SIG OpenXLA Community Meeting

August 9, 2022

Agenda

- Introductions (10 min)
- Roadmap updates & discussion (20-25 min)
- SIG collaboration (15 min)
- Next steps (5 min)

Mission

Open, state-of-art ML compiler, built collaboratively with Hardware & Software communities, using the best of XLA & MLIR.

Introductions & housekeeping

OpenXLA Meetings

- Monthly on Google Meet
- Rotating meeting host & scribe
- Proposed agenda shared by host 1 week prior in community wiki for feedback
- Meeting minutes & slides shared publicly on community wiki within 24 hours
- Meetings should include:
  - Roadmap & development updates
  - Design proposals
  - Community topics

Introductions (<10 minutes!)

- SIG Member Orgs:
  - AMD
  - Apple
  - ARM
  - AWS
  - Google (XLA, TensorFlow, JAX, PyTorch/XLA)
  - Intel
  - Meta
  - NVIDIA
- Any new attendees? What are you looking to focus on?

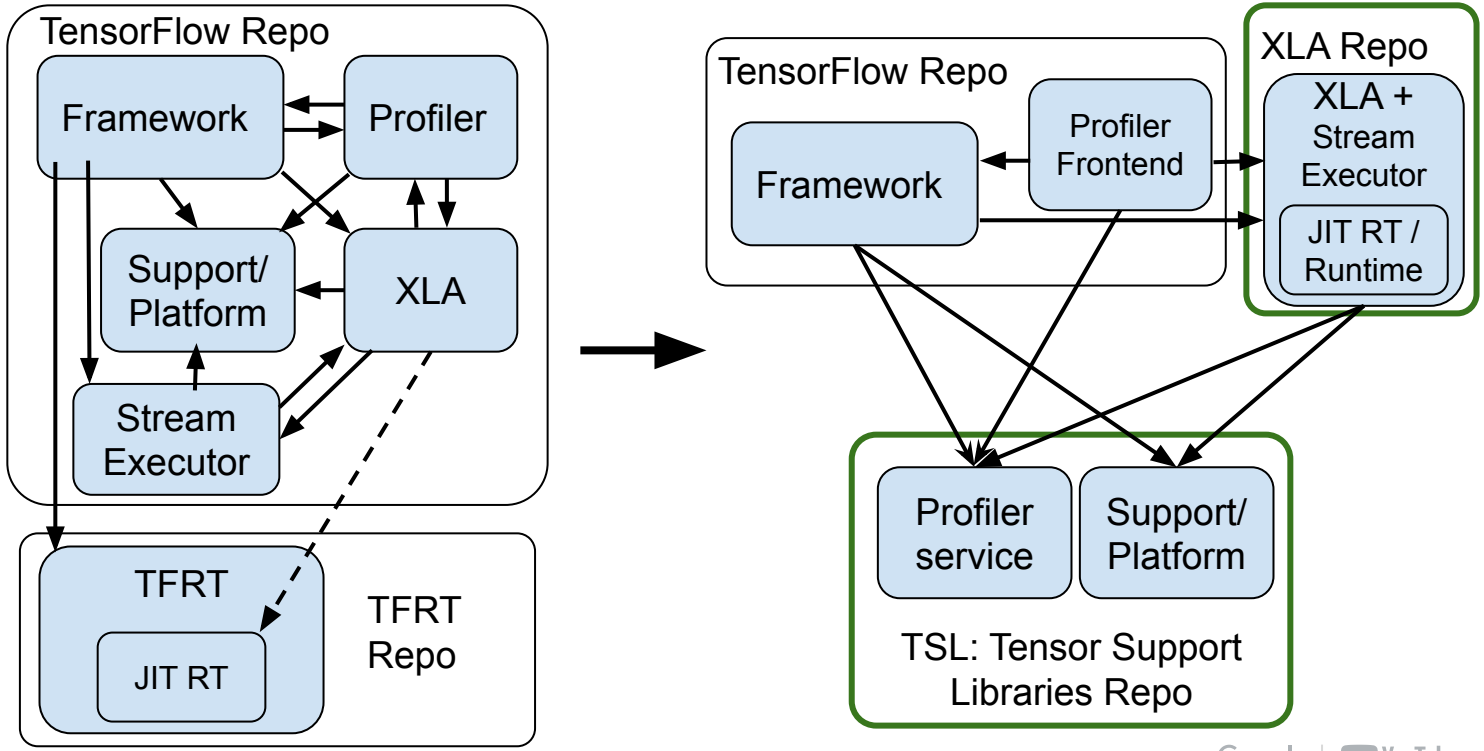
Technical Updates

TensorFlow/XLA Refactoring

Extracting XLA from TensorFlow

A three repos solution

https://github.com/openxla/xla



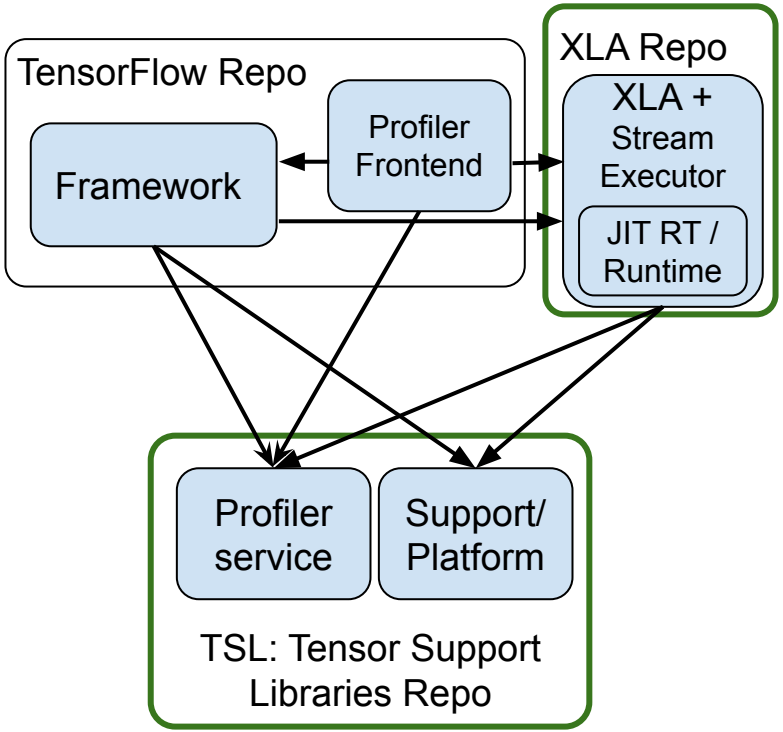
Extracting XLA from TensorFlow

A three repos solution

https://github.com/openxla/xla

- TSL (Tensor Support Libraries) is a new repository that will contain TensorFlow platform-independent portability code (tensorflow/core/lib and tensorflow/core/platforms) as well as the profiler service. These are the common dependencies between XLA and TensorFlow.
- XLA repo integrates StreamExecutor and JITRT. XLA will depend only on TSL to get platform independent utilities as well as profiler APIs.
- TensorFlow will depend both on XLA and TSL. For now we will vendor the XLA and TSL code into tensorflow/third_party to avoid cross-repo synchronization. Code depending on TensorFlow, like the TF/XLA bridge, will continue to stay in the TensorFlow repository.

Expected to deliver: 10/2022



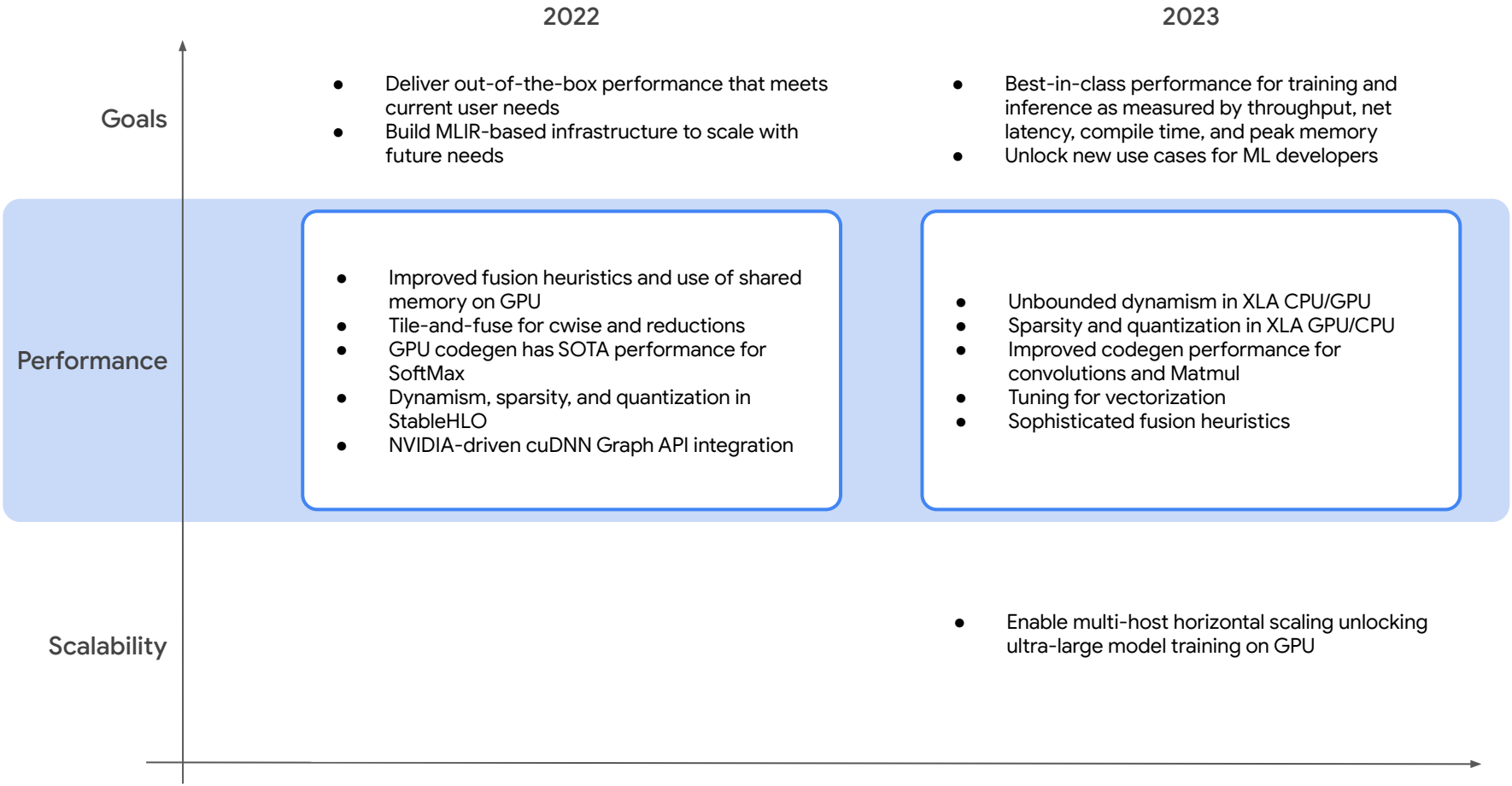
OpenXLA Roadmap (Proposed)

What Google plans to contribute as a member of OpenXLA

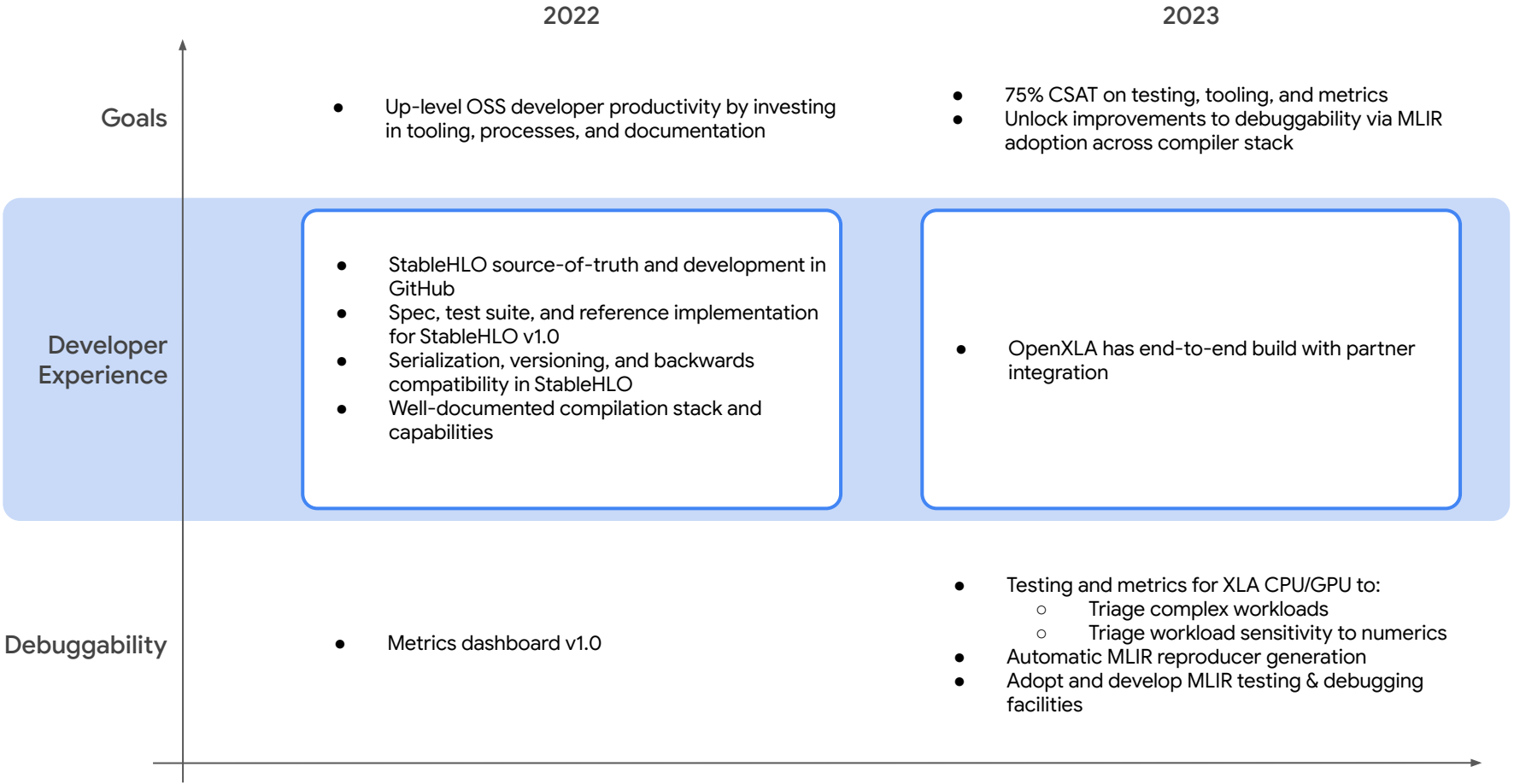
Google's roadmap contributions subject to change

8/9/2022

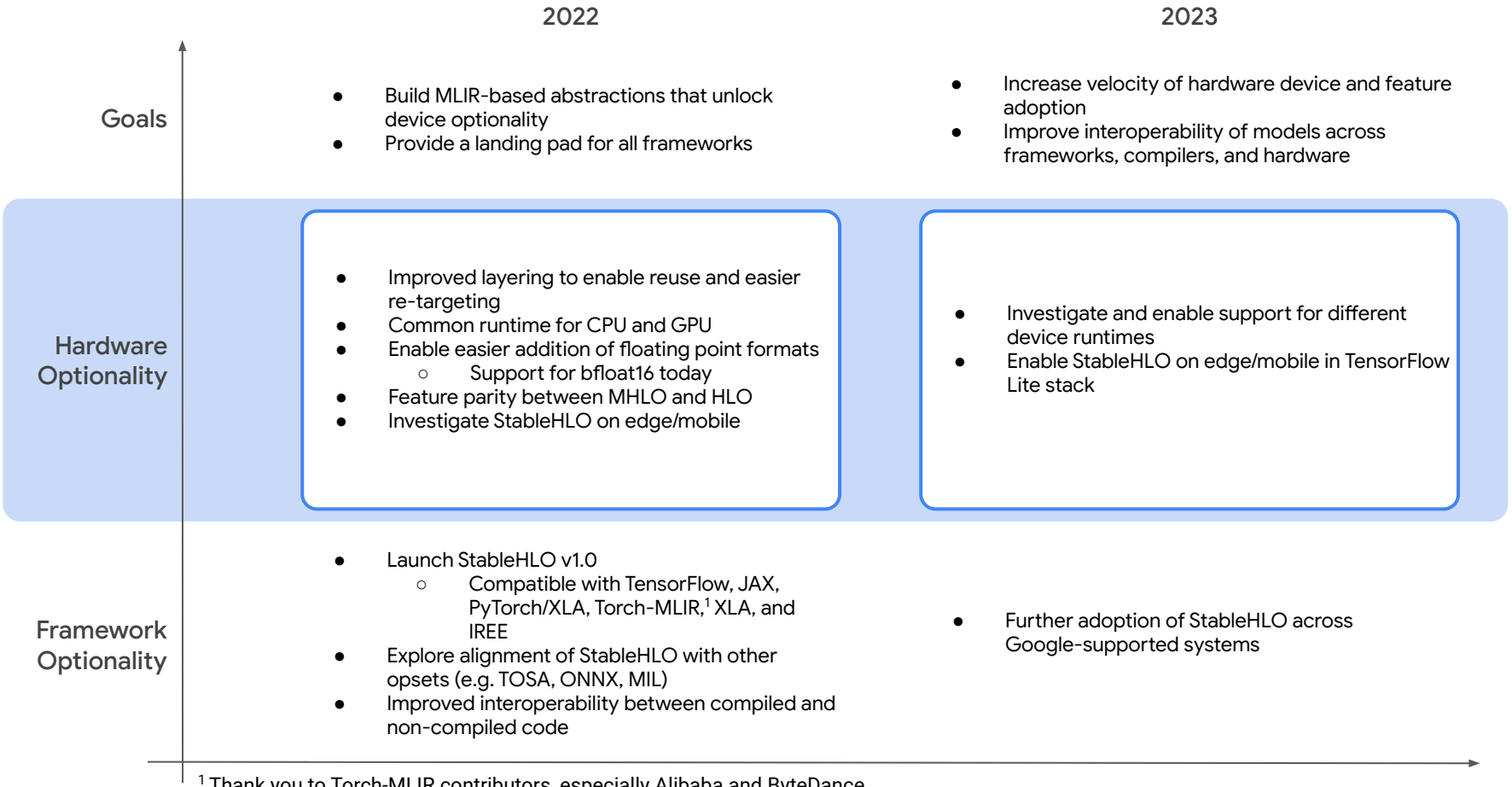
Performance & Scalability



Usability


2022
2023
Goals
Up-level OSS developer productivity by investing in tooling, processes, and documentation
75% CSAT on testing, tooling, and metrics
Unlock improvements to debuggability via MLIR adoption across compiler stack
Developer Experience
StableHLO source-of-truth and development in GitHub
Spec, test suite, and reference implementation for StableHLO v1.0
Serialization, versioning, and backwards compatibility in StableHLO
Well-documented compilation stack and capabilities
OpenXLA has end-to-end build with partner integration
Debuggability
Metrics dashboard v1.0
Testing and metrics for XLA CPU/GPU to:
Triage complex workloads
Triage workload sensitivity to numerics
Automatic MLIR reproducer generation
Adopt and develop MLIR testing & debugging facilities

Hardware & Framework Optionality



[1] Thank you to Torch-MLIR contributors, especially Alibaba and ByteDance.

2024 and beyond

Goals

- Cultivate 3P ecosystem of layers, plug-ins, and back-ends around XLA
- Expand framework and (edge/mobile) hardware optionality
- *"Train anywhere, serve anywhere"*
- Deliver further performance improvements for customers

Initiatives

- AOT machine learning compiler for 3P edge/mobile ecosystem
  - Exploring opportunities to achieve this in 2023
- Consolidate framework to StableHLO translation
- Enable more device-specific optimization via extension mechanism
- Automated heterogenous execution of models across CPU, GPU and accelerators
- Use ML to improve/replace heuristics in ML compilers

StableHLO

openxla/stablehlo

- The repository has been created! 🚀
- GitHub-first development
  - GitHub is the source of truth
  - Development via GitHub pull requests
  - Testing via GitHub actions
  - Planning via GitHub issues
  - Discussions via GitHub discussions / Discord (TBA)

In the short term

- Bootstrap the repository
  - Fork MHLO* from MLIR-HLO and call it StableHLO
  - Move CHLO from MLIR-HLO
  - Pull request: openxla/stablehlo#1
- Vendor the repository into MLIR-HLO
  - Regularly integrate changes from the repository into MLIR-HLO
  - Introduce a conversion from StableHLO to MHLO

* Except for the 8 MHLO ops which are private to XLA

In the longer term

- Workstream #1: Stable version of HLO/MHLO
  Specification, test suite, reference implementation - ETA: H2 2022
- Workstream #2: Evolution beyond what's currently in HLO/MHLO
  Ongoing work on dynamism, sparsity, quantization and extensibility - ETA: H2 2022
- Workstream #3: Adoption of StableHLO
  Support for ML frameworks (TensorFlow, JAX, PyTorch/XLA) and ML compilers (XLA and IREE) - ETA: H2 2022

Community discussions

- Coordinate LLVM commits for different project
  - Significant need in compatibility guarantees for dialects like MHLO
  - We can already start providing guarantees for StableHLO
  - In the longer term, also leverage serialization & versioning RFCs in MLIR upstream
- [RFC] Proposal for a high-level ML dialect in MLIR
  - "We believe that we need a dialect that is at a higher-level of abstraction than, say, Linalg"
  - StableHLO / MHLO are pretty related work
  - OpenXLA's collaboration & governance model are a great fit for these conversations!

SIG Collaboration

Collaboration channels

Channel	Content	Access	Archive
OpenXLA GitHub Org	Code, Design proposals, PRs, Issues, Roadmaps	Public	n/a
Community repo	Governance, meetings, code of conduct	Public	Public
GitHub Discussions (Community)	Meta discussions on openxla/community repo	Public	Public
GitHub Discussions (Technical)	Technical discussions on individual repos - stablehlo, xla	Public	Public
Discord Server	Sync discussions	Open invites	Archived chats
SIG Meetings	Monthly live meetings	Public	Public agenda, slides, meeting minutes
SIG Google Drive	*Shared docs, decks*	*Read-only to non members*	*Indefinite*

Thoughts on meetings/workstreams

- **Meeting cadence & scope**
  - Monthly high-level alignment(?) meeting
  - Optional every other week technical deep dive
- **Technical workstreams / working groups.** Initial ideas:
  - Fusion
  - StableHLO
  - DevInfra (testing, sec, release, etc)
- **Non-technical workstreams / working groups.** Initial ideas:
  - Community outreach (events, blog, etc)
  - Documentation

Open questions

- **Membership**
  - Public membership expectations
  - MEMBERS.md file
  - GitHub Org membership / teams
- **Proposal process**
  - PR-based (eg TensorFlow, Swift)?
  - Docs-based

Next steps

Next steps

- Find standing monthly meeting slot(s)
- Kick off technical workstreams/focus groups
- Establish proposal / RFC process
- Draft & discuss next version of project governance
- Set up openxla/xla repo - CI/CD, issue labels, etc