



Land Governance in an Interconnected World

ANNUAL WORLD BANK CONFERENCE ON LAND AND POVERTY
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Fit for Purpose Scalable GNSS Data Collection

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Paper:

It is not uncommon for the user of a software or hardware product to touch only a small percentage of the tools available to them. Functionality correlates highly with cost and can be a contributing factor to users being excluded from innovative new technology. GNSS data collection vendors have a responsibility to ensure their products are not only fit for purpose but also scalable to guarantee potential users are not unnecessarily priced out.

This is especially important for developing countries. They need to make the best of given budgets to get started with new technologies and workflows. On the other hand, they need the flexibility to upgrade and extend the purchased solution later, to meet changing and rising needs. For instance, an organization may only need sub meter GNSS accuracy and buys single frequency GNSS units. Later their demand grows, and they need to provide cm accuracy. Here they only have to upgrade the existing devices with a simple dual frequency upgrade which does not involve hardware replacements or servicing. This makes the solution future proof

The trend for propriety closed solutions is ending and across many industries there has been a rise in flexible and diverse software and hardware systems. Many of the world's largest technology companies have realized that systems that do not interoperate are no longer popular and cause a significant barrier to growth for organization. There is a shift towards cooperation and integration that is combining to make life easier for the end user.

Rapid advancements in technology have made this increased cooperation possible, easier to develop and much faster to bring to market. Scalability has become an expectation of the user and you no longer have to be locked into a large, complex workflow when you can pick and choose which elements of a system are relevant for you. Software and hardware should align to user's needs as their own industries are developing and changing as rapidly as the technology is advancing. Users need a solution which is tailored to their knowledge and experience. This is also important for developing countries for Land Administration projects where sometimes semi-professional or unexperienced surveyors have to conduct the field work.

It is common for users to identify high acquisition costs and the challenge of making a return on investment as barrier to procuring GNSS data collection solutions. Software and hardware vendors must have a more integrated approach, so users can help keep costs down by using their solutions with software and systems already within their organization. Users increasingly want to match software to existing hardware. On the other hand, they also want to match hardware with existing software.

The open system "Bring Your Own Device (BYOD)" concept allows, to match Leica components with 3rd party software and 3rd party hardware. It is likely the organization will have a mixture of back office systems and platforms all of which present a real challenge for the solution provider to be able to easily integrate with them all. Users often do not require the most advanced or most capable solution when there is a certain level of software or hardware functionality that will meet their requirements. In the world of GNSS data collection these requirements are often dictated by local standards or guidelines which vendors need to be aware of.

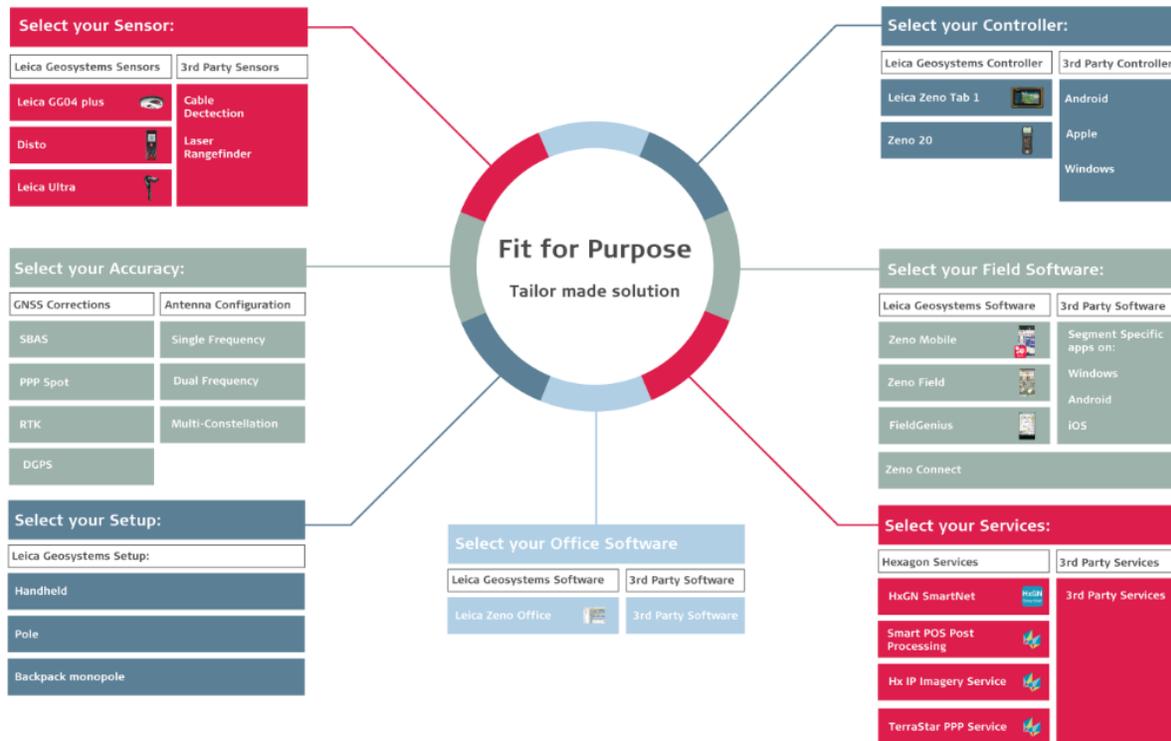


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Fit for Purpose: Your tailor made solution



With the challenges already outlined; as a provider of GNSS data collection software and hardware, Leica Geosystems' Zeno range of products give the user a customizable platform where they can choose the performance level and features that are relevant to them. Leica Zeno products are designed to be as easy to use as possible meaning that you do not have to be an expert or specialist in a certain field to use them.

For software, the Android Zeno Mobile app has a standard and professional version available which offers the user different levels of functionality for their needs. The app can export data in a variety of formats for use with different GIS systems. The Zeno Connect application runs on Windows, Android and iOS operating systems and provides GNSS positions to any location aware application. The user can configure NMEA messages to provide the GNSS metadata that is relevant for them. Both Zeno Mobile and Zeno Connect support 28 different languages to reach as many users in their native language as possible.

For hardware, the GG04 plus is a highly configurable smart antenna. Users can choose the level of accuracy they require and which GNSS constellations the antenna tracks. Different GNSS correction services can be used with the antenna including PPP (Precise Point Positioning) which provides corrections anywhere in the world without a mobile data connection. The Zeno 20 is handheld GIS data



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collector that has an in-built survey grade GNSS antenna. Like the GG04 plus, the Zeno 20 antenna is configurable to the user's needs. The Zeno 20 can run either Android or Windows operating systems and can be connected to an external antenna mounted on a survey pole for better GNSS tracking performance in difficult GNSS conditions.

An important part of the Leica Zeno ecosystem is Hexagon's SmartNet reference network which provides GNSS correction data to all Zeno products improving their accuracy. SmartNet is available in many countries around the world and users can choose different subscription models based upon accuracy and the amount of data that is used. In many developing countries these reference networks have either recently been established as major infrastructure projects or are being planned for the near future. Leica Geosystem are one of the major players and solution providers in these cases. For countries where reference networks are not yet established, the PPP (Precise Point Positioning) service which is part of the Zeno solution, can be used for precise GNSS data collection.

Finally, underpinning all GNSS data collection technology are the global navigational satellite systems and satellite-based augmentation systems themselves which are now a scalable option for the user. Advances in technology mean that users can now take advantage of any combination of GPS, GLONASS, Galileo, BeiDou, QZSS, PPP and SBAS satellites. All of these have different benefits depending on where in the world the user is operating.

Sensors	 Leica GG04 plus Zeno 20 Disto Leica Ultra	 Cable Detection Laser Rangefinder	 - when it has to be right Leica Geosystems
Controller	 Zeno 20 Leica Zeno Tab 1	 3rd party Android 3rd party Apple 3rd party Windows	
Field-Software	 Zeno Mobile Zeno Field FieldGenius	 Segment Software Apps on Windows & iOS	
Office-Software	 Leica Zeno Office	 3rd party Office Software	
Services	 HxGN SmartNet Smart Pos Post Processing Hx IP Imagery Service TerraStar PPP Service	 3rd party Services	

Solution toolbox for flexible combination of Leica components with 3rd party devices (BYOD)



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This paper discusses Leica Geosystem's latest Zeno GNSS data collection products in more detail and how these scalable solutions are expanding into new markets and meeting and overcoming many different user challenges.

Key words:

GNSS, scalable, solutions, future proof, flexibility, system integration