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### **Land boundaries inconsistency in Ukraine: reasons and solutions**

From 1992 to January 2013 the main document certifying the right of land ownership was the State Act about land possession. The issuance of the Act was preceded by the registration of the land documents. First, land ownership acts and land documentation were issued only in hard copy. But starting from July 2003, both hard copy and electronic format on magnetic media were introduced.

As a consequence, not all information about land ownership registration dated before January 2003 was converted into digital form, so now some owners may face the challenge of rejection or validity of their property rights. It happens because in some cases geospatial location of land parcels was determined inaccurately as some land management companies didn't make measurements on the spot but provided data on the paper only without binding the turning points of the parcel boundaries to the national geodetic network. This caused data inaccuracies in land deeds and led to the errors in determining the boundaries of land parcels, i.e. when one land parcel overlaps another, usually a neighboring, land. This is the reason why many users and owners encounter difficulties while registering, re-registering, getting the cadastral numbers of the previously registered land parcels.

Another serious problem is that the state geodetic network has not been updated for 30-40 years. So, each land management organization still uses its own geodetic network. Basically, the starting points of the survey are temporarily fixed coordinates which are determined by GPS observations. And if the boundaries are measured by different land management agencies, errors may occur.

To solve these problems, it is necessary to develop the state geodetic network in a unified coordinate system which will be comprehensive, current and accessible for all the agents of surveying and land management with fast coordination and communication over the Internet. In this case, standard geographic information system (GIS) software should be used at all levels. This unified geodetic network must also comply with international standards based on satellite positioning.

However, the accuracy of surveying also depends on the qualification and practical skills of a surveyor who has to strictly follow the instructions for the factual survey to prevent errors in measurements. According to these instructions, the average error in the position of objects and boundaries of a land parcel in relation to the nearest fundamental points should not usually exceed 0.4 - 0.5 mm on the territory with multi-storey buildings or 0.7 mm in mountainous and forest areas.

So both an updated nationwide geodetic system and strict fulfilment of the surveying rules could eliminate the problem of land parcel overlaps in Ukraine. However, many technical, financial, legal, organizational, educational and political challenges must be overcome to introduce these changes.