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Reshaping swiss agriculture through a peer-to-peer approach

Introduction

The case study is ADA, an open collaborative platform project for authorized data transmission within Swiss agriculture.

Sharing the assumption of platform and infrastructure studies, we would like to show you how platforms can be potential agents of change - alongside other actors such as law, norms or market - and how their political and economic forces are embedded in their architectures.

The question is which power arrangements are contained in – and/or prevented by – the technical arrangements of the platform, especially with regard to the *distribution* of competencies and responsibilities between the platform (provider), and its target users: public administrations, private organizations and farmers.

So, let's move now into the context of the ADA project, into its architecture, and to a discussion of its potential political and economic consequences.

Context that led to the ADA project

In Switzerland, agriculture is practiced by approximately fifty-three thousand farmers, supported politically and economically by the federal and regional administrations and structured by a wide range of professional and industrial organizations.

All of these actors supervise to some extent what and how farmers produce, favouring visions of agriculture with different shades of productivity, respect for the environment, and/or well-being of animals.

This is implemented by means of numerous services, measures and control points that farmers more or less freely subscribe to in exchange for financial support.

Until the nineties, data needed to manage these services, measures and control points were provided on written forms by farmers, and then integrated - sometimes using computers - by administrative staff.

As the number and density of applications increased, and as personal computers connected to the Internet became widespread, public administrations and private organizations began to operate *client-server* information systems, prompting and gradually forcing farmers to supply data themselves using their own computers.

For farmers, who must supply their data - *sometimes identically* - to different systems, this evolution resulted in more administrative work, considered to be a disadvantage in a context of increased pressure on productivity.

In November 2017, the Federal Council decided to introduce new policy measures with the aim to promote digitalization and simplify administrative work.

Following up on this announcement, the Federal Office of Agriculture began to promote a *smart-farming* business platform project, called "Barto".

Its stated goal was to standardize data management and centralize all the data needed by farmers within a single information system.

At the same time, the project promised to enable data-transmission to interested and authorized third-party systems. Barto claimed that providing a single

point of data entry for farmers would ease their administrative work.

The approach and its support by government provoked an outcry within the sector: organizations and farmers alike feared that they would be trapped in a centralized project whose private shareholders were perceived as reluctant to serve the interests of farmers.

Fearing a monopoly on agricultural data, their circulation and therefore the benefits of their potential added value, two organizations, representing nearly 50% of Swiss producers, decided to tackle the problem and proposed an alternative project called "ADA".

ADA is neither a commercial platform, nor a single centralized information system, but an open collaborative platform for authorized data transmission.

Positioned *in between* existing information systems (and not as an overhead), ADA aims to simplify the administrative work of farmers by avoiding the redundancy of data entry and control, while respecting the data and time requirements of the different organizations.

Fewer redundancies, according to ADA, would also (i) reduce the costs for the collection and control of data and (ii) increase the resources devoted to the valorization of these data - for example, through the development of new services, such as decision support tools, traceability, or innovative marketing instruments for direct communication between farmers and consumers.

To question the potential power arrangements contained in – and/or prevented by – the technical arrangements of the ADA platform, let's take now a glance into its architecture.

Results

Some initial elements of ADA's architecture

The ADA platform is an open and fully distributed set of hardware and software resources, developed for administrations and private organizations of the Swiss agriculture and intended to be provided on a non-profit basis.

Open means that access to its source code and technical documents is open. Everyone can see and develop its content according to their needs.

Fully distributed means that among all the resources, there is no single point of control and/or of failure. No entity, human or nonhuman, can take control or compromise the platform's operation.

According to ADA's designers, openness and distribution ensure the platform's neutrality with respect to the balance of power. In ADA, each actor can enter the field of exchanges, namely the circulation of data and their possible added value, *independently* of their role and weight in the sector.

Fully distributed, the platform is composed of *"nodes"* or "peers". Each node is a subset of ADA's hardware and software resources that can operate on its own. Each node must be legally operated by a single partner, such as an administration or an organization.

The partner connects its information system to its node through dedicated and secure remote procedure calls. This action does not involve any modification of and has no direct impact on the partner's information system and on the data it contains.

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When coupled with their administrative or organizational entities, the nodes communicate with each other within peer-to-peer private networks called *"ADA instances"*. Not every node has to collaborate with every other node; rather each node chooses with whom it wants to collaborate.

In each node, the same set of *"services"* is provided, defining the competencies and responsibilities of each of the exchange partners: the platform, the administrations and/or organizations, and the farmers.

Let's take a look at the four main services of the ADA architecture:

1. The first service, called *transmission*, provides to the platform's partners the ability to act as sender and/or receiver of data packets. Partners can choose which data they want to send/receive, to/from whom, and when. None of the data exchanged via ADA is stored in ADA.

2. The second service, called *authorization*, enables the farmer to decide - via a mobile app called "ADA-app" - which authorizations to grant or to withdraw for the exchange of his data. Two partners wishing to exchange data will not be able to do so without the consent of the farmer.

3. The third service, called *distributed and immutable register* ("ledger"), enables to publicly record the "segments" or metadata that the partners would be willing to send and/or to receive, and to document their usage. Farmers also have access to the ledger. All actors involved in a data exchange may see the "catalogs" of data available, *who* makes them available, who uses them, and *for what* purposes.

4. The fourth service, called *persistent memory* ("logger"), requires each partner to record for itself all the data exchanges in which it is involved. The challenge here is to implement a local tool for global accountability that enables to resolve potential conflicts.

Through these four technical services, defined in its architecture, we see how ADA's designers intend to define a set of rules shared by the administrations and organizations wishing to integrate one or more "instances" of its platform.

These rules could be summarized as follows: in ADA, the way data flows is (1) *chosen* by the partners, but *must be authorized* by farmers; (2) *transparent* for all the exchange partners; and (3) *fully traced*.

Defined by the platform, these rules nevertheless express a great autonomy for the partners insofar as they keep a total control over their data and their exchanges.

Discussion

Potential political and economic issues

These qualities of the architecture – openness, distribution and transparency -, besides their relevance from a political point of view, could also be decisive on an economical level.

Indeed, if a better circulation of data reduces the cost of their collection and control and increases the resources available for the development of value-added services, this could have an economic impact.

ADA's intended neutral architecture in terms of power relations may well be more favorable than its centralized counterpart, Barto, to create a more *competitive* and less *deterministic market* for the Swiss agriculture.

A commercial platform in the hands of a few players, which would centralize all data, could indeed lead to technical and/or legal control over the data and their circulation, and could thus drastically reduce the number of actors in the arena.

The sponsors of such a platform could also dictate the type of innovation, which may not necessarily be aligned with the interests of farmers.

In such a context, the commercial platform could engage a certain future of agriculture, for example leading to "smart farming", which is the intention of the Barto project.

The promotion of such "smart farming" could represent a risk of accelerating the structural change already known by Swiss agriculture under the pressure of the opening of borders, and may favor investor-buyers, suppliers and/or distributors.

The introduction of a centralized system could thus lead to a change in the balance of power, in the favor of a small number of actors (its shareholders) and lead to a greater determinism of Swiss agriculture.

Opacity and concentration/centralization of information are common criticisms within platform and instrastructure studies. The case of ADA shows however an example of how actors can attempt to integrate this criticism not just as a discursive element, but also as an integral part of their technical work. According to them, a transparent and decentralized data infrastructure calls for specific technical responses – which I briefly illustrated – in order to enact those political principles of openness, distribution of control and of benefits, transparency and accountability that are promoted by STS critique.

In this respect, these findings also question the analytical distance between the investigator and the subject, or the ethnographer and the architect: to what extent can proximity and integrated critique generate a collaboration dynamic (peer-to-peer) that is productive both for STS and Swiss agriculture?