TSC Budget Proposal

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Note: Following community feedback from a number of prominent individuals, this proposal has been modified to explicitly exclude items that will be funded by other budget proposals. The proposal aims to fill strategic gaps in the core infrastructure and maintenance requirements, and to set out a process for open and transparent procurement to fill these gaps. It is of course not possible to precisely define these gaps at this stage, and it would be unfair to name just a few, but we will work with the community to ensure that critical gaps are identified and filled.

Executive Summary

Cardano is at a critical juncture. The founding entities have successfully delivered a top-10 blockchain that is built to last, that is highly decentralized, that is resilient, robust and reliable, and that has an excellent system of on-chain community governance. This strong foundation needs to be maintained and to be carefully enhanced so that Cardano can deliver to its full potential in terms of scaling transaction throughput, enabling new L2 solutions, attracting new users, expanding utilisation by current users, and increasing diversity. This needs to be done in a coordinated way that works with the Cardano community to deliver the best possible solutions for the benefit of the Cardano ecosystem as a whole, including both current and future participants.

Intersect's Technical Steering Committee (TSC) requests a budget of **22.6M ada** from the Cardano treasury to support a programme of core infrastructure development and maintenance over a 12 month period planned to commence in June 2025, **to cover essential gaps in other budget proposals**. Work items will be selected according to community needs and priorities in accordance with the Cardano roadmap that will be agreed with the community. This will enable the Technical Steering Committee to fulfil an essential constitutional role in providing good technical oversight of core infrastructure work and in maximising its delivery potential for the benefit of the Cardano ecosystem as a whole. Work will be contracted to suppliers based on **technical quality**, **quality of the developer team**, **importance** of the work, **alignment with the roadmap** and **overall value for money** (which does not imply the lowest bid).

The budget will be distributed using an open and transparent tendering process that will enable the community to obtain the best value for money, ensure proper coordination of technical effort, maintain security and performance guarantees, coordinate rollout and deployment, and mitigate development and ecosystem risks. This process will be designed to be as lightweight as possible. The budget includes provisions to validate the technical and financial delivery of each project in line with standard practice for public procurement. Reports will be provided to enable DReps and ecosystem partners to track progress and monitor delivery. Wherever possible, work must contribute to the public open source repositories that are maintained by Intersect on behalf of the community.

Key Objectives & Strategic Impact

Fundamentally, the TSC requests a mandate from the Cardano community to ensure the orderly and effective delivery of the core infrastructure that is needed to support Cardano development in 2025 and beyond, employing the best technical expertise to achieve a coherent basis for long-term development of Cardano. In fulfilling this goal, the Technical Steering Committee pledges to act as honest stewards of these funds, aiming to apply the highest standards of probity.

Objectives

The main objectives of this proposal are to:

1. Ensure that **essential core infrastructure is properly developed and maintained**, in order to assure the long term sustainability of Cardano;
2. Create **a stable and certain technical base** for those building on and using Cardano, aligned with the community-agreed Cardano roadmap;
3. Ensure that **technical concerns are properly addressed** in all core infrastructure delivery, including technical feasibility, performance, security and long-term sustainability;
4. Ensure that **long-term as well as short-term development goals** can be supported;
5. Ensure that **integration, deployment and rollout of core infrastructure development** is properly considered in all work that is carried out;
6. Establish a framework for **responsible use of treasury funds**;
7. Create an **orderly and defensible process** for funding necessary core infrastructure work;
8. Ensure that **DReps and the community at large are fully involved** in the development process.
9. Ensure that proposals are submitted to the DReps not only from the perspective and interests of the proposers, but **according to the needs of the protocol, the ecosystem and all participants**. This includes commissioning tasks that have not been yet proposed by suppliers since they may not consider the issues relevant to their current or future interests.

Strategic Impacts

The strategic impacts of this proposal are that it:

1. Ensures a **sustainable core infrastructure maintenance and development plan**. Work can be managed cost-effectively and within budget limits;
2. Ensures **alignment** of work **with community needs and priorities**;
3. Ensures that **consistent audit and other necessary controls** are in place;
4. Ensures **continuity of core development** as needed for a sustainable ecosystem;
5. Maintains **flexibility of delivery** as new technical information is uncovered or new work becomes necessary;
6. Enables **opportunities for new ecosystem entrants.** Encourages collaboration and coordination;
7. **Resolves conflicts** between suppliers.

Budget Justification

This funding request is structured to **maximize impact while maintaining accountability and transparency**. By aligning investments across **sustainability, security, developer engagement, and commercialization**, it ensures **long-term viability for Cardano's open-source development**.

Main Advantages of the TSC approach

The primary advantages of the TSC approach are:

1. **Consistency**. All work items will be evaluated according to the same criteria.
2. **Transparency**. All funded work will engage with and report consistently to the community.
3. **Avoidance of technical gaps**. Suppliers can be sought for all necessary work items.
4. **Proper Prioritisation**. Work items can be prioritised in line with community needs.
5. **Avoidance of duplication**. Duplicate work items can be eliminated.
6. **Complementarity**. Where work items can benefit from each other, this can be identified and resolved.
7. **Conflict resolution**. Where work items conflict in scope, this can be resolved.
8. **Coordination of Effort**. Coordinated integration and rollout plans are necessary, e.g. for hard forks.
9. **Flexibility of Delivery**. Discovery tasks can be carried out where necessary, new work can be undertaken as it is needed, and unsuccessful work can be terminated.

Requested Budget & Allocation Summary: (June 2025–May 2026)

A detailed breakdown of the proposed budget can be found in Section 4. The budget allocations represent expected spend under each category. Full consideration will be given to prudent use of funds, with **unused funds returned to the treasury for future allocation**. The majority of contracts will be issued in fiat (e.g. US dollars, $) rather than ADA. In calculating the budget, we have assumed a conservative conversion rate of 1 ADA = $0.5. We will charge costs according to the actual conversion rate.

Initiative	Funding (ADA)	Funding (USD)
Core Roadmap Development, including necessary integration, deployment and rollout, where not covered by other funded proposals	11,960,000 ADA	$5,980,000
Core Infrastructure Maintenance as required to maintain Cardano's position as a top-10 blockchain, also where not covered by other funded proposals	4,874,000 ADA	$2,437,000
Applied Research (distinct from fundamental research into e.g. new consensus) as needed to progress the development of the Core Roadmap or answer questions that arise during development, also where not covered by other funded proposals	2,392,000 ADA	$1,196,000
Operating Costs for the TSC, including community communications, funding for community events and limited travel funding to attend necessary meetings and events	480,000 ADA	$240,000
Support for Sub-committees, reimbursement for community volunteers including the Parameter Committee, the Security Council, the Proposal Triage Group and Technical Working Groups.	1,000,000 ADA	$500,000
Contingency Funding approx 10% to be held for programme risks throughout the year.	1,900,000 ADA	$950,000
Total	**22,606,000 A**	**$11,303,000**

Section 1: Governance & Delegated Authority

The Technical Steering Committee requests a delegated mandate for a budget of **22,606,000 ADA** from the Cardano treasury to manage the technical delivery of a portfolio of Core Cardano Projects that align with the community-agreed Cardano Delivery Roadmap, **and that do not otherwise form part of the finally agreed Intersect budget proposal**. Work will be awarded according to priorities that are agreed with the DReps and Cardano community at large. Contracts will be negotiated with suppliers in accordance with standard good practice for public procurement, including measures to deal with fraud, supplier liquidation, or inability to carry out the contract etc. Bids will follow an open and transparent tendering process, and will be evaluated according to consistent criteria. **The Technical Steering Committee will adopt a principle of no dual funding for any work that is carried out:** work must not also be funded by e.g. Catalyst, by any other accepted budget proposal, or some other funding source. Where funds are not spent they will be returned to the Cardano treasury to be reallocated by the DReps. Suppliers will be required to engage with the broader community through the Technical Working Groups, dedicated technical workshops, AMAs and other events. They will also be required to provide regular standardized progress reports, and will need to produce auditable statements of the work that is carried out.

1.1 Scope of Work

This proposed budget **will cover** the following kinds of work:

1. Necessary maintenance of core infrastructure, including the Cardano node, DB-Sync, Daedalus, hardware wallets, and other essential core infrastructure;

2. Core infrastructure development that is aligned with the proposed Product Roadmap, as agreed and amended from time-to-time in consultation with the DReps and general Cardano community;

3. Applied research that is necessary to enable core infrastructure development;

4. Necessary support for evaluating and managing contracts, including evaluation of bids, contract negotiation, audits, technical reviews, technical workshops, and public dissemination of key technical results;

5. Support for ongoing technical activities, including Intersect's Technical Working Groups, Special Interest Groups, the Parameter Committee, the Security Council.

1.2 Work that is Out of Scope

AS described above, the proposed budget **will not cover** work that is funded by other budget proposals.

Furthermore, the proposed budget **will not cover** the following kinds of work:

6. New development that is not aligned with the agreed Product Roadmap;

7. Items that are not maintenance or development of core infrastructure;

8. Proprietary work or any non-open source development, except in exceptional circumstances (e.g. for hardware wallets);

9. Long-term basic research, e.g. as needed to develop new consensus protocols;

10. Work items that are not of general benefit to the Cardano ecosystem, e.g. ones that exclusively support one company's products;

11. Any work items that do not follow comply with good technical audit practice wrt security, reporting or other essential concerns

Items such as these will not be considered as in scope by the Technical Steering Committee, and will not fall within its remit. They may be considered in other budget proposals and by other groups (e.g. the Open Source Committee for Tools or Catalyst).

1.3 Specific Roadmap Priorities

Based on feedback from the Cardano community, including Intersect members, and taking into account current technical readiness, the Technical Steering Committee views the following as major priorities for Cardano in 2025 and into 2026.

1. Work on improving **transaction throughput** and **performance**;
2. Work on improving **transaction settlement/ finality**;
3. Work on infrastructure that is designed to **enable/support layer 2 solutions**;
4. Work which is needed to enable **interoperability**;
5. Work on enabling the development of **alternative node implementations** (including documentation, collaboration and consultancy);
6. Work that is aimed at **improving on-chain governance**;
7. Work on **improving stake pool incentives** and rewards.

The TSC will identify gaps in the roadmap that are not covered by other funded proposals, and ensure that these are properly prioritised with the community.

To achieve this vision, the TSC will work with the Product Steering Committee, Open Source Committee, Civics Committee and other Intersect committees and groups (such as Special Interest Groups and Technical Working Groups), and with stakeholders including DReps, SPOs, the Constitutional Committee, DApp Developers, Exchanges, the Cardano Foundation, as well as suppliers and software developers to refine the work plan.

The TSC notes that the above reflects the current view of the Cardano community's development priorities. Such a view is not fixed and may be subject to change during the term of the contract, whether due to technical feasibility or market changes. The TSC will regularly review priorities, in conjunction with the above stakeholders, to ensure that the development plan remains aligned with the changing needs of the Cardano ecosystem.

Section 2: Motivation: Problem Statement & Justification

2.1 Benefits of Delegated Authority

The Technical Steering Committee asks DReps to endorse a level of delegated authority to allow it to undertake a mandate on the delivery of the above budget. This has the following general benefits:

- **Improved Efficiency:** Delegating authority in this way allows for faster decision-making and action, essential when there need to be technical changes;
- **Enhanced Accountability**: Clear budget delegation ensures that everyone knows who is responsible for what;
- **Reduced Burden:** Budget delegation allows DReps to focus on strategic issues, rather than being tied down in day-to-day operations or other time-consuming activity;
- **Risk Management**: By clearly defining technical authority, risks can be managed in a responsible way;
- **Sustainability:** By defining clear roadmaps, enforcing alignment where needed, considering long-term maintainability, and supporting development changes as necessary, it is possible to ensure that development is sustainable;
- **Security:** Coordination ensures that necessary security requirements, including required performance guarantees, are adhered to by all development work;
- **Conflict Resolution:** Conflicts between suppliers can be resolved directly.

2.2 Maintenance of Core Infrastructure

Software infrastructure that is not properly maintained quickly becomes unusable. It may be buggy, slow, contain security vulnerabilities, or fail to work on required hardware platforms or with new operating systems or other software. When undertaking new work, full consideration will be given to the long-term maintainability of the software and the new features that are introduced, including the need to adopt new items. In line with Cardano's commitment to longevity and sustainability, long-term maintenance is expected to comprise a significant portion of the total budget that will be managed by the Technical Steering Committee. For comparison, software maintenance in other software projects can consume between 40% and 90% of the total software lifecycle costs. Because Cardano is exceptionally well engineered using advanced modern development techniques, and bug rates are extremely low, we anticipate that costs will be at or below the lower end of the industry average, but it is essential that they are not ignored, and that maintenance effort is properly coordinated to the benefit of the Cardano ecosystem as a whole.

2.3 Setting a Coherent Programme of New Work (Roadmap)

To ensure long-term sustainability for Cardano, as required by the constitution, it is important to ensure that any development programme is complete and coherent, and considers long-term as well as short-term goals. By working against an agreed roadmap, as with this proposal, it is possible to ensure that community priorities are identified and met. It is also possible to **fill any necessary gaps** in core infrastructure by issuing calls for specific work items. The approach taken by the TSC leaves the community in control of the work programme as a whole, while allowing suppliers flexibility to deliver within the scope of the overall community requirements.

In addition, core infrastructure work can require coordinated development. While well intentioned, and meeting community priorities, core infrastructure work items can even be mutually contradictory, either in terms of their aims or their effects. In such cases, technical coordination is necessary, and decisions will need to be made about the balance of work. An example is that improvements in throughput may well increase settlement times significantly. Such contradictions can only be resolved by open and robust technically-focused discussion with the suppliers and with the community. Security concerns must also be addressed in a coordinated manner. For example, the implementation of one new feature may make assumptions that negatively impact another feature. Once again, technical coordination and open discussion are necessary to resolve such conflicts.

2.4 Enabling and Facilitating the Integration and Rollout of New Features

Any roadmap items that the Technical Steering manages should consider all integration and rollout costs, and not just the costs for developing individual features (which may be a small fraction of the actual cost). New features will need to be properly integrated into existing software and deployed for use by the Cardano community. This work is often complex, time consuming and unpredictable in scope, and may involve a third-party supplier.

Similarly, successful rollout of new features will often involve large-scale coordination of Cardano ecosystem partners, documentation and support. This is most visible where a hard fork is required, but even small changes will need sensible rollout plans. In some cases, new parameter settings will need to be agreed, new guardrails must be defined, corresponding guardrails scripts written or updated, and constitutional amendments proposed and enacted. Such coordination cannot be done by a single supplier or organisation but requires large-scale and extended cooperation and consultation across the ecosystem. The budget includes sensible provisions to cover both integration and rollout where appropriate, and where this is not covered by other funded proposals.

2.5 Supporting Essential Technical Knowledge Exchange and Innovation

The TSC supports a number of critical services to the community on a mostly volunteer basis. It will use part of the requested funding to support and expand these services as necessary.

The **Parameter Committee** provides technical advice on protocol parameter settings and coordinates, providing specialist support on network, technical/security, governance and economic parameter settings. It serves to disseminate technical knowledge amongst the community, enabling a wider understanding of important design decisions affecting the operation of the Cardano network. It fulfils an important constitutional role in recommending settings for new protocol parameters (such as the governance parameters that have been introduced with the Conway hard fork). It also acts as the custodian of the guardrails that are written into the Cardano Constitution and of the associated guardrails script.

The **Hard Fork Working Group** is convened to coordinate effort across the ecosystem to enable the successful delivery of hard forks. It has successfully delivered both the Conway and Plomin hard forks This requires collaborative effort across the entire ecosystem, including software developers, exchanges, DApp developers, tool providers, the Constitutional Committee, SPOs, DReps and other ecosystem partners.

The **Proposal Triage Group** is a joint working group with Intersect's Open Source Committee and Product Steering Committee. It will undertake gap analyses, triage proposed work items against the agreed community priorities, determine how they can best be met by Intersect-administered budgets, evaluate proposals using clear and consistent criteria, and work to create a priority list with recommendations for improvements that can be put to the proposers and to the community.

The **Security Council** is a small body of experts that manages security concerns. Its primary function is to evaluate security issues, to provide security-related advice and recommendations, to inform developers of security issues as they become apparent, and to resolve security-related conflicts as they arise, balancing threats against operational needs. It works on a strict need-to-know basis, with security-related information held in a secure repository with carefully restricted access. The security council also coordinates critical incident responses, ensuring that incidents are properly triaged, that developers are involved, and that stakeholders are informed. This may include coordinating the development of hot fixes or even coordinating the agreed disaster recovery procedures in conjunction with SPOs, the Constitutional Committee, DReps, DApp developers, exchanges and other necessary parties.

Technical Working Groups have been established to ensure good communication with the teams that are developing various components, including ledger, consensus, network, node CLI and API, Plutus, Hydra, Mithril etc. Similarly, **Special Interest Groups** have been established to consider needs for specific communities such as DApp developers. These groups allow direct contact to be made with the developers who are working on a day-to-day basis in specific areas, allowing discussion of new ideas, discussion of bugs and features, solutions to problems, discussion of alternative approaches, practical information about contributions etc.

2.6 Evaluation of Bids

All bids (tenders) for work to be undertaken under this proposal will be evaluated according to the following criteria:

- Technical quality;
- Suitability of the team;
- Importance of the work
- Value for money;
- Appropriateness of requested resources, including effort;

Standardised Software Readiness Levels (SRLs) will be used to assess needed outcomes, and to identify gaps in proposed work that will need to be addressed by the proposers. Suppliers may bid for complete work items or for lots, as is common practice in the FinTech sector. This encourages competition, and allows small suppliers an opportunity to enter the Cardano ecosystem.

2.7 Management of Funded Projects (Delivery Assurance)

A high level of probity and transparency is required for any project that is managed by the Technical Steering Committee. The Technical Steering Committee commits to overseeing the successful delivery of selected work items, following good management practices. All funded work will need to include suitable auditing of:

1. Technical achievement, measured against overall goals;
2. Security requirements, measured against goals that are agreed with the Intersect Security Council;
3. Performance, measured against protocol and security requirements;
4. Long-term maintainability;
5. Financial costs;
6. Team effort and composition.

Funded projects must not exploit the community in any way, including inflation of actual costs, over-claiming of technical achievements, undertaking unnecessary or non-approved work, misleading performance or security claims. These conditions will be monitored carefully by the TSC and DReps and the community will be advised of any infringements. In the event that a critical project fails, it may be necessary to transfer budget to a new supplier. This will be done in as open and transparent a manner as possible.

Section 3: TSC Commitments

3.1 Commitments to the DReps and Community

The Technical Steering Committee will:

- Conduct **Open Tenders** to the wider community for proposals aimed at fulfilling gaps in the Cardano Development Roadmap and essential Core Infrastructure maintenance;
- **Review submitted proposals** and work with proposers to refine project proposals in order to achieve the best possible overall outcomes;
- Assess **software readiness levels** to determine initial and final expected status of a project proposal, and ensure that all necessary work is identified in the proposal;
- Assess **developer effort** and **team quality** to ensure that projects are properly resourced but deliver good **value for money**;
- Work with Intersect and project proposers to **build technical milestones** within each proposal, and define **sign-off criteria**;
- Ensure that proposed work is **properly communicated to the DReps and to the community**;
- Work with the Intersect team to create technical contracts to carry out the work in a **timely and efficient manner** that ensures **good value-for-money**;
- Provide **regular updates** to the DReps and the general Cardano community on project progress;
- Ensure that **critical maintenance activities** are carried out in a timely and efficient manner;
- **Consult the DReps and community** on **roadmap priorities** and adjust projects to meet changing priorities and needs;
- Ensure that the CPS and CIP processes are followed for all significant changes to the node or other relevant core infrastructure;
- **Inform the DReps and community** of any contract infringements, termination, or extension.

3.2 Alignment with the Cardano Constitution

This proposal aligns directly with the requirement to prepare a sound budget:

> *The Cardano Community is expected to periodically propose one or more budgets for the ongoing operation, maintenance and future development of the Cardano Blockchain ecosystem and for covering other costs related to the implementation, administration and maintenance of the decentralized, on-chain governance processes provided for in this Constitution*

It is the TSC's position that in order to meet this requirement, all core infrastructure maintenance activities need to be considered, as well as requirements for ongoing operation and future development. These need to be considered in a coordinated and coherent way that reflects proper technical concerns. That is the focus of Section 4, which also covers essential technical support for implementation and maintenance of the on-chain governance processes, including support for new governance features that may be required by the community, as well as technical support to enable decision making on parameter choices and updates, on hard forks, and on other governance issues.

The constitution further states:

> *"Hard Fork Initiation" and "Protocol Parameter Change" governance actions shall undergo sufficient technical review and scrutiny as mandated by the Guardrails to ensure that the governance action does not endanger the security, functionality, performance or long-term sustainability of the Cardano Blockchain. On-chain governance actions should address their expected impact on the Cardano Blockchain ecosystem.*

This mandates careful technical evaluation of any proposal that could affect the behaviour of the chain via such a governance action, since otherwise the completion of that work will be unconstitutional. This cannot be done by a single supplier. All contracts that will be awarded by the TSC will include provisions for proper independent technical review and audit, including ongoing security audit and performance evaluation as necessary to meet the needs of the constitution. Moreover, the entire programme of work that impacts the blockchain must be carefully coordinated across suppliers to **avoid endangering the security, functionality, performance or long-term sustainability of the Cardano Blockchain as a whole.** The TSC proposal will address these important issues when evaluating and assessing work items. Any work item that fails to meet necessary standards will be revised if possible, and terminated in the unlikely event that it cannot. As described in Appendix IV, the use of this budget will comply with all Constitutional Tenets.

Section 4: Budget Breakdown

The budget is broken down into a number of components. These represent estimates of the work that is expected to be done under each category, based on an evaluation of the number of active developers who could be available to work on those tasks (as Full Time Equivalent developers - FTEs). Budget is also requested to support essential operational requirements, including proper communication to the community of technical goals, work to be carried out under contract, and regular progress reports. Budget will be moved between categories if necessary. For example, maintenance effort may be redeployed to roadmap items or vice-versa, by negotiation with the suppliers involved. In many cases, the same developers will be involved, so this reallocation will be straightforward without the need to award new contracts.

The budgetary estimates for effort are expressed in terms of full-time equivalent (FTE) developers, who will be dedicated to the associated work items in a transparent way. The TSC is fully cognisant of the fact that this funding is community-based and will, through Intersect, emulate best-of-breed public procurement practices in delivering good value for money, high quality solutions, while avoiding unnecessary overheads and bureaucracy.

In instances where there is potential for competition, the TSC will endeavour to adopt approaches such as “bid by lot” which encourages small- and medium-sized enterprises to participate. In the absence of any current potential for competition, clear and transparent reporting of effort expended and associated costs will be mandated to demonstrate that community funding has been judiciously utilised.

The FTE to fiat ($) conversion has been done at the rate of $1,300 per engineering day, this being the figure that has been quoted to Intersect for similar work in 2025. The working estimate of 230 days per FTE year (this being the midway value for the countries that developers currently operate in). Thus an FTE year is $299,000 or 598,000 ADA (assuming 0.5 $/ADA). This rate is assumed to include all administrative overhead and project management costs.

The TSC views the total budget as an **upper limit** on expenditure and will return any uncommitted funds to the treasury at the end of the year that exceed a six-month contingency (to ensure continuity of funding for essential activities, as budget processes may not align perfectly). Should a continuation budget be passed (whether by Intersect or any other entity) these funds would be promptly returned to the treasury.

4.1 Core Roadmap Development (11.96M ADA)

It is expected that core roadmap development will cover some or all of the following items. Based on current staffing levels at established core suppliers, considering other budget proposals, and anticipating reasonable growth, it is estimated that approximately 20 FTEs can sensibly be made available in the 2025-2026 development period to cover these designated roadmap activities. The budget accounts for these at the assumed engineering rate of $299.000/FTE (598,000 ADA). Actual costs will be negotiated with suppliers to ensure good value for money.

Standardised Software Readiness Levels (SRLs) - Appendix II - will be used to assess the current state of development and expected final state of each roadmap item at the end of the 12-month period. Where projects are smaller/less complex, it is reasonable to expect a greater increase in the SRL. Conversely, larger/more complex projects will have smaller increases in the SRL. Nonetheless, significant and quantifiable progress will have been made in each case. A few projects will start at low SRLs. In most cases, this is because more clarity is needed on community requirements/needs (e.g. Governance Improvements). Some research may also be needed. This is, however, applied research that may well apply only to Cardano and that answers specific needs, rather than fundamental research that may have much broader applicability and require a much longer timeframe to come to fruition, as in e.g. the IOR budget proposal.

4.2 Core Maintenance Activities (4.784M ADA)

Core infrastructure maintenance needs to cover at least:

- Maintenance of the Cardano node and supporting infrastructure
- Maintenance of DB-Sync
- Maintenance of the DB-Synthesizer and associated tools
- Maintenance of the Daedalus full node wallet
- Maintenance of the Cardano Node Emulator and other core Intersect repositories
- Maintenance of GraphQL and cardano-wallet
- Hardware wallet maintenance

The majority of this work is expected to be carried out by IOE as part of its budget proposal. It is estimated that it will take approximately 8 FTEs to cover the remaining necessary maintenance work items across various suppliers. This has been budgeted at the same engineering rate of $299,000 per FTE (598,000 ADA) that is used for roadmap development. Actual costs will be negotiated with suppliers to ensure good value for money.

The *full list* of maintenance items that need to be covered by the total Intersect budget, including the work that is expected to be carried out by IOE, is shown in Appendix III. This is categorized by:

- Core Maintenance
- Operational Maintenance
- Community Support
- General Support

4.4 Necessary Applied Research (1.196M ADA)

Some Roadmap development work relates to proposals with low levels of maturity that require further research before development and will therefore come from the Research & Innovation budget. These proposals typically sit at Software Readiness Level 4 or less (spanning Research to Design as described in Appendix II). In some cases, projects that are at overall higher software readiness levels may require research consultancy to answer specific research questions or to clarify design or implementation decisions.

Examples of likely applied research needs include:

- research into governance improvements;
- research into improved transaction management;
- outline feasibility studies.

It is estimated that 4 FTEs will be sufficient to cover these activities.

In the absence of detailed information about costs for applied researchers, we have assumed the same rate as for engineering staff, that is $299,000 (598,000 ADA) per FTE.

4.5 TSC Operating Costs (480K ADA)

Pending a detailed calculation of exact operating costs and given the time constraints to prepare this budget, we have included a placeholder figure of $240,000 (480,000 ADA) to cover the operating costs for the TSC. These are primarily associated with facilitating coordination between the TSC and the wider Cardano community as well as internally within the TSC itself. Spend will be fully accounted for, with full consideration given to ensuring value for money, and any unspent budget returned to the treasury.

Software Requirements - 10K ADA

Software licences to enable the TSC members to effectively collaborate and communicate remotely, where these are not available to institutional members. This will be agreed upon integration of the successful nominees of the Spring 25 Elections but will potentially include Slack and Miro licences.

Quarterly one day meeting of TSC Members in person - 60K ADA

A quarterly 1-day workshop will be held for TSC members to discuss strategy and conduct quarterly planning and reviews. To avoid travel costs, wherever possible, this will be tied into one of the other major events where TSC members will already be in attendance such as Opensource Summit in Amsterdam or the 2025 Cardano Summit. The TSC will include open sessions for community members as part of each such meeting.

Engineering Town Halls - 80K ADA

Technical Review Meetings for Roadmap Development Projects Knowledge sharing with TSC members on completion of major Research & Development milestones, such as the completion of Investigation or Research Work. Open discussion sessions with the community.

Open Workshops for Tendering -165K ADA

These sessions will be held as part of opening a public tender for all of the development items listed above, whether that is Roadmap, Non-Roadmap or Research. These will be open sessions to share information on the project to date, share information on requirements and for potential vendors to ask questions.

Technical Workshops for Technical Working Group Members - 165K ADA

These are online sessions inviting all core developers to share achievements and quarterly plans across development teams. These will be open to all community members that wish to sit in. These events will be held in conjunction with major Cardano events where developers will be in attendance.

4.6 Community Support Reimbursement (1M ADA)

Also pending a detailed calculation of exact requirements, given time constraints, we have included a placeholder figure of $500,000 (1,000,000 ADA) to cover reimbursement of suitably qualified community members for contributing their time and expertise to the development of Cardano rather than relying on ongoing volunteering and good-will of community members, plus the costs of part-time staff to support community communications and meeting organisation. Spend will be fully accounted for, with full consideration given to ensuring value for money, and any unspent budget returned to the treasury.

Security Council - 100K ADA
This group is responsible for security issues, including defining and enforcing security procedures, tracking and responding to security concerns, coordinating incident responses, managing the bug bounty program. Costs include administration costs and managing secure storage for

Parameter Committee - 150K ADA
This group is responsible for providing advice on current and future parameter settings, considering economic, governance, security and networking concerns. Costs include secretarial (administration) costs.

Proposal Triage Group - 75K ADA
This group is responsible for evaluating development proposals from the community

Tender Evaluations - 250K ADA
This group is responsible for evaluating tender bids from suppliers.

Milestone Reviews - 350K ADA
This covers the technical review and sign off of projects to ensure that contract milestones have been completed to an acceptable standard and payment can be released to the supplier.

Technical Communication to the Community - 60K ADA
This part time role would be responsible for communicating all work under the TSC to the community.

Meeting Organiser - 15K ADA
This part time role will be responsible for organising meetings under the TSC remit

4.7 Contingency Fund (1.9M ADA)

Even with excellent planning, not all eventualities can be predicted ahead of time. For example, in developing Ouroboros Genesis, the ModusCreate team has uncovered security issues that were not identified as part of the (thorough) design studies. This required an additional development contract.

Rather than scaling individual budget items to cover for such contingencies, we instead request specific contingency funding of $950,000 (1,900,000 ADA) to cover:

1. Unexpected development or maintenance needs, e.g. to address security concerns, as described above;
2. Costs of dealing with major on-chain incidents if they cannot be covered by the maintenance budgets;
3. Changes in requirements, e.g. as a result of new information being discovered about community needs or priorities;
4. Risks of supplier bankruptcy or other disruption to the supply chain, requiring new contracts to be negotiated, work to be redone etc;
5. Some level of fluctuation in the ADA to fiat conversion rate, if ADA drops below $0.50 for an extended period of time.

This contingency is calculated as approximately 10% of the total budget. Spending against this contingency fund will be reported separately from that for other items, allowing DReps and the community to track the use of contingency funds. As with other items, unused funds will be returned to the treasury.

Appendix I: The Technical Steering Committee

Delivery of a technical roadmap requires dedicated technical experts. The TSC is a body of elected community representatives with an enormously strong technical background acquired over years of delivery at the core of Cardano. Collectively, TSC members have been at the heart of successful Cardano delivery since its inception. They have been at the forefront of delivering all hard forks from the Byron reboot, through Shelley, to Plomin, as senior members of the delivery team. They also have significant experience of successfully evaluating, managing and delivering large scale public projects involving dozens of different suppliers across many international boundaries, spanning up to 5 years in duration.

Kevin Hammond - Chair

Kevin Hammond chairs the Technical Steering Committee, co-chairs the Intersect Parameter Sub-Committee, and serves on the Security Council and Hard Fork Working Group.

As Head of Software Engineering for Cardano at IOG and IOE, I was at the heart of Cardano's technical development for over five years, from the rollout of the Incentivised Testnet in 2019, through the successful deliveries of Shelley, Allegra, Mary, Alonzo, Vasil and Valentine hard forks, that have delivered tremendous value to the Cardano ecosystem through the development of on-chain incentives, NFTs, smart contracts, reference scripts and numerous other improvements, up to and including the delivery of the Chang and Plomin Hard Forks that have collectively enabled on-chain decentralised governance through CIP-1694. I also have a strong relevant technical background in performance analysis, parallel and distributed computing, optimisation, and real-time systems, having published over 130 research papers and obtained over 30 national and international research grants. I have led many of these research grants, which have involved coordinating large teams across many countries. These projects are almost universally rated as delivering excellent value for money and producing outstanding results within budget and on time.

Adam Dean - Vice Chair

Adam Dean is Vice Chair of the Technical Steering Committee and co-Chair of the Open Source Committee.

Adam has been a member of the Cardano Community since 2019 during the ITN and HTN phases where he was a stake pool operator, eventually running an NFT/Token minting platform (Buffy Bot), and then moving into community event organization and planning (cNFTcon, NFTxLV). Through it all he has strongly contributed to the open source and developer ecosystem of Cardano where, when, and how he could.

Johnny Kelly

Johnny Kelly has 6 years experience working with On-Site Asset Maintenance Contract Management for Residential and Commercial Real Estate locations as well as generating Quarterly and Annual Accounts Reports for over 200 Real Estate Clients.
Serves as a part of the Governance Parameters Working Group, was a co-author of a Report from this Group relating to the Initial Recommendations for Governance Parameters Settings as a part of Cardano's CIP-1694 implementation. Served as a DRep.
Is currently a Non-Custodial Co-Management SysOps Engineer (Tech Janitor) for 3 Stake Pools on Cardano, providing SPO Server Maintenance and Monitoring without access to his Clients' cold keys.

Johnny regularly provides Pro Bono support to people who wish to set up their own Development Infrastructures, or who wish to set up an SPO Infrastructure.
Is a Cardano Keystone Wallet Ambassador working with them to ensure full compatibility with Cardano Ecosystem CIP Standards where possible. Is a tester of their upcoming Firmware implementations to give feedback on the UX/UI experience for Cardano Users.

Markus Gufler

Markus Gufler is the Technical Community lead at the Cardano Foundation. He has 25 years of experience in the Internet Service Provider sector as CTO of his own company which has served thousands of customers, integration partners and clients. This means hands-on experience in all areas of procurement, design, project management and quality control of networks, hardware, operating systems, software, applications and monitoring. He has been a community member since 2017, developer of CLIO explorer, RockPi StakePool node, ITN stake pool, Ambassador, developer and service provider of the Topology Updater service, co-founder of CNTools, Testnet and Mainnet stakepool operator, inventor of SPO-poll and the blockperf monitoring project.

Ben Hart

Ben Hart is Chief Technology Officer at MLabs, a Cardano supplier. In addition to his role of the Technical Steering Committee, he also serves on the Membership and Community Committee, and has served as a voting member of the Membership and Community Committee, the MCC's working group on ecosystem grants, as well as the Core Infrastructure Roadmap Working group as a Co-Chair over the course of 2024..

Since early 2021, Ben has worked in various capacities to assist many Cardano businesses and services launch, and has worked directly with IOG to deliver core Cardano functionality. He was also a co-chair of the Cardano Defi Alliance, and the Cardano Developer Experience Working Group.

Neil Davies

Neil Davies has over 7 years experience within the Cardano ecosystem, working within Predictable Network Solutions Limited he has had significant input into the design and implementation of the 'system' aspects of Cardano (data diffusion, the node architecture etc). He has also contributed to the initial design of Hydra and, most recently, the evaluation of the Peras and Leios designs. He has a long history of publishing on issues of performance and system design, including several related to the Cardano development. He has experience defining, tendering and managing large scale international projects (in EU framework programs) and running a small (but beautifully formed) distributed systems performance consultancy for over 20 years.

Within Intersect Neil is currently chair of the Network Parameters Advisory Group, part of the Parameter Committee and has been a member of the Technical Steering Committee since it was formed in October 2024.

Appendix II: Software Readiness Levels (SRLs) for Core Node Development

These standardised Software Readiness Levels (SRLs) reflect a view of the research and development work that needs to be carried out in defining a new software feature for deployment on-chain via a hard fork. They represent a refined version of the SRLs that have been used within IOG to inform on project development, informed by practical experience. They allow systemic treatment of major milestones and deliverables, and enable progress to be assessed against a structured framework. While successful projects will normally require the majority of these stages to be completed, some minor SRLs will not always be needed. Some projects (especially larger and more complex ones) will require additional milestones and deliverables. A similar approach will be used to assess projects that do not require on-chain deployment (e.g. support tooling).

Stage	SRL	Minor	Description	Typical Artefact
Research	1	1.1	Idea Formulated	Outline Problem Statement/Position Paper
		1.2	Basic Research Completed	Research Paper
Innovation	2	2.1	CPS Produced	CPS or Technical Report
		2.2	Initial Delta-Q Analysis	Analysis Report
		2.3	First CIP or Technical Report Produced	CIP
Feasibility	3	3.1	Outline Feasibility Demonstrated	Report
		3.2	Initial Software Demonstrators	Software Demonstrators
		3.3	CIP Updated	Revised CIP

Stage	SRL	Minor	Description	Typical Artefact
Design	4	4.1	Outline Design Study	Outline Design Report
		4.2	Feasibility Study Completed (Functionality)	Feasibility Study
		4.3	Quantitative Timing Analysis Completed	Detailed Timing Analysis
		4.4	Detailed Software Prototypes Produced	Software Prototypes
Initial Implementation	5	5.1	Detailed Design Completed	Detailed Design and Formal Specification Produced
		5.2	Code Investigation Completed	Report on Code Investigation
		5.3	Design Reviewed	Technical Workshop
		5.4	Implementation Plan Produced	Implementation Plan
		5.5	Initial Implementation	Software Deliverables
Main Implementation	6	6.1	Code Completed	Software Deliverable
		6.2	Functionality Tests Completed	Test Results
		6.3	Security Review Completed	Security Audit Reports
		6.4	Performance Tests Completed as Necessary	Performance Reports

Stage	SRL	Minor	Description	Typical Artefact
Integration	7	7.1	Integration Into Node	Integrated Node (Preview Release)
		7.2	Integration Functionality Tests Completed	Test Results
		7.3	Node Deployed to Preview Test Environment	Explorer shows deployment
		7.4	Performance Tests Completed	Performance Results
Deployment	8	8.1	Mainnet-ready node Released	Integrated Node (Mainnet Release)
		8.2	Node Deployed to PreProd Test Environment	Explorer shows deployment
		8.3	Node Deployed to Mainnet	Possible Hard Fork
Completion	9	9.1	Post-deployment snags fixed	Snagging Report
		9.2	Live Performance Evaluation Completed	Performance Evaluation
		9.3	Residual Issues Identified	Final Report

Appendix III: List of all Core Infrastructure Maintenance Items

Core Maintenance	
Title	***Description***
Node Bug Fixing	*Fix bugs, test, and deploy*
Node Minor Feature Enhancements	*Design, implement and test minor features, update and improve features in response to user requests*
Open Source Code Review and Code Integration	*Review contributions and integrate into code repositories. This is a Open Source approach related item and will be prescribed by OSPO. Essential for ongoing code development.Code integrated into core repositories or rejected with reasons*
Github issue tracking	*Monitor, respond to and deal with issues that are reported via GitHub*
Development Update Reporting	*Report on development updates via cardano-updates, to Intersect etc*
Unit/Property Test Maintenance and Improvements	*Maintain test case consistency with implementation changes, additional testing, correct and document tests, remove redundant/erroneous tests*
End-to-End (E2E) Testing	*Maintain, extend and enhance E2E tests and testing framework. Produce test reports. Sign off releases. E2E (End-to-End) testing is a software testing methodology that evaluates the entire system, from start to finish, to ensure that all components work together correctly. In the context of Cardano, E2E testing involves testing the complete functionality and interactions of various components within the blockchain ecosystem, including smart contracts, wallets, nodes, and network communications. Provides assurance that both existing and new end-to-end functionalities continue to work as expected*
Conformance testing	*Ensure consistency between specification and implementation, generate tests from specification*

Security Review of Designs and Code	*Review designs and code for security issues*
Performance analysis and system integration level benchmarks	*Constant performance measurements and analyses for Cardano at system integration level, as needed to identify performance regressions and maintain security guarantees. Safeguard new releases, features or hard forks by identifying potential performance regressions and provide evidence for effectiveness of optimizations.Performance dashboard created*
Security Issue Management	*Follow Intersect security policies and coordinate with Security Council as appropriate, including following the responsible disclosure policy*
Node Performance Improvements	*Benchmark and improve node performance, eliminate bottlenecks. Performance improvement may include speed, timeliness/responsiveness, memory, network etc*
Technical Debt	*Fixes and improvements to improve long-term maintainability/sustainability*
Operating System and other Environmental Upgrades	*Code changes to ensure consistent behaviour with new operating systems and environments*
Interoperability	*Changes and improvements to ensure interoperability with wallets and other tools*
Security Improvements	*Changes and improvements to improve security, including new cryptographic primitives/techniques*
Robustness/Reliability Improvements	*Changes and improvements to improve the robustness and reliability of the node*
Code quality improvements	*Other improvements to the quality of the code*
Cardano API Maintenance and Improvements	*Maintain Cardano API, ensure consistency with ledger, improve interoperability with other applications.*
Cardano CLI Maintenance and Improvements	*Maintain consistency of Cardano CLI with ledger, consensus etc, enhance and improve CLI commands, update CLI for new ledger eras*
DB-Sync maintenance and improvements	*Maintain consistency of DB-Sync with new node versions; bug-fixing etc*

Plutus Core maintenance and Improvements	*Update Plutus Core, add new primitives, improve performance of the Plutus interpreter, integrate into the Cardano node*
CDDL maintenance and improvements	*Update the CDDL specification and associated implementations*
db-analyzer, db-synthesizer, db-truncator Maintenance and improvements	*Maintain and enhance the* db-analyzer, db-synthesizer, db-truncator *tools that are needed for chain analysis, benchmarking, disaster recovery etc.*
Tracing systems maintenance and improvements	*Maintain and improve the node performance metric tracing system and associated tooling*
Design improvements	*Improvements to the node design, reflected in the codebase*
Update and maintain formal specifications	*Update formal specification for Shelley etc. to Agda; revise the formal ledger specification as issues are discovered; extend formal specification to non-ledger components*
Update and maintain documentation	*Maintain on-line code-level documentation*
Code Modernisation	*Update code to support new libraries, compiler versions etc*
Guardrails Maintenance	*Review, maintain and update the Guardrails for on-chain use*
Guardrails Script Maintenance	*Update the guardrails script in line with the checkable guardrails*
Identity Management Script Maintenance	*Update the Identity management script that is used by the Constitutional Committee as required*
Ensure MainNet Security	*Identify and mitigate threats and security incidents. Systematically enforces best practices in security. Regular cadence of security audits, no major breaches or incidents*
Update Hardware Wallets	Maintain Hardware Wallet Consistency with hard forks
Full Node Wallet (Daedalus) Maintenance and enhancement	Maintain and enhance Daedalus to provide full node wallet capability
GraphQL/cardano-wallet maintenance	Maintain and enhance cardano-wallet and GraphQL as necessary

Operational Maintenance	
Title	***Description***
Disaster Recovery	*Support and coordination is needed to ensure the disaster recovery process that is outlined in CIP-135 can be executed in the event of a critical mainnet failure*
Network Monitoring	*Provide monitoring for the MainNet to be used by oversight & community. Ensure block propagation falls within consensus requirements. Establish continued network monitoring and escalation process*
Global mempool monitoring	*Observing and gathering data on pending transactions that have not yet been included. Transactions in the mempool can alter the validity of the newly submitted transactions it complexify the dApps logic and increase the development effort.Global mempool monitoring for Cardano provides real-time transaction visibility, improved network awareness, enhanced transaction prioritization, efficient fee estimation, optimal transaction confirmation times, effective network congestion management, proactive issue detection, and data-driven decision-making for users and stakeholders.Global mempool monitoring provides real-time observation and data collection of pending transactions, offering insights into transaction patterns, fee optimization, and network health. It enables analysis of transaction behavior, optimizing transaction processing and scalability while ensuring compliance with specific criteria. The data obtained from mempool monitoring also facilitates predictive analytics for anticipating network congestion and making informed decisions.*
Operate the Bootstrap Relay Network	*Continued operation / Maintenance of the bootstrap relay network as needed to support Cardano mainnet pending full deployment of Ouroboros Genesis*

Maintain Testnets	*Support public Cardano testnets, including e.g. Preview, PreProd, SanchoNet. These testnets allow SPOs, exchanges, tool providers and DApp developers to test their in a controlled environment using test ADA.*
Incident Support	*Incident management and reporting procedures. On-call support for critical incidents, including Tier 1, Tier 2 and Tier 3 support*
CI/CD Operation	*Operate the Continuous Integration/Continuous Deployment (CI/CD) System that is needed for code contributions to the Cardano node and other software*
Performance Cluster Operations	*Operate the Benchmarking Systems to Support Performance Analysis and Evaluation*
Governance Action Preparation & Submission	*Prepare and submit hard fork and parameter update proposals*

Community Support

Title	*Description*
Hard Fork Roll-out Coordination	*Implementation, planning, and coordination of Hard Forks. Allows for seamless HF Roll-outs, minimizing impacts to the mainnet, preview and preprod networks. Technical support for hard forks*
Supporting the Technical Steering Committee	*Overall Technical Oversight for Cardano Development. Ensure technical priorities are identified, work items are progressed and issues resolved in a rapid and effective manner for the overall benefit of the Cardano ecosystem*
Supporting the Security Council	*The Security Council evaluates and records security risks and issues for Cardano, including maintaining a risk register and coordinating incident responses. It needs technical support and advice to enable this operation*
Supporting the CIP/CPS process	*Prepare CPSs and CIPs to support work items, review and comment on CIPs and CPSs, track & evaluate CIP readiness, attend CIP editor meetings, act as CIP editors*
Supporting the Constitutional Committee	*Provide the Constitutional Committee with technical advice and support as necessary to enable them to assess functionality, security, performance and sustainability of governance actions, including advice on roadmaps etc.*

General Support	
Third-Party Library Maintenance	*Fix and develop third-party libraries that are needed for Cardano, e.g. libsodium*
Nix Enhancement and Bug Fixing	Developing and Enhancing the Nix build system as
Release Management Process	*Managing releases, integrating code, verifying successful integration, writing release notes*
CI/CD Maintenance and Support	*This covers maintenance and support of the CI/CD system that is needed for development testing, integration, building and release. It supplements the operation of the CI/CD system*
Formal methods for system performance assurance - Delta Q (design & measurement)	*Performance assurance is needed to guarantee the reliability of software implementations. Reliability in software development projects. Performance space is not quantified. Formal methods applied to ensure performance guarantees.*
Haskell Compiler Support	*Needed to deal with maintenance and improvements to the Haskell compiler and related tools, provide support and advice to core developers, assist with performance issues etc. as necessary to support development activities*
Quickcheck Improvements	*Update Quickcheck as needed to support new testing mechanisms, such as dynamic property testing*

Appendix IV: Alignment with Constitutional Tenets

TENET 1 Transactions on the Cardano Blockchain shall not be slowed down or censored and shall be expediently served for their intended purpose. Performance requirements will be considered in all work proposals.

TENET 2 The cost of transactions on the Cardano Blockchain shall be predictable and not unreasonable. All work proposals will need to respect the requirements of predictable and reasonable transaction costs.

TENET 5 The Cardano Blockchain shall not lock in an ada owner's value or data without the owner's consent. All work proposals will need to avoid locking either value or data without the owner's consent.

TENET 6 The Cardano Blockchain shall not unreasonably impede interoperability. All work proposals will need to demonstrate that they do not impede interoperability.

TENET 7 The Cardano Blockchain shall preserve in a safe manner any value and information stored on the Cardano Blockchain. All work proposals will need to meet this important security requirement, including assuring the principle of preservation of ADA.

TENET 8 The Cardano Blockchain shall not unreasonably spend resources.

Good use of on-chain resources will be considered carefully when evaluating any work proposal. This will include node performance, on-chain storage of data, off-chain storage, use of memory, and network traffic.

TENET 9 All users of the Cardano Blockchain shall be treated fairly and impartially, taking into account the collective desires of the Cardano Blockchain Community, consistent with the long-term sustainability and viability of the Cardano Blockchain.

All work proposals must produce results that treat users fairly and impartially. The collective desires of the Cardano Blockchain Community will be considered when prioritising work items. Full attention will be given to long-term sustainability and viability of work items, including integration, deployment and rollout of new features.

TENET 10 Financial stability shall be maintained and the total supply of ada shall not exceed 45,000,000,000 (45,000,000,000,000,000 lovelace).

No work proposal will be accepted that changes the total supply of ada, or that impacts financial stability.

Appendix V: Risk Analyses

The general approach of the TSC is to consider both the systemic and the individual project risks. For example, progressing multiple projects that can each support scaling will provide alternatives should one of the proposed approaches turn out to be infeasible.

Risk Register

The TSC will construct, and maintain, an overall risk register - seeking input from working groups, development teams and other subject matter experts. It will publish this, subject to the usual concerns about security and individual privacy. Risks will monitored over time to track their evolution and state of mitigation. They will be classified by severity and likelihood using a traffic light system: Green (Low Risk); Amber (Moderate Risk); Red (High Risk). Red risks require immediate attention and mitigation. Amber risks require monitoring, and should be mitigated where possible.

Project-Specific Risks

Each funded work item will be required to produce and maintain a specific socio-technical risk analysis, including likelihood, severity, and mitigations for each risk. Many technical risks will be mitigated by the systematic use of the SRLs shown in Appendix II, which create a ladder of clear project milestones, and allow project progress to be rigorously demonstrated and assessed. Specific SRLs address key risks. For example, SRL 3.1 requires the production of an outline feasibility study, SRL 4.2 requires a quantitative timing analysis to identify performance risks, SRL 6.1 requires a security review, and SRL 7.1 requires performance evaluation of the completed code.

Systemic Risks

We will also conduct a full analysis of systemic risks. These risks will include:

- Loss of key personnel acting as subject matter experts
- Failure of a supplier
- Inability (technical / budgetary) to deliver on a work item
- Unexpected security or technical concerns for one or more work items
- Inability to find appropriate suppliers for necessary work items, including essential maintenance
- Inadequate budgeting or reporting
- Unexpected dependencies between work items
- Unwillingness of key suppliers to engage with the designated process
- Inability of supplier to explain the work that has been carried out on behalf of the community
- Variations in the conversion rate from fiat ($) to Ada
- Regulatory/legal risk, especially if suppliers are international or open-source contributions are involved
- Risks that arise particularly around project failure or lack of transparency, to the perception of the wider cardano ecosystem.
- Governance risks, such as disputes between working groups or suppliers' conflicts of interest

Standard mitigations exist for all of these issues and will be applied as appropriate.

Risk Monitoring and Escalation

Projects are expected to manage their own internal risks and to report on these to Intersect's Delivery Assurance team, who will update the risk register. Where serious risks materialise, they will be escalated to the Technical Steering Committee, who will assess them, recommend mitigations, and in turn escalate them to Intersect staff if necessary.

Appendix VI: Team Quality

As described above, the Technical Steering Committee and its associated sub-committees and working groups represents a highly experienced body of technical expertise that spans Cardano, providing both breadth and depth of technical expertise, including all current developers via the corresponding Technical Working Groups.

Roadmap and maintenance suppliers will be selected based on their technical appropriateness to undertake the corresponding work item, including experience with the Cardano ecosystem. This will generally be the proposer of each roadmap work item. Full consideration will be given to the best way to onboard new suppliers as part of funded work items. This will be assisted by the ability to bid by lot.

While consideration will be given to obtaining best value for money, this will generally be achieved by selecting the best technical expertise rather than necessarily the lowest bid for a work item. Cost per FTE will not be the dominant assessment criterion when selecting suppliers.