

THE SURVEYOR WHO HEARD THE VOICE OF THE EARTH

- From Instrument Operators to Interpreters of the Planet's Language

Tomasz MALINOWSKI (Poland)

ABSTRACT

"The Future We Want"

This is the theme of this Congress.

This is the topic that brought us together in Cape Town.

This is why I am here.

Globalisation operates as if the world had one coherent map. It does not.

Globalisation operates as if geospatial data simply existed - current, consistent, accessible. They do not.

Globalisation is flying blind. It just does not know it yet.

This paper identifies seven mechanisms through which globalisation ignores surveying and geodesy, and presents a six-pillar transformation model. Each pillar supports specific Sustainable Development Goals. Seven principles form a geodetic manifesto.

Our instruments capture the heartbeat of the Earth. The question is: Are we listening? This paper is not a report. It is a call to action.

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1. THE DAY THAT CHANGED EVERYTHING

Dear Friends,

I have over thirty years in this profession. Thousands of measurements. Hundreds of projects. Dozens of countries. And for most of that time, I was blind. Blind to something that was right before my eyes. Blind to something that was right beneath my feet. Blind to something that was in my own instruments.

I surveyed car parks. I surveyed land parcels. I surveyed the boundaries of neighbourhood disputes. And I did not see. Until one day.

On 14 October 2018, I stood on a hill near Kraków (Poland). Total station in hand. Another car park. Another concrete void instead of trees. Silence. No people. No machinery.

Just me and the Earth.

And then something happened. The coordinates would not stabilise. The instrument behaved strangely. Deviations, corrections that made no geodetic sense. For twenty-five years I had been taught what to do: correct it, force compliance with theory, smooth it out, eliminate the noise... blur the picture - you know the drill?

That day, I did something different. I stopped. I observed. I listened.

And then I heard it. **The Earth speaks.**

Not mystically - scientifically. Quantum physics long ago proved that observation affects the observed system. For years, GNSS systems treated atmospheric disturbances as error, anomaly, correction- today we extract invaluable data from them. Geophysics knows that measurement anomalies precede earthquakes. What I had called error for years **was information**. Information I had not learned to read.

That day, my career as a surveying instrument operator ended. That day, my journey as a listener to the Earth began.

But the more I listened, the more a question tormented me. If geodesy is so fundamental - why does the world not see us? If geospatial data are so important - why does no one invest in them? If we can give so much - why do we only survey "car parks"?

I searched for answers for years. And I found something that shook me.

2. SEVEN WAYS THE WORLD IGNORES US

Globalisation has a flaw. Not a small one. Not a marginal one. A systemic one. I discovered seven mechanisms of this blindness. Seven ways in which the world ignores the foundation on which it stands. Look down - you are on planet Earth!

The first mechanism is the invisibility of the foundation.

Geodesy works best when it is invisible. I simplify the world by showing where the starting point is. Roads are on the map - it works. An address leads to the destination - it works, perfectly. A boundary is clear, unambiguous - it works. And precisely for this reason, no one funds the foundation. Politicians prefer apps. Politicians prefer fireworks. Politicians prefer

things they can show in a campaign. But control networks? Registers? Standards? Quality control? That is boring. That is invisible. That can wait. Do you think so too?

It cannot!

Until a flood comes - and emergency services do not know where the administrative boundaries are.

Until a dispute arises - and two neighbours' maps do not match.

Until an investor arrives - and discovers that an active gas pipeline runs beneath the car park, one that no one ever mapped.

Then everyone asks: Why do the data not match? Who surveyed this? Who should have surveyed it? Why...? **Because no one invested in the foundation- in geodesy!**

The second mechanism is the cult of speed.

The global economic model rewards "time-to-market." Data must be available "now" - even if they are inconsistent? Even if they are outdated? I will not even mention whether they have been checked or verified. Time pressure pushes the culture of quality to the margins.

Until the first disaster strikes. And we have many!

Has this become everyday life and "looks good" on television as news?

The third mechanism is fragmentation.

The world has glued together supply chains - a product designed in California, manufactured in China, assembled in Mexico, sold in Europe. But the world has not glued together data chains. Every ministry has its own truth. The Ministry of Agriculture has its parcels. The Ministry of Environment has its protected areas. The Ministry of Infrastructure has its roads. And these three maps do not match. We know this too? And is this how it should be?

The fourth mechanism is the myth of commercial maps.

A common misconception - confusing Google Maps with state infrastructure. Navigation shows how to get there. But it will not tell you who owns the parcel. It will not tell you whether you can build. It will not tell you where underground utilities run. Visualisation is not accountability. A consumer map is not a legal register. We know this perfectly well, but does the world?

The fifth mechanism is geopolitics.

Geospatial data are sensitive - they concern security, resources, critical infrastructure. Some countries restrict exchange. Others lack the capacity to produce data. At borders, data end abruptly - as if the Earth suddenly ceased to exist there. Each of us knows this is an abstraction!

The sixth mechanism is pendulum fear.

Instead of a mature ethical architecture - a pendulum reaction. Either "open everything" and expose privacy. Or "close everything" and block development. Both extremes are counterproductive. The middle ground is missing. Where is the balance?

The seventh mechanism is the competence deficit.

In many countries, there is a shortage of people, processes, institutions. Globalisation assumes that countries "simply have this." Unfortunately, they do not. AI will support processes, but the decision remains on our side, where the competencies and knowledge reside. Seems obvious.

Seven mechanisms. Seven ways in which the world ignores the foundation. The foundation that, for me, is geodesy.

And the price of this ignorance? Who is counting? Because the price is enormous.

3. THE HIDDEN PRICE

There are costs that are visible: project delays, legal disputes, utility collisions, failures. And there are costs that are invisible: buildings constructed on flood plains, roads cutting through habitats of protected species, gas pipelines that no one knows about until an excavator severs them - the list is endless. These costs never appear in budgets as "geodetic failure." They are dispersed. Hidden. Invisible. But who gave such "permission" for these failures of missing data or their misinterpretation? WHO?

But there is something worse than money.

In Africa, the absence of a cadastre means the absence of land rights. For example, millions of people cannot obtain a loan because they cannot prove ownership. They cannot inherit because there are no documents. Women are particularly vulnerable - customary law does not protect them, and modern registers do not exist. We have known this for a long time. I do not even ask "what is the cost?"

In Asia, urbanisation races faster than data. By 2050, 68% of humanity will live in cities. Many of these cities are growing chaotically - without planning, without maps, without registers. Is this how we want to plan? Is this how we want to live?

In Latin America, resource conflicts stem from unclear boundaries. Indigenous communities protect 80% of the world's biodiversity. Yet they have secure rights to only 10% of the land. This is destroying us, and it is no coincidence.

In Europe, floods and fires strike with increasing force. Cross-border coordination is essential - water knows no borders, fire does not respect lines on a map. But data and coordinate systems stop at national boundaries. Someone will say we have insurance, but I have seen floods and their cost. I have seen priceless, unquantifiable losses that we could have prevented.

Statistics are important. But no statistic captures what I have witnessed with my own eyes.

In a cadastral project in the Balkans, I met a woman. Her name was Milena. For fifteen years, she had cultivated the land left by her deceased husband. Alone. Without documents. Customary law said the land belonged to the husband's family. A neighbour filed a claim. Milena had nothing. No papers. No proof. Fifteen years of work could vanish in one day. We call this a religious or ethnic conflict, and it works perfectly in the media as a "shameful news story."

Thanks to our surveying work - documentation, measurements, a process that recognised her rights - she received a document with her name, official, legally valid. HER LAND. She cried. So did I. And does such a process have a price, and is it in people's consciousness?

"Leave no one behind" - a beautiful, good UN slogan, the foundation of "Agenda 2030." But in practice, it loses to "no data behind." Because how can you help those who are invisible in the registers? I ask rhetorically, but it is a question we must ask ourselves. Not to accuse. To understand.

Milena waited fifteen years. Fifteen years of solitary work on land that was legally not hers. Fifteen years of fear that tomorrow someone would come and say: get out.

Somewhere during that time, we - the surveying community - measured millions of points. We built systems, perfected technologies. We collected awards at conferences. And Milena waited. Do you feel that fear mixed with anxiety?

This is not an accusation - it is sadness! Because we know we could have done more. Because we know we can do more. Because we know the world needs more from us.

4. WHO WE REALLY ARE

They tell us: you are technicians, you are engineers. They tell us: you survey parcels. They tell us: you operate equipment. They tell us: you can be replaced by drones. **They are wrong.**

But let us be honest - somewhere along the way, we lost what defined us. We know who we could have been: explorers, guardians of spatial truth, interpreters of the planet's language. And we know who we have become: data providers, contractors, operators of ever more sophisticated machines. Am I oversimplifying? **I do not think so.**

This did not happen through ill will. It happened slowly. Project by project. Compromise by compromise. The market dictated terms, and we accepted them. And here we are. With the best technology in history. And with a question that may hurt: what are we using it for?

The value of geodesy transcends the precision of measurement, transcends technical proficiency. It transcends the ability to calculate coordinates to millimetre accuracy. We serve as guardians of spatial truth. We serve as stewards of territorial integrity. We serve as interpreters of the Earth's physical reality into information that supports human decisions. Even in the 4D dimension - we can do this, and as few others, we feel it. And here lies the true art of creating space and imaging it on maps.

This role cannot be automated, because it requires something algorithms cannot do: contextual understanding, ethical judgement, social trust, and a critical approach with double verification of measurement. For us, this is simple.

"UAV drones" capture millions of points, but which patterns matter? Satellites see every square metre of the planet, but what does it mean for a specific community? Artificial intelligence processes petabytes of data, but how do the results translate into fair decisions?

More data means more noise. And more noise means a greater need for interpretation.

Each of you has seen a point cloud in 3D scanning... seemingly natural noise in a scan, meaning in reality there is noise too!! We can work with this.

Automation does not threaten surveyors who can listen.

Automation does not threaten surveyors who can interpret.

It only threatens those who want to remain machine operators.

We have a choice. We can be technicians, engineers whom algorithms will replace, or we can be interpreters - bridges between data and decisions.

Between technology and society.

Between the Earth and humanity.

If only we choose wisely - we can give the world, and we do give, something extraordinary.

5. WHAT WE CAN GIVE THE WORLD

Geodesy can give humanity something extraordinary. Not symbolically, but operationally. Not in the future - now. This is really happening!!

We can save lives.

In 2019, during a flood in Central Europe, teams from four countries shared data through a common platform. They coordinated measurements. They modelled flood progression. Within hours, not days. The speed of response prevented two hundred casualties. 50 million euros in damages. This is not theory - this happened.

You know this!! You experience this!

We can protect the climate.

Sustainable development does not work without spatial truth. Where is the water? Where does it flow? Where are the flood plains? Where can you build without creating a future disaster? 143 million people may become climate migrants by 2050. They must go somewhere. Someone must plan where, someone must map the risk. This is work for geodesy. **It starts with measurement - we set the tone.** Have you forgotten? We are a very important component - fundamental!

We can build justice.

In the Balkans, in a cadastral project, the team made a commitment to women's land rights. They ensured that women's names would appear on ownership certificates - despite local resistance, perhaps even tradition. The result? A forty percent increase in documented land ownership by women. It opened the door to loans, to inheritance, to protection. **This is the quiet pillar of social justice.**

We can reduce costs.

In Eastern Europe, after cadastre modernisation, land disputes fell by 70%! Tax revenues increased by 45%. Foreign investment increased by 120%. Because investors trust data. Because investors trust the system. Because investors trust the state! Geodesy is not an add-on. It is a reality control system. **It is the foundation on which decisions worth billions stand.**

6. SIX PILLARS OF NEW GEODESY

How to do it? I propose six pillars of transformation.

Each responds to a specific mechanism of blindness.

Each has a practical implementation path.

Each leads to the same future - a future in which geodesy is what it has always had the potential to be.

Global Geospatial Information System.

An integrated planetary platform for geospatial data, updated in real time, transcending national borders. Just as the internet democratised access to knowledge - this system will democratise access to data about the Earth.

GeoEthics.

An international code protecting data integrity, guaranteeing transparency, ensuring that measurements serve the common good - like the Hippocratic Oath for surveyors.

Technology Without Borders.

An open-source ecosystem for rapid response to the climate crisis. Linux, Apache, Python - the foundations of the modern internet - emerged as open projects. Geodesy needs a similar revolution.

Institutional Integration.

Permanent embedding of geodesy in UN and World Bank strategies. Not as an add-on. As a foundation. Sounds simple.

Educational Revolution.

Training Earth Ambassadors who combine technical knowledge with environmental awareness and ethical commitment. Not machine operators, but interpreters of our blue planet's language.

Culture of Collaboration.

Unity among universities, associations, the private sector, and governments. Collaboration over competition. **FIG shows that this is possible.**

It is here, with you, that I have noticed, understood, and felt this.

7. THE MANIFESTO

Seven principles. Seven commitments. Seven foundations of new geodesy. 777.

Truth over effect. First credibility, then visualisation. A beautiful map that lies is worse than an ugly map that tells the truth.

A common minimum for all - the data foundation must serve every ministry, every sector, every citizen - not one project, not one minister, not one term of office.

Names and boundaries must be unambiguous. Because without this, the world is not comparable. And without comparability, there are no global solutions to global problems.

Interoperability is a duty of the state. Not a nice add-on for IT specialists. A fundamental function of modern administration.

Inclusion and "leave no one behind." Data must reduce exclusion, not deepen it. Every person deserves to be visible in the system. It is a privilege.

Privacy and ethics as standard. Because without this, social consent for data will shatter. Trust is built over years, lost in minutes.

Maintenance, not one-off efforts. Data are either alive or become disinformation. A map from five years ago can be more dangerous than no map at all, because it gives a false sense of certainty.

8. FROM EXTRACTION TO DIALOGUE

I want to say something more. Something that goes beyond technology. Something that goes beyond policy.

Traditional geodesy asked: What does humanity want from the Earth? How can we extract maximum value? How can we divide? How can we measure? How can we appropriate?

Listening to the Earth asks differently. What does the Earth require of humanity? How can we live within planetary boundaries? How can we coexist?

This is a shift from extraction to relationship. From domination to dialogue. From treating the Earth as a resource to treating it as a partner.

Sounds abstract? I will show you something concrete.

On a highway project at the Czech-Polish border, we had systematic deviations of 15 to 20 cm. Geology straightforward - yes. Equipment working - yes. Conditions ideal - yes. We did not understand. Only in-depth historical research revealed the truth. Beneath ran a medieval trade route. Centuries of wagon wheels, horses, people - compacted the soil in a way invisible to the eye. But detectable by modern instruments. The Earth remembered. Our instruments picked it up. What a satisfaction that was.

We changed the route. We saved an archaeological site that no one knew existed. A history that would have been destroyed had we done what we were taught: corrected the deviation and moved on, without reflection, but on schedule.

This is listening to the Earth in practice. Not mysticism. **Science plus humility.**

Geodesy can be an instrument of justice—by mapping, documenting, protecting the rights of those who have none. Or it can be an instrument of oppression—enabling dispossession,

exploitation, exclusion. The choice is ours. It belongs to each of us who holds surveying instruments in hand.

9. THE CALL

"The Future We Want"—the future we desire.

This is the theme of this Congress. This is the topic that brought us together in Cape Town.

And I am here!

I look at you. I look at this room full of people who have dedicated their lives to geodesy. And I see something that gives hope. I see knowledge. I see experience. I see people who can change the world. But I also see fatigue. I see the compromises we have had to make. I see projects that could have been better. I see dreams we have put off.

I do not say this to accuse. **I say this because I know it myself. I am a surveyor.**

I have a question for you. Not as a reproach. As an invitation.

What if we went home and did one thing differently?

Just one. One project where quality matters more than the deadline.

One conversation with a minister in which we tell the truth about the state of data.

One hour in the curriculum devoted to

WHY we measure, not only HOW.

FIG unites surveyors from around the world - it is a powerful organisation!!!

We have knowledge. We have tools. We have people. And we have a choice.

We can go home and carry on as before.

No one will judge us. The world will not collapse. At least not immediately.

Or we can begin. Not a revolution, because revolutions burn out. A transformation, step by step, project by project, person by person. For ourselves. With joy and dignity.

Together we can build a Global Geospatial Information System.

Together we can create a GeoEthical code.

Together we can train a generation of Earth Ambassadors.

But "together" begins with a decision that each of us makes alone. Today. Here. In this room.

I am not a government side. I do not represent a university. I do not have ready answers. **I am an observer and a connector - I see every element from every side.**

There are some people in this room who know me ;-) me as action ;-)

And I see that this is the moment - not because the world is ending, but because the world needs us. And because we - **finally** - can be who we have always wanted to be.

On 14 October 2018, on a hill near Kraków, I heard the Earth speak. Since that day, I know that our instruments do not only measure distances, but

They capture the heartbeat of the Earth. I hear it. Every day.

I know that transformation is possible. I have seen its effects. Two hundred lives saved during a flood. Milena with her certificate in hand. A medieval trade route saved from beneath the asphalt. 40% more women with rights to land. 70% fewer boundary disputes - these are not slogans. These are people. These are places. This is proof that we can do more.

Now I stand before you - before the FIG community - and I do not demand. I invite.

To a future in which geodesy is what it has always had the potential to be: the foundation of civilisation, the guardian of truth, the interpreter of the planet's language.

Our instruments capture the heartbeat of the Earth. **Are we ready to listen?**

BIOGRAPHICAL NOTES

Tomasz Malinowski, MSc Eng., surveyor, son of a surveyor, surveying consultant. Manager of many projects with over thirty years of international experience.

Vice President of the Association of Polish Surveyors since 2022.

Co-owner, Vice President, TPI sp. z o.o. - provider of surveying solutions from Topcon, Faro, DJI, Terrasolid, Nivel System and others.

Professional public speaker, certified world-class speaker, leader and development facilitator.

Co-organizer of the FIG congress in Poland in 2022

Approach: **Have your own point of reference.** Observe the elements of the world from every side. **Effectively connect people and places, build bridges.**

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