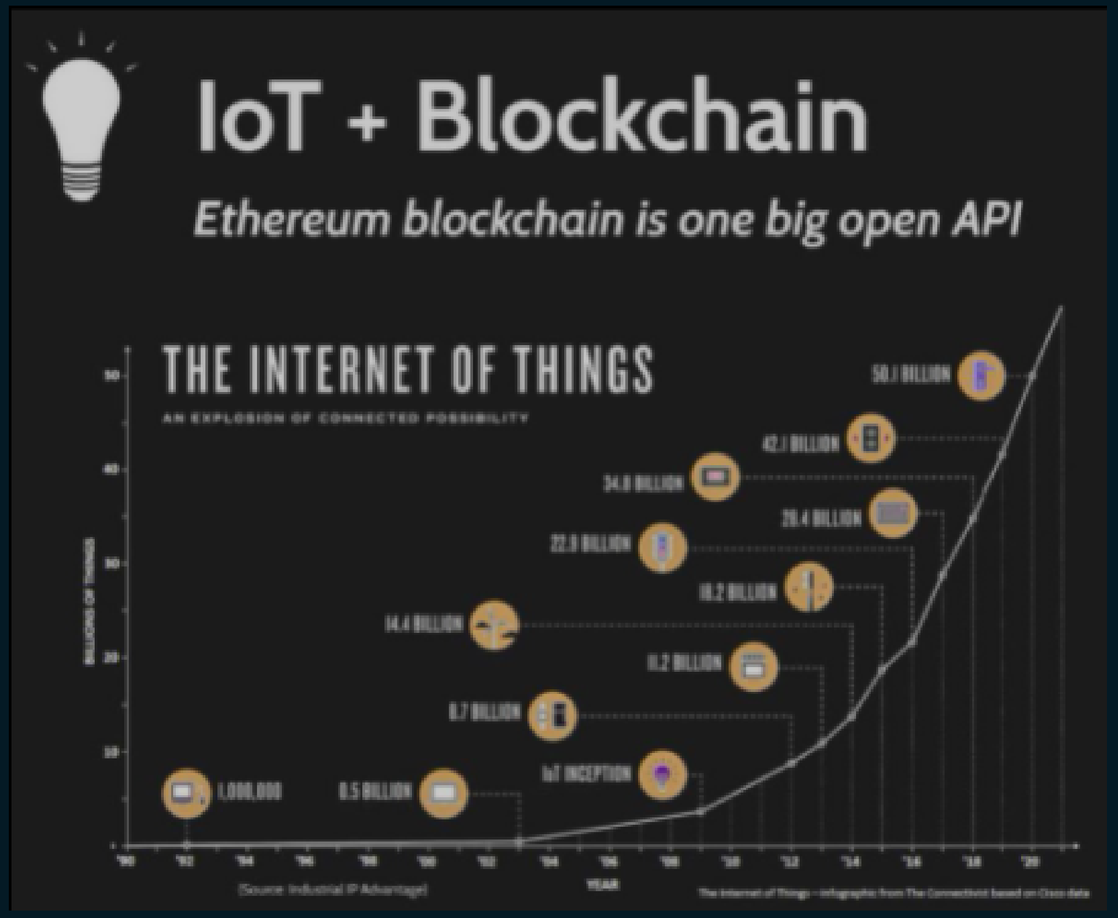
InternetS of enegry -DAISEE

HackBMU 4.0

Highlights



Introduction

DAISEE stands for Decentralized Autonomous Interconnected System(s) for Energy Efficiency.

Up today, the easiest way to provide fairly important amounts of energy to a relatively big amount of people was to build big power plants (from coal to nuclear also using gas and hydropower) with heavy infrastructures (big pipes that go through the territories and more little pipes that go from the substations to homes). Such a system is relying on low-cost and abundant non-renewable resources.

With the increase of both local and global energy consumption, resources (very fast) depletion, climate change and... renewable energy costs plummeting, the system has started to evolve... So, more and more it looks like pretty much like that

Introduction

A more decentralized organization relying on diffuse renewable resources. This means that production points are more local and close to consumption points.

However, such a system is based on existing infrastructures and local electricity producers are usually not the owners of the produced good (electricity) since they are constrains by regulatory laws making it compulsory either to sell the electricity to another bigger producer or a dispatcher, or to consume its own electricity.

problems & solution

There are mainly 4 problems:

- First, energy producers and dispatchers do not know well (usually not at all) the real time consumption pattern at the micro-level, meaning they do not have meaningful energy consumption information on their clients that would help to real time optimize the production/consumption balance;
- Second, in current systems energy losses are huge (between 7 and 12% of the total production) because of losses in the pipes making the grid;
- Third, the current systems do not take the full potential of local resources; those systems are not in place and not consistent with developing countries issues about energy accessibility because not resilient enough;
- Last but not least, consumers do not get real interaction with energy, making raising awareness on reducing energy consumption hard. The only relation you've got with your energy provider is, first the bill, second the switch.

problems & solution

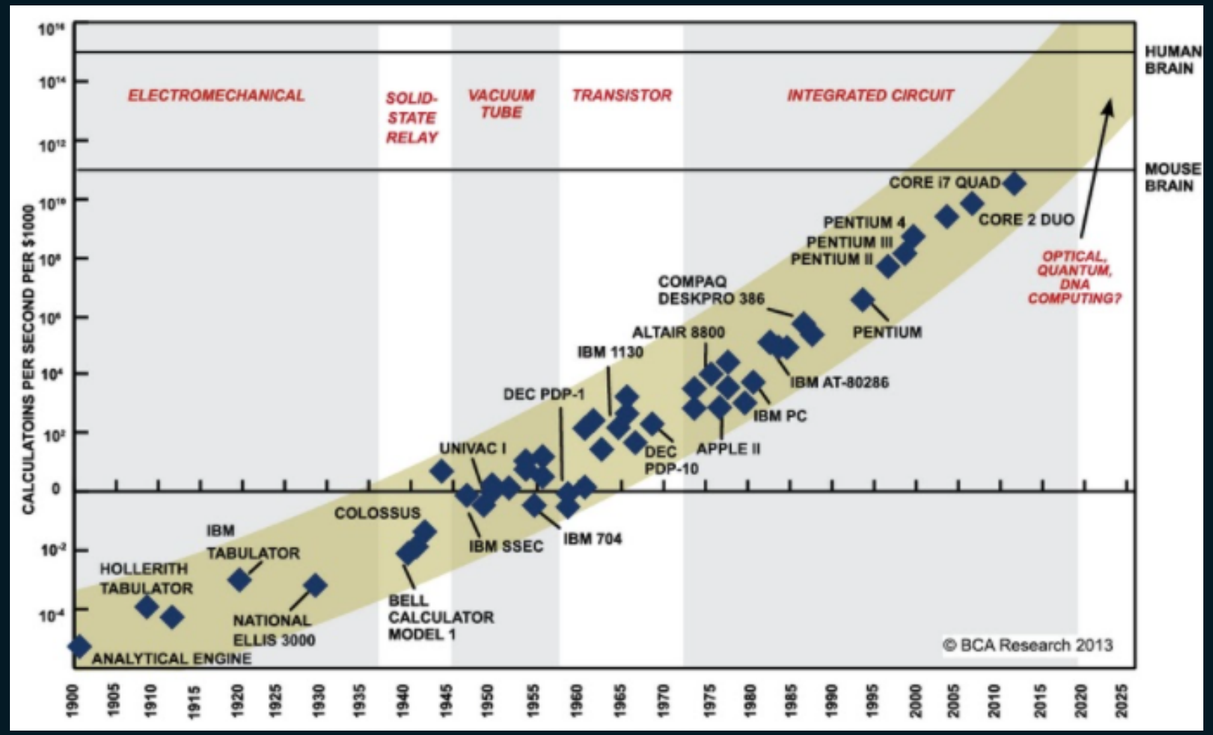
The are then 4 big issues levels:

- The increasing complexity of the energy system and organization;
- The cost of a trusted 3rd party (specifically the one enabling distribution);
- The complexity and inconsistency of the regional regulatory contexts;
- The consumer side: how to get people involved in energy governance?

problems & solution

The solution that is proposed here to solve those problems is to experiment and move towards a (more) DISTRIBUTED energy systems organization, like that.
Like the internets we strongly believe that DISTRIBUTED energy systems will help to develop DECENTRALIZED AUTONOMOUS energy ORGANIZATIONS, thus providing strong and resilient answers to the here-above mentioned challenges.

software eats the world but energy is the limit



All industries are reorganizing

What are the challenges to solve the problem?

Secure energy data

We could access to meaningful and secured energy consumption and production data with monitoring systems like Open Energy Monitor with embedded installed Ethereum (light) clients to record energy flows on a distributed ledger ("blockchain"). This gives the opportunity to secure and validate data and to access "pseudonymous" consumption and production energy data to facilitate transactions.

Reduce energy losses

Relying on peer-to-peer energy transactions through micro-grid at the local level makes it possible to significantly reduce energy losses in the grid since electricity does not have to cross the country to reach the consumption point.

Create "short circuits"

Locally distributed energy systems that are interconnected one to another make it possible to take full advantage of diffuse local resources (sun, wind, hydro, electro-chemical electricity production - from plants and bacteria...) while strengthening the resilience of the system, since what's produced locally is locally consumed.

Open energy governance

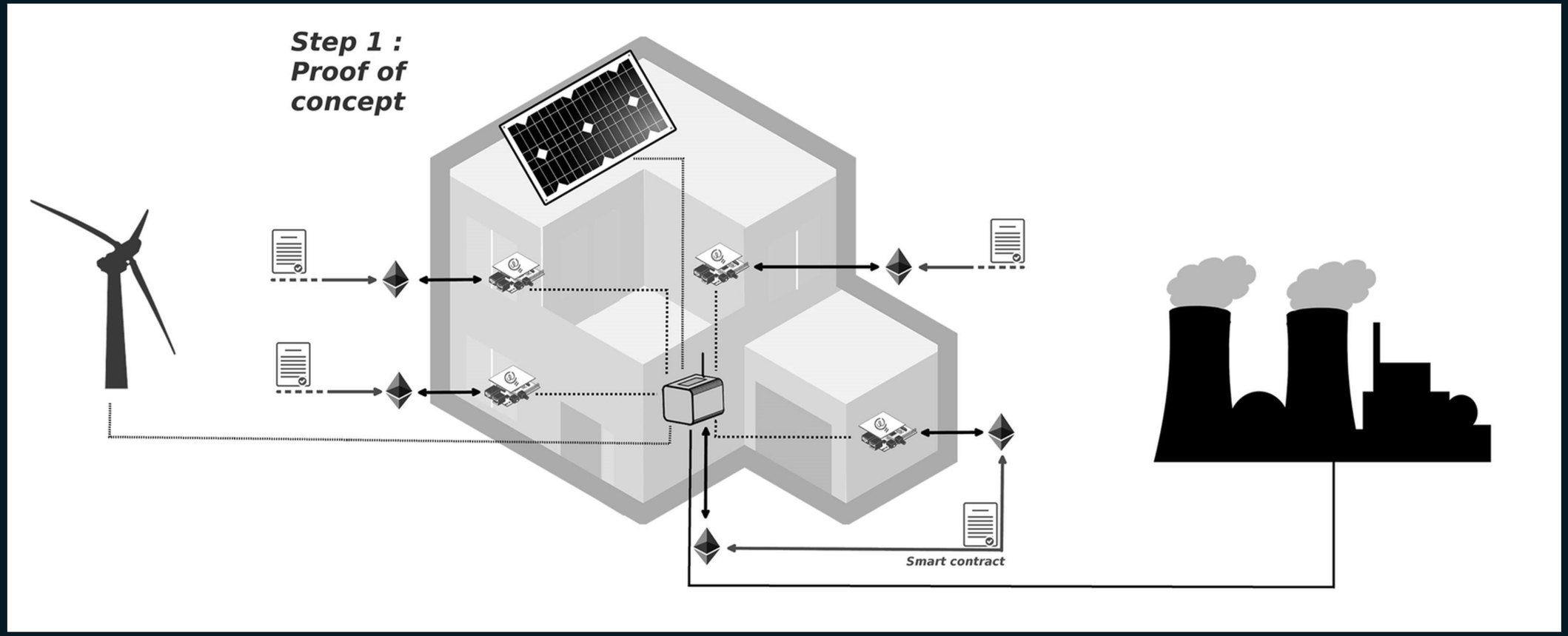
Consumers are part of the equation, if not the central and main actor while talking about energy. A distributed system makes it possible to switch from pure consumer to "prosumers", giving a way for people to be involved in energy governance. Not only this helps to tackle on-ground needs but also to make energy a palpable good.

What is the mission of DAISEE in this context?

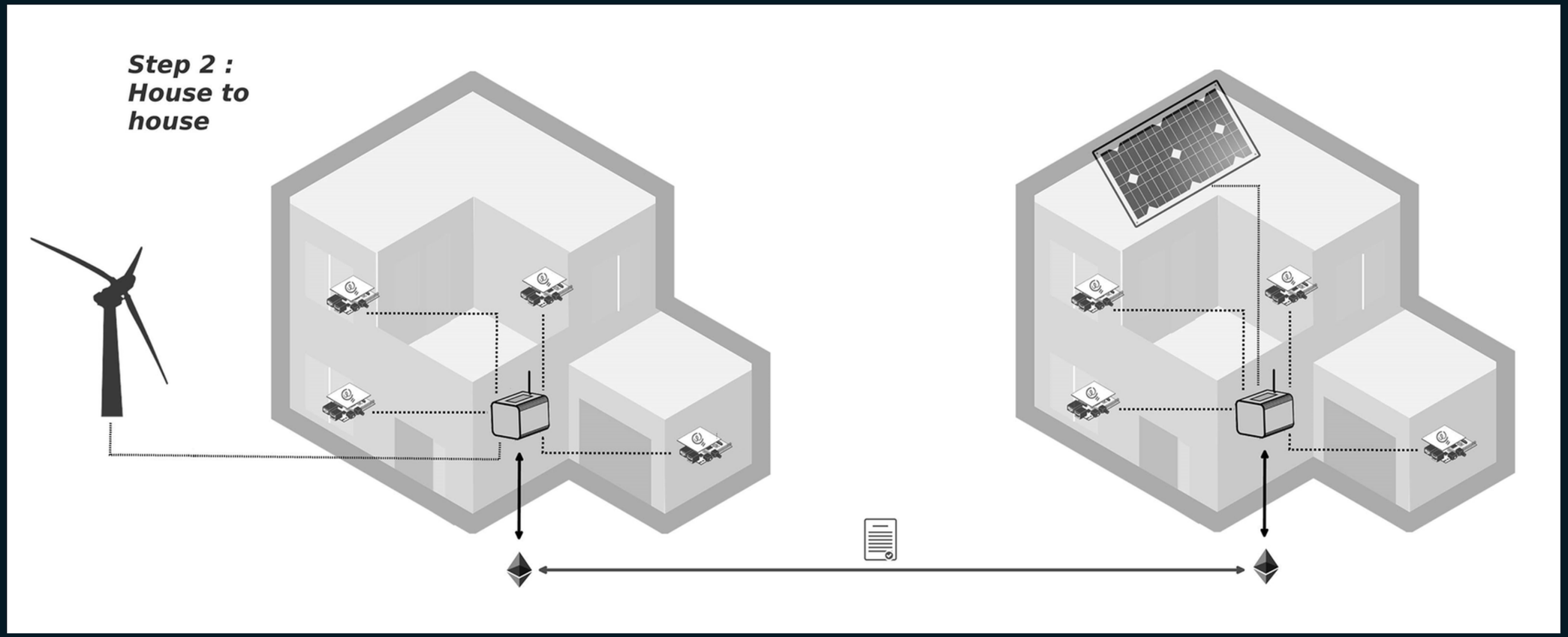
- There are 3 packages in the master plan:
- Energy monitoring: how to securely monitor energy consumption / production on a system based on open-source technologies?
- Machine dialogue: how to make objects take consensual decisions while dealing energy-token between them about who’s consuming what-when-how they contribute to energy consumption reduction ?
- Trusted transactions: how to make it possible to make peer-to-peer energy transactions at the district / town / territory level?

DAISEE's mission is to build the "Internets of Energy" and organise energy as a common. We have to deploy open-source secured decentralized autonomous energy production systems and consumption monitoring, in line with building micro-grid infrastructures, thus enabling trusted peer-to-peer energy transactions.

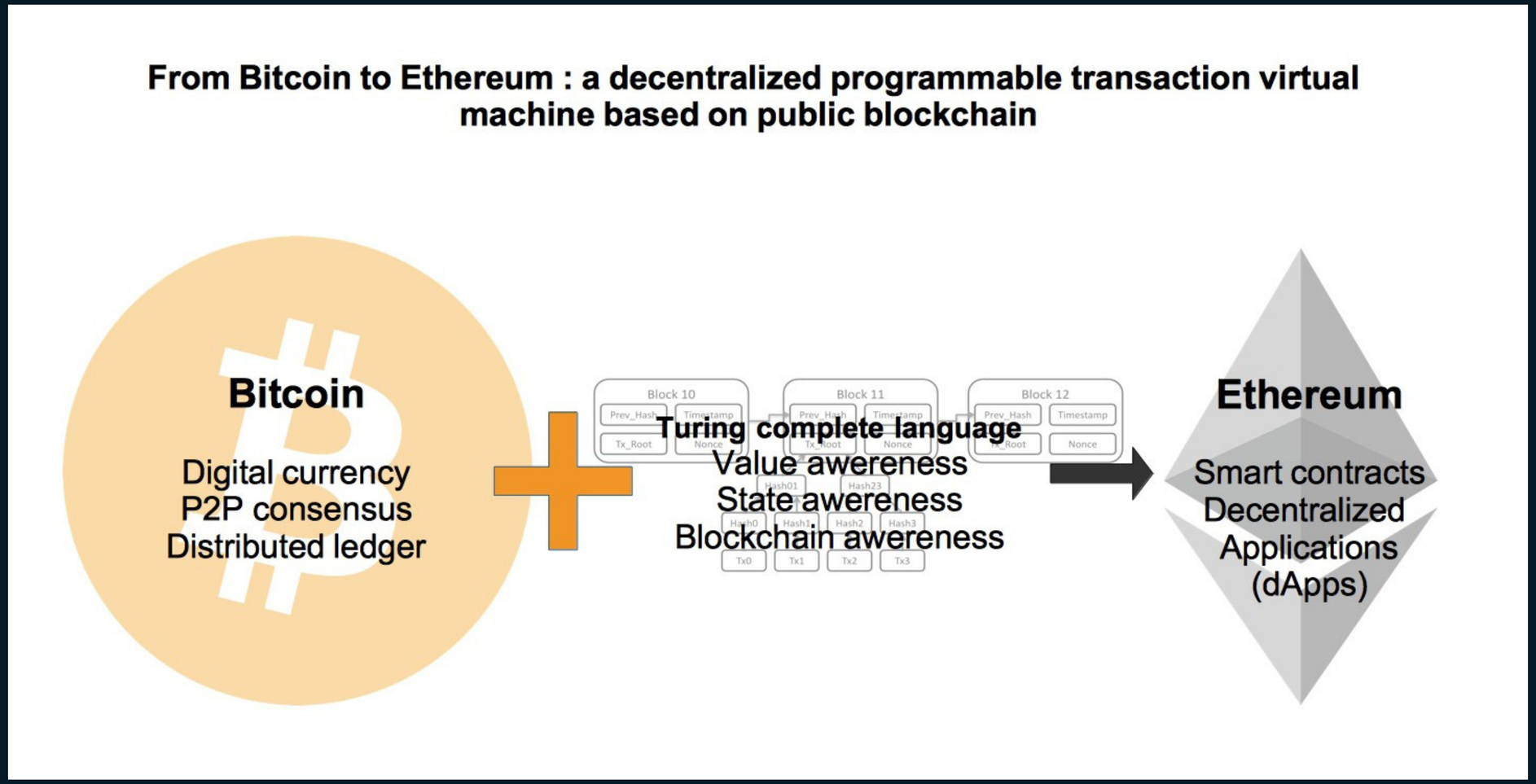
step 1



step 2



The Decentralized Autonomous energy Organizations (DAOs) are Ethereum based:



What are the provisional development steps?

- Energy monitoring : set up sensors, check various data transfer and data.
- Make the sensor communicate: install an ethereum client on two sensors and make them communicate through a basic smart contract on the blockchain
- Make things work with a sensor in each house and test the first transactions.
- Make things work between more than two houses (and deploy micro-grids).

the team

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