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Smart surveyors for land and water management

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Implementation of 4D Cadastre Concept for Land Dispute Potential and Solution of Post Natural Disaster in Palu, Indonesia

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Indonesia

INTRODUCTION

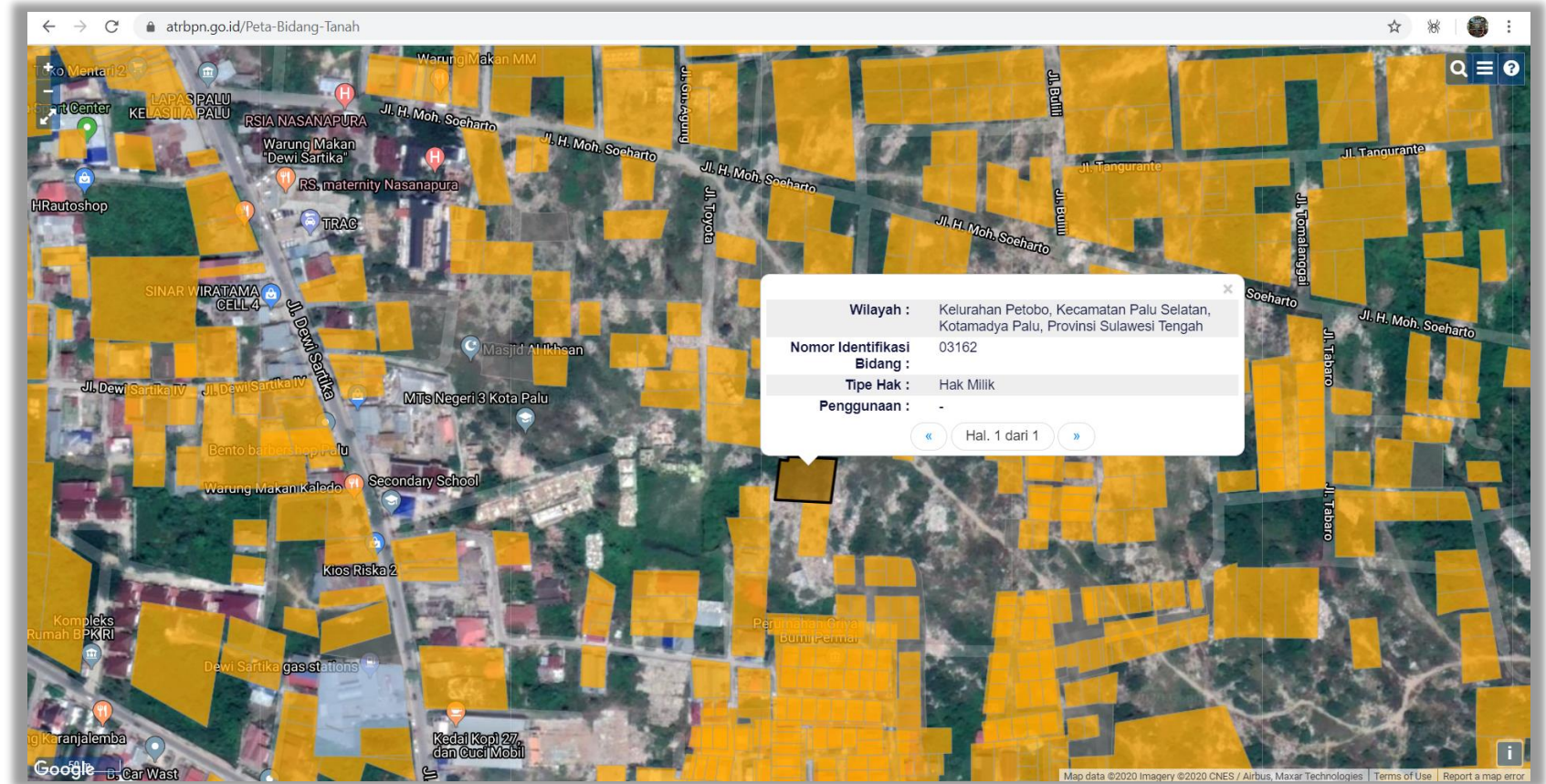
On September 28, 2018.

in Palu and Donggala, Central Sulawesi, a devastating earthquake of 7.5 magnitude and a tsunami with a height of 3 meters from the Mean Sea Level (MSL) resulted in the loss of tens of thousands of parcels and people died, resulting in potential disputes soil.



Petopo Situation

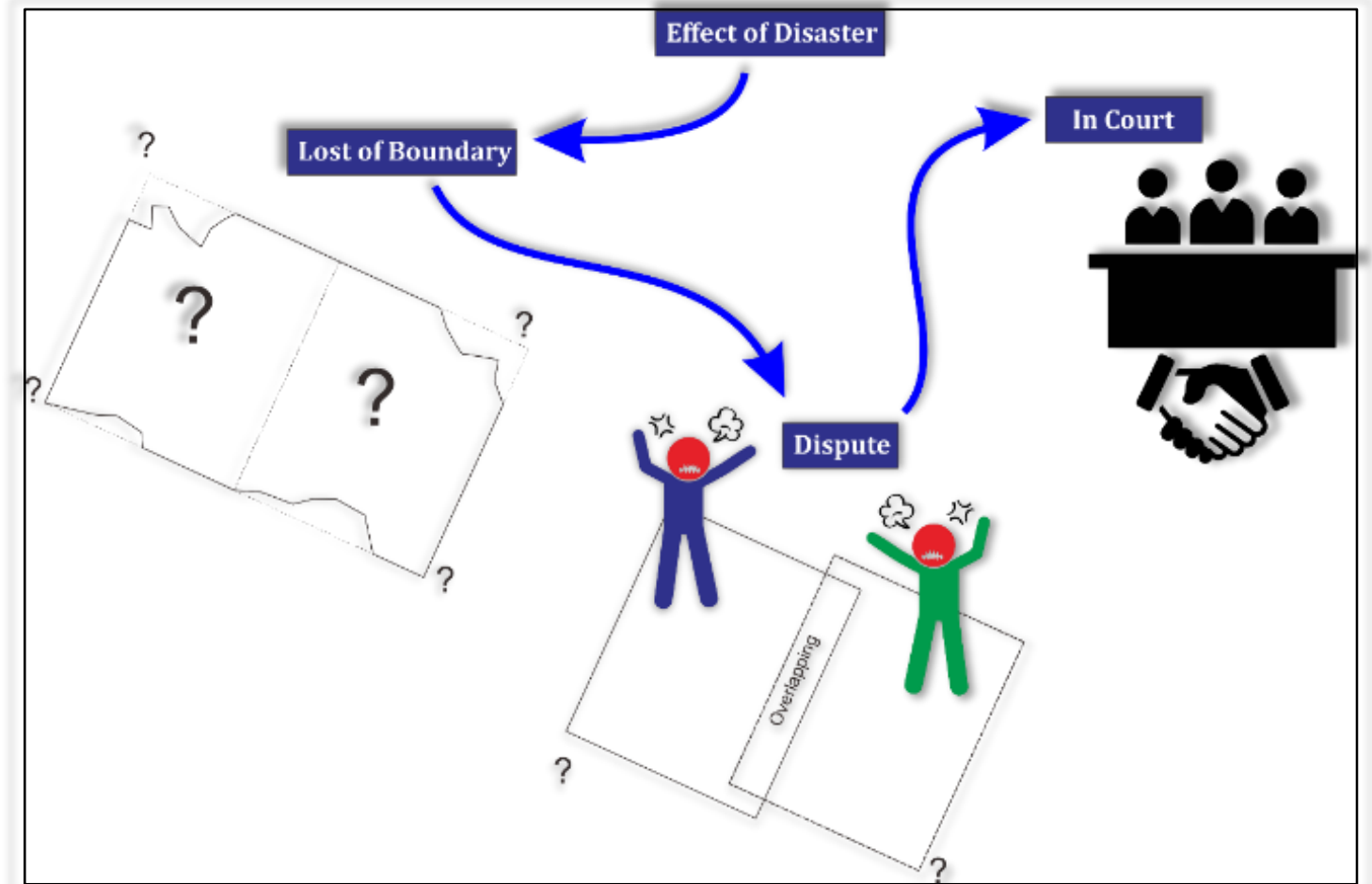
In Indonesia, ownership rights are in the form of land certificates through a complete systematic land registration program (PTSL) for economic equality in Indonesia as outlined in agrarian reform policies.



Ownership data from the Ministry of Agrarian Affairs and Spatial Planning (BPN)

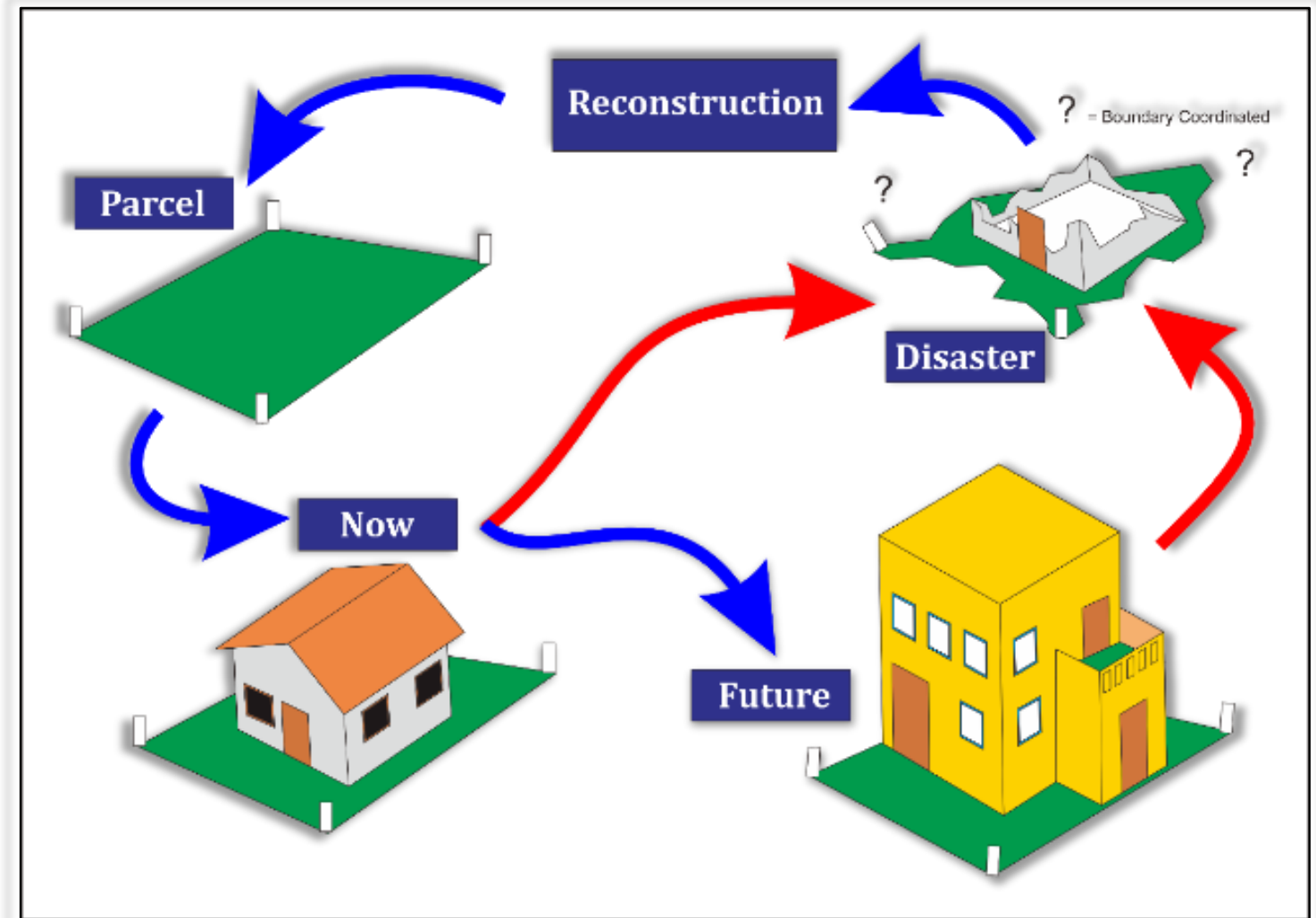
Incomplete parcels in one area will occur potential land disputes in the future and that is leading to a lot of problems which we need to address. One of the problem is the reconstruction of lost boundaries and unilateral recognition by a number of persons or unauthorized persons in ownership.

the effects of disaster caused of loss of boundaries thus agreement is needed in the determination of land boundaries and if there is no agreement it will end in court session. (right-side)

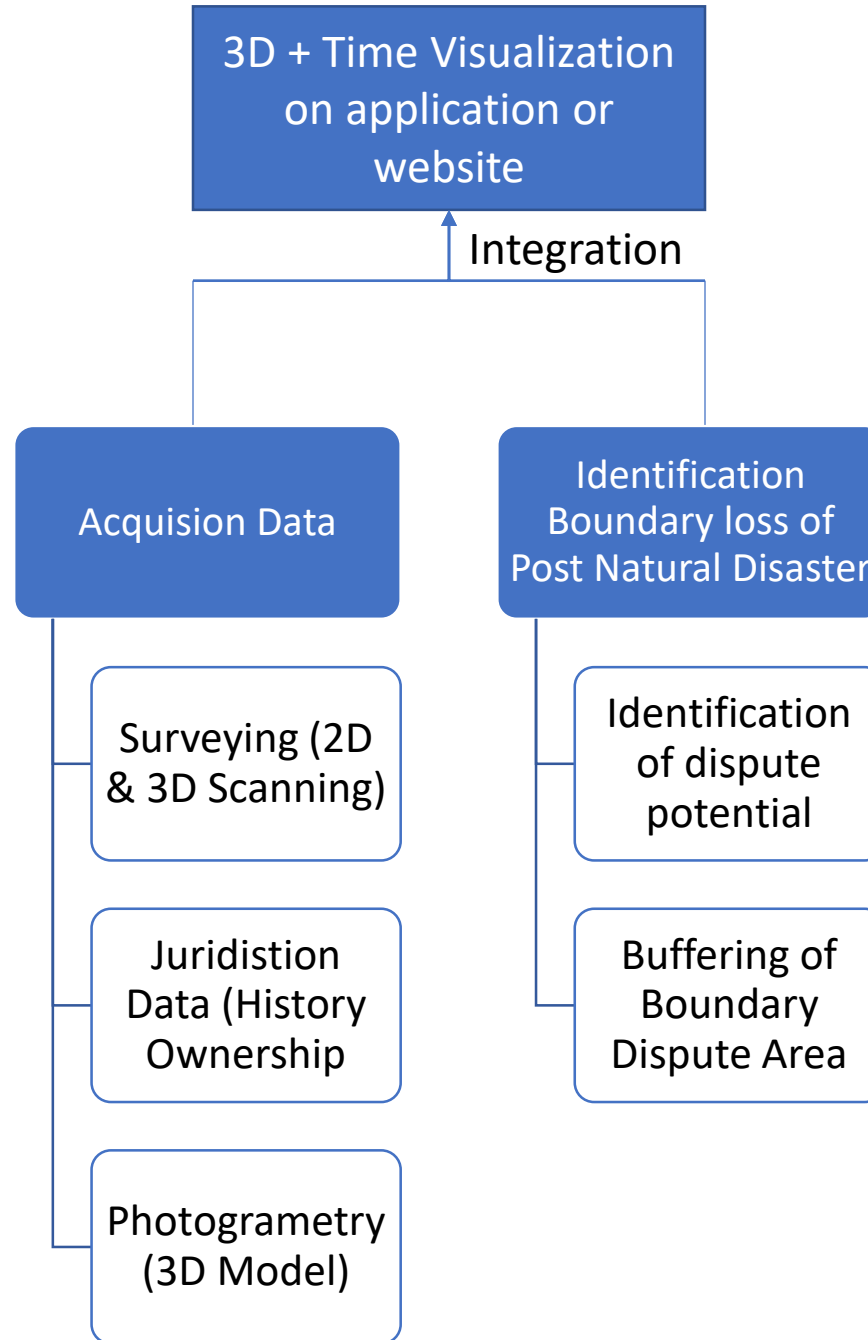


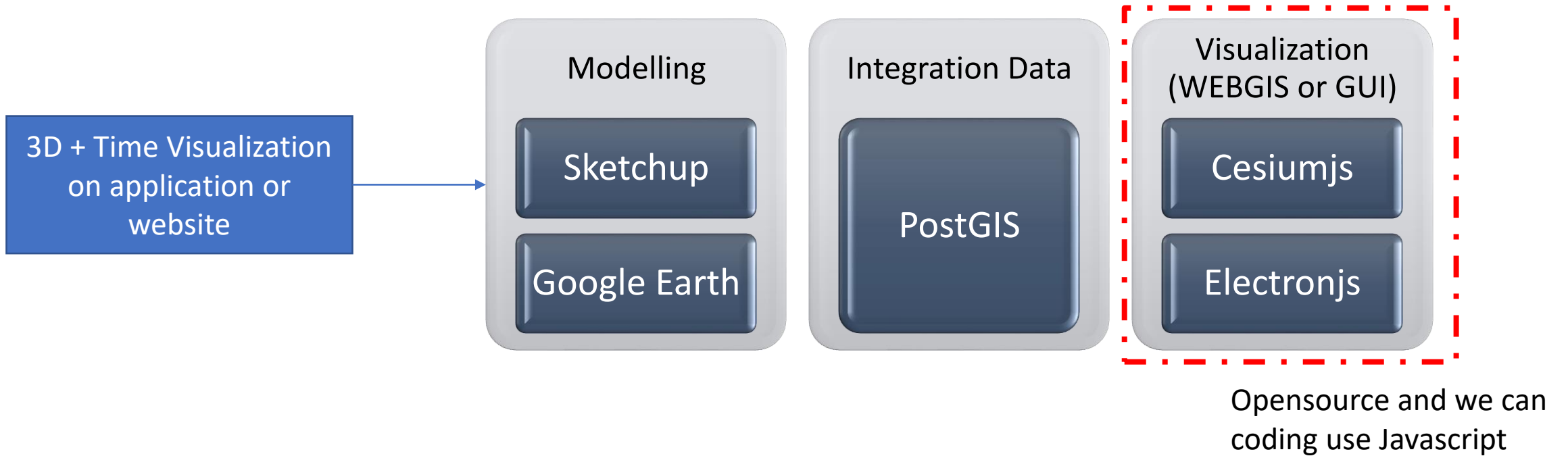
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That reconstruction of land boundaries (right-side), requires accurate data and detailed of land administration system and there is a 3d model thus it can quickly determine decisions.



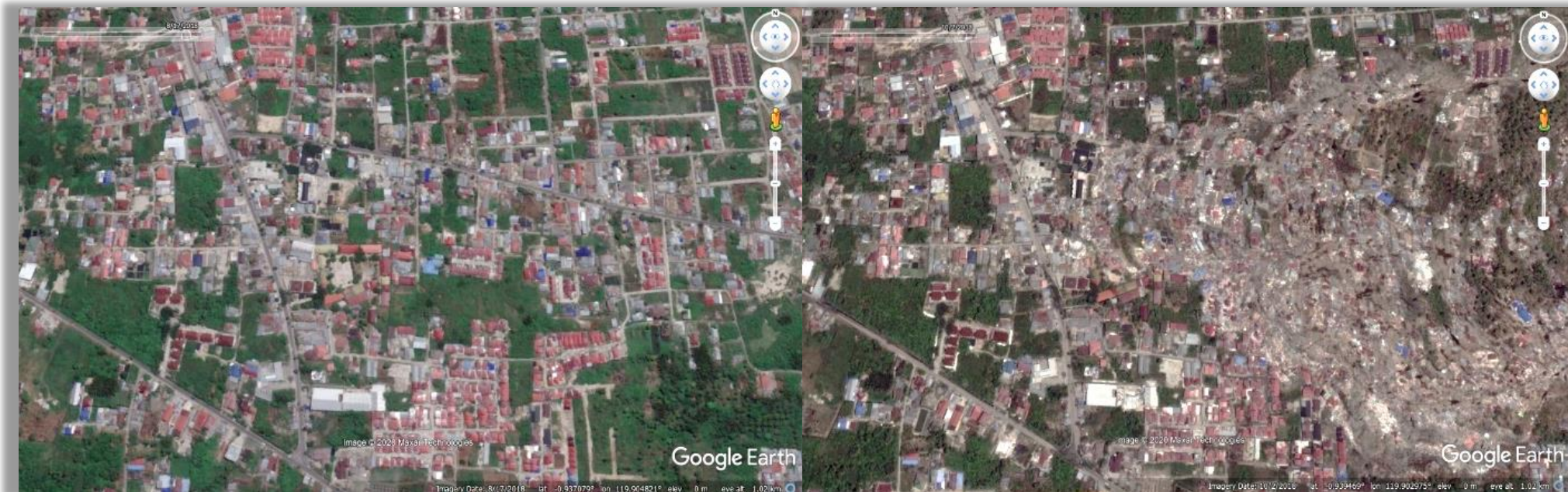
METHOD





DISCUSSION AND RESULTS

In this research case, where the location is in Petopo village, South Palu sub-district, Palu city, Central Sulawesi Province. Seen in the Google Earth satellite imagery in Figure 3, in a vulnerable period of time from August 10, 2018 (left-side) there are no occur when natural disaster with namely earthquake, tsunami, and liquefaction. On October 2, 2018 (right-side) there was occur a natural disaster thus lots of people died and lost their boundary of own land right.

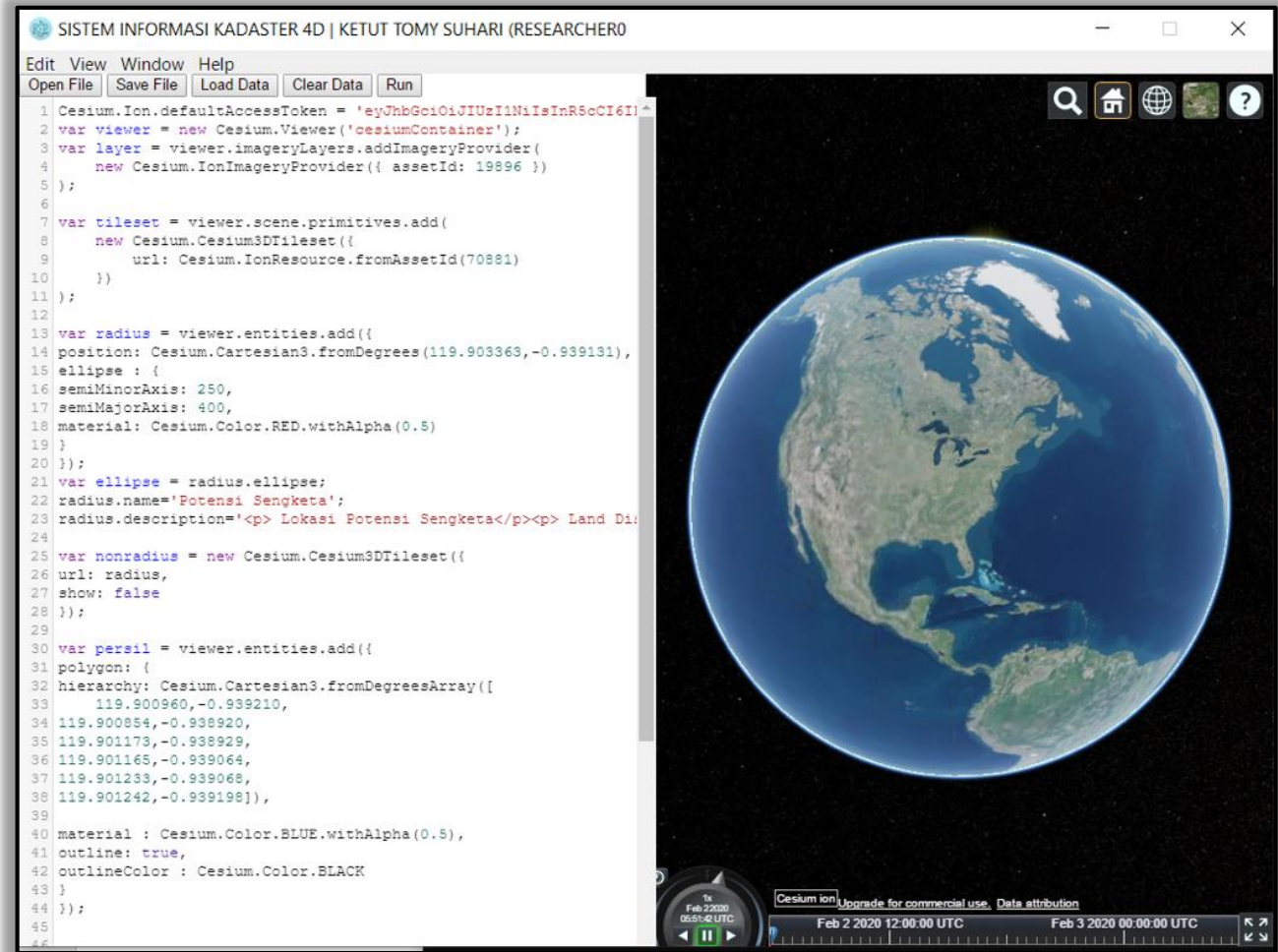


The research continued to the location by flying DJI Phantom Pro 4 drone to obtain imagery photo data and can be used as orthophoto maps to seen clearer than satellite imagery with a resolution of 3 cm,



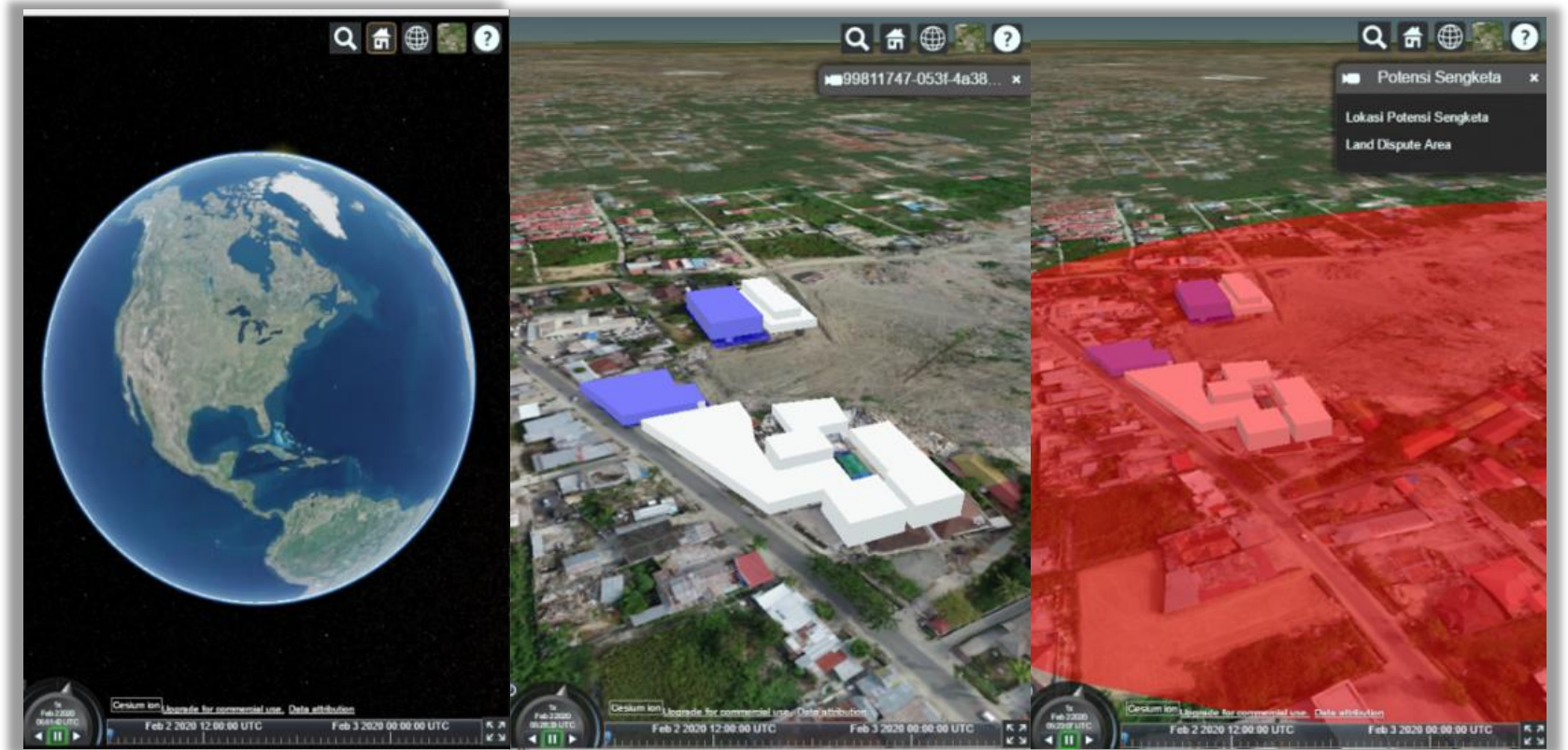


This software is electronjs (opensource) with javascript and html based. It useful for visualization the 3d model and set the time.

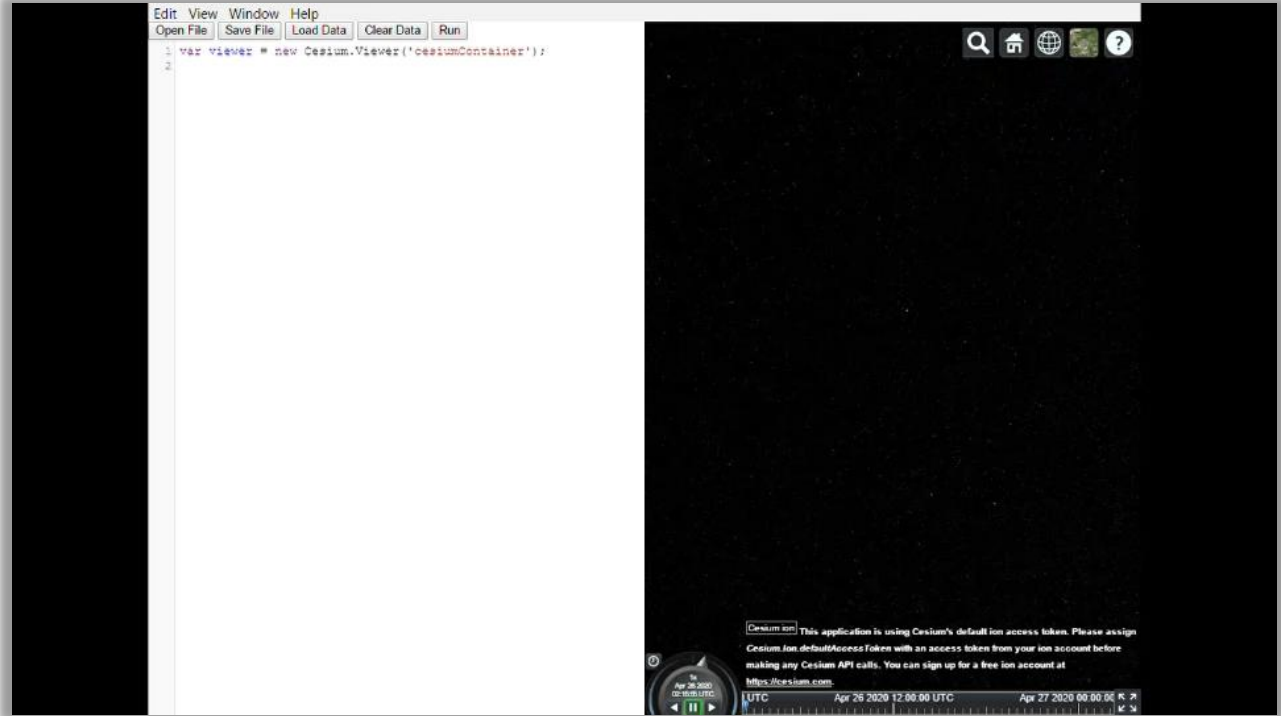


With the cesiumjs based in electronjs GUI, it can insert the data 3d model in orthophoto file and 3D Model from skecthup to CityGML,

Level of Detail (LOD) 1 which is blue colors are sample of ownership rights.



This Results will shown in this video



CONCLUSION

The goal of this research, is to elaborate information system 4D Cadastre to facilitate and explain the digital results of legal property law who owns land certificate or in specific of an owner of apartment. Using 3D model data from Orthophoto, LOD 1, Cesiumjs and electronjs are expeted to show 3D including position and height (x,y,z) and time (t) in the application or website. The spatial data will be recorded in a system, thus can be used as an archive of the history of ownership and can be used to simulate the lost data or add spatial planning in the future. The software can adjust the time, that it is useful and needed in analysis, monitoring and allows in real time if it is integrated with IOT.

By using the 4D Cadastre Information System, it will minimize land disputes which can occur at a late time. This will be the basis in the investigation, the adjudicate, and court judgment for future disputes. For future work, using the LOD 2, 3 and 4 in CityGML can be well integrated as long as it is used and modelled into Cesiumjs for visualization purposes.

THANK YOU