Designing a coherent land registration system for rural Portugal

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After almost a century of several attempts to establish a coherent land registration system across the whole country, in 2017 the Portuguese government decided to try a new, digital native approach to the problem. Thus, a web-based platform was created, where property owners from 10 pilot municipalities could manually identify their lands’ properties using a map based on satellite images. After the first month of submissions, it became clear that at the current daily rate, it would take years to achieve the goal of 100% rural property identification across just the 10 municipalities. Field research during the first month after launch enabled us to understand landowners’ relationships with their land, map their struggles with the platform, and prototype ways to improve the whole service. Understanding that these improvements would still not be enough to get to the necessary daily rate, we designed, tested and validated an algorithm that allows us to identify a rural property shape and location without coordinates. Today, we are able to help both Government and landowners identify a rural property location with the click of a button.

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Context & problem

For the past century, several Portuguese governments have tried to implement nationwide rural property registry initiatives, not only focusing on gathering ownership information, but also rigorous property boundaries identification. Though several methods have been tried - some promoted by the government, other by local power - with varying degrees of success, as of today only half of the country (mainly south of Tejo river) is registered in an updated database of both rural ownership and property boundaries. The other half (which contains a much larger number of smaller, individual properties) has been stuck on a negative feedback loop, resulting in the degradation of the value of said properties, and also hampering the ability to sustainably manage these lands, either by owners or public institutions. This loop has been boosted by various reasons: an aging rural population, the loss of knowledge about where properties are and the fast declining of commercial exploration of these properties. All these factors result in large areas of unkempt vegetation and forest, which then leads to even less interest in these rural properties. Unfortunately, this unmanaged territories have also been the ones where environmental catastrophes, mainly fires, have been the most common.

So, it was not surprising when in June 2017, 53 thousand hectares of land in the Portuguese interior were destroyed by one of the biggest forest fires to ever occur in Portugal, also taking the lives of 64 people. This human and environmental catastrophe would then be followed by more destruction, just four months after, in October 2017, when hundreds of smaller fires consumed another 54 thousand hectares of land across the whole country, resulting in the death of 54 more people.
Though a new initiative for rural properties registration was already in the works, the June fires sped up the urgency of understanding who owned what and where. As one of the main constraints of previous initiatives had always been the high costs of acquiring GPS equipment and hiring (or training) technicians that could go on the field to gather hundreds of thousands of precise property coordinates, this time a digital native mindset inspired the writing of the decree-law behind the new initiative.

Hence, BUPI — Balcão Único do Prédio (roughly translates to Centralised Property Desk) — was born. A web-based platform that would allow for rural landowners to register their properties and identify its boundaries using aerial/satellite photos. Because the main target of this tool would be a very aged population, the decree-law also included the setup of physical counters where technicians could help owners using the platform. These physical counters were positioned at each municipality’s town hall and could be accessed by appointment only. Though web-based, during the first 8 months of the initiative, the platform could only be accessed through the physical counters and with the supervision of the technicians.

Because of its novel approach, BUPI was designed as a pilot program, to be tested in a small region of the country, before a wider launch. The June fires ended up being one of the decisive factors in the selection of the 10 municipalities that would become part of the year-long pilot. In order to rapidly implement the defined vision, an assembly of companies, with different types of skills and know-how, was hired. As a Strategic Design Consultancy, specialised in research, strategy and design outputs, we were invited to evaluate the service, both in the digital platform and the physical counters, and devise a communication strategy that would generate the necessary demand by the targeted local communities.

The narrative

To better tackle all of the challenges ahead we assembled a multidisciplinary team composed by a researcher, a digital strategist, a communication strategist, a service designer and a digital designer, working together throughout the duration of the whole project. Our very first challenge was a kind of go-to-market strategy before the research project even started. We only entered the project one month before the decree-law’s starting date (November 2017), and during the first full month we focused on helping to create the conditions so that BUPI could work from day one. This work involved service design for the counter, reviewing/improving the existing web platform and creating the first communication pieces to be used. It is important to note that for the first six months of BUPI, the online platform could only be used by certified technicians, provided by each municipality.

Though this was not part of our core challenge, we embraced it and saw it as a way to set up the stage where we would be doing research. During this initial period, we were able to engage in web platform testing, use roleplaying to experiment with different counter concepts, establish productive connections with the most relevant local actors, and build several prototypes for communication mediums that, besides serving for the upcoming launch, would also allow us to understand what kind of messages resonate with people. This was also the time when it was decided that we would focus our research effort mainly in the municipality of Penela.

When the pilot was launched, we started a two-month-long field research phase during which we not only visited Penela, but actually lived there for several weeks. This was an intensive research and empathy phase, containing not just information gathering, but also reiteration and prototyping.

Besides doing research on every village of the municipality, talking with both private and public actors, interviewing all kinds of owners, observing how people interacted at the BUPI counter, even trying to buy a rural property, and using tools for property boundaries identification, we prototyped a lot: new kinds of counters, new ways of identifying a property (both digital and physical), several versions of communication pieces and even town hall meetings. All of this served not only the purpose of mapping the challenges and improvements to the physical and digital services, but also rapidly understanding what actually worked, in order to spread it across the other 9 municipalities.
Figure 1: The first landing page we built

Figure 2: Our attempt to buy a rural property helped us understand how lands are priced and sold.

Figure 3: Besides using the digital platform, we also experimented identifying properties through the old fashioned way.
One example of this research approach is the prototype for a decentralized counter we created in Penela’s weekly market. After understanding that some of the main bottlenecks of the project were the time each technician spent with each owner, each municipality having only one technician per counter, and the hard time property owners had searching for their properties on a 2D digital map, we decided to test a way that could allow each owner to get to the counter with as much applicable knowledge as possible about the whereabouts and boundaries of their properties. So, for 3 wednesdays in a row we set up a table at the center of the weekly market and using Google maps, a digital tool already used either by the target population or close relatives, we helped several people drafting the shape of their properties on top of Google satellite images. This whole experience allowed us to understand several things:

- The kind of questions a technician might use in order to help a property owner;
- Mapping of strategies for knowledge gathering before an owner goes to an official BUPi counter;
- The different media that owners use to record this type of information;
- The way this knowledge should be structured for easy reading by the technician;
- How a decentralized counter might streamline the whole process;
- The new role we would have to create for this kind of help counter;

Figure 4: We prototyped a new "help counter", outside the city hall, where owners could get support, gathering information before going to the main counter

Figure 5: Testing Google Street View as a way to streamline owners’ identification of property location
By the end of this intensive research phase we had identified 4 main issues present in the whole initiative:

1. Disorganized and complex communication between the different entities and with the target population, originated by a lack of understanding about the overall goals of the initiative, different interpretations of the law, lack of a coherent governance model and generalized misunderstandings about what the digital property boundaries identification was all about;

2. At the base of the creation of the decree-law and the first batch of communication were unrealistic scenarios that did not take into account different kinds of property owners and the different reasons why each different type of owner might be interested in this initiative;

3. Although the main goal of BUPi was to allow for a better management of rural and forest lands in the future, the registry of rural properties ownership was seen as the single most important thing in the user flow, reducing the identification of property boundaries and shape to either a hard in-between step, or an after thought that was dismissed by everyone;

4. All the work imperative to reach the initiative goal was dependant on the daily work schedule of each technician, a factor that would be very hard to scale.

To tackle these problems, we defined a strategy around three main principles:

1. Refocusing on property boundaries identification, not only communication-wise, but also in the way both the digital and physical flows were designed;

2. Decentralization of the counters, using public spaces and under-used public resources (e.g. computers, vans);

3. Highly targeted offline communication taking into account three different types of rural property ownership and the different and idiosyncratic communication spaces available.

Using these three principles we redesigned everything across the whole project and delivered a service design and communication report. Several key recommendations were implemented days or weeks after the report was presented.

But all of this was done inside the scope defined by the decree-law, which contemplated only one of the ways the overall goals — rural property registration and boundary identification — could be accomplished. So we went further and redefined not only the overall goals, but also the way to get there.

We understood that the end goal was not amassing property registries and pixel perfect boundary identification. The end goal was to increase existing knowledge about a massive area of rural properties and forest. This redefinition allowed us to show to the Portuguese Government that in order to better manage this huge area there was no need for thousands of owners to go to a BUPi counter or learn how to use the online platform, and identify exactly where their properties were. Attributing this responsibility to landowners could actually delay reaching the previous goal — to registry and map one hundred percent of rural lands in a year — by decades.

The passive approach adopted by the Portuguese Government, whose role besides creating the decree-law and building the offline and online tools was simply to wait for owners to seek the service, did not make sense in an age of satellite images, artificial intelligence and huge amounts of data. Thus, on top of everything we recommended, we also proposed a redefinition of the vision for the whole project, to use satellite images,
historical databases of ownership and every bit of publicly available georeferenced data, together with computer algorithms, in order to understand the amount of rural properties that exist in a given area, the most likely boundaries of these properties and who might be their owners.

This new approach opened the door to new opportunities in the long run. If successful, it would be possible to get a citizen to confirm if what was deduced was true, changing the incentives system for participation: you wouldn’t have to put in the work, just check if everything you owned was deduced. It would also allow for more clear identification of the owners who had neglected their properties (increasing the risk for catastrophes). So, together with one of the other companies working on the project (specialized in big data) we started a two-months-long proof of concept, with a mini project.

During this period, we collected public information from both public and private institutions, tested different kinds of satellite imagery, cleaned and improved databases. In the end, using three different methods according to the data points available for a given property, we were able to show that it was possible to identify the probable location of any given property in the municipality of Penela, the municipality chosen for the proof of concept. This capability was then included in the platform, in which both technicians and property owners could now automatically get the probable location for a given rural property number, without any other input. The development of the property boundaries identification algorithm is as of today a work in progress, together with the further development of the overall concept behind this new vision, in order to scale its capabilities and usefulness.

When we presented the service design and communication report, together with the new vision for the project in January 2018, two months after the launch of BUPI, the average goal completion for the 10 municipalities was around 2%. By November 2018, the project was able to go above the 50% mark of overall goal completion — properties location and boundaries identified/checked by its rightful owners. BUPI became one of the fastest initiatives of its kind, and extended beyond the initial 1 year pilot program. As of today, a national roll-out is being discussed in the Portuguese parliament. The big data effort also allowed for an increase in the project scope. For the first time, georeferenced data that was owned by different institutions and seldomly shared is now centralized in a single platform which allows an unprecedented level of knowledge creation about the Portuguese territory. As a tool, this knowledge can only grow in capabilities, with the potential to go from a tool deployed for catastrophe prevention, to an active platform available to everyone who wants to reinvent how value is generated using areas that have been abandoned for several decades.

Figure 7: First concept of the location and shape detection algorithm
Key learnings
From all the things we learned during the research phase and the following months of implementation of the report recommendations and the new vision, we want to highlight four that we believe can be applied by anyone practicing Design Thinking:

1. Taking time to setup the real world conditions where we will apply Design Thinking is not a problem, but rather a strength even when we have to actually build the things we will end-up studying. We would even argue that this is at the core of prototyping and testing as principles of Design Thinking;

2. Applying the Design Thinking principles, beyond a linear process, is in itself a way to start solving the problem we are studying while doing the project. Everything we did during the research phase in Penela, even just talking with people at local coffee shops, helped this municipality being the one with the best average completion goal while we were there. No one can study a problem in a vacuum, Design Thinking can be used as an impactful change agent during this process.

3. Gradually presenting micro-results and strategically valuable knowledge generated in an immersive and empathy-focused Design Thinking approach allows for growing confidence within the project team and third-party entities, uplifting design to be the discipline that leads a strategic and innovation process across multiple dimensions (law-making, operational support, communication, service, digital platforms);

4. It is quite common for the challenge to be set around means goals and not end goals, which can limit how the strategy is developed. In any project, taking a step back and reaching a clear and defined overall end goal can open up or even change the scope of the challenges and solutions devised within the strategy.

Final thoughts
Before the program was launched (November 2017), there were 243.195 hectares of properties that needed to be georeferenced by its owners on 10 pilot municipalities. From November to the middle of January, the program had achieved the 2% mark of completion. This was around the time when we presented our research reports and the new, data intensive approach. Once the service design report recommendations started being applied we saw significant improvements in the number of properties georeferenced across all municipalities and the percentage of completion skyrocketed to 47.47%, until October. This percentage includes 82.860 properties identified, for a total of 35.601 hectares of rural land. On top of this, all the mobilisation generated 45.000 individual counter bookings that couldn't be fulfilled as of October: by the end of the project, demand exceeded supply.

Besides the expansion of the project, improvements of the algorithm and development of visual supports for mass media communication, we are already studying how the data collected can be used to empower entrepreneurs from all over the country to find new ways to enrich rural Portugal.