The Enterprise Blockchain Development Platform
A unified development platform to **create** and **deploy** enterprise smart contract systems.

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worldsibu.tech
Costa Rica: High tech and nature
About Costa Rican government tech

- Digital Transformation following examples of Estonia, Belgium, Singapur.
- Big focus on Interoperability between governmental institutions and private organizations.
- Country-wide digital signature - BCCR CA.
- 5 million people.
- Top 5 healthcare system.
+45,000 downloads
Remote Infrastructure Orchestrator

➔ Easier and faster.
➔ Multi-cloud by design with major cloud provider integrations.

FROM

TO

A decoupled approach by design

The blockchain components

The computing infrastructure

Blockchain Nodes

worldsibu.tech/forma
Remote Infrastructure Orchestrator

New Network

What
General information regarding the new Network.

Where
You can choose between a fully managed service by WorldSibu, deploy the whole network in one of your clusters or create a fully distributed multi-cloud network made of the clusters from every participating organization.

Who
Organizations to join the new network. They will receive a request to join.
About the Convector Suite

- Development framework
- Like Angular for Blockchain
- MVC-based
- Typescript
- Target: Developers
- Enterprise development
- Its own CLI

- Development environment
- Resolves all dependencies
- 1 command to network
- Immutable setup
- Decoupled from Convector
About Convectr

- Actual development platform.
- Compilation. Detect errors.
- Fullstack TypeScript/JavaScript. NestJS, Express, Angular, React.
- Models and Controllers. Focus on business and complex modeling.
- Unit tests. CI/CD integration. Debugging.
- Modular. Logic units that can be merged. Better for code scaling.
- Native features from Fabric as it is a peer dependency.
- Helpers that allow for a explicit predictable behaviour.
About Convector
Models and Controllers

```typescript
export class Product extends ConvectorModel<Product> {
  @Readonly()
  @Required()
  public readonly type = 'io.worldsibu.hackathon.product';

  @Required()
  @Validate(yup.string())
  public name: string;

  @Required()
  @Validate(yup.string())
  public owner: string;

  @Required()
  @Validate(yup.number())
  public weight: number;
}

@Controller('product')
export class ProductController extends ConvectorController {
  @Invokable()
  public async create(@Param(Product) product: Product) {
    product.owner = this.sender;
    await product.save();
  }

  @Invokable()
  public async transfer(
    @Param(yup.string()) id: string,
    @Param(yup.string()) newOwner: string
  ) {
    const product = await Product.getOne(id);
    if (product.owner !== this.sender) {
      throw new Error('Only the owner can transfer!');
    }

    product.owner = newOwner;
    await product.save();
  }
}
```
About Convector

Versus Hyperledger Composer

- Known programming language. No need for new syntax.
- Well defined target: developers.
- Flexible models as they are JavaScript-based.
- Data goes straight to the ledger. Easier to spot issues and work with the data through analytics.
- Transparent access to native APIs. Allowing the evolve faster and not get left behind (Convector migrated from 1.1 to 1.4 smoothly).
- Adapters allow for a decoupled design layer regarding the blockchain implementation, so the same code can run in multiple platforms (Chaincode, Server, FrontEnd, other blockchain techs).
Our overall goal

Enable less transformational projects to benefit from the technology.

Just like databases once were too expensive to replace some paper-based processes.
Roadmap

Public and private sector long-awaited interoperability

1. Data sharing evidence between parties
2. Privacy preserving features
3. EMR in the blockchain
4. User controls data on EMRs
Phase 1

Peer-to-peer request to access patient data. Single store for data-sharing approvals trail. Laboratories with requests from the CCSS.
Phase 1

Requester and Approver roles for data access. Patient with Costa Rican digital signature

Proof trail of patient-approved data sharing request and data-shared between parties

- Request: Digitally signed by the patient
  - Verifiable by the Approver through the Smart Contract
  - If approved (automatic signature review) the a one-time token is generated
- Data-share action: Hashed version of the data is logged with one-time token generation
- APIs checks token against the ledger
### Why blockchain/DLT for phase 1

<table>
<thead>
<tr>
<th>Need</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request needs to be signed and verifiable</td>
<td>Pacient official country digital signature, requester (dr, specialist) country digital signature, public keys distributed</td>
</tr>
<tr>
<td>Trail of multiple parties’ requests</td>
<td>Both parties sign and store requests in their own ledger</td>
</tr>
<tr>
<td>Trail of multiple parties’ data-shared proof</td>
<td>Two sided signature stored in their own database</td>
</tr>
<tr>
<td>Maintain correct public key in a single place</td>
<td>API for public key and patients’ directory</td>
</tr>
</tbody>
</table>

### Unanswered questions

- Data integration to get single state of patient approved data-sharing requests:
  - Different formats
  - Time to get the data
  - Data accessibility (APIs)
    - Directory
    - Accesses
  - Who unifies it
- Third party revision and audit trail (auditors)- how to get the data?

Government keeping active record of everything?
1. Signs approving request

2. Make request

3. Verify Patient signature

4. Make request with Token

5. Respond data

6. Log data shared

---

Proof of approved access request

Proof of data access request

Proof of shared data
Why blockchain/DLT for phase 1

Try the technology in the field

- The sponsors are on-board
- The industry shaker is pushing the project forward
- We have the tech to make it low-cost
- Scalability
## Demo

Non-confidential piece of code in Convector

<table>
<thead>
<tr>
<th><strong>Participants</strong></th>
<th><strong>Assets</strong></th>
<th><strong>Transactions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CCSS</td>
<td>Identities</td>
<td>RegisterPatient</td>
</tr>
<tr>
<td>Laboratories</td>
<td>Patient directory</td>
<td>CreateRequest</td>
</tr>
<tr>
<td>Clinics</td>
<td>Request</td>
<td>CloseToken</td>
</tr>
<tr>
<td>...</td>
<td>Access token</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Proof of data</td>
<td></td>
</tr>
</tbody>
</table>
Relevant Links

https://worldsibu.tech

https://docs.worldsibu.com/convector

https://docs.worldsibu.com/article/73-code-samples

https://discord.gg/twRwpWt

Convector Suite
Convector Developer Office Hours
EVERY FRIDAY 6:00PM CST
The Enterprise Blockchain Development Platform
A unified development platform to create and deploy enterprise smart contract systems.

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