# EdgeX Face to Face
Decisions, Action Items, Wrap up

Geneva Release

Phoenix AZ, Nov 4-7, 2019

Business Topics

- Objectives for EdgeX 2020/21 - What's our ideal state
- EdgeX place in LF Edge/Shaping LF Edge
- EdgeX Marketing Priorities/Budgets
  - EdgeX Project marketing Autonomy
  - Co Marketing/Matching Funds
  - Hackathons/Plugfests
  - Digital Marketing Strategy
  - Trade shows plans
  - Website Strategy & Development
- Ecosystem positioning and support
- Vertical Solutions plans
- Certification status/plans
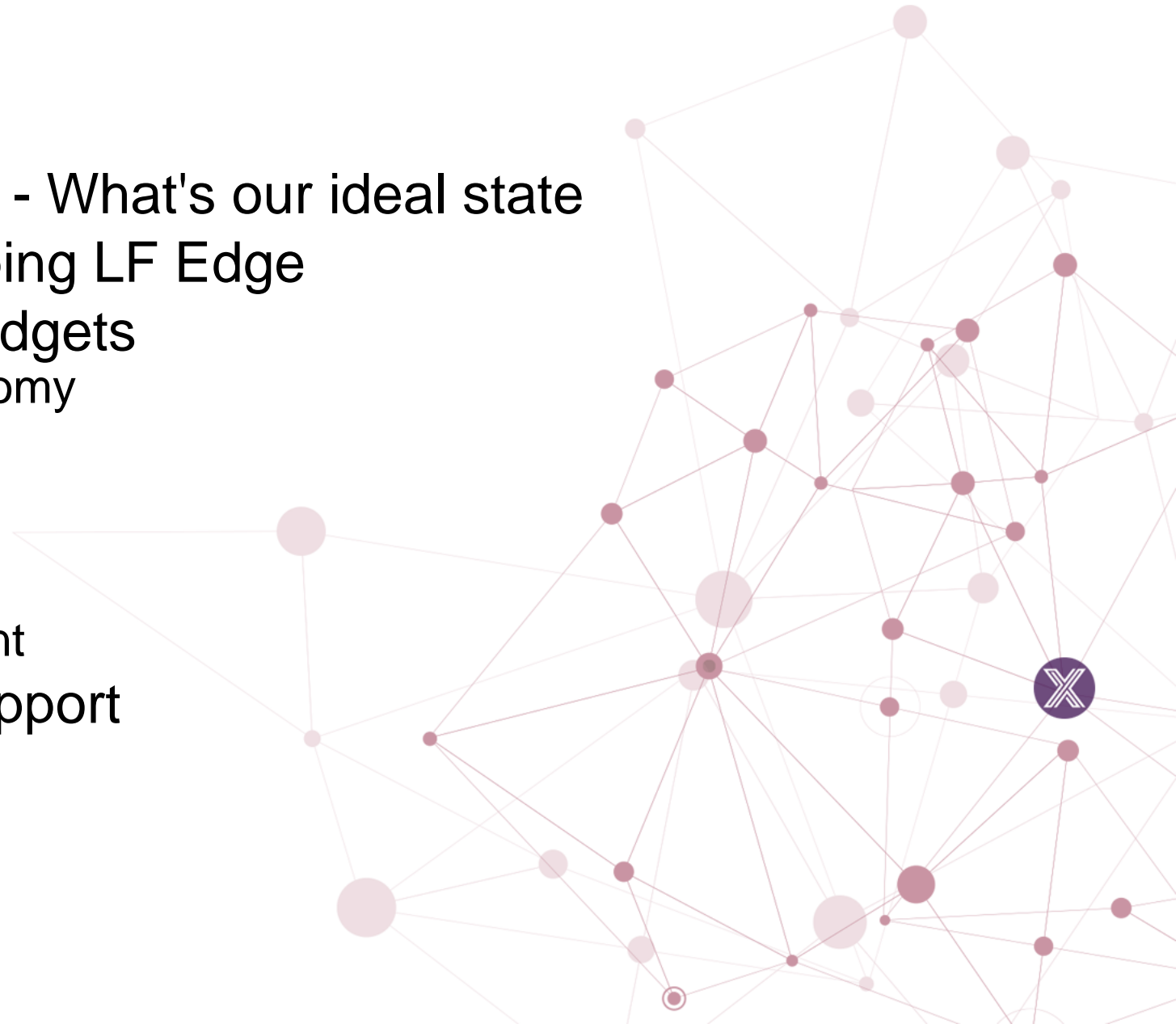
Fuji Dates

- Freeze Date – Oct 23
- Release Date – ~~Nov 13~~ Now Nov 15th due to last minute bug fixes
- https://wiki.edgexfoundry.org/display/FA/Fuji
- Current List of Features:
  - New and improved security services - fully integrated with existing micro services (API Gateway, secure storage)
  - Addition of PKI infrastructure for token/key generation
  - Application services and application functions SDK as full replacements for older export services (much more efficient, scalable with and SDK to help the user community build custom north side integration)
    - Inclusion of north side encryption and compression functions
    - Improved/updated support for Azure IoT Hub, Amazon IoT Core
  - System management improvements to include ability to set configuration
  - Improved testing and quality assurance procedures and tools
    - Implementation of an improved and more flexible test framework
    - Performance testing harness and regular performance metrics collection
    - Improved black box testing and framework to include device service black box test coverage
    - Unit test coverage for all services above 35%
  - Addition of an many more device services to include BLE, BACnet, OPC UA and IP Camera Device Services
  - Certification process allowing for self assessment of devices services (Dec 2019)
  - Improved and added documentation; allowing for documentation versioning

Fuji Missed Features

- Not included features:
  - Security
    - Program to initialize and unseal Vault in security-secretstore-setup
    - Set up of per service Mongo DB secrets in Vault
    - Creating per service security token in security-secretstore-setup
    - Process to revoke old tokens
    - Consul support for proxy & secretstore
    - Integration of security services – ability for all services to use the security store to get service secrets
    - Update testing (API testing through API gateway)
  - Device Service
    - Number of device services (REST, Camera, etc.)
    - Query parameters whose names start with "ds-" will be allowed. They should not be and they will be blocked in future versions.
    - overwrite flag (re-upload text-based config to the registry) is not implemented.
    - The OnChange option for AutoEvents is not effective on Binary data. So in the case where two successive Binary readings are identical, both will be sent to core-data regardless of the OnChange setting.
    - Device services will not unregister from Consul when they shut down.

Missed Features and LTS

- Expected completion of missed feature set
  - ~ mid-December for security work
  - ~ mid-January for integration of security work with other services
  - ~ mid-December for some additional device services and device service SDK update
- Formal decision made by TSC
  - Wait to release this work with Geneva (~ April 2020)
  - Available via master branch if needed by others sooner.
- Fuji was going to be our 1st LTS
- Given security feature slippage, decision on LTS deferred
  - Fuji will not be LTS

EdgeX Release Cadence
Semi-Annual Pulse Check

Cadence Check

- April & Oct remain target release months
  - Geneva release – April 2020
  - Hanoi release – Oct 2020
  - Ireland release – April 2021
  - Jakarta release – Oct 2021
- Venue for next F2F Meeting (April/March 2020)
  - Limerick Ireland – Dell IoT Center
- Conferences – marketing committee update; any changes?
  - At least 2 x large marketing/promotional events (Hannover Messe, IoT SWC)
    - To be reviewed by marketing committee
  - At least 1 x developer focused event
    - ONES?
    - IoT World? – felt more like a partner conference vs developer conference
    - No decision – continue to monitor for good options

Release Planning/Scope Discussion

- We have missed on date or scope (or both) in almost every release

- Approaches & Open Discussion
  - "Train leaves the station on time" (deadlines are key; scope can be reduced)
  - "Users are counting on functionality" (scope is king; deadline shifts if the predicted functionality isn't ready)
  - "Combo platter" (a select few features are deemed critical and must be in the release or it is delayed; everything else can be pushed to the next release)
  - Release smaller and more often
  - All work groups release when they want, what they want

- Preliminary decision by TSC is that "train leaves on time" is the approach we'll use
  - Mike J presented some guidelines/rules to help (see architecture discussions)

TSC Organizational Shuffle

- System management chair – Jim vacating
    - Jim nominating Michael Estrin
    - Michael to serve as acting until vote can be held

- TSC approval needed for proposed election schedule
    - Nominations through Nov 15th
    - Voting after nominations through Dec 1st
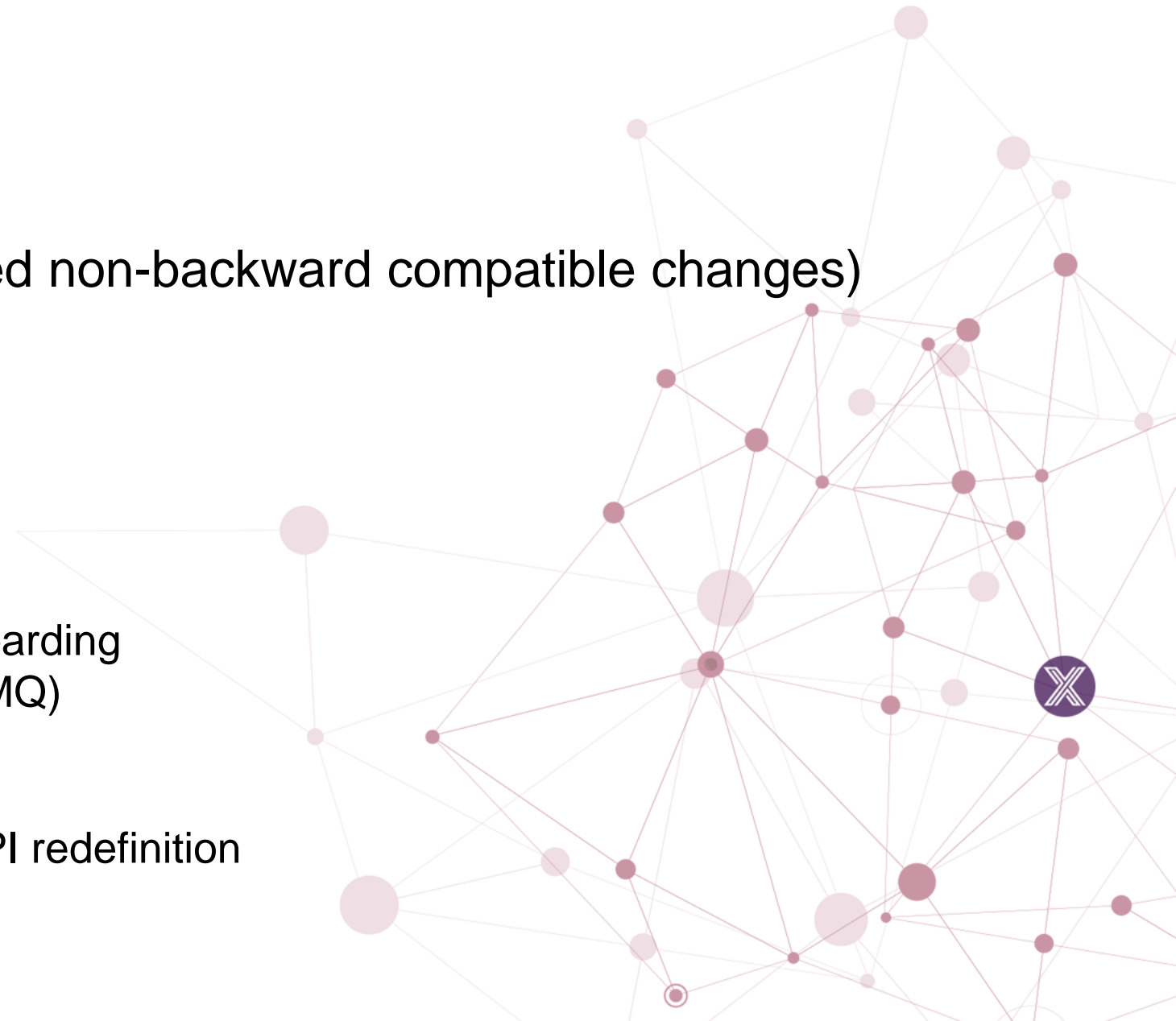
Scope

- Full 6 month cycle
- Version 2.0 (i.e. there are planned non-backward compatible changes)
- Major themes
  - Improved Security
  - Interoperability testing
  - User guidance on platform needs
    - More performance statistics
    - # of devices/per recommendations
  - Dynamic device provisioning/on-boarding
  - Alternate messaging support (to 0MQ)
  - Archive of Export Services
  - DevOps Jenkins Pipelines
  - Request/response changes and API redefinition

Geneva – General (cross area)

Maybe scope – stretch/TBD

Potential Hanoi targeted feature

In

- Move to Go 1.13

- Redis as default DB
  - Implement with username/password protection.

- 0MQ Alternate between core and app services
  - Should help with Windows dev (long standing backlog)

- Configuration simplifications where possible

- Separate the configuration and registry APIs

- Create and separate Request and Response types for API endpoints

- Type the data in the event/reading
  - Eliminate use of value descriptors

- Establish a document template for API information
  - Used to better define the Swagger documents

- *Generic error handling (per Anthony Bonafide's presentation)*

Keep in backlog

- ARM 32 support

- Alternate message bus support for all services
  - Service to service comms via alternate to REST (may include WebSocket or other protocol)

- High Availability
  - Application of 12 factor principles
  - Service orchestration
  - For non-HA scenarios
  - Instrumentation
  - Design/document vs implementation?

- Services can live on any platform

- Services can have multiple instances

- Monolithic service build and deploy

- Support Cloud Events

Out

- Watchers/callbacks for read only config

Geneva – Core (and Supporting)

In

- Use of Dependency Injection in Go services found in edgex-go

- Combine/reduce UIs

- Blacklist/whitelist of devices (w/ DS WG)
  - As part of auto provisioning

- *Alternate message bus provider (w/ App WG)*
  - *Allowing data from Core Data to be pushed to multiple channels / topics and how to deal with marking an event/reading as pushed in that circumstances*

- *Providing a strategy and solution around handling a moving (wearable) device in metadata*

Keep in backlog

- Add SMS to notifications

- Logging service rework
  - Intel has developed a Logging/Telemetry as a Service – Replace/Augmenting service

- Support for alternate logging format
  - XML & CSV in addition to JSON

- Command improvements
  - Min/max limits
  - Security authorization option(s)

- Provide query string support in the Event payload

Out

- Provide command chaining (?? Iain saying otherwise – Steve O checking)

Geneva – Application WG

In

- Export Service archive/deprecation
- Application services should provide for batch and send modes
- Rules Engine Replacement (<mark>w/ Core WG</mark>)
  - JSON Logic implementation (see arch issues)
- *Create a design and implement a means for application services to feed data back into core data*
- *Support Cloud Event import (device service) and export (if not supporting Cloud Events model throughout)*

Keep in backlog

- Export commands
- Other functions (transforms, enriching, encryption, …???)
- Blockchain/digital ledger attribution
- Additional language SDKs
- Rules engine to trigger notifications
- Add a cloud service app function to the App Functions SDK
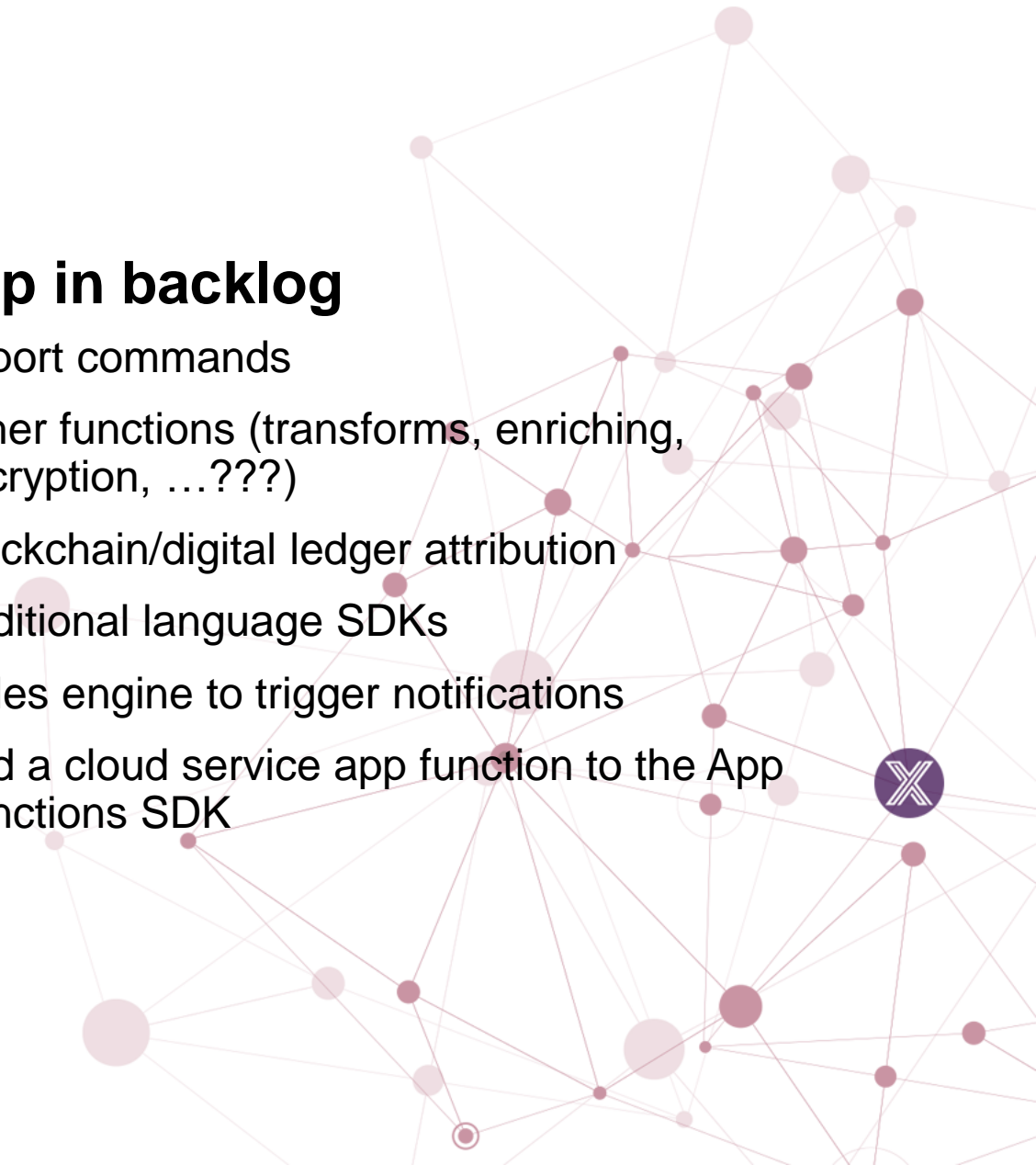
Geneva – DS & SDK

In

- Device Profile cleanup

- Device services (and the SDK) will include automatic/dynamic device provisioning capability

- Data filter design between DS and Core Data
    - Provide a design about how to implement this before implementing.
    - If possible, can the filter functions be shared across App Services and D.S. (w/ App WG)
    - *Implement a call in the Device Service to call out and execute a filter operation (similar to how the application services do it today).*

Keep in backlog

- Support for mesh network protocols

- Support device hierarchy

- Tooling for SDK (CLI, JetBrains, or Eclipse plugins, etc.)

- Tooling for Device Profile creation

- Downsampling/upsampling – DS throttle back on readings if nothing is changing

- Additional language SDKs

- Adding a reading cache to device service SDK

- Adding new device service connectors (LORA, Zigbee, ZWave, etc.).

- Rewrite of the device-service SDKs

- C SDK artifact creation

Geneva – System Management

In

- All system management (SMA) APIs to be made asynchronous

- Start/stop/restart all done by the executor to include stop/restart of SMA

- CLI improvements
  - *Windows support*
  - *Work with security*
  - *IDE plugin*
  - *In holding still? How to handle CI/CD and testing (w/ DevOps and Test WG help)*

- Open Horizon "Walk" (TBD)

Keep in backlog

- Set configuration when file-based
- Storing metrics collected locally
- Callbacks (alert on changes to config/metric) –
- SMA translations to other protocols
  - LWM2M
  - Redfish
  - OMADM
- Actuation based on metric change
  - "rules engine" for control plane data
- Consider use of QoS and blockchain to prioritize resource usage by certain services.
- SMA to store configuration – lightweight configuration store
  - In replacement of Consul or whatever provider we have for reg/config).
  - Discussed at recent sys mgmt. WG meeting. Bigger question is do we still want Consul.

Out

- Setting readable configuration

Geneva - Security

In (work with all WGs)

- Create a hardware secret storage design
  - HW secure storage abstraction layer
  - How to protect the Vault Master Key
  - *Provide a hardware secret storage implementation*
- Create and use a per service Vault token in the security services
- Service token revocation and rotation
- Ensuring the services running are those expected and authorized (w/ DevOps assistance)
- Blackbox tests of APIs through the API gateway
- *Design work*
  - *How to implement HTTPS in EdgeX (that is, how to protect all service endpoints with HTTPS)*
  - *How to implement role-based security across our all EdgeX services.*

Keep in backlog

- Renew/refresh threat assessment
- Access Authentication per service (role based)
- HTTPS for APIs
- Implementation of service-to-service communications
  - TLS between service communications
- Securely providing service updates
- How to securely provision new devices/sensor
  - Device identification and authentication/authorization
- Hyperledger/blockchain/digital ledger integration
- Protect data at rest
  - In DB like Mongo
  - In log files
- Privacy concerns (HIP-A, GDRP, …)

Geneva – Test/QA/Documentation

In

- Device Service testing – complete testing for current set of EdgeX Device Service (w/ DS WG)

- New blackbox tests to support Geneva API changes on new Robot-based Test Automation Framework (w/ all WG input/help)

- Documentation – move all API definitions to Swagger (w/ all WG assistance)

- System integration / interoperability tests - Device Service read data -> Core Data -> Rules Engine or Application/Export Service -> Command

- Implement enough performance testing in order to be able to answer key performance measures – extend existing Robot perf test summary suite developed during Fuji

- *Add unit tests/testing for global libraries. (w/ DevOps help)*

Keep in Backlog

- Backwards compatibility testing between California and Fuji releases

- Negative testing or bad data testing

- Configuration testing
  - Need to identify and add additional testing configurations to automated blackbox testing

- Automated Performance Testing
  - The ability to create reports/dashboards of key EdgeX performance indicators with alerts if thresholds have been exceeded
  - Blackbox and performance test runs against other container technologies supported (e.g. snaps)
  - Automated performance testing - baseline performance of service binaries no container

- Tracing
  - During testing, configuration
  - Candidate tools/technology based on OpenTracing standard: Zipkin, Jaeger

Geneva Planning – DevOps

In

- Move to Jenkins Pipeline
    - Requires the use of Github.org Plugin for Jenkins
- Apply Synk scan to other services and images (<mark>w/ all WG input</mark>)
    - Synk can't do ARM images
- *Sharpen our use of SonarCloud and provide developer education around it.*

Keep in Backlog

- Alternate deployment/orchestration
    - Beyond Docker/Snaps
    - Kubernetes
    - Kata Containers
    - …
- Code/artifact signing
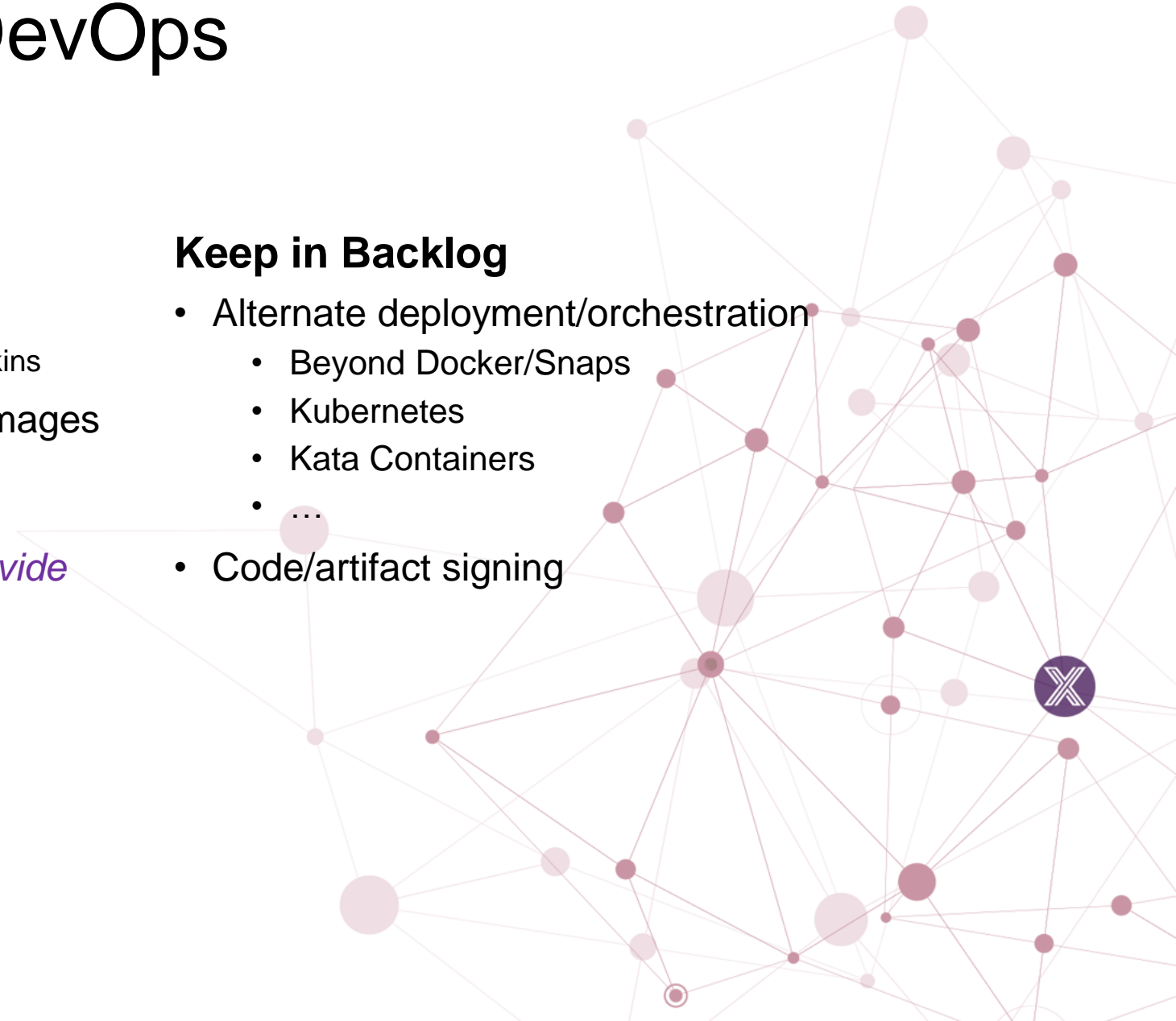
Geneva - Certification

In

- Self certification still a goal

- May not be delivered with Geneva

- Dependencies
    - LTS
    - TAF/Robotic framework (<mark>DS and Test WG deliverable</mark>)
    - API refactor (<mark>Core WG deliverable</mark>)

Geneva – Developer Advocate

In

- Refocus website on consumers rather than contributors

- Enable documentation versioning

- Expand Devkits ecosystem

- LF Edge cross-project demos:

    – EdgeX running natively on EVE

    – EdgeX use case Akraino blueprint

    – Fledge feeding data into EdgeX

- *Academic outreach program*

Keep in Backlog

- Replace manual metrics gathering with a hosted solution

- EdgeX Ambassadors program

State of the Development Community

- What's the current community of developers look like?
  - 25% increase in overall contributors (33% increase in monthly contributors)
  - Big increase in contributors from Intel
- What's the current community of users look like?
  - 300% increase in docker downloads
    - Now at 1.2 million downloads across all images
    - Mostly x86 (~90%)
  - 30% increase in website traffic
    - 40% USA (up from last cycle), 30% APAC
    - 66% English, 15% Chinese
    - 66% of traffic is from documentation site
  - 50% increase in weekly Slack users
    - #help is most active channel, followed by #device-services and #general
    - Slightly more messages sent in DMs than public channels
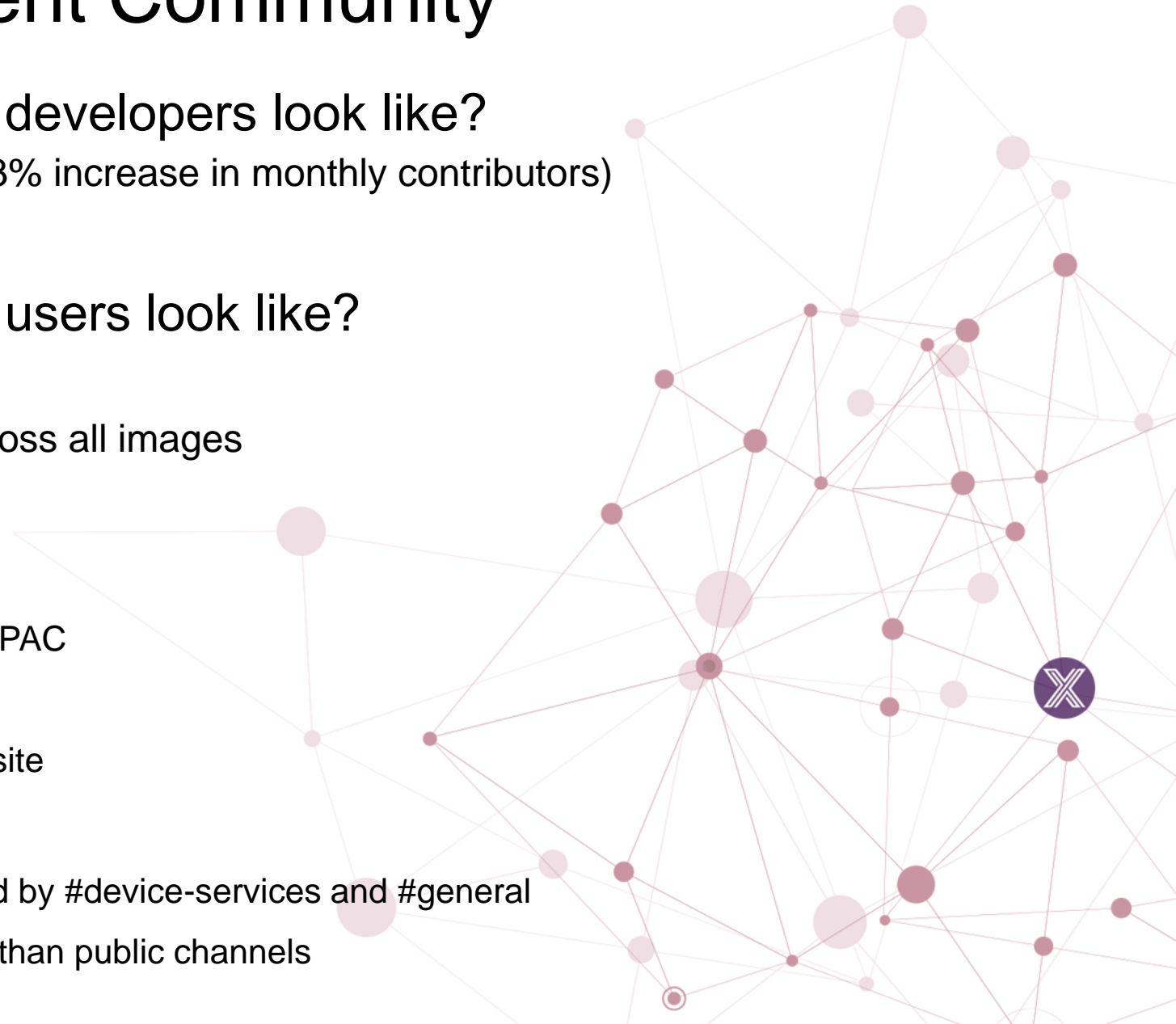
State of the Development Community

- What are the common questions
  - Application Services SDKs and configurables
  - Configuring services, especially device services
  - Fewer docker/networking questions
- What are the common needs
  - How to configure export-client/export-distro
  - How to setup certificates for HTTPS/MQTTS exports
  - How to use the EdgeX UI

Architecture Issues & Decisions

Architectural Issues

- Geneva API Review
    - based on https://github.com/tsconn23/edgex-geneva-api
    - A bit more work/design to do on things like asynchronous responses (use of Memento Pattern) and ability to send single vs multiple things into POST (use of separate endpoints)
    - Tentatively approved and in scope, with Christmas time read out from Core WG
        - Design
        - Answer ?'s
        - Indicate scope/level of effort with other Work Groups weighing in (testing and its impact in particular)

- How do we fix the issue of missing release deadlines or missing on functions in a release?
    - Use feature flag to allow for new feature to be worked on but not yet incorporated into a release formally (allowing a feature to span multiple release cycles) – Mike J going to provide doc on how-tos
    - Use Architect's meeting to review Mike's proposal
    - No change to the release cycle yet (every 6 months)
    - "Train leaves station on time" approach to start meeting release cycle deadlines
    - Explore some mid-term mileposts (Lisa R) for better predicting what is going to be in/out of a release

Architectural Issues

- Developer best practices going forward - How to build better developer communications; reduce contention; improve planning

- Pull request size issue
    - Hard to get PR into certain size
    - Try to use Github drafts to allow people to review earlier
    - Have conversations with people earlier to pre-wire before PR is out
    - Use tags to specify architecture review is needed

- PR Reviews
    - Use template to be defined by Mike to help strengthen info/comments in PRs
    - No vote on >1 reviewers for now

- Out of holding review approval process
    - Use a template to specify what is in the repo, what testing has been done, etc. (Mike providing a template)
    - Use a PR to track issues and comments
    - Agreed to following process: WG must approve and send out notice of move; week later TSC holds meeting, announces vote, and must hold vote via email

- Commit messages
    - James to do research on tool for how to provide commit message check in build
    - Next architect's meeting will look at conventions/format of what should be in commit messages (and updating Wiki)

- Swagger Generation – how to do it; bottom up/top down via tool
    - Agreed this is developer choice. If tool works – great.

- WG Meeting Minutes – outlining significant actions/decisions
    - Yes – they should be done. Jim to try to follow up and police with WG leads to be consistent and get it done each meeting

- Project Management tracking tool
    - Use Github Tracker
    - Each WG chair to anoint a secretary to enter and update the items in the tracker tool (Lisa to work with secretaries to keep things up to date)
    - Secretaries to work together to define common template for items in the tracker

- Put in branch protections
    - James working with LF

Architectural Issues

- How can we expand our event/reading types to include maps and arrays?
  - Decision – Arrays of simple types (int, float, etc.) approved and to be put in place for DS/SDK and core (treat like CBOR)
  - Maps – can be added but with feature flag to allow people to explore it and make later determination as to whether it is incorporated by default later on

- Replacing the rules engine in Geneva
  - Yes – application working group to take on development of JSON

- The Open Horizon project – what's next?
  - Approved sub-project under Sys Mgmt for the next year (show harmonization, integration to management solution)
  - Goal to launch LF Edge project after "mentorship" period
  - Next steps in actual development of the project to be determined by sub-project group
  - Work with Test and DevOps WG to provide testing and CI/CD infrastructure

Architectural Issues

- EdgeX UIs – Combining? Dropping? …
    - IOTech UI being pulled down (archived)
    - VMWAre UI to be single open source effort
    - Jim to try to work with VMWare team to get more participation/input to/from rest of the project

- LTS – Fuji nor Geneva are anticipated to be LTS releases at this time. Official criteria for LTS have been loosely established. Discussion and ratification of what LTS means
    - LTS when its ready. Criteria:
        - Stable release
        - Well defined APS
        - No major features due in next release

- Certification – what do we really want to certify and what do we need in place to do this? When do we want to offer it?
    - Yes – continue to work to self cert to start.
    - Precursor needs
        - API cleanup (V2 inclusion)
        - Robot Framework/TAF
        - LTS

Architectural Issues

- How can we provide better cloud support (AWS, Azure, etc.) without creating a long term maintenance issue?
  - Create Docs (not in Github)
  - Show how to use with config app service
  - Not include anything in code base
  - Make sure people are aware it is only basic work (account setup, shadow setup, etc. not covered)
- Feeding data from application services back to core data (current APIs or REST device service?)
  - Work to allow app services to subscribe to multiple topics/queues
  - With the release, also looking at 0MQ alternate that would help

Architectural Issues

- Collect and record architectural discussion and decisions
  - Options exist like Google's Architecture Decision Record: https://github.com/joelparkerhenderson/architecture_decision_record
  - For now, just do a better job of having WG leads document their meetings
  - Jim will summarize week's meeting decisions and cover those at the front of the TSC meeting (have WG chairs try to keep their updates to quick summaries)

- How can we simplify configuration and bootstrapping?
  - Some suggestions made with regard to added "hard coding" in the service
  - Also some suggestion on improved implications which may be accomplished in all services if they adopt DI approach
  - Lenny and Core WG to present new configuration API and will work simplification design through that work group

Open discussion

- Do we need C SDK artifacts
  - Value questioned - most build from master
  - Creating artifacts (libraries) would be heavily system dependent
  - Agreed to add it to DS/SDK backlog
  - The SDK(s) should be tagged at the release points (DevOps & DS WG action item)

10 min talks provided by

- Andy (IOTech) – XRT
- Glen (IBM) – Open Horizon
- Ramya (Intel) – TAF
- Mike (Intel) – Markdown/RST
- Lenny (Intel) – Docker profiles and env overrides

Get with presenter
for more info

Action Item Review

Outside of scoping and architectural decisions

Action Items

- All to provide LF Edge thoughts to Keith/Jim
  - Need organization mandate to provide best input to LF Edge

- Elections to be held for Sys Mgmt WG lead (Jim stepping out of role and TSC)
  - Michael Estrin nominated
  - Voting last week of Nov

- Security Issues – Tingyu/Malini to setup meeting to review status
  - Release tentatively pushed to Nov 15th

- Malini/James to look at Codecov.io reported Consul CVE issue and activate process if necessary

- Steve O – check with Iain on command chaining need

- Queued architecture meeting topics
  - PR Template (general but also move from holding to regular repo)
  - Acceptance of DS and testing needs
  - Moving tests to individual repos with new TAF (issues/concerns)
  - Bound checking issue

Action Items

- Jim/Lisa to look at milestone markers/check-ins for Geneva release

- As a result of Security issues – longer term than immediate crisis
  - Security WG to find supported version of Kong for x86 and ARM
  - Malini to look at CVE and roadmap for supported versions of security tools (Kong, Vault) and see if we have issues
  - We need an ARM env for testing
  - We need a better/regular review of issues – put this on WG chairs
    - Lisa to check in WG chairs to insure this is getting done
    - Maybe add cross-cutting concern label to Github for issues
    - Add to backlog a tool to archive or otherwise automate issue review/archival

- Need a how-to-guide/video for TAF framework

Hanoi Road Mapping

- Green items in backlog were discussed and somewhat agreed upon

- In general, feeling was that Hanoi should be a dot release (potentially LTS)
  - As such, should include fewer big new features
  - Focus should be on "hardening", testing and specifically testing across the service boundaries

Next Meetings Planning

- For Hanoi
  - Lessons learned/changes
    - Pre-wire architecture meeting was good and should be repeated.
    - Helps to reduce the scope/discussions within the people that really know the issues
    - Training day was good.
      - Keep it strictly training
      - More hands on labs would be preferred
    - Move Training day to last day
      - Allow training day to coincide with hackathon planning or other event where necessary

- Fall 2020 meeting
  - Venue: Ireland was selected; Dell IOT center to host
  - Time: April 27-30th (allowing for one trip to Europe even if you are going to Hannover Messe)
    - April 10-13th Easter weekend
    - April 20-24th Hannover Messe
    - April 20-21st ONES