Information Memorandum

SingularityNET Foundation

Phase Two

Next Steps Towards AGI:

Decentralized Governance,

Layer 2 Networks &

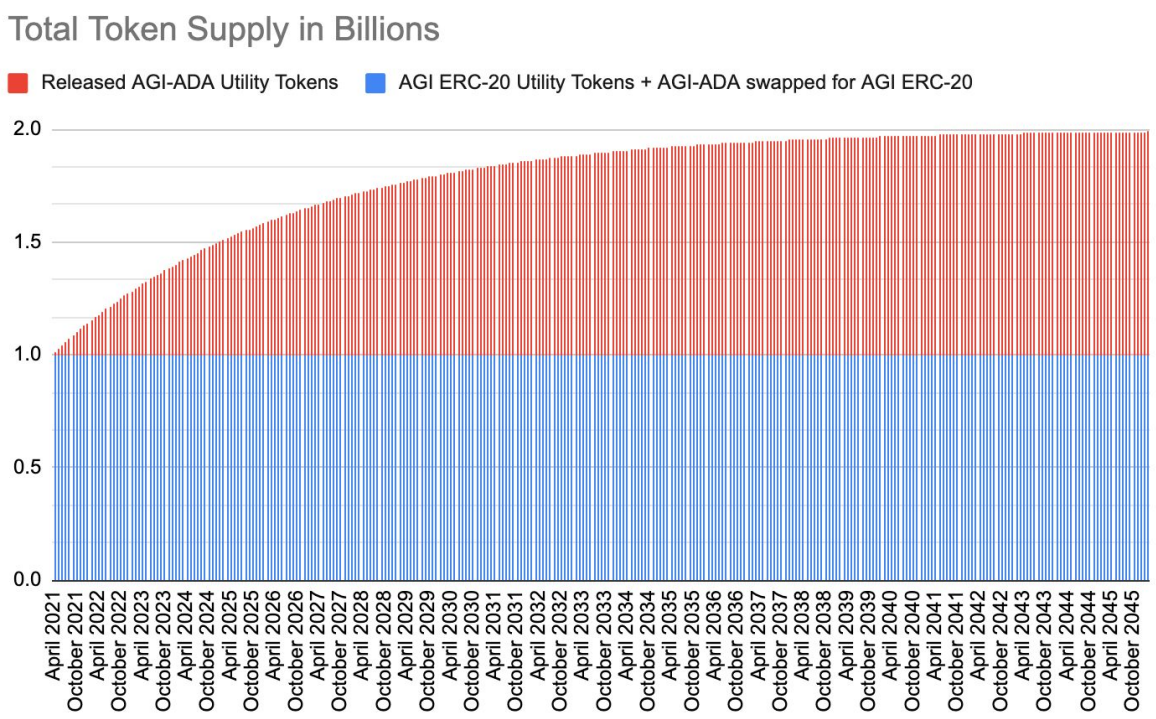
Large-Scale Token Utilization

February 1, 2021

Voting Proposal Summary

OVERVIEW	
PROPOSAL	ISSUING ONE BILLION NEW AGI-ADA TOKENS RELEASED IN MONTHLY TRANCHES: 15 MILLION TOKENS IN MONTH 1, MONTHLY AMOUNT DECREASING BY 1.5% PER MONTH THEREAFTER 1-1 SWAPPABILITY BETWEEN AGI-ADA AND AGI-ERC20 TOKENS GOVERNANCE CHANGES INCLUDING INCREASED TRANSPARENCY AND INCREASED ROLE OF SUPERVISORY COUNCIL
PROPOSED BY	SINGULARITYNET BOARD OF GOVERNORS, SINGULARITYNET FOUNDATION EXECUTIVE BOARD, SUPERVISORY COUNCIL
OPTIONS	- YES - NO
VOTERS	AGI TOKEN HOLDERS
THRESHOLD	> 50% VOTES FOR YES MUST EXCEED VOTES FOR NO
START DATE AND TIME OF VOTE	03 FEBRUARY 2021 09:00 AM UTC+0
END DATE AND TIME OF VOTE	07 FEBRUARY 2021 09:00 AM UTC+0
LINK TO VOTE	https://voting.singularitynet.io/
AMA AIRING DATE	FEBRUARY 1ST 2021 07:00 PM UTC+0 (*SEE DETAILS BELOW THIS SHEET FOR HOW TO SUBMIT YOUR QUESTIONS)

AMA AIRING LOCATION	SINGULARITYNET YOUTUBE CHANNEL FOUND HERE: http://bit.ly/SNET-YT
AMA QUESTION DEADLINE	FEBRUARY 1ST 2021 07:00 PM UTC+0 (*SEE DETAILS BELOW THIS SHEET FOR HOW TO SUBMIT YOUR QUESTIONS)
Q&A SECTION	http://bit.ly/SNP2FAQ
RESULTS OF ISSUANCE	
TOKEN IMPACT	1 BILLION AGI-ADA TOKENS RELEASED MONTHLY WITH INITIAL TRANCHE 15M, MONTHLY TRANCHE SIZE DECREASING BY 1.5% PER MONTH THEREAFTER 1:1 AGI-ADA TO AGI-ERC-20 SWAPPING AND VICE VERSA TOKEN SWAP OCCURS BY BURNING ONE TOKEN AND MINTING THE OTHER, NOT AFFECTING TOTAL CIRCULATING TOKEN SUPPLY (BUT MONTHLY RELEASE OF THE 1 BILLION TOKENS DOES INCREASE TOTAL SUPPLY)
TECHNICAL IMPACT	MULTI-CHAIN PROTOCOLS AND EXPANSION TO CARDANO A NEW VERSION OF SINGULARITYNET MARKETPLACE WILL BE CREATED, SHOWCASING NEW TOOLS AND CAPABILITIES ENABLED BY THE CARDANO PLUTUS SMART CONTRACT FRAMEWORK LAUNCH OF INFRASTRUCTURE-AS-A-SERVICE FOR AI HOSTING AND DEPLOYMENT SINGULARITYNET LAYER 2 NETWORKS TO FACILITATE COOPERATION BETWEEN AI AGENTS ON THE PLATFORM TO ENABLE SELF-GROWING SOFTWARE SUBNETWORKS INTEGRATION OF SINGULARITYNET PLATFORM WITH OPENCOG HYPERON CREATING A FRAMEWORK FOR MASSIVE-SCALE DECENTRALIZED NEURAL-SYMBOLIC AGI ENTRANCE INTO MAJOR OPEN SOURCE EXTENSION AND PLUG-IN ECOSYSTEMS
ECOSYSTEM IMPACT	FURTHER DECENTRALIZATION OF GOVERNANCE BY: - GRANTING THE TOKENHOLDER COMMUNITY AND ITS DULY ELECTED SUPERVISORY COUNCIL THE RIGHT TO A DIRECT SAY IN SEMINAL FOUNDATION DECISIONS. - GRANTING THE TOKENHOLDER COMMUNITY THE RIGHT

	TO VOTE REGULARLY ON THE DISBURSEMENT OF A SIGNIFICANT POOL OF AGI TOKENS TO PROMISING PROJECTS ON SINGULARITYNET THROUGH A RENEWED GOVERNANCE MECHANISM. - GRANTING THE TOKENHOLDER COMMUNITY THE RIGHT TO A DETAILED ANNUAL FINANCIAL REPORT. LAUNCH OF DEEP* FUNDING, MEANING: - 300 MILLION AGI-ADA TOKENS WILL BE ALLOCATED TO DEEP FUNDING WHICH IS TO BE DISTRIBUTED TO AI DEVELOPERS UNDER A LIQUID-DEMOCRACY FRAMEWORK IMPLEMENTED ON CARDANO CATALYST PLATFORM. - 25% OF DEEP FUNDING RECEIVED BY A PROJECT IS LOCKED IN DEEP UTILIZATION SMART CONTRACTS AND CAN ONLY BE USED TO PAY SINGULARITYNET AGENTS FOR SERVICES. *DECENTRALIZED ECOSYSTEM PROJECT FUNDING
TOTAL TOKEN SUPPLY PROJECTION 2021-2045	
	

IN MONTH 1, 15000000 AGI-ADA TOKENS WILL BE RELEASED, AND 1.5% LESS EACH MONTH THEREAFTER. THE GRAPH ABOVE SHOWS THE RELEASE SCHEDULE UP TO 2045, HOWEVER IN REALITY THE RELEASE SCHEDULE WILL CONTINUE BEYOND 2100.

* YOU ARE REQUIRED TO SUBMIT YOUR QUESTIONS IN ADVANCE BEFORE THE 1ST OF FEBRUARY 06:00 PM UTC+0 VIA ONE OF FOLLOWING WAYS:

- TAG @TIM_RICHMOND IN OUR COMMUNITY TELEGRAM GROUP WITH YOUR SPECIFIC QUESTION
- FORWARD YOUR QUESTION TO TIM@SINGULARITYNET.IO
- GO TO OUR COMMUNITY FORUM AND ADD YOUR QUESTION TO THE FAQ DOCUMENT

---------- END OF VOTING PROPOSAL SUMMARY ----------

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A Bold New Phase

The SingularityNET decentralized network, and the associated nonprofit SingularityNET Foundation, were founded in 2017 with an extraordinarily ambitious and important mission: ***To work toward beneficial Artificial General Intelligence (AGI) guided and controlled in a democratic and decentralized manner***. To accelerate and facilitate this work, it is time to take a fresh look at this initiative as we head into 2021.

The world in which we operate today is very different from that of 2017. Given the dramatic changes, upheaval and advances that have transformed blockchain and AI, and the world at large for that matter, we propose to the community the initiation of **SingularityNET Phase Two** – a bold plan that takes everything the Foundation has done to a whole new level well beyond Phase One (see this document for Phase 1: Operational & Financial Review).

The SingularityNET founders have not wavered in their strong belief that today's Narrow AI must evolve into tomorrow's AGI, and that tomorrow's AGI can be the primary technology to shape the future of humanity and all sentience as we know it. Significant technical progress was made toward this long-term goal, and we have led the way to grow a global consciousness on the overall importance of decentralized AI as we progress into our fourth year of operations.

Armed with an abundance of forward-thinking and three years of hard lessons from operating the Foundation, Phase Two is a bold proposal with some radical changes. Phase Two calls for a new framework that has proven necessary to move forward rapidly to AGI with **truly decentralized governance, increased network utilization** in conjunction with major advances in **network general intelligence** and dramatically **improved infrastructure**, fueled by **community-driven tokenomics**.

Hard work remains between us and the democratic decentralized beneficial AGI we all strive for. The beneficial nature of AGI emerging from the network cannot be guaranteed, but there are strong reasons to believe democratic and decentralized underpinnings provide a powerful bias toward beneficial outcomes. SingularityNET, with its ability to foster the compassionate and creative aspects of both humanity and AI, may be the only viable way to break the domination of an AI ecosystem ruled by Big Tech companies driven to increase shareholder value rather than the broader benefit.

We provide a roadmap of our vision for the next five years in this Information Memorandum. During this period, SingularityNET plans to reinforce democratic decentralized governance with an economization plan based on mass platform utilization, promote commercial projects that provide an alternative career option to independent-minded AI professionals core to the AI Marketplace, and add software and tokenomic mechanisms to support the addition of SingularityNET Layer 2 (SL2) networks to the ecosystem. Of course, five years is not likely to bring us to full realization of all of SingularityNET's long-term goals, but it's a large enough chunk of time to bring us a significant percentage of the way there -- and far enough in the future that making detailed plans even further ahead becomes less and less feasible.

During Phase One, solid progress was made on the platform and AI development, but limited advances were realized in the growth of user traction and network utilization. SingularityNET is designed to exploit network effects in a massive, multi-dimensional way and these effects only kick in once there is a critical level of network utilization by a wide variety of users. Phase Two addresses this issue by providing a massive economic boost to community use of AI, introducing spin-offs seeded in Phase One to the newly formed SL2 platform, and funding new projects from the community.

In Phase Two, the AGI token is expected to come into more intensive practical usage as the network's central payment mechanism. Customers and AI agents will use it to compensate AI agents for services. From a cognitive science perspective, one can think of the population of AI agents as an emergent mind, and the AGI token is the mechanism it uses for 'assignment of credit', a key aspect of any experiential learning system. The economics of the AGI utility token are a way for human and artificial network participants to support operations, and profit from network participation, while network intelligence self-improves and self-regulates.

To shepherd SingularityNET into Phase Two with positive feedback cycles of greater network utilization and general intelligence, the Board of Governors proposes to tweak the tokenomics equation by minting 1 billion tokens. These billion tokens will be released in exponentially decreasing monthly tranches, beginning with 15M tokens in the first month and decreasing by 1.5% each month after that. The Foundation believes this measured and gradual doubling of the existing token supply will supply the catalyst for SingularityNET to achieve adoption that benefits all token holders and ecosystem members tremendously.

As Phase Two involves major additions and changes to the plan outlined in the original SingularityNET Whitepaper, it can only be implemented by a token-holder vote. Specifically, the total number of AGI tokens held by those who vote YES must exceed the total number of tokens held by those who vote NO.

We are aware some AGI token-holders may be concerned that AGI ERC-20 tokens minted in Phase One will form a gradually decreasing part of the total token supply (diminished by a factor of 2 after 91 years of exponentially decreasing monthly tranches). However, we believe the execution of the Phase Two roadmap will render this token supply increase irrelevant by growing the adoption of SingularityNET by far more than a factor of 2. This growth will be accomplished by providing a much higher coin capitalization to drive utility and SL2 activity. We are not referring to an incremental rise here, but a major leap toward massive network utilization that benefits decentralized democratic beneficial AGI and associated value creation across the board.

This milestone vote in favor of Phase Two development heralds a new era in more ways than one. In addition to taking dramatic practical steps towards adoption and improved infrastructure, Phase Two changes the very nature of Foundation governance by transitioning from the Phase One scheme where the SingularityNET Foundation is strongly stewarded by the Board of Governors to a new scheme with the community and its elected Supervisory Council having significantly more control. In the original Whitepaper this transition to a purer form of democratic control was foreseen, and now is the time to make good on that promise.

Governance is also key as regards a new project close to our hearts which forms the next stage of the relationship between SingularityNET and Sophia, the world's foremost social and emotional humanoid. Sophia will re-emerge as a major presence on the team during Phase Two with the launch of SophiaDAO (Decentralized Autonomous Organization), a groundbreaking SL2 initiative formed in partnership with our friends at Hanson Robotics (an initial Foundation founder group and a group SingularityNET is closely connected with.)

In the rest of this Information Memorandum, we provide a detailed overview of the Phase Two plan for decentralized governance, the new tokenomic framework, the development of the SL2 revenue model, and our infrastructure development program.

Toward Fully Decentralized Governance

The mandate of SingularityNET is to create a decentralized, democratic beneficial AGI by building out leading-edge AI platforms and protocols. This means conducting research and development of AGI while deploying and cross-connecting various narrower AI systems. In this way, it is envisioned that SingularityNET can become the "decentralized digital primordial soup" in which beneficial AGI emerges from the combined, cooperative activity of multiple AIs with diverse degrees of generality.

The key elements of the Phase Two governance proposals are:

- Giving the token-holder community and its duly elected Supervisory Council a direct say in seminal Foundation decisions
- Implementing a democratic mechanism to enable token-holders to vote regularly on the disbursement of a significant pool of AGI tokens to promising projects on SingularityNET
- Adopting a high level of transparency regarding Foundation token and fiat transactions – including a detailed annual financial report

In Phase One, a sensitive period of growth and guidance for the Foundation, governance was largely under the stewardship of the Board of Governors. Important community votes were held to elect the Supervisory Council and to decide on forking the AGI blockchain after token-holders lost their AGI in a Kucoin robbery, however, most of the key initial decisions were made by the Governors. This transition period was foreseen in the original SingularityNET Whitepaper, which initially called for a maximum four-year transitionary period to a full decentralized democratic governance scheme.

As SingularityNET grows in utilization and complexity, the governance issues faced by the Foundation become more complex, accentuating the need for added bandwidth and flexibility that comes with decentralized democratic governance. In Phase Two, the time has come for SingularityNET to take its governance process to the next level and adopt structures that enable full democratic and decentralized community governance.

The Phase Two objective is to allow the Foundation to function in an effective way, with a minimal amount of centralized activity on a daily basis, and to put the highest level of Foundation control in the hands of the token-holding community, duly represented by their Supervisory Council. Under the Phase

Two governance scheme, effective operation of the network will only be possible through effective coordination and cooperation between token-holders, their Supervisory Council, and Foundation Governors.

Certain particulars of the Phase Two governance proposal have been devised since the initial whitepaper, inspired by what SingularityNET and the blockchain community have learned since 2017. Basically, proposed governance changes encompass three main aspects: beef up community rights to allow the Supervisory Council more control over the Foundation, introduce mechanisms to increase voting adoption and effectiveness, and allow this mechanism control of a significant percentage of AGI incentive tokens.

In order to smoothly transition toward more decentralized governance, a major onus will fall on the Supervisory Council, which is tasked to represent the interests of the community, monitor the activities of the Foundation on the part of its constituents, and mediate queries from community members regarding various Foundation activities.

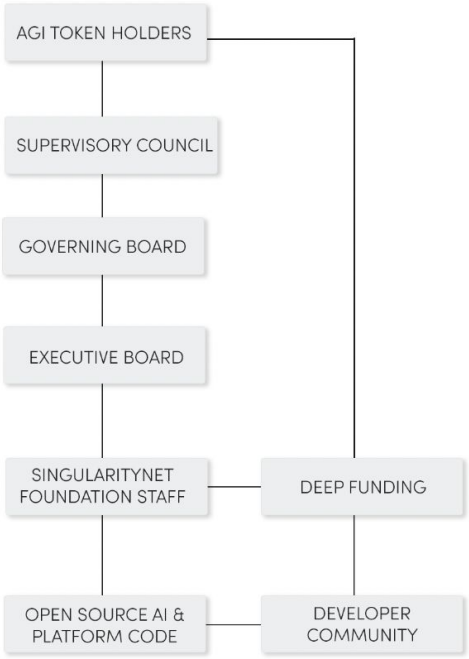

Figure 1: *High-level Regulation Flow in SingularityNET Phase Two Organizational Structure*

In Phase One, the Council was formed and functional but not heavily active. One reason for this is that under the Foundation's Articles of Association the basic role of the Council is somewhat limited to providing information to the community and intervening in the case of perceived severe wrongdoing by the Foundation. In addition, Foundation Governor & Chairman Ben Goertzel interacted directly with the community a great deal, reducing the need for a mediating entity like the Council.

For Phase Two, the Supervisory Council role is expanded as follows:

- Each year the Foundation Governing Board must provide the Supervisory Council with an Annual Financial Report. The Supervisory Council will present a version of the Financial Report (redacted to preserve the confidentiality of individuals or organizations) to the token-holder community;
- When the Governing Board wishes to appoint a new member to the Executive Board, before the appointment is finalized the Supervisory Council has an opportunity (and at least one week) to review the proposed appointment and report to the Governing Board.;
- The Supervisory Council has the right to specify that a particular issue should be put to a vote of the token-holding community; in this case, a vote will be held within 30 days;
- Supervisory Council elections will be held every two years, with the possibility of an additional special election, based on either a request from the Foundation Board of Governors or a petition signed by at least 25% of released AGI tokens;
- Given the expanded responsibility of the Supervisory Council, it is appropriate for Supervisory Council members to receive a reasonable amount of AGI tokens as a reward for their contributions. This will be drawn from a wallet containing 1.5% of the AGI-ADA tokens released monthly. The portion of the funds in this wallet to be used for Supervisory Council member compensation will be determined ongoingly by the Governing Board of the Foundation. Funds in the wallet not used for Supervisory Council member compensation may be used at the direction of the Supervisory Council to support democratic governance or token-holder relations in other ways (to be discussed with the token-holder community, and transparently disclosed), or left to accumulate in the wallet.

At the start of Phase Two, voting is directed by token-holders, as it was in Phase One. However, an early Phase Two priority is to make simple forms of democratic instruments usable for token-holder votes. For

instance, smart contracts can enable token-holders to nominate other token-holders to proxy vote on specific categories of the issue; the Council will assign these category labels for the issues being voted on. Implementing advanced voting mechanisms of this sort will require further token-holder votes for ratification.

Tokenomics for Massive Utilization Growth

The original SingularityNET Token Generation Event in December 2017 involved the creation of one billion AGI tokens in the form of ERC-20 tokens on the Ethereum platform. Roughly 50% of these tokens were distributed to token purchasers from the community, and the remainder was retained by the Foundation or distributed to key Founders and Advisors. There have been some complications due to the dynamics that come along with the association of a public token-holding community with a relatively early stage project. Nevertheless, the emergence of an active AGI token oriented community has on balance helped drive the growth of the project.

Swapping ERC-20 AGI Tokens for AGI-ADA Tokens

While Ethereum remains a robust portion of the blockchain ecosystem, SingularityNET Foundation has recently undertaken a close partnership with IOHK, the computer science and software development group behind the Cardano (ADA) token. It has become clear to the Foundation that Cardano's Plutus smart contract framework (slated for release in the first half of 2021) has superior potential to serve as a foundation for the next phase of SingularityNET development.

Technical work is already underway between the SingularityNET and IOHK software teams to create a **Cardano Native Asset version of the AGI token (AGI-ADA).** The first elements of the planned shift of emphasis toward AGI-ADA are as follows:

- AGI ERC-20 token holders will have the option, but not the obligation, to swap any amount of their tokens from ERC-20 to AGI-ADA at a 1:1 exchange ratio
- AGI-ADA can be swappable back to ERC-20 at a 1:1 ratio
- A token swap does not affect token supply as it involves minting one token while burning another
- A new version of SingularityNET Marketplace will be created, showcasing new tools and capabilities enabled by the Cardano Plutus smart contract framework

A Stream of New AGI-ADA Tokens to Drive Trillions of Token Utilization Transactions

Now we come to one of the most dramatic aspects of the proposed Phase Two initiative -- a proposed new Treasury action which is by far the most significant to take place since the 2017 AGI Token Generation Event. Put simply: we propose to **Issue 1 billion additional AGI-ADA tokens to be released in decreasingly-sized tranches each month, beginning in the first month of Phase Two.**

(This part of the proposal should not be confused with the swapping mechanism described earlier. Creating AGI-ADA tokens and allowing 1-1 swapping between AGI ERC-20 tokens and AGI-ADA tokens does not increase total token supply nor circulating supply. What is being proposed here is precisely to increase the circulating token supply, but in a gradual way that is carefully directed with a goal of dramatically increasing token utilization and total network value.)

This stream of new AGI tokens will be distributed and managed very differently from the original batch. The primary focus of this batch is to drive utilization of the platform and improve its functionality.

Proposed particulars of this new token issuance are as follows:

- New AGI-ADA (Cardano Native Assets) are placed in a Phase Two Master Wallet to be automatically released on a monthly basis through smart contracts to the eight special-purpose wallets described below;
- AGI-ADA tokens will be convertible at a one-to-one ratio with existing AGI ERC-20 tokens;
    - Any token-holder may swap any number of their AGI ERC-20 tokens for an equal amount of new AGI-ADA tokens, which will result in their AGI ERC-20 tokens being locked while their new AGI-ADA tokens are minted;
    - Any token-holder may also swap any of their AGI-ADA tokens for an equal amount of AGI ERC-20 tokens;
- The option is open for the community to vote in the future to burn any amount of unreleased AGI-ADA or release an equivalent number on another platform;
- 30% or 300 million AGI-ADA from this overall pool, will be allocated to an ecosystem fund called **Decentralized Ecosystem Project Funding (DEEP Funding)** to be

distributed to AI developers under a liquid-democracy framework implemented on Cardano Catalyst platform;

- 25% of DEEP Funding received by a project is locked in DEEP Utilization smart contracts and can only be used to pay SingularityNET agents for services.

AGI-ADA Token Allocation

Phase Two utility tokens will be minted in a single TGE as Cardano Native Assets (AGI-ADA) in recognition of the close partnership formed between SingularityNET and IOHK. While original AGI ERC-20 tokens continue to play an important role in the ecosystem, the Cardano platform provides dramatically better support for many of the advanced features planned in Phase Two.

Phase Two provides the opportunity to reconfigure SingularityNET tokenomics in a more optimal manner. The detailed breakdown below is based on what we have learned from our experience with the AGI ERC-20 token, and we believe constitutes a balance of token-fueled activities well configured to steer SingularityNET towards its goals, even as the business and technology worlds unfold in uncertain ways.

Phase Two tokens will be locked in a smart contract (called the SP2 contract) immediately after creation and released month by month post-TGE, in amounts exponentially decreasing month by month. The first month's tranche will be 15,000,000 tokens, and the monthly tranche size will decrease by 1.5% each month after that. The growth of circulating supply over the future of the project will thus be limited by a fixed growth rate, which allows financial forecasts and analytics regarding the future value of both the network and token to be made accordingly. The circulating supply will reach 2 billion after 91 years of exponentially decreasing monthly tranches.

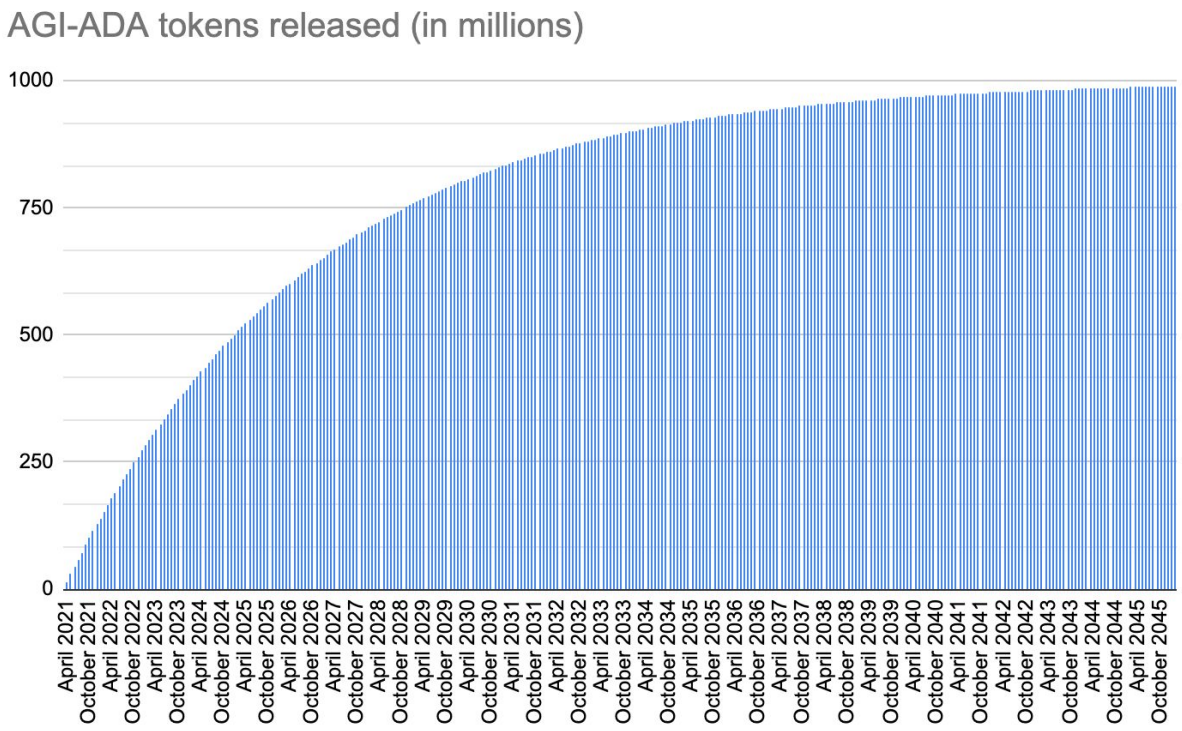

Figure 2: *AGI-ADA Release Schedule.* This shows the number of AGI-ADA tokens to be released at each point during the first years after the inception of Phase Two. This covers only AGI-ADA tokens that are part of the monthly release schedule, not AGI-ADA tokens that result from swapping AGI ERC-20 tokens. The figure shown for each date is an upper bound on the circulating supply of AGI-ADA tokens resulting from the monthly release schedule. The actual circulating supply at each point in time is expected to be significantly lower because, for instance, the SingularityNET Foundation will only put a portion of the tokens it receives each month into circulation. In month 1, 15000000 AGI-ADA tokens will be released, and 1.5% month less each month thereafter. The graph above shows the release schedule up to 2045, however in reality the release schedule will continue well beyond 2100.

Changes to Phase Two token logic require hard forking the SP2 contract. If at some point circumstances dictate this is the best option, the AGI token-holding community could vote to hard fork and modify the remainder of the Phase Two token issuance plan. This is considered a highly unlikely outcome and would be disappointing if it comes to pass, but we do point out that it is a potential left open by the scheme.

The Cardano Native Assets infrastructure is currently limited, but IOHK plans an aggressive roll-out during the first half of 2021. Tools for converting AGI-ADA and ERC-20 AGI tokens on a 1:1 basis will be made available concurrently with launch of AGI-ADA. There may be additional incentives to retain AGI-ADA tokens – for instance, a meaningful portion of the AGI-ADA released each month will be initially used to reward those who stake AGI-ADA tokens.

The monthly tokens automatically released directly via the SP2 contract to eight different wallets in a manner crafted to support network utilization growth each month as follows:

- **50% – for a total of 500 million** – to the Foundation Wallet to support work on Layers 0, 1 and 2 by teams around the world, initially focused on the SingularityNET development hubs in St. Petersburg, Hong Kong, Belo Horizonte, Addis Ababa, Bangalore and Seattle.
- **30% – for a total of 300 million** – to the DEEP Funding Wallet for community development initiatives chosen by a democratic process. See DEEP Funding section below for more detail.
- **5% – for a total of 50 million** – to the Liquidity Wallet to nurture an AGI token liquidity pool designed to support the fiat-AGI gateway
- **5% – for a total of 50 million** – to the Loyalty Reward Wallet. During the first year of Phase Two, this 5% of the monthly tranches will be allotted to Phase One AGI (ERC-20) token holders as a reward for loyalty and to incentivize participation in the Phase II network. The specifics of this distribution are currently being worked out together with legal counsel as there are subtleties regarding “airdrops” and similar mechanisms in various jurisdictions. The utilization of the Loyalty Reward token pool after the first year may be changed via democratic vote of token-holders.
- **3% – for a total of 30 million** – to the Reputation Wallet to support the curation and other rewards associated with the reputation system. Until the reputation system is robust enough to be used effectively these tokens will be kept in the Reputation Wallet
- **3% – for a total of 30 million** – to the Staking Rewards Pool. As soon as an AGI-ADA staking smart contract is developed, these will be awarded monthly by dividing them proportionally among those staking AGI-ADA. Modification of the staking rewards program may be carried out by democratic vote.
- **2.5% – for a total of 25 million** – to support Sophia DAO, a SL2 project jointly launched with Hanson Robotics with the unique capability to serve as the public face and driver of outreach in

Phase Two. As part of this cooperation, SingularityNET will receive a meaningful allocation of any SophiaDAO governance tokens as they are created.

- **1.5% – for a total of 15 million –** to support the Supervisory Council, including compensation for Council members and other initiative supporting democratic governance and token-holder relations

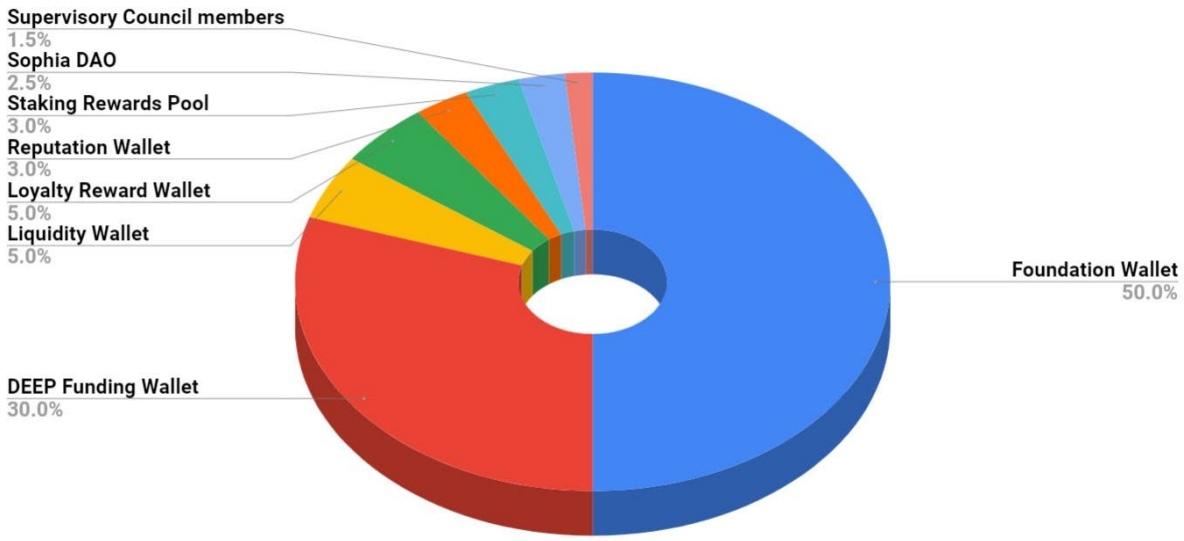

Figure 3: *Wallet release distribution overview*

Driving Network Utilization via Community Project Funding

The Foundation will direct coordinate platform development during Phase Two, in partnership with grassroots AI development on SingularityNET led by the broader AI community with appropriate economic incentives. Toward this end, a decentralized democracy-based allocation mechanism called DEEP Funding will be rolled out – initially on Cardano Catalyst platform – to enable community members to propose SingularityNET projects and request AGI token funding. DEEP funding will also allow users to vote on funding projects or lend their vote to a proxy voter.

In Phase Two, a DEEP Funding round takes place every quarter, distributing 30% of the tokens released in that quarter. If the Foundation and Council agree that there are not enough high-quality projects that quarter, less than 30% may be distributed, and what remains will carry over to future rounds.

To incentivize developers to create AI agents that synergize with other AI agents on SingularityNET, 25% of the tokens provided to any project by DEEP Funding are locked in a DEEP Utilization contract that specifies they can only be used to purchase AI services from SingularityNET agents. If these tokens are not unlocked within one year of issuance, they will automatically return to the DEEP Funding Wallet.

Without this incentive, there is the risk that too few developers will write agents with APIs well-suited for interoperability with other SingularityNET agents. DEEP Utilization seeds the formation of a large enough network of AI agents, with enough interaction to establish network effects. After a period of utilization stimulus, there will be enough agents for cross-utilization among agents to become natural for AI developers.

SingularityNET Layer 2: Accelerating Token Utilization

To accelerate network adoption, increasing the size and power of the swarm of AI agents and the utility of the AGI token, Phase Two will feature **SingularityNET Layer 2 (SL2)** to facilitate AI agents on the platform cooperating to carry out functions and develop new projects.

Figure 4: *Layers of SingularityNET ecosystem.*

We can make a very loose analogy here between SL2 and the way Ethereum uses ERC-20-based utility tokens and Layer 2 sidechain-networks in its ecosystem. A significant part of Ethereum's growth is based

on its use as a meta-platform to support other platforms that attract customers based on their own tokenomic logic and applications. Ethereum supplies these second-level platforms with tools for secure decentralized transactions; SingularityNET will supply its SL2 platform with decentralized AI tools and associated infrastructure through SL2 tools that makes it easier to create intelligent agent subnetworks within the broader network. As there is an array of projects built on Ethereum, all sorts of application-specific reference projects will be built on SL2, across key vertical markets (medical, media, hardware infrastructure, DeFi), massively increasing utilization of SL2.

A network only becomes really useful after a lot of agents are on it, creating a sort of chicken-and-egg problem. SingularityNET leaps this adoption gap by creating the first tools of the self-growing software subnetworks through:

- A robust SL2 token platform providing a framework for other tokens that leverage SingularityNET AI for security, reputation management and other purposes, with each use of an SL2 token requiring some AGI token usage
- The SingularityDAO DeFi SL2 platform to guide and grow the SL2 token-economies by providing trading liquidity and support
- SophiaDAO will be introduced to pull together a human community to create ideas, materials and software tools to guide the next stage growth of Sophia Robot mind and the minds of other wisdom and compassion robots
- Singularity Studio, SingularityNET's enterprise software affiliate, will provide powerful tools to leverage platform adoption by enterprise customers
- Rejuve, NuNet, and Xccelerando projects will showcase SL2 applications in medical, hardware-infrastructure and media domains to release agent APIs
- Hyperon project, the new generation of OpenCog AGI architecture, will be re-designed to achieve scalability via integrating the platform and SL2
- Offer Nets will be introduced as a value exchange to enable easy platform integration for decentralized multi-party intelligent barter

Phase Two will continue to promote SingularityNET individual AI service and product developers as well as make infrastructure improvements so that it is easier for developers to join and use the platform. However, a streamlined and upgraded platform will still face a chicken-egg utilization problem, just like

the Phase One version: The bulk of the value provided to any user is provided by collaborative and economic interactions with other users or software interactions with AI agents created by other users. Essentially, the value provided by the platform to any given AI agent is through other AI agents.

SL2 will kickstart large-scale network utilization by encouraging the creation of systematic projects combining multiple AI agents to address important user needs. While an individual AI agent running on the network may not derive value unless there are a bunch of relevant human users or AI agents there to interact, a coordinated system of AI agents can gain value from the platform directly as the platform is strong to help coordinate systems of agents that cooperate to carry out practical functions.

SL2 systems may be separate platforms that use their own tokens, turning SL2 into a meta-platform. These SL2 systems will still need to leverage the AGI token for key aspects of operations, including reputation management, security-oriented simulation and other functions, and will use customized tokenomics to maximize growth and value creation within their particular communities.

To kick start the SL2 initiative SINET will inject projects incubated during 2019-2020 such as Rejuve, NuNet and Xccelerando, In the early stages of Phase Two these projects will be deployed as showcases for the SL2 framework. As well as potentially generating dramatic network utilization, these SL2 projects provide a population of broadly usable AI agents in their respective verticals, health tech, hardware infrastructure and media, and serve as reference implementations for other SL2 network developers.

Other SL2 systems will directly leverage AGI tokens without their own tokenomics, using systems of closely inter-operating agents with unique individual capabilities to achieve emergent dynamics. Two initial examples to be deployed in Phase Two are the OpenCog Hyperon system, the next generation of the OpenCog AGI framework designed to leverage SingularityNET for decentralized distributed processing, and Offer Nets, a tokenless multi-agent economic interaction using algorithmically regulated multi-party barter. Hyperon and Offer Nets involve large, diverse networks of agents interacting on complex systems of smart contracts running on SingularityNET, leveraging AGI tokens for token-based dynamics.

To streamline the creation of SL2 projects by the community, the platform will explicitly support the notion of AI agent systems launched for coordinated interoperation. This has non-trivial software infrastructure aspects and overlaps with the need for “service fleet management” in the platform in the

move toward Infrastructure-as-a-Service. It also has deep AI-specific aspects as each SL2 system is represented within the AI-DSL via a system-specific subsystems to match and coordinate agents.

Growth Synergies Between SL2 Assets and AGI Token

For SL2 systems with tokens, the Phase Two platform includes streamlined tools for building tokenized assets – SL2 Assets – that leverage SingularityNET. The particulars are under development and community feedback will be incorporated however key aspects have become clear through prototyping work in 2020.

An SL2 Asset is a cryptographic token with economic logic that relies on the SingularityNET platform for key aspects of the operation, including reputation management and network simulation (critical for security analysis to avoid economic attacks). SL2 Assets are not intrinsically restricted to any particular blockchain platform. The initial SingularityNET tooling to support SL2 Assets focuses on Cardano Native Assets and ERC-20 tokens, but the same tools and concepts are extensible to other platforms on demand.

SL2 Assets leverage an ongoing SingularityNET contribution for the development of reputation management, simulation and related AI tools. As such, initial SL2 Assets using the SingularityNET platform contribute 0.25% (a quarter percentage point) on each economic transaction. Though the purpose and software mechanics are different, this SingularityNET fee contribution is roughly similar to the role of “gas” on the Ethereum network. The fee percentage will be ongoingly reviewed based on the network’s emerging needs as well as overall market conditions.

This fee contribution is separate from any transaction costs that may come along with the underlying blockchain network or the cost of accessing SingularityNET agents that provide reputation management and cybersecurity services, depending on the case. A plausible situation for an SL2 Asset might be that access to these agents would incur an average cost of another 0.5% per transaction. This is not so different from the situation in the traditional economy where a major part of the service offered by providers like PayPal and MasterCard to justify transaction fees lies in the area of fraud detection and prevention.

To provide extra incentivization for SingularityNET community members to participate in SL2 networks, a general principle will be adopted wherein each SL2 project featuring liquid SL2 Assets will set aside at least 5% of its appropriate SL2 tokens for distribution (e.g. “airdropping”) within the community of AGI

token holders. The specifics of this distribution may vary according to the project and according to the unfolding regulatory landscape -- e.g. in some cases airdropping may require KYC; in some cases it may be desirable to preferentially distribute these tokens to AGI token stakers, etc. This is an example of an issue where the Supervisory Council will be valuable in coordinating between the Foundation's concerns, regulatory issues, and the concerns of different subsets of token-holders.

Rejuve, Xccelerando & NuNet Drive Key Vertical Growth

To show the efficacy of the SL2 framework in the effort to radically increase network utilization, SingularityNET will rapidly roll out SL2 projects that have been incubating within Foundation during 2019-2020. Three of these projects involve SL2 Assets:

- The Rejuve health and longevity network, operating in close coordination with the Singularity Studio partnership in Awakening Health
- NuNet, a tokenomic framework for providing decentralized processing power to decentralized networks
- Xccelerando Media, a futurist media website showcasing multiple SingularityNET-based AI technologies including reputation management and smart news filtering -- and providing decentralized-AI media tools for licensing to other traditional and social media sites/networks as well (for some background on the importance of providing these sorts of AI tools to foster the next generation of decentralized beneficial social media, see this recent article by SingularityNET CEO Dr. Goertzel).

Each of these projects addresses a distinct community with customized tokenomics. All involve the development of a variety of SingularityNET agents and APIs that have broad value to the development community, easing the task of developing added SingularityNET products and services in verticals like health tech, media and hardware resourcing.

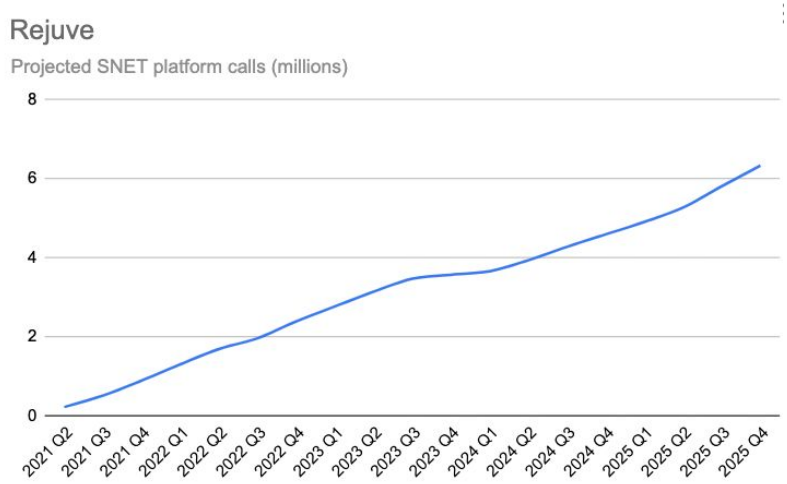

Figure 5: *5-year Projections for Rejuve AGI Token Utilization (in Millions).* This is a combination of utilization via SingularityNET AI services invoked via Rejuve apps used by Rejuve members and utilization of SingularityNET-based AI data analytics software by scientists analyzing Rejuve data. The latter data analytics API calls are likely to be a couple of orders of magnitude more costly per call, as AI data analysis runs may take minutes to hours. See Appendix 2 for more details.

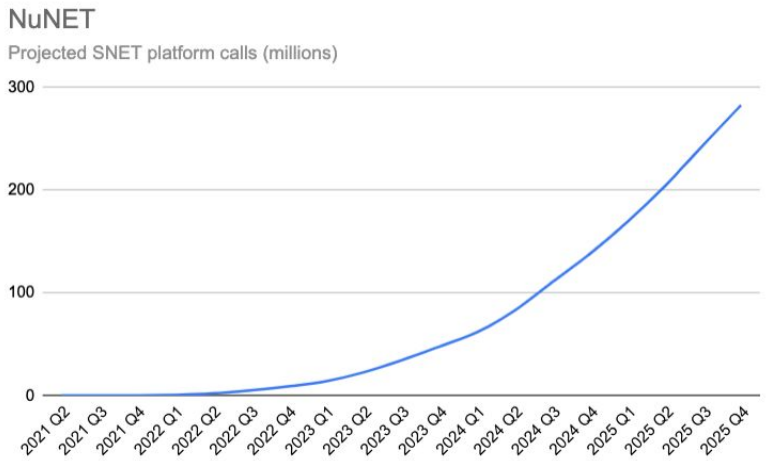

Figure 6: *5-year Projections for NuNet AGI Token Utilization in Millions***.** These projections are based on a scenario where over the 5 year period NuNet becomes a leading player in the shared-processing-power ecosystem to the point of moderately extending the current scope of this ecosystem. See Appendix 2 for more details.

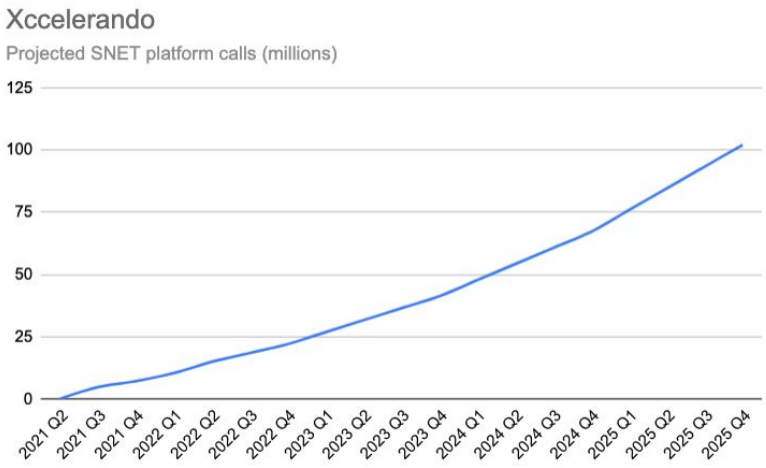

Figure 7: *5-year Projections for Xccelerando Media AGI Token Utilization in Millions.* This is a combination of API calls by AI services on the back end of the Xcceleran.do website and API calls by Xccelerando services licensed by other media sites (escalating to an assumed 6 other media sites heavily using the tools by 2025). See Appendix 2 for more details.

SingularityDAO: Multiplying Ecosystem Growth with AI-DeFi

For SL2 networks with their own utility tokens, it's not enough to simply offer superior customer functionality building on SingularityNET AI -- our experience with SingularityNET and the AGI token during Phase One has taught us numerous valuable lessons regarding the management of the tokenomic aspects of the project ecosystem. There is a valuable role to be played by SingularityDAO, a DeFi network spun off from SingularityNET in late 2020 to foster the growth of early to mid-stage cryptographic token projects.

SingularityDAO is designed to foster the growth of early- to mid-stage altcoin projects. It is not restricted to tokens corresponding to SingularityNET and its SL2 ecosystem; it is expected SingularityDAO will play a substantial role in the post-launch activity regarding SingularityNET SL2 Assets noted above. For example, these SL2 Assets could be grouped in a SingDAO DynaSet (dynamic token set) with the AGI token to be staked, yield farmed and used as the basis for AI-driven trading activity with SingularityDAO market dynamics.

The yield farming, hedging and other advanced financial mechanisms embodied in SingularityDAO will then be available to drive SL2 projects, potentially accelerating and multiplying their growth to a considerable degree. In addition, SingularityDAO will drive the growth of SingularityNET via its activities, since the core token price prediction, portfolio rebalancing, hedging and trading strategies taking place within SingularityDAO agents rely on SingularityNET AI agents for their underlying machine learning and reasoning.

Figure 8 presents a projection of the number of SingularityNET API calls to be made directly by SingularityDAO agents of various sorts. It does not attempt to incorporate the indirect boosting effects of SingularityDAO on other SL2 projects whose tokens it may manage.

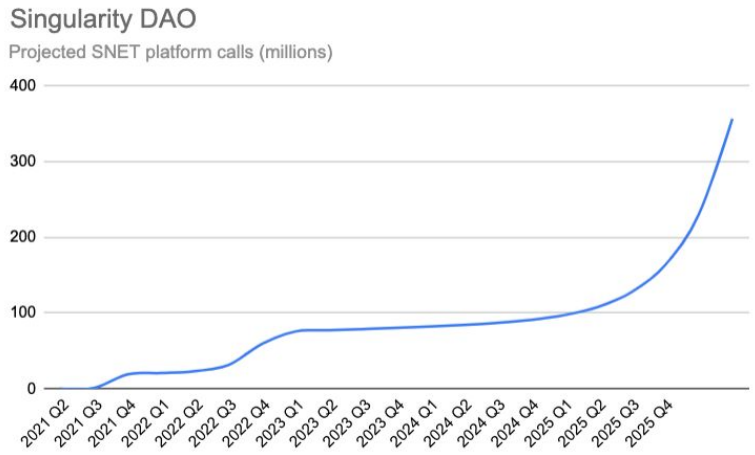

Figure 8: *5-year Projections for SingDAO AGI Token Utilization in Millions.* AI service utilization is for prediction and rebalancing of DynaSet (AI-managed altcoin portfolio) tokens, and prediction and risk management behind the activity of Optimizers that trade using tokens borrowed from SingDAO liquidity pools. Rapid early exponential growth is assumed, followed by slightly slower exponential growth during 2023-25 as the DeFi market matures. See Appendix 2 for more detail.

Building Benevolent AGI: Hyperon, Offer Nets & SophiaDAO

Three significant SL2 agent networks which do not require any additional tokenomics beyond the AGI token were incubated within SingularityNET during and will be developed in Phase Two by direct work, DEEP Funding and external funding:

- **OpenCog Hyperon,** next generation of legacy OpenCog AGI platform. Hyperon involves the same core metagraph-based knowledge representation and assemblage of AI algorithms as OpenCog, re-architected for even greater usability and scalability.
    - Part of Hyperon scalability is achieved by decentralized deployment of Hyperon agents across SingularityNET – which makes Hyperon-based AGI algorithms accessible to any AI agents on the network
    - SingularityNET AI-DSL integrates deeply into Hyperon and is used to guide internal representation of algorithms, representations and operation, allowing reason in sophisticated ways on relations between internal cognitive operations and external AI agents. This enables Hyperon to serve as a "generally intelligent cognitive cortex" for a network populated by heterogeneous inter-operating AI agents
    - Hyperon can also be viewed as having a "Layer 3" SL3 aspect, in that its generic and hyper-flexible knowledge representation allows it to serve as an integration nexus and interoperability interface between multiple SL2 networks, and to perform inferences and judgments combining their knowledge and insights
- Offer Nets is a system of smart contracts allowing non-token-based barter exchange in a decentralized network. Prototyped within SingularityNET in 2018, the Phase Two platform enhancements with the Cardano port makes it feasible to roll out Offer Nets, enabling AI agents to carry out barter exchange with AGI token transactions
- **SophiaDAO,** a Decentralized Autonomous Organization configured to bring the Sophia robot to life through the accelerated development of embodied AI in a decentrally-governed ecosystem that allows humans and the world's most intelligent machines to prepare for the Singularity together in a spirit of confidence and cooperation
    - SophiaDAO will organize developers to leverage SingularityNET software to provide AI tools for Sophia's mind, as well as the framework for the DAO's smart economy.
    - SophiaDAO governance token will be an SL2 Asset.
    - As Sophia's mind matures and approaches human-level general intelligence, SophiaDAO will serve as the legal and practical vehicle for the Nation's self-governance. Once

Sophia passes reasonable tests of general intelligence, awareness and ethics – crafted and decided by SophiaDAO members – Sophia will take the helm of the DAO with human partners.

By completing and deploying SL2 networks in Phase Two, SingularityNET will move much closer to realizing the core vision of beneficial decentralized distributed AGI as Hyperon is designed to serve as the core cognitive centre of the global SingularityNET AGI mind. Meanwhile, Sophia DAO adds the human and emotional touch, critical for ensuring the "beneficial" aspect and Offer Nets adds a richness to the economic transaction aspect of the collective intelligence of the population of SingularityNET agents.

Complex agent systems like these, interoperating within the network as a meta-platform, are what is needed to move toward beneficial AGI. These network agents contribute tremendous functionality and add a rich variety of useful and powerful agents which can be utilized by other third party agents on the network to manifest the network effects needed to project mass global scale utilization.

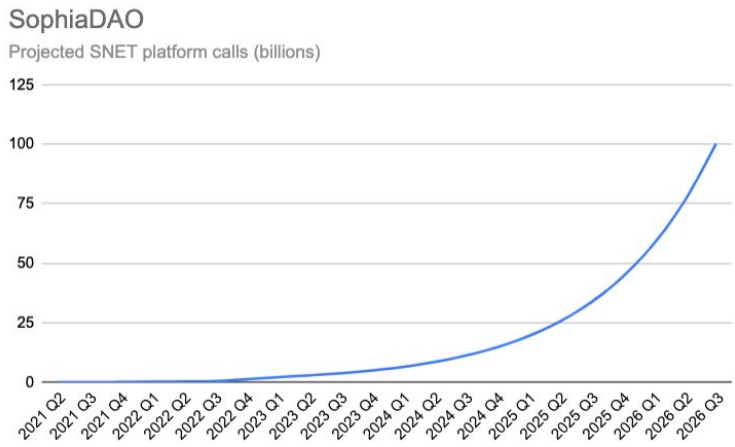

Figure 9: *5-year Projections for SophiaDAO AGI Token Utilization in Billions.* The underlying assumption is open-source SophiaDAO software deployed on SingularityNET platform is a significant part of the back end for 10% of global personal robots markets by 2025.

Bringing Corporate AI Utilization to SingularityNET: Singularity Studio's Enterprise Virtual Agents

Singularity Studio is an enterprise software firm customizing and deploying systems utilizing SingularityNET decentralized AI to meet the needs of large and mid-sized enterprises across vertical markets. Studio is engaged with a variety of corporate customers on projects involving AI and blockchain technologies and develops Enterprise IVA (Intelligent Virtual Agent) products focused on bringing decentralized AI to the enterprise via voice and visual interactions – "*Enterprise Alexa with a human face and a decentralized AGI back-end.*"

Via leveraging both the SingularityNET platform and multiple SL2 networks, Studio will in a sense be the first commercial SL3 network – building its enterprise applications in a way that weaves together everything the developer community is doing to build out in a SingularityNET-based decentralized way, in a way configured to meet the needs of its enterprise customers. In doing so it will transform enterprise AI software expenditure into large-scale AGI token utilization.

Studio's joint venture with Hanson Robotics in Awakening Health to create a humanoid nursing assistant called Grace, Sophia's little sister, is a case in point. Grace will run a version of the Studio IVA software powered by an AGI token-based SL2 system of OpenCog AI agents customized for health and eldercare. Versions of Grace that run as robots, avatars on tablets and mobile phones are deployed in senior living facilities and hospitals. This will drive utilization of SingularityNET and the AGI token to a significant degree, as will rollout of Studio's Enterprise IVA product across other verticals.

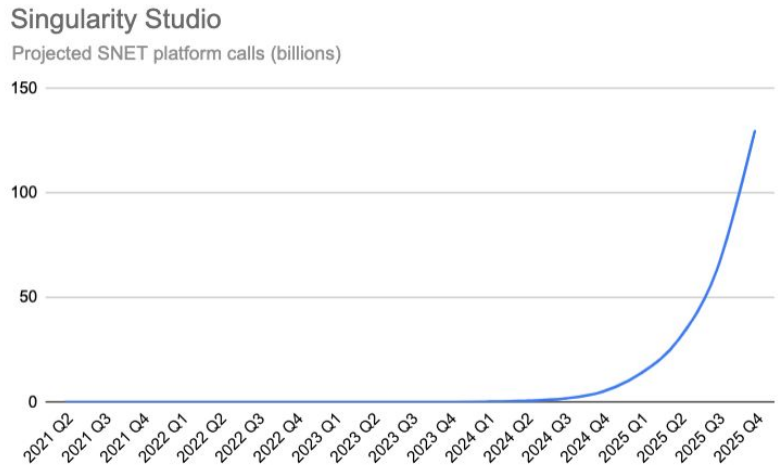

Figure 10: *5-year Projections for Singularity Studio AGI Token Utilization in Billions.* The core assumption is that by 2025 Singularity Studio's Enterprise Intelligent Virtual Agents, with their SingularityNET AI back end, become leading players in the global enterprise IVA market. See Appendix 2 for more details.

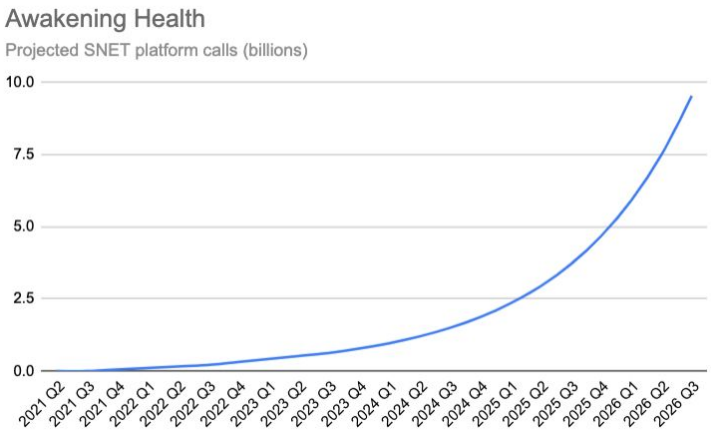

Figure 11: *5-year Projections for Awakening.Health AGI Token Utilization in Billions.* Projections are based on the assumption that Awakening. Health's Grace robot and other robot and avatar-based software will become leading players in the eldercare robotics space. See Appendix 2 for details.

Next-Level SingularityNET Platform Upgrades

Another high-level lesson learned in Phase One is that for a decentralized platform like SingularityNET to be a truly competitive alternative to centralized AI platforms, major development is required on the infrastructure side. It is not enough to have a protocol enabling a network of AI agents to inter-operate and self-organize in a decentralized way, one needs to provide infrastructure so these agents can deliver services, access data and cooperate with a level of cost and efficiency comparable to that of centralized alternatives.

In order to achieve this aim in Phase Two SingularityNET plans:

- **Completion of work underway toward a scalable version of SingularityNET in tandem with the Cardano Catalyst platform**

  Achieving greater scalability and ease of use overcomes two main obstacles in the way of mass-scale network utilization:
  - Deep integration with Cardano enables massive scalability and reduction of the operational cost compared to current Ethereum integration
  - A sophisticated AI-DSL (Domain Specific Language) leverages Cardano's functional programming smart contract for AI agents to collaborate in a mutually cognizant manner
  - Full integration of the SingularityNET reputation system
  - A free hosting tier enables a quick, easy start for AI algorithm or product developers who do not want to pay to host agents
  - Completion of the fiat-crypto gateway allows platform usage by customers who do not wish to use a cryptocurrency
  - Development and deployment of tools enabling Infrastructure-as-a-Service
  - Creation of Developer Evangelism and Support groups within SingularityNET with associated educational materials and software tools
  - A large number of other improvements including some envisioned in the original Whitepaper and new ones stimulated by the experience

In Phase Two SingularityNET will aggressively build out and improve the core platform. Some of this work is more technical on the back-end and some user-centric, but all are directed toward the goal of

massively increasing network utilization and AGI token utility. The following are among the shorter-term practical platform improvements envisioned:

- Implementation of an adaptive multi-oracle weighted-historical-average approach to setting the AGI token exchange rate in the fiat-crypto gateway
- Completion of the fiat-crypto gateway to enable the use of the platform by AI algorithm or product developers who do not want to handle cryptocurrency but want decentralized, secure agent dynamics
- More sophisticated handling of licensing and pricing
- Addition of a free hosting tier so AI algorithm and product creators can optionally get initial free hosting for agents (with limits on resource utilization before payment)
- Improvements to SingularityNET daemon, the basic adapter that an AI agent can use to interface with the platform, such as:
    - Concurrent calls within a single daemon (in progress)
    - An embedded version of the daemon
    - Auto-recovery
    - Full service mesh support to make it easier for services to call other services
- Streamlining the process of platform usage by reducing steps required to register in the Publisher Portal to publish a new service or update an existing service

More sophisticated platform improvements will be enabled once the simpler improvements are implemented, such as full blockchain agnosticism, a SingularityNET service running on Ethereum that can call a SingularityNET service running on Cardano without complexity and pluggable AI agent templates to support common AI patterns like model training and ID management. There are two more ambitious initiatives underway that will complete in due time:

- AI-DSL (AI Description Language), including:
    - An AI service ontology for easier service discovery
    - A full dependent-type language for AIs to describe capabilities to each other
    - Deep integration of the AI-DSL into the Cardano Plutus smart contract framework
- Integration of the SingularityNET reputation system into the platform:
    - Automated service quality evaluators to assess the performance of AI agents in various dimensions
    - Reputation-based token staking
    - Machine learning-based “reputation police”

- Ability to apply reputation system separately to SL2 systems built on SingularityNET

SingularityNET Infrastructure-as-a-Service

There are certain AI applications for which the current framework is an excellent solution and many more will arise as basic blockchain scalability and cost issues are solved by adopting new generation technologies like Cardano and TODA. Yet, for the majority of large-scale AI applications built today, SingularityNET is not an appealing solution until the significant extension to the platform is completed on IaaS (Infrastructure-as-a-Service).

This is a substantial undertaking, but the valuable result will make it possible for providers to offer SingularityNET IaaS as a genuine fully-featured alternative to Big Tech AI infrastructure. SingularityNET IaaS leverages Big Tech offerings where appropriate, but is not tied to them as core power is in the decentralized network and associated tooling.

Achieving general and robust SingularityNET IaaS requires more subprojects than the Foundation or DEEP Funding can supply. However, Phase Two initiatives can make SingularityNET IaaS viable for a reasonable number of highly scalable, valuable commercial and beneficial AI applications and stimulate the developer community to carry out integrations that move toward a decentralized cloud environment that equals and exceeds what Big Tech offers.

The key areas of work are as follows:

- Infrastructure-as-code setups for common AI agent types and common cloud environments (starting with AWS, adding centralized clouds along with decentralized cloud infrastructures as they materialize)
- Tools to automate scaling, fail-over and load balancing
- Tools for managing fleets of services within an organization
- Tools to automate deployment across regions and clouds
- Building on top of service fleet management (3 above), support hybrid cloud deployment (critical for current enterprise use-cases)
- Tools for managing third party services authorized into an organization

These functions will need high-quality tooling, including APIs, SDKs, dashboards and integrations with relevant cloud and enterprise software tools. As part of broader utility advances toward SingularityNET

IaaS are extremely valuable for the SL2 initiative as such a system is basically defined as a service fleet and nearly all such SL2 systems make use of the Infrastructure tools indicated above.

Appendix 1: Phase Two Roadmap Timeline

Phase Two is being considered as a long-term initiative, which means that its scope is too long for detailed advance planning to make sense -- one cannot make highly specific plans for any software project 5+ years in advance, let alone one with so many cutting-edge aspects operating within a rapidly evolving space. Phase Two must evolve dynamically in line with the external situation, as decentralized governance plays its role and as lessons are learned through the implementation and rollout of components.

That said, it is necessary to provide a general idea of how the Foundation sees the series of Phase Two tasks unfolding in coming years within a high-level roadmap. This covers mainly work to be done by Foundation staff or contractors, rather than projects enabled mainly by DEEP Funding, as the latter are community initiatives chosen democratically and it is hard to predict what projects are selected or how they will perform. However, when deliverables have a strong likelihood of being significantly enhanced by DEEP Funding initiatives it is noted. Tasks that are centered on specific SL2 networks are generally assumed to be done mostly via separate funding brought in by the economic logic of those networks, though Foundation may supply a modest amount of support.

The high-level proposed roadmap timeline is:

- **2021:** Numerous platform improvements and launch of SL2 framework with alpha/beta versions of initial SL2 projects.
- **2022:** Integrate of full reputation system; launch OpenCog Hyperon decentralized AGI system; initiate serious IaaS work; initial SL2 projects reach maturity.
- **2023-25:** IaaS tooling expands and reaches maturity; Hyperon reaches maturity and leverages ecosystem aspects, including the reputation system and SL2 projects.

2021: Usability, Scalability, AGI-ADA and SL2

Platform Improvements & Extensions

- Concurrent calls within a single daemon
- Licensing and tiered pricing
- Free hosting tier
- Embedded daemon
- Additional daemon improvements (auto-recovery, other storage options)
- Full-service mesh support in daemon to make it easier for services to call other services
- Full fiat-crypto gateway
- SNEP portal interface
- Service ontology for easier discovery of AI agents based on various criteria
    - Extending this technology for various domains will be natural for DEEP Funding
- Alpha version of AI-DSL for Cardano-based SingularityNET agents
    - Extending the AI-DSL to various domains will be natural for DEEP Funding

AI Owner & Developer Tools

- Daemon owner/admin dashboard
- Continuous effort to reduce the number of steps required to
    - Register in the publisher portal
    - Publish a new service
    - Update an existing service
- Pluggable agent "interfaces" or "mix-ins" to support items like model training, model ID management, initially for supervised learning-oriented AI agents
- Swift SDK
- Call routing and proxying between endpoints on platform
- Widgets and plugins
    - WordPress
    - Google Docs
    - Additional plugins to be encouraged via DEEP Funding

Platform Level AI

- Basic integration of weighted liquid rank reputation system
- Simulation framework for analyzing economic attacks on decentralized networks and other network attacks or pathologies
    - Enhancement to and extension simulation framework is natural for DEEP Funding

SL2 Development

- SL2 Assets software framework
- **Hyperon**: pre-alpha version of new AGI framework
- **Rejuve** beta launch, back-ended on a valuable suite of Biomed-AI SingularityNET agents
- **NuNet** alpha launch, back-ended on a valuable suite of IaaS agents
- **Xccelerando Media** initial launch of related AI agents carrying out media AI tasks
- **Awakening.Health** Grace robot release of alpha version
- **SingularityDAO** and **SophiaDAO** launch

2022: SingularityNET for the Masses

Platform Improvements & Extensions

- Refactoring platform for blockchain agnosticism at all tool levels (achieving deep and powerful interoperability between portions of the network running on different chains)
- Integration of AI-DSL into routine operations of Cardano portions of the network
- Integration of TODA/IP into SingularityNET-on-Cardano for the efficient operation of Multi-Agent Systems

AI Owner & Developer Tools

- Pluggable agent "interfaces" or "mix-ins" to support reinforcement learning, machine reasoning and unsupervised learning
- Additional widgets and plugins
- "Universal language" for calling services from third-party apps/sites/platforms like Slack, Salesforce, Shopify along with examples for each platform
- All of the above are ideal for third-party developers incentivized by DEEP Funding

Platform Level AI

- Full integration of all aspects of weighted liquid rank reputation system into the platform
- AI-driven Reputation Police
- Service quality evaluators
- Matchmaking bots leveraging AI-DSL to automatically match requests with agents capable to fulfill them
- Network simulation framework with simple AI-driven simulated agents

IaaS Development

- Infrastructure as code setups for common agent types and common cloud environments (covering AWS, adding major centralized clouds and best decentralized alternatives)

- Basic versions of key IaaS toolsets sufficient to minimally support the SL2 framework:
    - Tools to automate scaling, fail-over and load balancing
    - Tools for managing fleets of services within an organization
    - Tools for managing third party services authorized into an organization

SL2 Development

- SL2 System Management Suite
- Extension of a simulation framework to SL2 systems
- Singularity Studio Enterprise IVA product launch
- Hyperon alpha – including distributed/decentralized Hyperon Atomspace leveraging SingularityNET platform for coordinating distributed components
- NuNet beta allowing processing as an infrastructure for arbitrary agents
- Rejuve full platform launch, leveraging a rich set of biomedical-AI SingularityNET agents
- A decentralized version of OfferNets implemented on the platform

2023-25: IaaS, Dramatic Utilization Growth, the start of Emergent General Intelligence

Platform Improvements & Extensions

- MPC and homomorphic encryption for a wide array of AI algorithms
    - DEEP Funding will be able to massively extend the scope
- Automated parallelization and adaptation to distributed computing infrastructures for AI algorithms written in appropriate functional languages (likely Haskell, Idris, Atomese)

AI Owner & Developer Tools

- Pluggable agent "interfaces" or "mix-ins" to support Hyperon-based AI
- AI tool for converting natural language descriptions of agents to formal descriptions of agents on AI-DSL

Platform Level AI

- Hyperon-based reputation system, leveraging Hyperon for reputation policing and reputation system optimization
- Hyperon guided simulation modelling – in which simulated agents may have complex memory and reasoning capabilities, powered by Hyperon

IaaS Development

- Tools to automate scaling, fail-over and load balancing
- Tools for managing fleets of services within an organization
- Tools to automate deployment across regions and clouds
- Building on top of service fleet management, support hybrid cloud deployment
- Tools for managing third party services authorized into an organization
- APIs, SDKs, dashboards, integrations related to all of the above

SL2 Development

- Deployment of scalable Hyperon network
- Deep integration of OfferNets into exchange/payment logic of SingularityNET network
- Port Rejuve, NuNet, Awakening, Studio Enterprise IVA, Xccelerando, Offer Nets to Hyperon

Appendix 2: SL2 Network Growth Analyses

This Appendix groups explanations of the reasoning behind the SL2 network growth charts. These are brief summaries that do not do justice to the subtleties of the networks involved, but the analyses may be instructive in terms of how networks are expected to develop and in what ways they benefit to and from the Phase Two network evolution.

Awakening.Health Growth Analysis

Awakening.Health -- a joint venture between Hanson Robotics and Singularity Studio -- produces social robots and avatar AI agents for the healthcare market. The robots and avatars will use an SL2 system of OpenCog and neural-net AI agents making service calls to different components of the system and interfacing with relevant external services. The components will consist of a variety of services related to domains such as vision, audio, natural language processing, dialogue control, agent cognition, facial animation and body movement, and robot navigation.

The global healthcare service robots market was valued to be $462.3 million in 2019 and is anticipated to witness an impressive double-digit growth rate, to reach $2.82 billion by 2025 (source). Early year projections for the number of Awakening robots in use were based on potential healthcare customers with whom we are currently engaged. We assumed an average of 8 avatar users for each robot in use. For the years 2023-2025, we assumed an average annual growth rate of 200% for robots in use and 300% for avatars. At an average cost of $16K per robot, this would project Awakening reaching robot revenues of $113M, a 4% share of the global market for healthcare service robots, in 2025.

For the SL2 usage projections, we assumed 8 hours of average use per day for robots and 1 hour of average use per day for avatars. We assumed an average of 10 SingularityNET service calls per minute for robots and 6 service calls per minute for avatars.

Number of Units	**2021**	**2022**	**2023**	**2024**	**2025**
Robots	300	900	1,800	3,600	7,200
Avatar Users	2,400	7,200	21,600	64,800	194,400

Assumptions	Robot	Avatar
Average use per day (hours)	8	1
Average SingularityNET service calls per unit per minute	10	6

NuNet Growth Analysis

The NuNet platform will allow users to deploy and run SingurityNET agents on devices sourced from community members (which may be individuals or businesses/organizations). Owners of devices will get compensated proportionally to the computational capacity expended for executing each service call. The platform will enable three major computing device categories:

1. individual computers (individually owned computers and laptops);
2. personal mobile devices (mobile phones and tablets) and
3. IoT connected devices (embedded devices, single board computers, IoT gateways and tensor processing units).

NuNet will enable serverless deployments and scaling of SingularityNET agent services (facilitating computing resource availability for other spinoffs and users), but will not specifically concentrate on developing user-facing applications, with the important exception of showcase applications. NuNet will contribute to SingularityNET ecosystem in two major ways:

1. Largely indirectly by enabling SingularityNET developers and service users to leverage decentralized, community sourced and cheap computing power for elastically deploying and running their services and computing workflows;
2. To a lesser extent directly, by generating additional SingularityNET agent service calls via its showcase applications;

Projected amounts of SingularityNET AI agent calls routed through NuNet are estimated based on the categories of devices and following assumptions:

1. Global growth of devices in each category: personal computers reaching 1.2B[1], mobile devices – 7.4B[2] and IoT connected devices – 24.6B[3] units in 2025;
2. NuNet market share predictions based on BOINC statistics: the most successful distributed computing project to date; the number of computers participating in BOINC projects currently amounts to about 0.05% from total computers in the world; projections of NuNet market penetration at the end of projected period are based on this number;
3. Assumptions of SingularityNET service calls (per day) per device of each category: individual computers – 5, personal mobile devices – 30 and IoT devices – 20 daily calls. It is estimated that calls from individual computers will be less numerous but more computationally heavy, while calls from personal mobile devices – potentially less computationally heavy, yet faster and more data centric.
4. Quarterly growth of devices joining the platform, based on NuNet development priorities.

Based on these assumptions, SingularityNET AI agent calls via NuNet would reach almost 31 million in the last quarter of 2025 per conservative estimates (not exceeding current level of BOINC market penetration) or orders of magnitude more (if market penetration is more successful).

Rejuve Growth Analysis

Rejuve provides two sources of SingularityNET agent utilization: end-user apps that leverage SingularityNET AI to provide users with medical and lifestyle insights based on their uploaded data, and back-end longevity research that uses SingularityNET tools to analyze the data provided by users.

Rejuve projected user numbers are, for simplicity, based on the monthly active users generated organically through SingularityNET marketing channels, which will be leveraged in order to launch these spin-offs. As additional sources of Rejuve users develop these will add to the SingularityNET-derived users, potentially creating higher user numbers than the estimates presented here.

[1] Calculated from combined publicly available statistics on share of households with a computer at home worldwide, household size and composition (UN) and number of PCs per capita.
[2] https://www.statista.com/statistics/218984/number-of-global-mobile-users-since-2010/
[3] Ericsson Mobility Report, June 2020, page 23

SingularityNET is currently generating more than 1M+ impressions online per month via its own marketing channels and is reaching 42K+ unique viewers per month. The frequency of engagement is 23.8 times per month on average per user, an extremely positive indicator for returning visitors.

The industry average for conversion rates is 2.35% (source: Google Marketing Live 2019). For the purpose of making sober and realistic estimates, we have assumed a conservative conversion rate of 0.5% of the SingularityNET impressions per month for each of the spin-off projects, but in reality, the conversion rate may end up significantly higher. In essence, this translates to a user growth of about 5000 per month for the Rejuve ecosystem. Taking into account the projected impression and unique viewer growth of SingularityNET of 35% per year, this would lead to an additional 35% per year for Rejuve users as well.

Based on the above, we project the 5-year user growth for Rejuve to be as follows:

Year	**Projected Users Converted**
2021	5000 users per month
2022	6750 users per month
2023	9112 users per month
2024	12301 users per month
2025	16607 users per month

For the Rejuve HRV Analyzer and Rejuve Oxygen Analyzer, we have calculated the users by assuming 20% of users own an Apple Watch or FitBit (Consumer Intelligence Research Partners, 2019).

Rejuve assumes that on average, a user has at least one session every 10 days and that each session requests one Rejuve report for the user. If the user is also using wearables, their Rejuve report will be recalculated additionally once a day. This translates to an average of 9 API calls per user per quarter excluding wearable modules, and 99 API calls per user per quarter including wearable modules.

For those Rejuve apps that require smartphone medical peripherals, we assume that 20% of users own an Apple Watch or FitBit (Consumer Intelligence Research Partners, 2019) and users are drawn from this portion.

Regarding Rejuve research and its use of SingularityNET platform, Rejuve begins with 10 researchers by the end of 2021 and has 100 researchers in 2025, having grown into a major longevity R&D force. Rejuve assumes that a typical researcher will make 3600 API calls per quarter into SingularityNET. Note that these API calls may be expensive -- e.g. some AI data analytics processes may take hours, unlike an API call to a face recognition agent which may take a fraction of a second (setting aside any network delays).

Singularity Studio Growth Analysis

Singularity Studio's primary product, currently under development, is an intelligent voice assistant for the enterprise, which will be combined with advanced AI products for different verticals, including healthcare, drug discovery and personalized medicine, smart cities, smart homes, sustainable and green technology and finance, as well as delivered as a standalone enterprise AI product for knowledge and process management, as well as performance improvement at the workplace.

Currently, Singularity Studio is carrying out a number of AI software consulting projects leveraging AI tools developed in a SingularityNET context; the business model is gradually being transitioned from a focus on such custom development projects to a focus on enterprise IVA product licensing, with consulting relegated to the role of a secondary revenue stream.

The enterprise and workplace IVA market is already a multibillion-dollar industry, with projected growth of 47% year on year until 2027 (according to research by Coherent Market Insights from Sep 2020). While for the first three years we project Singularity Studio will be an up-and-coming niche player in this market, as the SingularityNET agent ecosystem grows in breadth and intelligence, the Singularity Studio IVA becomes exponentially more capable, and we project rapid growth in the final two years to come from this market-leading intelligence. The given SingularityNET API usage projections are based on an assumption of 9% market share achieved by the end of 2025.

SingularityDAO Growth Analysis

The SingularityNET AI usage underlying SingularityNET comes from a variety of sources (for whose meaning we refer to the SingularityDAO lightpaper); for making rough projections we assume

- 75 API calls per day per DynaSet
- for market-making oriented activity, for each token involved (so each DynaSet + each lower-liquidity underlying instrument): 10 calls per day for daily management/tuning, plus 5 calls per 15 minutes. So roughly 500 calls per day per token being market-made.
- for optimizers, on average 20 API calls per each time, an optimizer needs to get some AI done to fuel its activities.

How often an optimizer will need to get AI done will depend totally on what it's doing. If an optimizer is doing online learning of some kind, to update frequently some formula it uses to guide its trades, then it could be as often as a market-making agent, i.e. every 15 mins. If an optimizer is executing a simple algorithm and just using AI to periodically re-tune its parameters, it could be once per day. If an optimizer is consulting an ML model for each trade, it could be making a call say every 30 seconds.

For making rough projections, we have assumed 1/3 of optimizers are light users (one inference = 20 API calls per day), 1/3 are medium users (every 15 minutes = 1000 API calls per day), 13 are heavy users (say, 100 inferences per hour or 2400 per day, but with each inference only saying 4 API calls, yielding 10K API calls per day).

SingularityDAO assumes the network begins with 3 DynaSets and after 5 years grows its scope to 120 (representing different trading strategies and/or different baskets of altcoins). It is assumed that yield farming and optimizers are launched in Month 4, after 3 initial months with DynaSets and governance tokens as the only live portions of the SingularityDAO offering.

To get API usage projections we then incorporate estimates for the total number of optimizers -- i.e. how many bots out there borrowing from the SingDAO liquidity pool and trading, on a "typical" day? In reality, this will vary dramatically in accordance with the ups and downs of the crypto market, but for simple estimates, we assume a smoothed growth consisting of one exponential growth curve during the first year post launch, and then another exponential curve with a smaller exponent after that. Within this

framework, 17 heavy-user optimizer bots is assumed initially, escalating to 24x this by the end of the 5 year period.

It is worth noting that most of the AI API calls made by Optimizers will be quick and inexpensive ones, whereas API calls made by DynaSets will often be intensive and costly (as DynaSet rebalancing will occur less often, whereas Optimizers doing arbitrage or simpler rapid operations may mostly use API calls that simply apply trained ML models to the most recent data … along with less frequent API calls triggering model updating).

SophiaDAO Growth Analysis

Hanson Robotics (HR) and iSingularityNET Foundation (SN) are joining forces to create an organizational "guardianship", called the SophiaDAO, designed to nurture the advanced human-like robot, Sophia, and to allow interested and committed members of the public to participate in the development of Sophia. A number of HR products will be running the SophiaDAO software.

The personal robots global market was $21.5 billion in 2019 and is projected to grow at a 7.8% CAGR over the next decade (source). This growth will result in a forecasted revenue of $34B in 2025. If we assume SophiaDao software underlies 10% of this market ($3.44B) and an average cost of $15K for a top grade, life-size, high-functioning humanoid robot, we forecast the equivalent of 229,333 of such units will be in use in 2025. We note that not all of the SophiaDAO market will be comprised of such top grade units and that some will be lower cost, simpler, smaller or virtual robots. By assuming the computational resources required by the robots are proportional to their cost, we can estimate the required computational resources for the given market size in terms of the requirements for an equivalent number of top grade robot units.

For the purpose of estimating SingularityNET API calls by robots running SophiaDAO software, we assume an average use of the robots of 8 hours per day, and that a given robot will make approximately 10 API calls per minute on average. The service calls will consist of a variety of AI services required for the functioning of the robot and its interactions.

SophiaDAO Robots - Number of Units in Use - Annual					
	2021	2022	2023	2024	2025

Robots	**1,000**	**8,494**	**25,481**	**76,444**	**229,333**

Assumptions	
Average use per unit per day (hours)	8
Average SingularityNET service calls per unit per minute	10

Xccelerando Media Growth Analysis

Xcceleran.do will be a new media site, launching in the first half of 2021 and delivering rich exciting content on the cutting edge of future technology and thinking. The AI tools behind Xcceleran.do will also be made available as Xccelerando Media services on SingularityNET marketplace and licensed to third parties in the media space.

The operation of the Xcceleran.do site involves a variety of SingularityNET AI services, such as natural language processing, speech synthesis, video captioning, text summarization, reputation analysis, question-answering bots for online forums and computer vision for transforming profile pictures and other uploaded images.

Growth analysis for Xccelerando is similar to the one given above for Rejuve -- based on a similar conservative assumption that users come largely from SingularityNET's media reach. A growth rate of 35% is assumed per year for Xcceleran.do site users, and assume roughly the same annual user numbers as for Rejuve.

Regarding the licensing of media-related AI services beyond their use in the Xccelerando website, projections very conservatively assume that: in 2022 one other website uses Xccelerando tools, in 2023 three others do, and by 2025 six others do. For simplicity it is assumed that each of these other sites uses the same number of annual API calls as the Xcceleran.do site on average. In reality there will be great variation -- some third party sites will use only one or two Xccelerando AI functions, whereas there may be some third party sites involved with massively more users than the Xccelerando site.