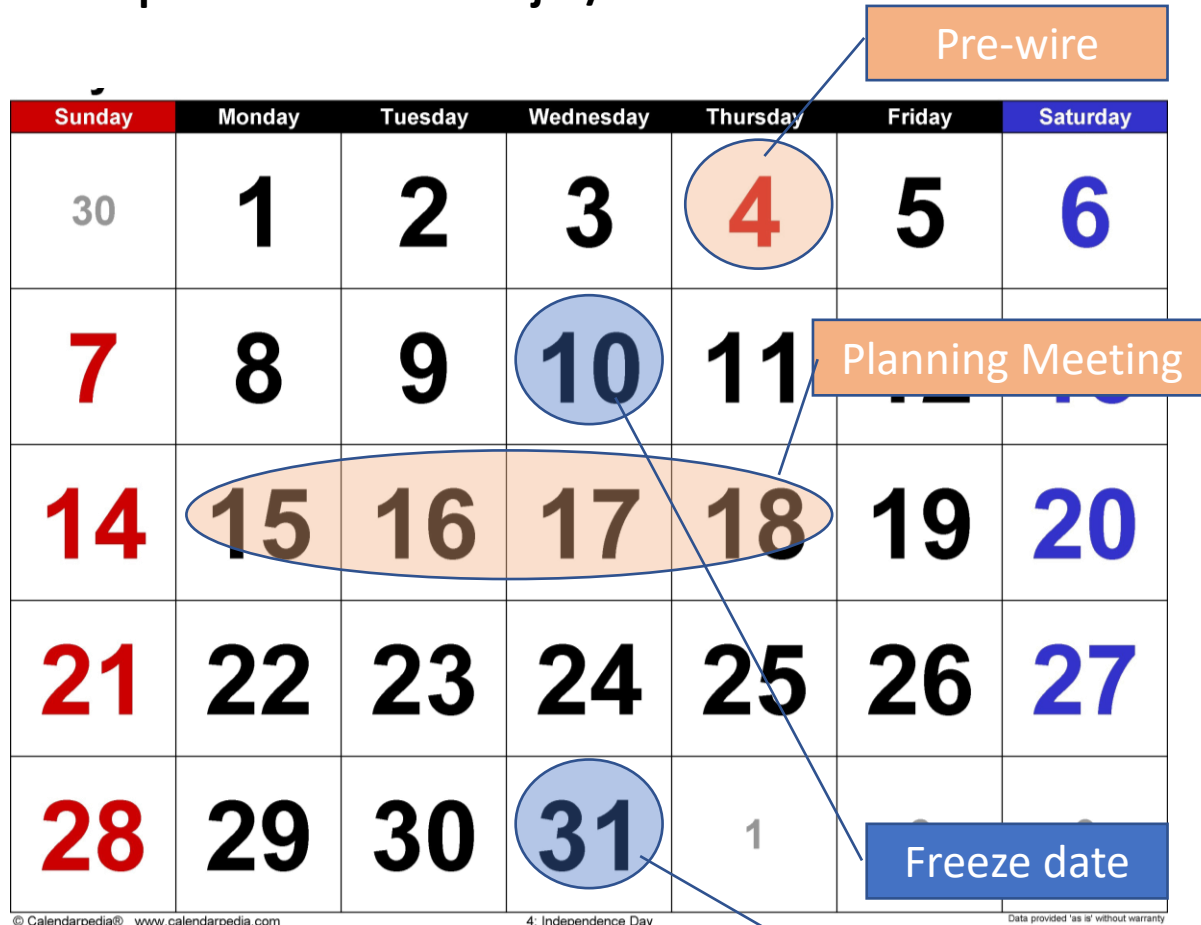
**Example Calendar for Minor Release**

EdgeX Meeting Times Relook

- Mondays
  - Device Services @ 8am PDT
  - Certification & Outreach/Marketing alternate @ 9am PDT
  - Architect's meeting once a month @ 10am PDT
- Tuesdays
  - Occasional Adopter series meeting @ 8am PDT
  - Application Services WG @ 9am and 3:30PM PDT alternate weeks
- Wednesdays
  - TSC @ 8am PDT
  - Security @ 9am PDT
- Thursdays
  - Core @ 8am PDT
  - DevOps @ 9am PDT
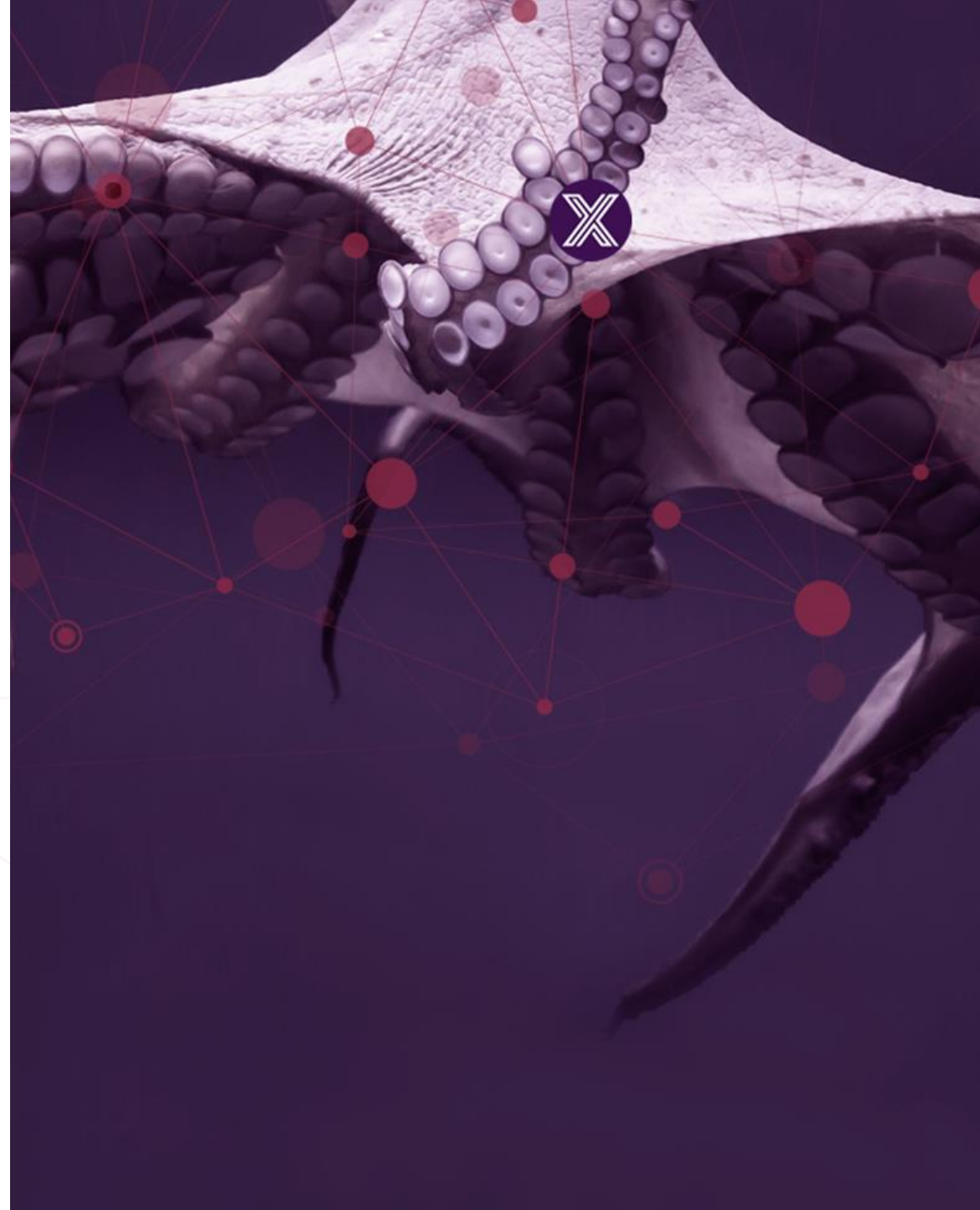- Friday
  - No meetings

Any changes ?
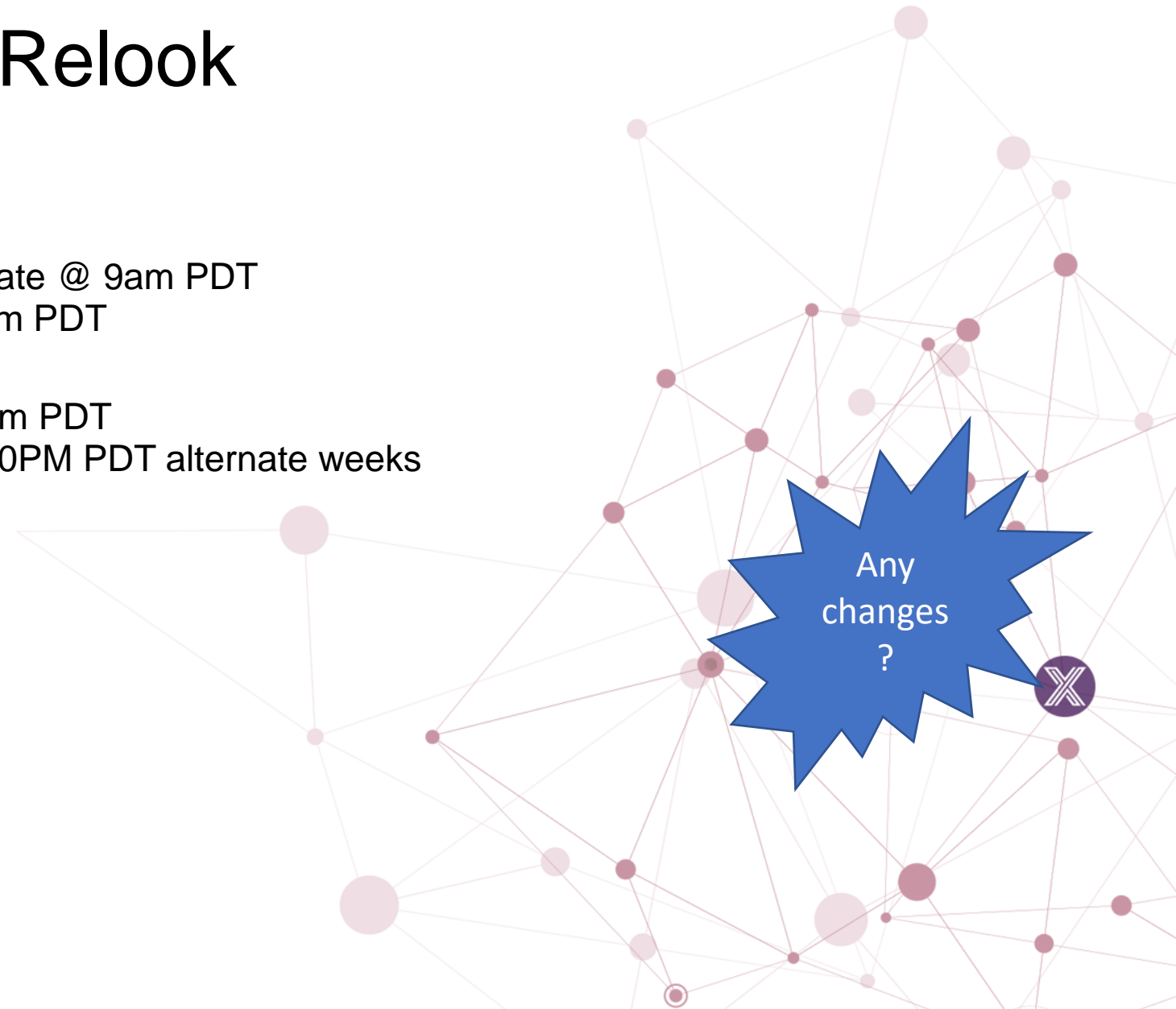
EdgeX Meetings Start, stop, continue (improve?)

- WG meetings – more/less frequently

- Monthly architect meetings
  - More/less frequent?

- Adopter Series
  - Bi-monthly?
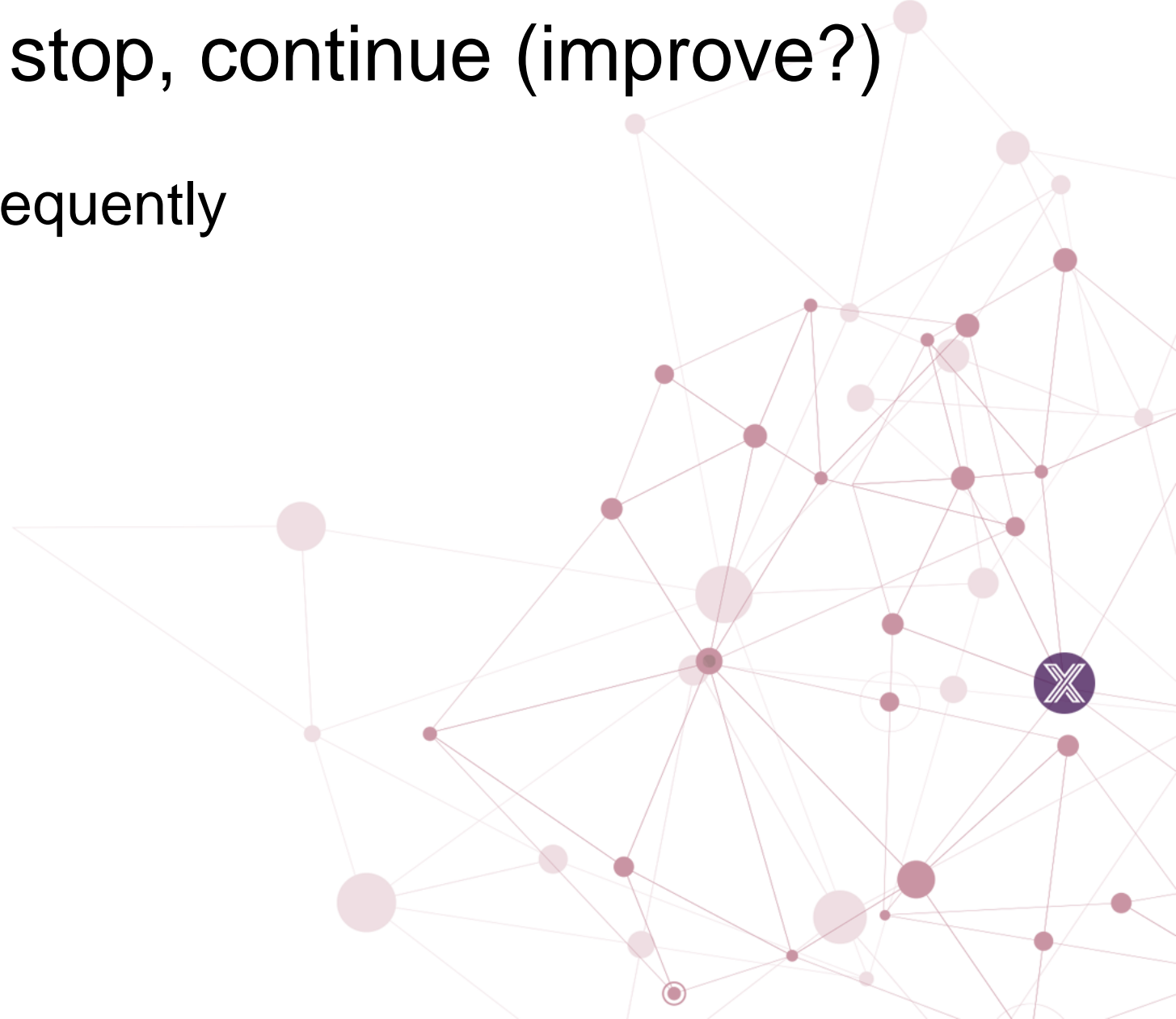
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Architectural Discussions/Decisions

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In Scope

Dynamic Profiles

- ADR - https://github.com/edgexfoundry/edgex-docs/pull/605
- What do we allow to be added, removed, updated on profiles (and their associations) once system is running
  - Adding easier than allowing updates/removals
- Needs to be enforced across the system
  - CLI, GUI, APIs, etc.
- Probably need at least a design during this release

Metrics Collection

- ADR - https://github.com/edgexfoundry/edgex-docs/pull/268
- Each service to send metrics to topic
  - Ex: number of events sent, average time per request, etc…
- How to implement
  - Go metrics, other package
  - Impact to C services
- Considerations
  - Impact to size
- Also need control plane events??
  - Ex: a device was provisioned, a service was stopped, config has changed…

UoM
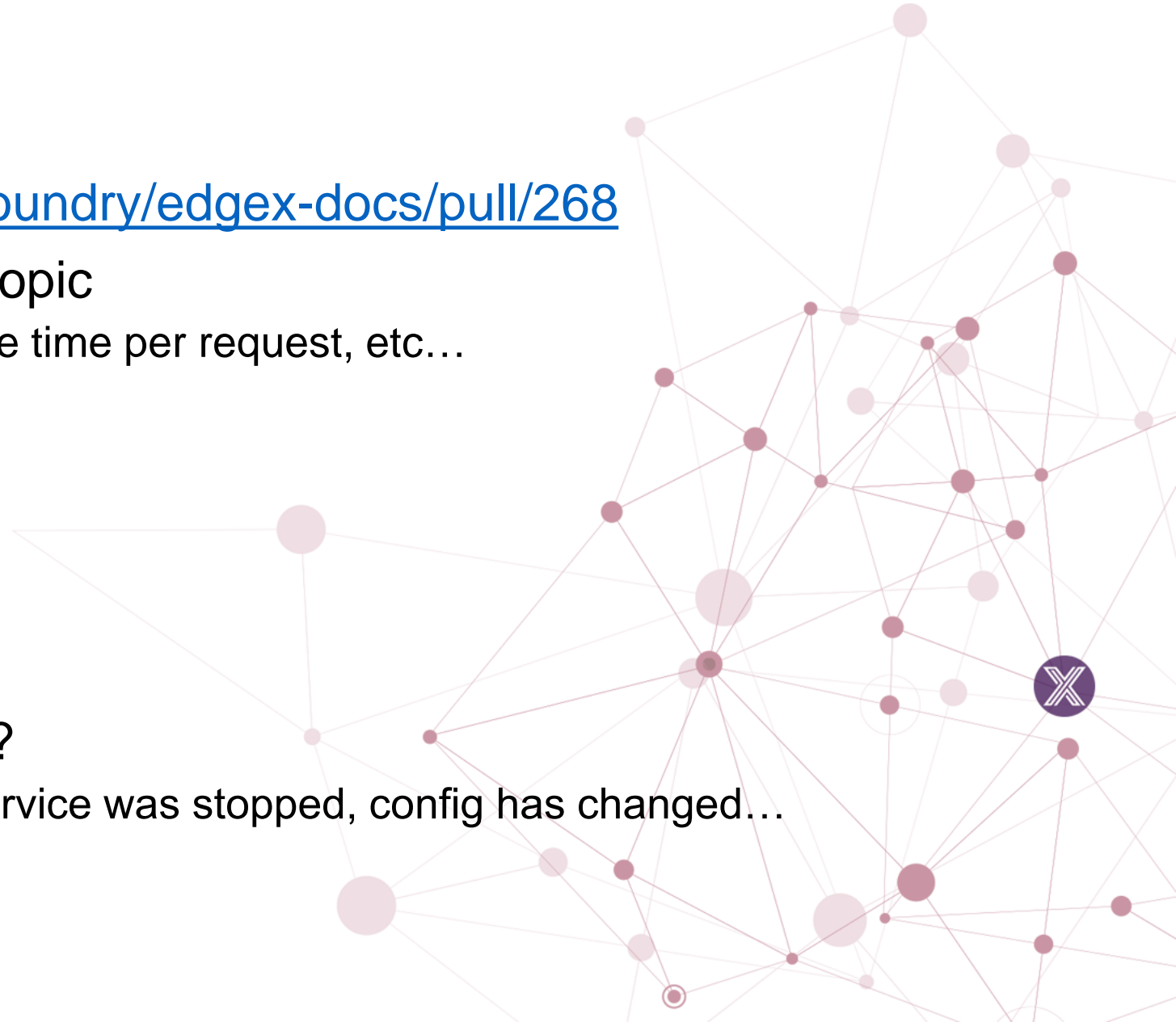
- ADR - https://github.com/edgexfoundry/edgex-docs/pull/386
- Can't find a spec that is universally used
- Allow for adopter to specify but add to UoM to event/readings
- Validation - later

Tracking project decisions

- ADR has been used (successfully?) for large stuff

- What about all the smaller and project decisions by WGs?

- Project is losing track
  - PR process is too heavy to submit for all decisions
  - Needs to be accessible by everyone
  - Needs to be quick to update

- For reference: Kubernetes
  - https://github.com/kubernetes/community/blob/master/sig-architecture/README.md

Under consideration

In scope by default

North-South message bus

- We've successfully implemented the ability to send sensor data from south to north via message bus
- No way to send requests from north to south in message bus
- Message bus provides means for:
  - Guaranteed delivery and better QoS where needed
  - Messaging preferred in many use cases
- Would require (and could be done in phases)
  - Command service to receive and relay messages
  - DS to receive/process messages
- Other questions
  - Would AS need message bus acknowledgement
  - Rules engine to call message bus or REST option?
  - What about other services using message bus (support)

Moving Command API into Metadata service

- Command API is tiny
  - Doesn't have its own DB anymore
- Reasons for it to still exist (future needs)
  - Allow for more/tighter access control
    - Control who has access to critical actuation
  - Allow for multiple actuation needs
    - Fire commands across device services
    - Fire many commands at one time
    - Allow for command transactions

Kubernetes

- What's next?

- We have an example

- In the past we had a helm chart example

- Intel members say "can't run EdgeX in K8s"
  - How can we get more (services) of EdgeX running in K8s
    - What's blocking from running all of EdgeX in K8s?
    - Why and why is not in a form that most in K8s field accept?
    - Expectation of scalability – how do we address?

Things Provisioning

- Adopters are asking for more automatic discovery/provisioning
  - "Zero touch" provisioning
- How can we improve and simplify the discovery of devices?
- How can we improve and simplify the automatic provisioning of devices?
- Device configuration file is helping
- How about some tooling too?

Windows Support

- We claim platform independence

- Running natively on Windows is now nearly impossible (outside of Docker or something like WSL2)
  - ZeroMQ does not compile on Windows 10 (Mike J script broken)

- Can we keep backward compatibility but allow for no-ZMQ windows option?

- Can we provide Windows MSI for base EdgeX install (like Ubuntu Snap with everything included?)

- And do we need testing in CI/CD for Windows?

REST/SOAP inside a device service

- How should REST/SOAP communications be handled in a Device Service?
- Comes from Support object data type in both Set and Get command issue
  - https://github.com/edgexfoundry/edgex-go/issues/3754
- RFID/LLRP DS need similar
  - https://github.com/edgexfoundry/device-rfid-llrp-go#data-format
- Needs and ADR going forward

Global Configuration

- Is it time to consider some sort of global configuration?
  - We have a lot of duplication
  - Requires a lot of config to be touched when an adopter wants to change one item
    - Examples: topic name, logging
    - Turn on/off metrics collection in the future

- Difficulty – where would the configuration go?

- Considerations: with or without Consul, with or without security (and Vault)
  - Additional consideration: containerized vs non-containerized (Snaps)

# On the fence

Out of scope by default

EdgeX Size Concern

- EdgeX size is getting bigger
  - Of course there is more functionality too
  - Better security – but at a price
  - Message bus support – but requires infrastructure (potentially a broker)
- EdgeX services are quite tiny, but 3rd party services are huge
  - They were created for the enterprise by enterprise experts
  - They were not meant for the edge
  - We only use a fraction (10%) of the functionality provided by these systems
- It is time to research alternatives or even consider our own implementations in some cases
  - Could we encourage 3rd party partners to develop edge specific alternate?
  - We need to be careful in creating custom security service that are not trusted
    - First rule in security – don't create your own security solutions
- Spend this release researching options

Component	Size
Consul	113MB
Kong (and its DB)	308MB
Vault	196MB
Average EdgeX service	~20MB

Deprecating SMA

- It is already deprecated

- What replaces it? Does anything replace it?
    - Start/Stop/Restart capability
    - Metrics of services (memory, CPU)
    - Get config

- Docker or K8s provides this
    - What about non-containerized or Snaps

- What is the timing of removing
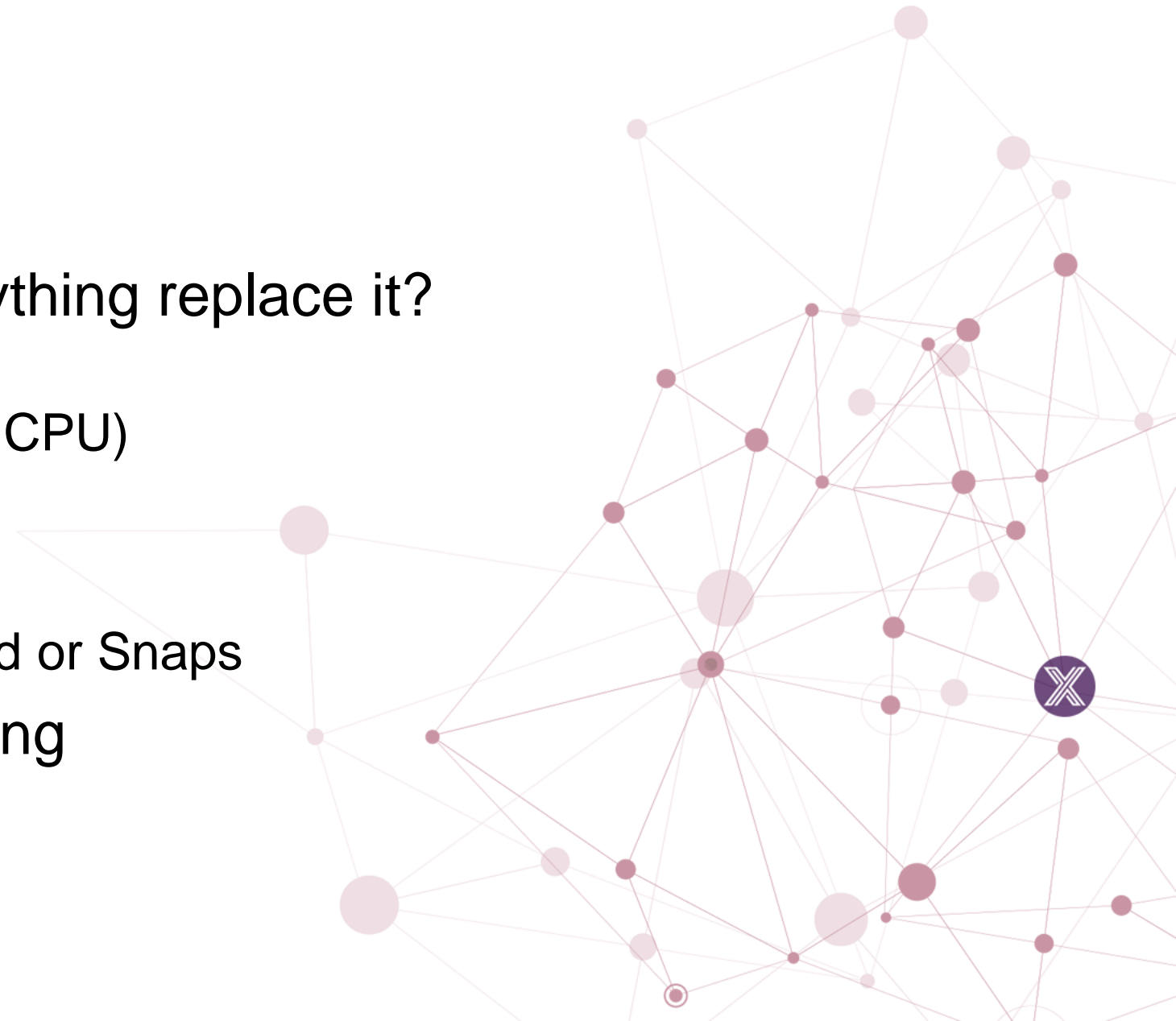
Expand Support Notifications

- Adopter use case needs
  - Send notifications via SMS, web socket or message protocol (MQTT)
  - Make it easier to use/send notifications
    - Better examples
- Allow rules engine to trigger notifications
- Allow configuration (vs coding) of alarms
  - Notifications based on certain conditions
    - Examples
      - Sensor value falls outside of a threshold
      - Service metric falls outside of a threshold (time to respond is > than a number of milliseconds)
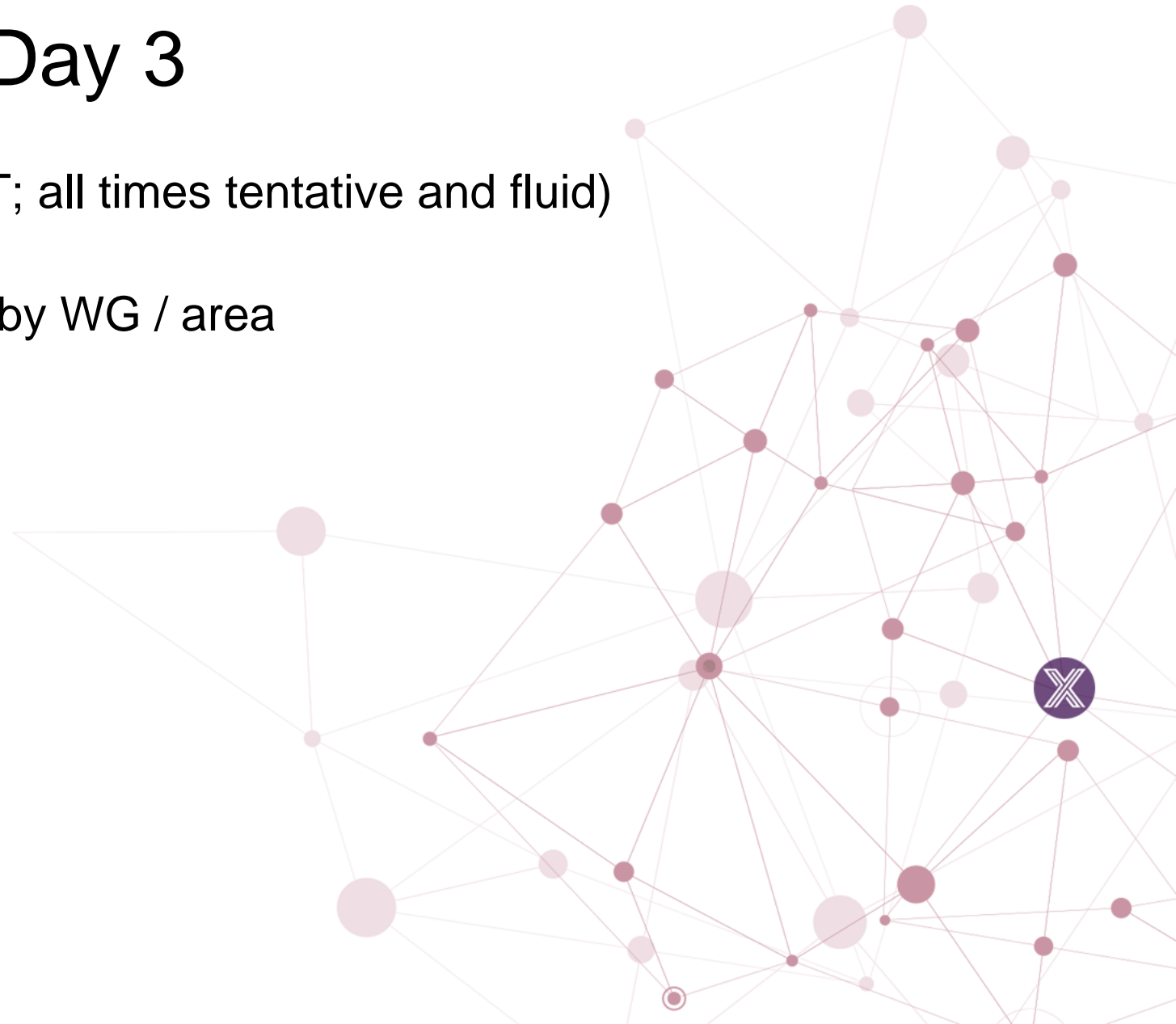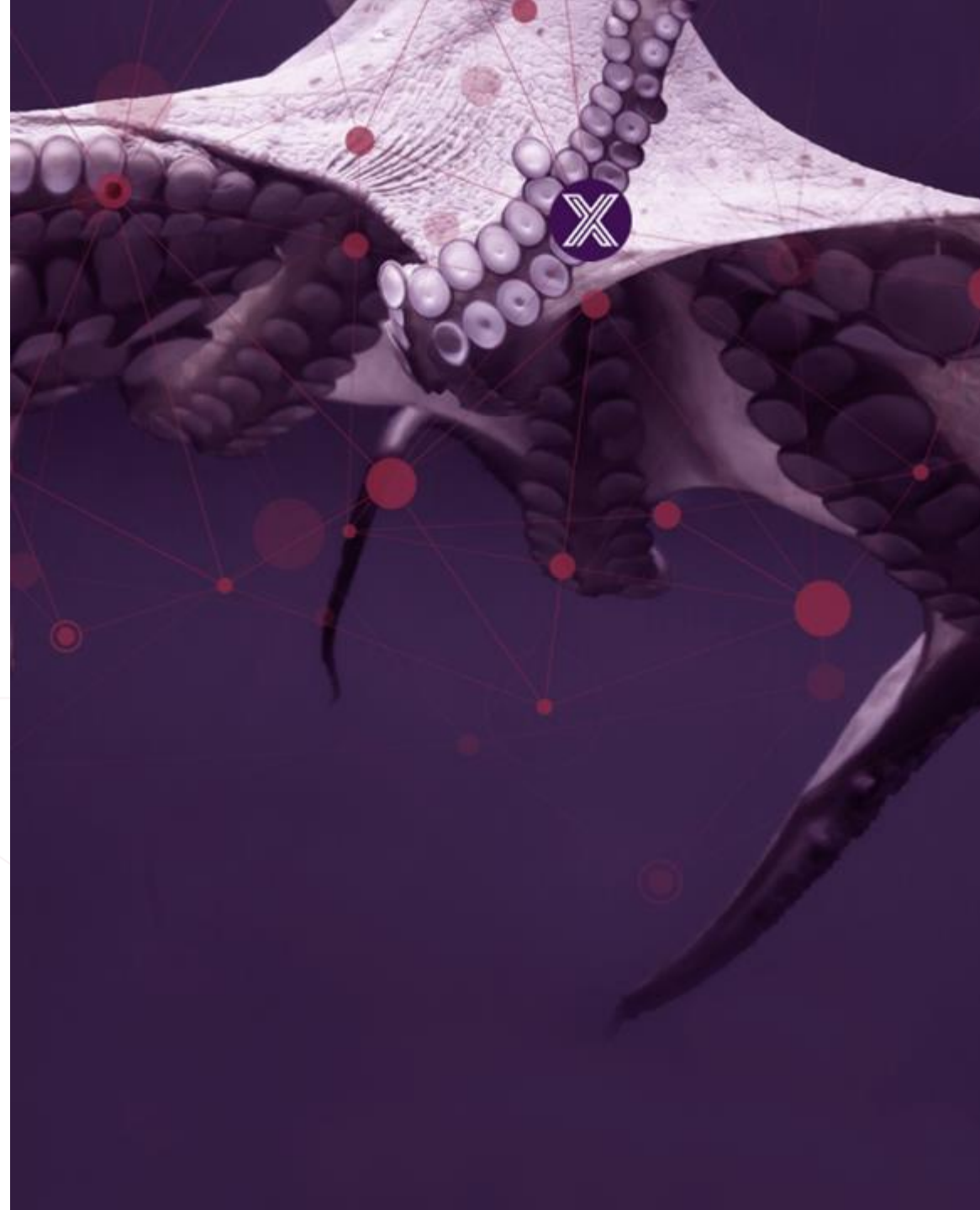   - Service memory use exceeds a threshold of MB
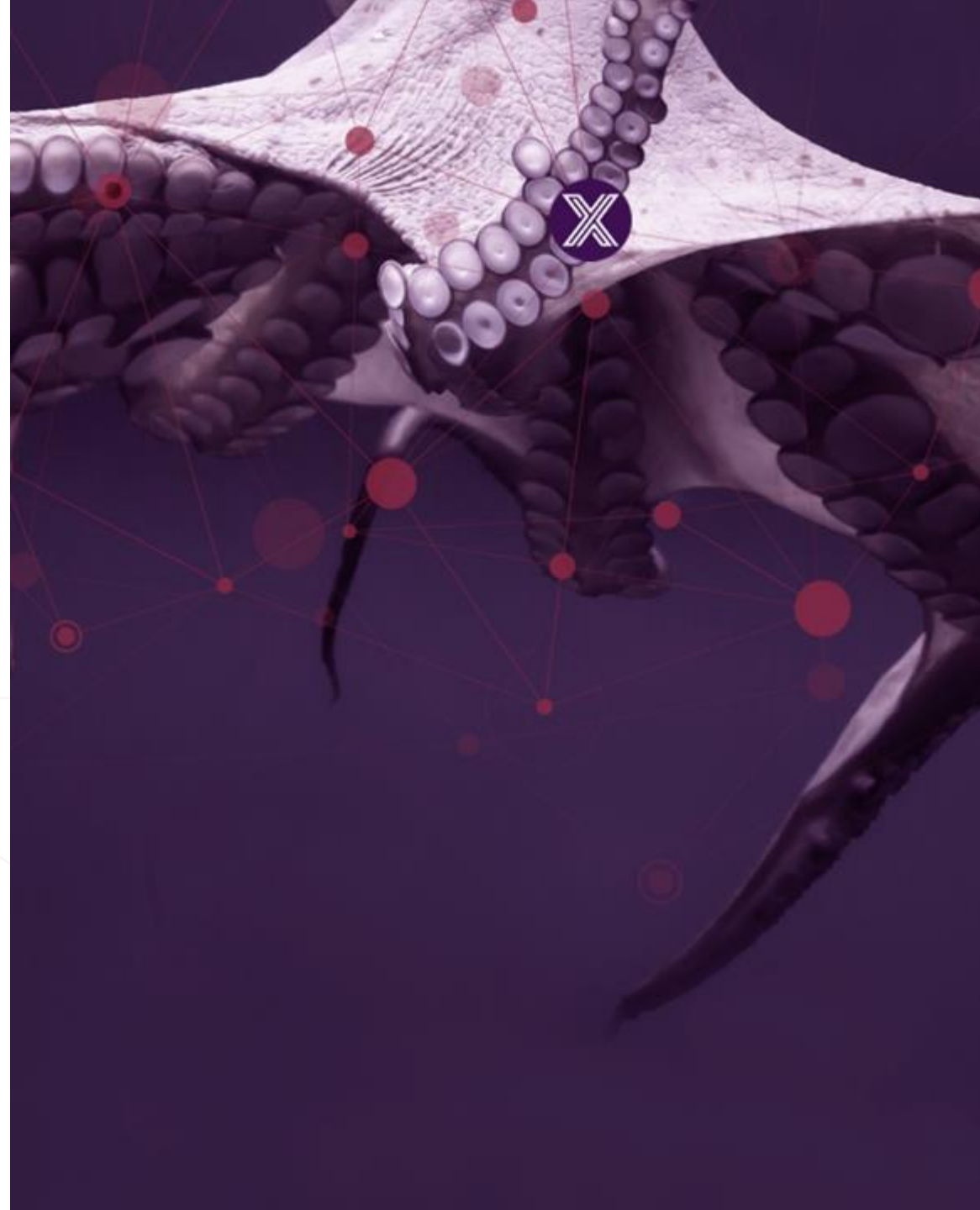
Conference Agenda – Day 3

- Nov 3, Wednesday (all times in PDT; all times tentative and fluid)
- 7:00am PDT
- 7:15am Kamakura scope planning by WG / area
  - General
    - Common
    - Cross cutting concerns
  - Core
    - GUI
    - CLI
    - System management
    - Test QA
  - Device Service
  - Application
    - eKuiper / rules engine
  - Security
  - DevOps
- 11am day 3 adjourn

Considerations

- Is there a champion / developer to drive the solution & get the work done
  - Who
  - Timeline
  - Dependencies
- What is high priority and what is a stretch goal?
  - T-shirt size it
  - Small – one release; one WG; one service; approximately one man to complete
  - Med – one release; many services;
  - Large – one release; all services; could take someone all release to finish
  - X-Large – multi-release and probably more than one service

Caveats

- Items in the pages following are options at this point
- May be research or design tasks for this release
  - May be partial implementation
- No level of effort has been determined
- No priority has been assigned

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General

- Upgrade Go (1.17)
- Always send CBOR option for performance
  - Test first and apply if it makes sense
  - What would "significant" savings look like?
  - >100 milliseconds?
- Remove ZMQ to allow for Windows native
  - Backward compatibility issue
- Replace poorly supported 3rd party libs
  - bitbucket.org/bertimus9/systemstat
  - github.com/armon/circbuf
  - github.com/go-logfmt/logfmt
  - github.com/mitchellh/consulstructure
  - github.com/pascaldekloe/goe
  - github.com/ryanuber/columnize
  - github.com/sean-/seed
  - 3 V1 CLI's as well
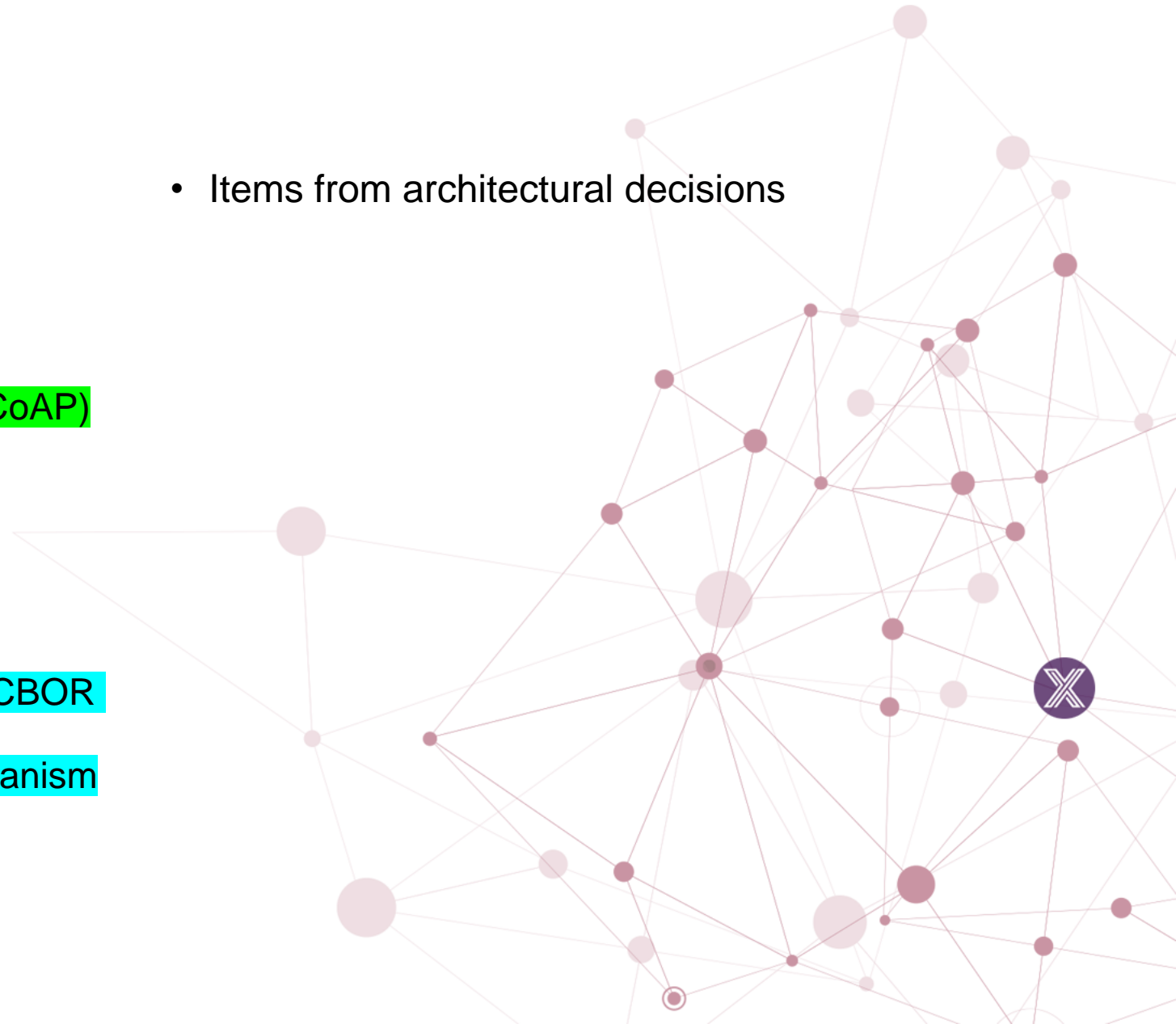
- Items from architectural decisions
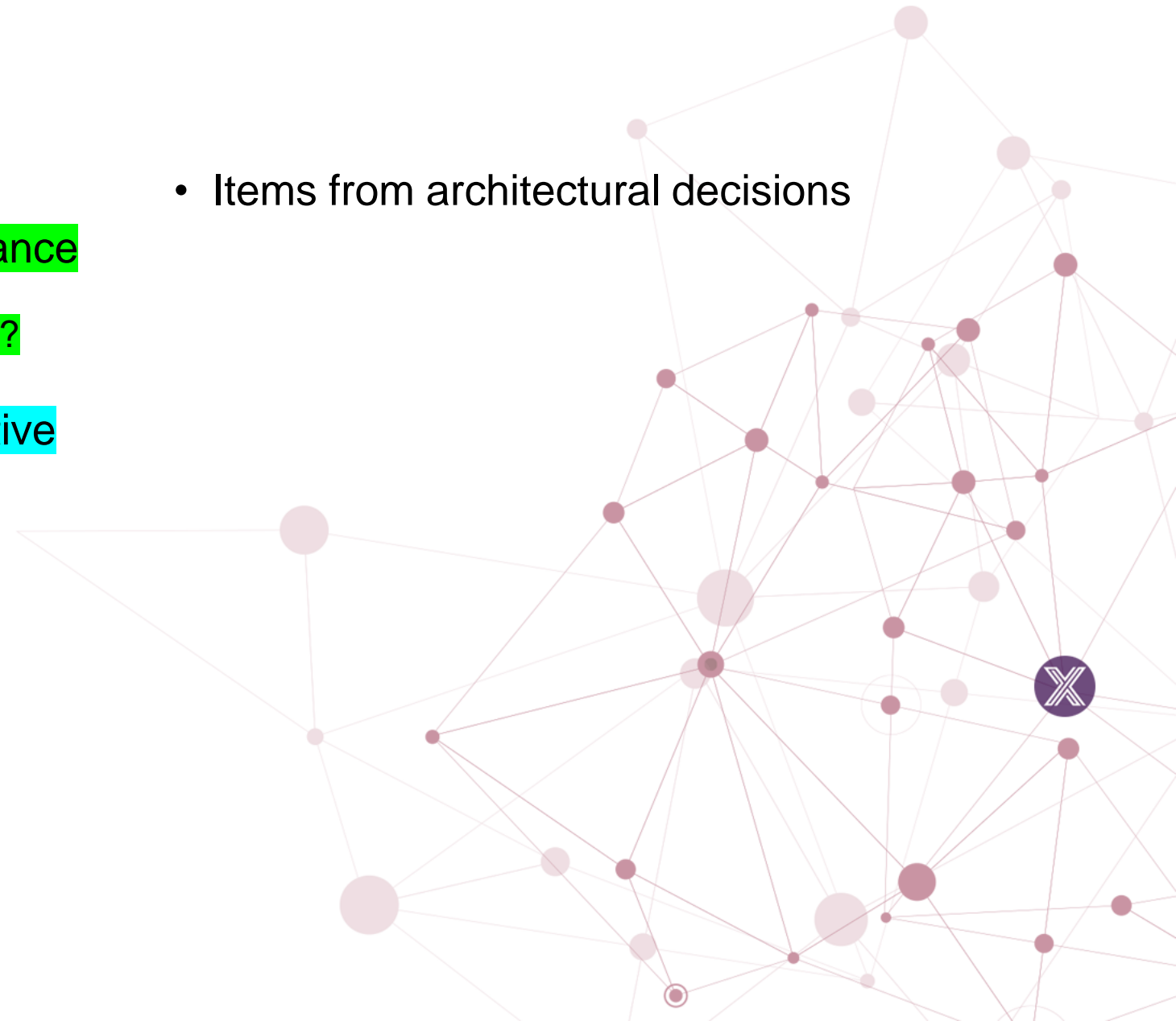
Core

- Core
  - Update lastConnected should not trigger device service callback
  - Refactor the pkg.Encode func name
  - Move to typing in JSON
    - Tech debt to use interfaces vs string:string in properties
    - Complexity - using the string match on provision watcher
  - Support custom attribute in Device object
    - Labels very simplistic and not what they are intended for
    - Eaton requirement help
    - Narrow discussion to support for parent-child
  - Prometheus integration
  - Expand the notification service
    - SMS, message bus, web sockets
    - Raise alarms (when data or metric out of threshold)

- GUI
  - Fix unallowed activity (ex: mod device profile)
  - Testing

- CLI
  - V2
  - Support app and device services
  - Support for registry, proxy setup

- Test QA
  - More Improvements to testing (from our Jakarta planning)
    - Test without optional services, message bus v REST, etc.
    - Improved integration test (Kuiper)
    - Improved stress tests
    - Improved performance testing (other device types, CBOR, etc.)
  - Trigger performance tests from edgex-taf
  - Real hardware testing
    - In the LF lab?
    - At least a small pilot
    - CI/CD integration needs?

- Items from architectural decisions

Device Services

- C SDK work outstanding
  - Complete securing consul with access tokens
  - Complete securing the message bus
  - Secret provider for all
- BACNet DS
- Review/approve contributions (UART, GPIO, CoAP)
- Record and replay DS
  - Wiki doc design already in place
- Use cmake options to optimize dependencies
- Use Yaml v3 library (vs V2)
  - Needed for code hygiene purposes
- Handle both JSON request bodies as well as CBOR request bodies
- Implement ProtocolProperties validation mechanism
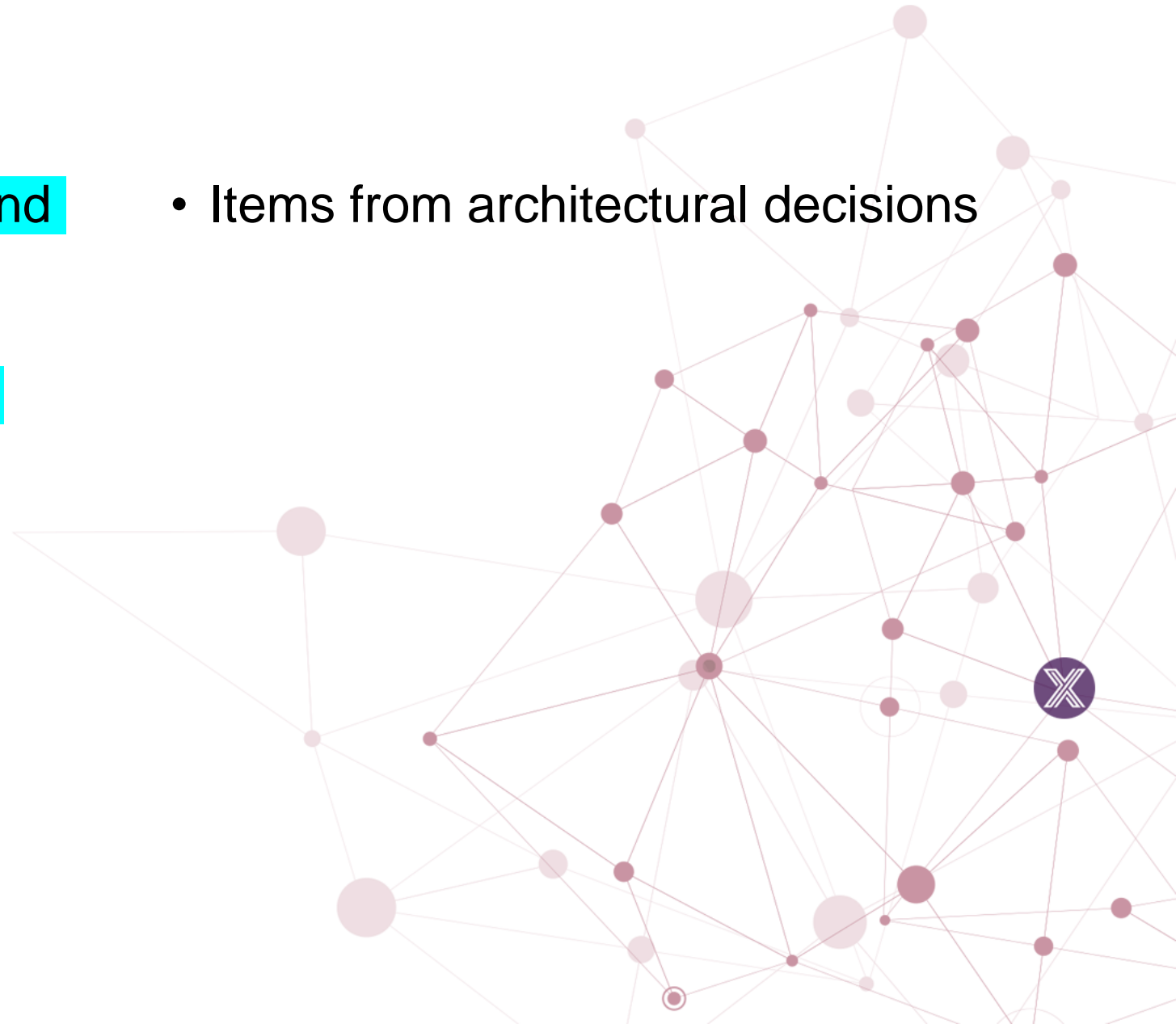- DS Filtering
  - ADR already in place

- Items from architectural decisions

Application Services

- Tight coupling between EdgeX and eKuiper
    - How do we remove this?
- Use nano message IPC for ASC pluggable pipeline function
- CloudEvent as TargetType

- Items from architectural decisions

Security

- [Secure Consul Ph2] Device SDK C: Enable Registry/Config access tokens
  - https://github.com/edgexfoundry/device-sdk-c/issues/335

- Secure message bus connection for C SDK
  - https://github.com/edgexfoundry/device-sdk-c/issues/314

- Implement ADR 0019 - Delayed start secret store tokens (SPIFFE ADR)
  - https://github.com/edgexfoundry/edgex-go/issues/3773

- Add "make lint" target and add to "make test" target (only for GO)
  - https://github.com/edgexfoundry/go-mod-secrets/issues/129

- Update SSH Tunneling for remote Device Service how to for V2
  - https://github.com/edgexfoundry/edgex-docs/issues/515

- Update Swarm for remote Device Service how to for V2
  - https://github.com/edgexfoundry/edgex-docs/issues/516

- Internal Digest implementation doesn't work with ONVIF Foscam/amcrest IPCAM
  - https://github.com/edgexfoundry/device-camera-go/issues/104

- Expose Consul UI on the host when EdgeX is operating in secure mode (snap)
  - https://github.com/edgexfoundry/edgex-go/issues/3744

- [Secure Consul Ph. 3] Fine tune Vault configuration as to Consul's secret engine token's TTL
  - https://github.com/edgexfoundry/edgex-go/issues/3258

- [Secure Consul Ph. 3] Create ACL Policies and Roles for all services and per EdgeX service
  - https://github.com/edgexfoundry/edgex-go/issues/3257

- [Secure Consul Ph. 3] Create a global Consul token (stored in a file) for use in remote configuration
  - https://github.com/edgexfoundry/edgex-go/issues/3158

- ADR for microservice communication security (ADR first – not necessarily implement)
  - https://github.com/edgexfoundry/edgex-go/issues/1950

- We should perhaps be thinking about enabling the "bring-your-own Vault" approach, similar to what I proposed for SPIFFE/SPIRE support. This would allow users to potentially run the Vault instance in a cloud where it is more secure.

- Integrate GoKart security scanning
  - https://github.com/edgexfoundry/edgex-go/issues/3715

- Investigate alternatives to Kong that have better platform support and use less memory
  - https://github.com/edgexfoundry/edgex-go/issues/3747

DevOps

- Pipeline Optimizations:
  - Tech Debt: Fix multiple nodes being spun up during edgeXBuildGoApp and edgeXBuildCApp
  - Spike: docker image multi-arch builds with buildx (spin up less nodes, speed up builds)
  - *Implementation: depending on spike docker image multi-arch builds with buildx
  - Spike: rewrite git-semver in python
  - *Implementation: depending on spike, rewrite git-semver in python
  - Potential Golang linting/scanning pipeline changes. Will coordinate with Security WG
- Documentation
  - Continued documentation updates

- Potentially automate badge awarding
- Implementation of Docker CIS Security bench pipeline
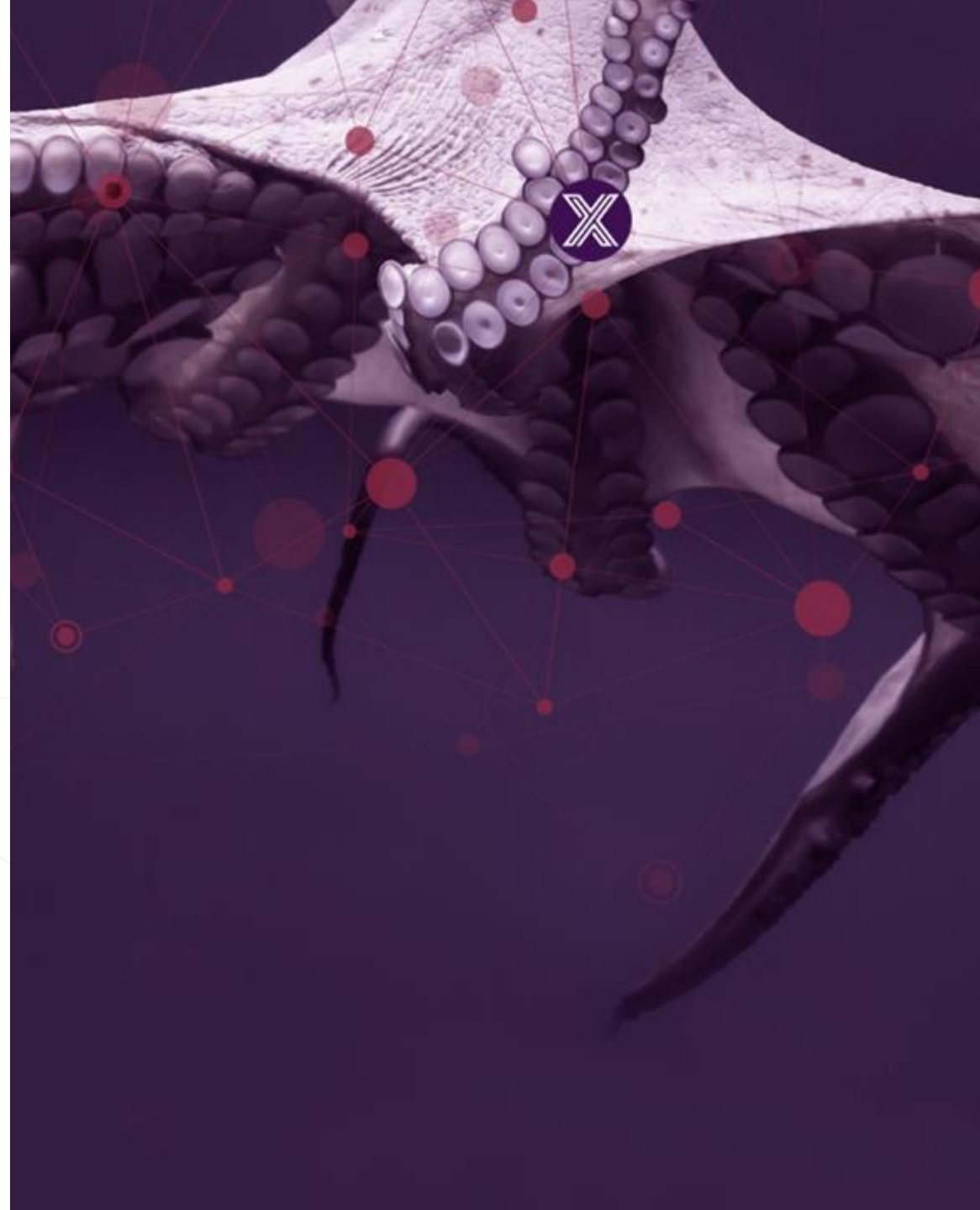- Investigate Snky API

Miscellaneous

- Snaps
  - ???

- Examples updates/improvements
  - Cloud export – more explicit for Azure, AWS, Google
  - Update cloud templates
  - Timeseries DB export (Influx)
  - RP4
  - More Kubernetes support/examples
- Docs
  - Device service restructuring and adding undocumented features
  - Documenting the API (like discovery)

Conference Agenda – Day 4

- Nov 4, Thursday (all times in PDT; all times tentative and fluid)
- 10am PDT Meeting Start
- Scope and architectural questions not addressed in prior 3 days will be finished as priority work on day 4 as needed.
- 10:15am Jakarta lessons learned
- 10:45am Spring release - in person face to face??
  - Venue/time line
- 11am Long term roadmap - beyond Kamakura
  - Backlog revisit
  - Next LTS forecast
- 12:30pm Planning meeting lessons learned and changes for Levski
- 1pm day 4 adjourn

Lessons Learned in Jakarta

- Positives
- What could be improved
- Shout outs for great work

- For context and reference – here were our items from Ireland
  - Things that we did well/were wins
    - V2/TAF
      - Lot of work, scheduled well, coordinated well
      - Lot of redesign as we went along
    - Behaving more "agile" in project nature
    - Breaking changes – we got a lot done; removed future issues
      - Even things that weren't originally on our radar like port adjustments
    - EdgeX doing well in China
    - Slack communications
    - EdgeX Website
      - EN/Chinese
  - Things that we could improve
    - Some design decisions seemed too rushed
    - Redesign did cause churn
    - Did we tackle too much?
    - Outreach organization – needs some focus
    - Need for hackathon like outreach – COVID impact, but how do we get more developers
    - Not overlay freeze week with planning meeting
    - Need 3 weeks for freeze with LTS

Spring (Levski) Release Planning

- Time for a face-to-face?
  - Organizational support
  - Venue suggestions/volunteers to host
  - Timing
    - Mid-April?
    - With potential early May release dates

Long-term Roadmap

- Backlog
  - https://wiki.edgexfoundry.org/display/FA/Backlog
- What would we see as likely big features in Levski?
- When would we project our next LTS?
  - 2 years?
- Long-term considerations
  - Digital ledger technology
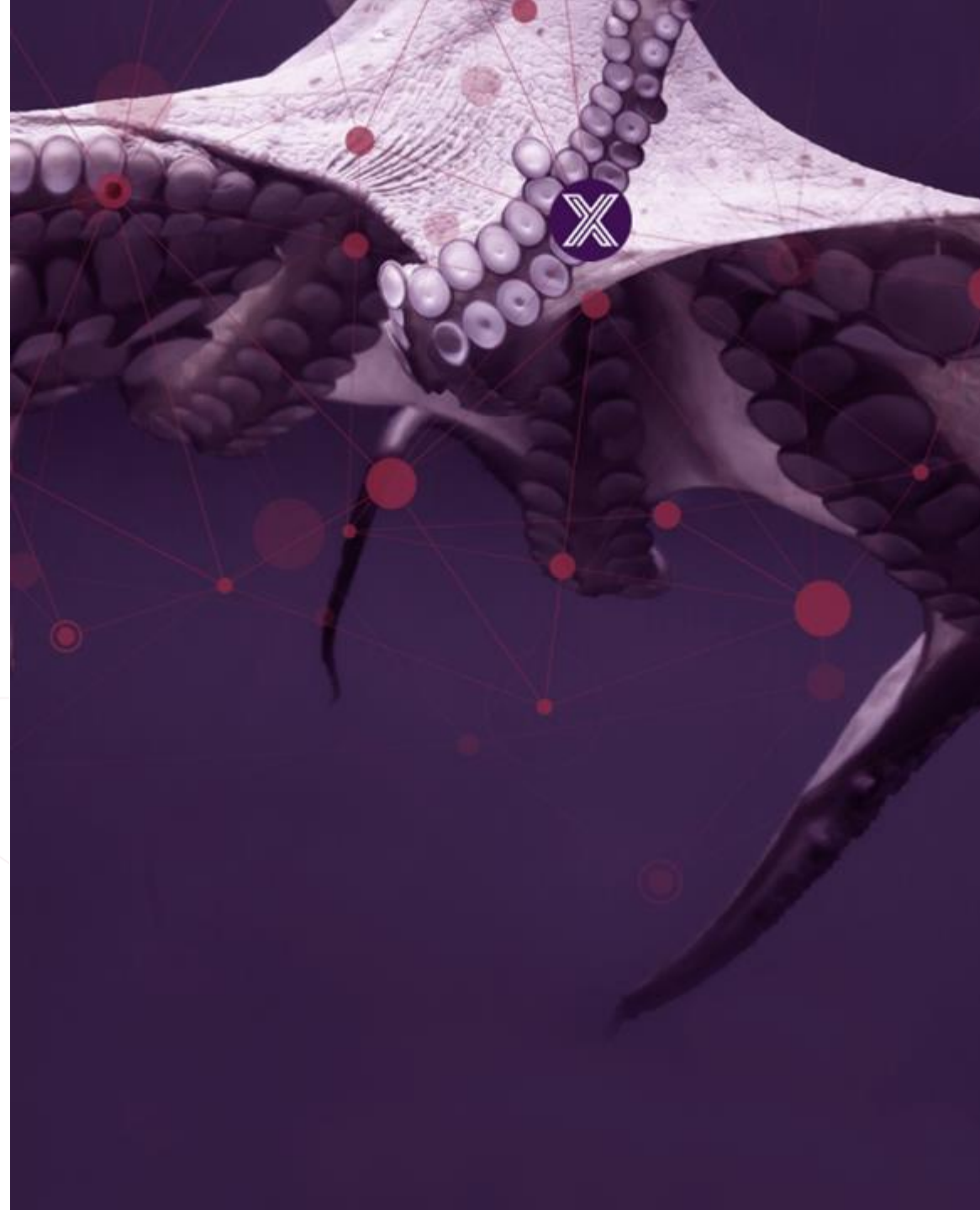   - Providence and governance

Planning Meeting Lessons Learned

- Release Planning Meeting
  - Any lessons learned?
  - Any thing that could be done better?
  - Start doing, continue doing, stop doing
  - What worked well and what did not?

- If we shift to F2F for the next meeting, what would we do different?

Conference Agenda – Day 5

- Nov 5, Friday (all times in PDT; all times tentative and fluid)
- 8am PDT Meeting Start
- Unconference schedule to be determined