Insolar Economic Paper

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1 Executive Summary

Insolar is a technology company building a horizontally scalable hybrid blockchain platform with interoperability between public and private networks. The project is aimed at empowering enterprise to use modern blockchain solutions and integrate with decentralized service providers, while retaining the required levels of robustness and data privacy.

Insolar MainNet is the primary public network powered by Insolar Blockchain Platform. It brings together infrastructure service providers, application service providers, and enterprises in a collaborative environment, set out to create a developer community, and an applications marketplace for leveraging the benefits of blockchain technology for modern business processes.

The platform is fueled by Insolar Coin (XNS) which serves as a medium of exchange and a store of value, used for payments and staking, and at a later point, decentralized governance.
2 Insolar Overview

Insolar is a global technology company building innovative public and private blockchain solutions on Insolar Blockchain Platform — the most secure, flexible, and scalable blockchain for business. Distributed ledger technology (DLT) possesses the potential to radically transform many existing business processes, business models, and industries. Insolar aspires to be a foundational part of that change. Insolar strives to become the world’s leading technology company that enables organizations to transact directly, seamlessly, efficiently, and securely.

Insolar Blockchain Platform combines a fourth generation blockchain protocol with the most complete and secure set of production-ready business blockchain tools and services to quickly build and launch enterprise applications, accelerating the progression path from initial proof-of-concept to full-scale production.

Insolar Blockchain Platform has four strategic objectives:

1. Streamline the design, application and reuse of complex cross-organizational business processes;

2. Automate cross-organizational business processes and conduct thorough data monitoring in case of potential legal disputes;

3. Create a blockchain protocol and tools compatible with legacy enterprise software and other DLT solutions;

4. Create a hybrid network, building on the inherent interoperability of Insolar Blockchain Platform to enable innovative business models and interactions, seamlessly connecting applications across public and private blockchain networks.

Besides building the platform, Insolar also provides blockchain services and ecosystem support for companies that are looking to develop and deploy blockchain solutions. The architecture of Insolar Blockchain Platform is enterprise-oriented and interlaces the best of cloud, blockchain, and distributed technologies, introducing dozens of industry-first features. It is easily deployable and solves the fundamental challenges of modern blockchains, including scalability, ease of use, and interoperability with legacy enterprise software and other DLT solutions.

Insolar has been ranked number one globally in terms of development activity amongst DLT companies and has a team of over 80 people across Europe and North America. The company is led by founders with solid experience: 6+ years of entrepreneurial experience, graduates from Harvard Business School and top tech universities in Europe. The team includes 50 software engineers with industry and blockchain expertise, including collaboration with academics from York University, ETH Zurich and UC Berkeley.
3 Technological Summary

In order to present a robust, horizontally scalable solution, Insolar Blockchain Platform utilizes a multi-layer architecture with clear separation of layers, suited to be supported by different types of agents and businesses. This approach makes platform design a challenging task, but with proper use it enables the building of complex solutions with better control of development risks and (later) of ownership costs.

Below is an illustration of the layered architecture that facilitates such a collaborative environment.

![Layered Architecture Illustration]

**Figure 1: Architecture of Insolar Blockchain Platform.**

**Layer 1:** Business applications (contracts);

**Layer 2:** Business services and templates for business applications;

**Layer 3:** Federation of Clouds. Insolar MainNet is a public Cloud in the Insolar’s Federation of Clouds;

**Layer 4:** Providers of hardware capacities organized into national and/or industrial computational & storage resources.

Within the network coinomics, stakeholders act in different layers, each with their own sets of goals, requirements, and incentives (more on that in Section 5).
4 Insolar MainNet

Insolar MainNet is a public network built on Insolar Blockchain Platform, filling the role of the primary public Cloud. It utilizes Insolar Blockchain Platform protocol to create an open ecosystem for enterprises, infrastructure service providers, application service providers, and coin holders.

The network is going to be actively developed and supported by Insolar Foundation, with the strategic aim of facilitating an active market for application services for enterprises and individuals. To that end, Insolar Foundation is taking steps to build a self-sustainable community of developers and infrastructure service providers, providing support and incentives for the market agents to populate the network.

Long-term plans for Insolar MainNet are closely related to its objectives:

- Supporting the availability of infrastructure resources in sufficient capacities to meet high demand brought forward by the application service layer;
- High utilization of infrastructure resources, allowing infrastructure service providers to focus their activities in the network, maximizing their business efficiency;
- Growing an active community of developers, creating and maintaining software for provision of application services;
- Creating a rich marketplace of application templates, applications, and integrated solutions for every business case that can benefit from leveraging DLT;
- Sufficient maturity of the network in terms of decentralized autonomous governance, with full eventual independence from Insolar Foundation.
5 Stakeholders

Insolar MainNet brings together multiple kinds of companies and individuals with differing roles and requirements.

<table>
<thead>
<tr>
<th>Enterprises</th>
<th>Role in Insolar MainNet</th>
<th>Use applications deployed on Insolar MainNet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td></td>
<td>• Predictable fee structure;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High quality of application performance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application service providers</th>
<th>Role in Insolar MainNet</th>
<th>Develop and deploy applications, receive fees for their usage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td></td>
<td>• Sufficient base of enterprise users and amount of resource capacities;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Performance of infrastructure service providers within given SLAs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infrastructure service providers</th>
<th>Role in Insolar MainNet</th>
<th>Provide hardware capacities for running applications and receive fees.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td></td>
<td>• Predictable income for hardware provided.</td>
</tr>
</tbody>
</table>
### Coin holders

<table>
<thead>
<tr>
<th>Role in Insolar MainNet</th>
<th>Provide coins for staking as collateral behind the SLAs and receive staking fees.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td>• Sufficient staking demand from infrastructure service providers.</td>
</tr>
</tbody>
</table>

### Insolar Foundation

<table>
<thead>
<tr>
<th>Role in Insolar MainNet</th>
<th>• Creation of a large developer community for Insolar MainNet;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Creation of a large hardware resource market;</td>
</tr>
<tr>
<td></td>
<td>• Attraction of enterprises to use Insolar MainNet;</td>
</tr>
<tr>
<td></td>
<td>• Maintenance and improvement of the platform.</td>
</tr>
</tbody>
</table>
6 Insolar Coin

The native coin on Insolar MainNet serves three distinct purposes:

**Payments.** In this group of interactions, the coin fulfills the role of a medium of exchange: transferring value from one interested party to another, proportional to the mutually agreed valuation of their exchange. Payments may include application fees, resource fees, and subsidies.

**Staking.** Collateralizing the responsibility of actors utilizes the coin as both a medium of exchange and store of value. The total value locked up in the staking system represents the aggregate commitment to the security of the network, and is also evident of the total revenue that can be accumulated by the nodes participating in consensus.

**Governance.** Plans for Insolar MainNet include the gradual introduction of decentralized governance to the point of full autonomy governance in a mature self-sustaining ecosystem. The mechanisms of this collective regulating body is to be fuelled by Insolar Coin (XNS).

The mechanisms and economic interactions are described in further detail in section 7. On Insolar MainNet, all of these interactions are fueled by the network native currency, Insolar Coin (XNS).
7 Coin Interactions

7.1 Payments

Interactions incurring fees on Insolar MainNet are tied to the technological architecture of Insolar Blockchain Platform, as presented below:

Figure 2: Data and value flows associated with a transaction.

The user only pays the application user fee to an application service provider, abstracting away the composite nature of the underlying costs and payments.

Fees

For application service providers, there are three types of fees:

1. **Execution fee**: payment for an application service call, transferred from the transaction source (user or application) to a single node, executing the transaction.

2. **Validation fee**: payment for the validation of a transaction execution result, transferred to multiple nodes performing the validation (the number is determined according to the SLA requirements chosen by an application service provider).

3. **Service fee**: payment for the usage of resources. With Insolar MainNet, there are three broad classes of resources that are consumed by applications: computation, networking, and storage. Consumption of each resource is measured and priced independently, with service fees payable for their usage.
Subsidies

During the early stages of the network life cycle, infrastructure and application service providers will gradually join the ecosystem and assume their respective roles. During that time, Insolar Foundation will provide the initial software and hardware infrastructures, as well as incentivize the process of populating the network. One of the mechanisms towards that goal is subsidies in the form of monetary incentives.

![Value flow for subsidies](image)

Figure 3: Value flow for subsidies.

Insolar Foundation pursues two objectives throughout these phases:

1. **Maintain sufficient infrastructure capabilities at all times.**
   The goals for this objective are attracting and then retaining independent infrastructure service providers. Since infrastructure needs to be present before any demand can occur, Insolar Foundation aims to provide comparable market returns on resource commitments by infrastructure service providers by dynamically subsidizing them as necessary.

2. **Establish a large developer community and a large application marketplace.**
   Insolar Foundation is considering subsidies and grants for developers of applications and application templates that reflect business cases most relevant for enterprise users, or provide value for the general platform software infrastructure.

### 7.2 Staking

Insolar MainNet employs coin staking to collateralize the SLAs between infrastructure service providers and application service providers. Nodes need to stake Insolar Coins (XNS) in order to be able to start providing infrastructure services in the network.

The stake size is adjustable: there is a fixed minimum amount that needs to be committed by the node, but a bigger stake may be placed at the discretion of the node owner.

Stake size determines the value of transactions the node is allowed to process: more expensive (and, therefore, more profitable for the node) transactions require a bigger
collateral, connecting the profit potential of the node with the size of the financial responsibility of its owner. Bigger stakes translate into greater revenues from processing transactions.

![Diagram of Staking mechanism](image)

Figure 4: Staking mechanism.

Node holders with no coin holdings and coin holders not running nodes can collaborate via proxy staking, whereby a coin holder can commit their coins for a node they do not own. The same rules about stake sizes apply, but the fees that the proxy-staked node receives are split between all its stakers, pro rata to their respective stakes. Using this mechanism does not change ownership of the coins staked, nor give any additional rights to any of the parties.

7.3 Governance

At Insolar Foundation, we strongly believe that decentralized autonomous organizations built on collective decision-making and self-regulation are the way to the future for most, if not all distributed ledger projects, and for the software industry in general. Increasing decentralization can contribute to the overall robustness of the system, removing single points of failure and introducing additional flexibility.

The theory and the practice for efficient decentralization have both seen substantial effort in the years since the Bitcoin genesis block, but vast territories still remain to be explored. Every blockchain project, Insolar included, has to find its balance between efficiency and persistence of centralized commitment — absolutely vital at the initial stages — and the potentially unlimited scope of attracting talent and ideas into a decentralized community — at later stages, when enough traction has been produced for the network to be able to sustain itself.

At some point, all network-wide decisions in Insolar MainNet will be made by the community through a robust collaborative decision-making process, all facilitated by Insolar Coin (XNS).
8 Platform Design Canvases

Below we present the Platform Design Canvas, Ecosystem Entity Portraits, and mapping of the economic interactions on Insolar MainNet to Transaction Boards.

Figure 5: Platform Design Canvas of Insolar MainNet.

Figure 6: Entity portrait: Enterprises.
Figure 7: Entity portrait: Application service providers.

Figure 8: Entity portrait: Infrastructure service providers.
Figure 9: Entity portrait: Coin Holders.

Figure 10: Entity portrait: Insolar Foundation.
### Application Service Call Execution And Associated Fees

<table>
<thead>
<tr>
<th>E1</th>
<th>Transaction/Interaction</th>
<th>E2</th>
<th>Currency/Value Unit</th>
<th>Channel or Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise</td>
<td>Request an application service call transaction</td>
<td>Application service provider</td>
<td>XNS, Information</td>
<td>Hardware marketplace (Application user fee)</td>
</tr>
<tr>
<td>Application service provider</td>
<td>Pay for execution and validation of an application service call</td>
<td>Infrastructure service provider</td>
<td>XNS</td>
<td>Hardware marketplace (Execution fee)</td>
</tr>
<tr>
<td>Enterprise</td>
<td>Report the results of a validated application service call execution</td>
<td>Infrastructure service provider</td>
<td>Information</td>
<td>Hardware marketplace (Validation fee)</td>
</tr>
</tbody>
</table>

Figure 11: Transaction board for application service call fees. The black and white arrows stand, respectively, for the originator and the recipient of value transfer.

### Resource Usage Fees

<table>
<thead>
<tr>
<th>E1</th>
<th>Transaction/Interaction</th>
<th>E2</th>
<th>Currency/Value Unit</th>
<th>Channel or Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure service provider</td>
<td>Pay for short-term data storage.</td>
<td>Application service provider</td>
<td>XNS</td>
<td>Hardware marketplace (Resource fee)</td>
</tr>
<tr>
<td>Infrastructure service provider</td>
<td>Pay for long-term data storage.</td>
<td>Application service provider</td>
<td>XNS</td>
<td>Hardware marketplace (Resource fee)</td>
</tr>
<tr>
<td>Infrastructure service provider</td>
<td>Pay for networking resources used during application service call executions.</td>
<td>Application service provider</td>
<td>XNS</td>
<td>Hardware marketplace (Resource fee)</td>
</tr>
<tr>
<td>Infrastructure service provider</td>
<td>Pay for computation resources used during application service call executions.</td>
<td>Application service provider</td>
<td>XNS</td>
<td>Hardware marketplace (Resource fee)</td>
</tr>
</tbody>
</table>

Figure 12: Transaction board for resource usage fees. The black and white arrows stand, respectively, for the originator and the recipient of value transfer.
Network Subsidies

Figure 13: Transaction board for subsidies. The black and white arrows stand, respectively, for the originator and the recipient of value transfer.

Node setup and staking

Figure 14: Transaction board for staking. The black and white arrows stand, respectively, for the originator and the recipient of value transfer. Two white arrows stand for redistribution.
9 Roadmap to Scale

We present a number of steps from launch to the full maturity of Insolar MainNet as a decentralized self-sustainable ecosystem. This is the growth evolution currently envisioned by Insolar Foundation, with each rough stage changing the level and the kind of involvement and intervention Insolar Foundation is planning to employ.

Step 1: Launch

<table>
<thead>
<tr>
<th></th>
<th>Independent</th>
<th>low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure service providers</td>
<td>Insolar Foundation</td>
<td>high</td>
</tr>
<tr>
<td>Application service providers</td>
<td>Independent</td>
<td>low</td>
</tr>
<tr>
<td>Application market size</td>
<td>Insolar Foundation</td>
<td>medium</td>
</tr>
</tbody>
</table>

The key objectives are establishing the baseline infrastructure and applications enabling onboarding of the stakeholders of every described kind. Insolar Foundation provides most of the infrastructure and application services at this point.

Step 2: Early Days

<table>
<thead>
<tr>
<th></th>
<th>Independent</th>
<th>medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure service providers</td>
<td>Insolar Foundation</td>
<td>medium</td>
</tr>
<tr>
<td>Application service providers</td>
<td>Independent</td>
<td>medium</td>
</tr>
<tr>
<td>Application market size</td>
<td>Insolar Foundation</td>
<td>medium</td>
</tr>
</tbody>
</table>

Insolar Foundation actively subsidizes independent hardware providers (providing returns at market rates for the infrastructure committed to the network) and developers. Subsidies to hardware providers are dynamically adjusted to maintain the target levels of infrastructure availability. Partnerships are secured to attract developers and enterprises to use the services.
Step 3: Active Growth

<table>
<thead>
<tr>
<th>Infrastructure service providers</th>
<th>Independent</th>
<th>medium to high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolar Foundation</td>
<td>low</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Application service providers</th>
<th>Independent</th>
<th>medium to high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolar Foundation</td>
<td>low</td>
<td></td>
</tr>
</tbody>
</table>

| Application market size          |             | large          |

Active independent development of business applications continues. The developer base and variety of applications keeps growing. More and more business cases are sufficiently serviced within the network with existing applications. Infrastructure and service markets are nearing self-sufficiency, with only occasional incentivization. At this point, models for the gradual introduction of decentralization via platform governance start being introduced to the network governance.

Step 4: Mature Ecosystem

<table>
<thead>
<tr>
<th>Infrastructure service providers</th>
<th>Independent</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolar Foundation</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application service providers</th>
<th>Independent</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insolar Foundation</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

| Application market size          |             | very large |

Mature ecosystem is self-sufficient and decentralized, with any potentially serviceable business application already present or being actively developed. Infrastructure capacities are plentiful.
10 Conclusion: Going Forward

The economics of Insolar MainNet introduces a number of practical use cases to XNS Coin, contributing to its demand at present and in the future. Utilization of the native network coin streamlines building a hardware capacity infrastructure, an open developer community, and a mature applications marketplace on Insolar MainNet.

The unique architecture of Insolar Blockchain Platform combines strong points of public and private blockchain networks. Using Insolar, enterprise clients are able to retain the privacy of sensitive data while still being able to openly interact with third party services.

An integrated environment with composable application service calls allows multiple service providers, regardless of their locations in the public/private networks powered by Insolar Blockchain Platform, to collaborate with each other and create streamlined pass-through business processes, thus increasing efficiency, quality of services, and general business value to fully satisfy client needs.
11 Disclaimer

The models outlined in this paper represent the current approach Insolar is taking towards delivering the economics for Insolar MainNet. Insolar makes no claims about the future plans to adopt or implement any model or design.

The economic model presented in this paper is an ongoing work of continuous research and improvement, with every mechanism, model, statement, assumption, and design choice subject to possible change in the future versions. No single statement, or group of statements, stand for commitments to the final implementation. Insolar Foundation does not hold any responsibility to implement any systems or components as they are described herein.

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