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The following is a paper discussing the evolution of the role land surveyors have played in society through history. (Originally presented at the XXIII FIG Congress in Munich, Germany).

The Surveyor in Society

—by Jan De Graeve



As for many other professions at the beginning of this third millennium A.D., the image of (land) surveying and its functions have changed with the introduction of newer technologies. Not surprisingly, with this change, the role of the surveyor in society has evolved as well. In this article, I trace the evolution of that role and its definition¹ by FIG and other stakeholders.

The history of surveying

The activity of measuring has been in practice for over 5000 years. Evidence of this can be found on cuneiform tablets from Mesopotamia which were until recently housed by the Cincinnati Library (USA). One of these tables—which were created between 1900 BC and 1700 BC in Akkadian language from Sumer—states: “3 acres of field ad Nerdanham, 14 sar of field for Pichi-Ilishan, the judge, 9 sar of field for Hulsius. . . 1 ebel and 3 iku each for Sin-Eribam . . . » This text confirms that areas were measured 4000 years ago by surveyors and others involved in real estate transactions.

Hammurabi, King of Babylon (1792-1750 BC) issued an important codicil known as the Code of Hammurabi. This codicil was inscribed on a stone monument which was discovered in 1901 by Jean Vincent Scheil and which is now on display in the Louvre in Paris, France.

The code describes in great detail private property, as are water wells, canals, and irrigations, the other important assets in a country where royal possessions were often administrated by high-ranking officers—the surveyors,

The code provided rulings on private property, including that of the King. Taxation was based on manpower available for war and/or for building public works, canals, dikes, lakes and water supplies. Property rights applicable to the land, occupancy, indemnity, cultivation and taxation, as well as recompense for damage by floods were addressed as they were issues constantly before the landlords.

Property titles were in common use, and land and houses could be sold or leased, exchanged or given; mortgages were possible as was giving land as guarantee.

The Babylon of 4000 years ago was short on water, and so they built canals whose maintenance was a highly esteemed job. Not surprisingly, water was needed for drinking, but also for boat traffic commerce, and agriculture.

In Egypt, before the Aswan Dam was built in the last quarter of the 20th century, annual flooding of lands along the banks of the River Nile had been the norm. The farmers affected by the flooding would then apply to the high priest for a redress (e.g., *Monumenta Cartographica Africae et Aegyptiae the Prince Youssouf Kamal – 1926*).

The priest’s allocations were measured by Egyptian surveyors using Egyptian measur-

ing systems and proportions. In 2005, at a FIG meeting in Cairo, these 5,000-year-old measurements, and our ancient Egyptian colleagues, were brought to life in PowerPoint presentations by Prof. Legemann from the University of Berlin, and John Brock, an Australian researcher of hieroglyphic languages.

Herodotes II wrote that “Sesostoris distributed the soil of Egypt to the inhabitants,” giving each a square part of land of equal area. He derived his income from the rents paid by the farmers working the land. If the Nile took part of that land, the priest went before the Pharaoh to explain what happened, and the Pharaoh would then send his surveyors to measure the exact loss of land. One result of the survey was that the owner’s tax was reduced in proportion to the remaining land.



The boundaries of properties were marked with border stones, as reported by Amenemhait (3578 to 3548 BC) and many others of that era. The border fixations had a “divine” connotation, and it was the priests who gave a sacred role to the border stones.

The practice of making borders official through sacrifice was not unique to Egypt.

¹ After 20 years of work by FIG Commission 1, and that of Messrs Simpson and Rafaelli and then Jan De Graeve and Jacques Tassou, the definition of surveying these parties developed was agreed upon by FIG at the Montreux General Assembly of 1981. Subsequently, the *Code of Ethics* was adopted and published (paper 103.1). In 1990, the functions and activities encompassed as surveying were discussed at the General Assembly in Helsinki, Finland, and their definitions were published in Publication no. 2 (1991). The English, German, and French definitions of the surveyor—the Surveyor, Vermessungsingenieur, and Géomètre-Expert—were subsequently adopted at General Assemblies in Rome and London.

The Etruscans, who preceded the Romans, carried out sacrifices on the boundaries of their properties. These sacrifices were to encourage the saints of the house, the Penates, to protect them, and when a family moved to another property, they attached their Penates to the new location.²

The Romans co-opted the God Jupiter to declare the boundaries sacred, and this recognition, if you will, was re-affirmed each year with a pilgrimage to the boundary and a festival called the "Terminalia."³



The Romans were also more discerning when it came to defining the job of the surveyor. Their agri-mensores, the land measurers, had many titles—metadores, retores, censitores, inspectores, artifices agentes in rebus, professores, ministeriales imperatorum and arboratores—depending on the type of measurements they specialized in. The "limitatores," for instance, demarcated the boundaries of a property by setting the border stones. The "mensores fromentari" surveyed the crops and wheat distribution.

But while a Roman surveyor may have had different titles, depending on which niches he specialized in, his reputation among the public was singularly clear. A surveyor was a "good man, sober, modest, incorruptible, chaste, and skillful in his art."

In Rome, the important task of fixing boundaries was more often than not given to war veterans. Soldiers who had survived beyond their 40th birthday were allotted land confiscated from the conquered enemies or expropriated from previous landlords. The different units of measures applied to "fixing the borders of the Roman empire, and the complex cadastre, were documented in duplicated writings, with one copy held locally and the other in Rome on marble tablets.

The most remarkable of these originals is *Codex Arcenianus*, text on land and bound-

ary surveying written by Roman surveyors and preserved in Wolfenbüttel, Germany, in the Herzog August Library.

Other texts describing the profession of surveying include Mortiz Cantor's "*Die Romische Agrimensores*," published in Germany in 1875, and English Dilke's "*The Roman Land Surveyors*," published a century later, in 1971. Both texts relied on translations; Cantor in particular frequently consulted Blume, Lackman, and Rudorff's "*Die Schriften der Romisches Feldmesser*," compiled between 1848-1852. The first English translation by Brian Campbell, "*The Writings of the Roman Land Surveyors*," was published in London, in 2000.

The Roman land surveyors used different border stones to demarcate boundaries between different types of property—sacred, forest and agricultural land, river embankments, and leaseholds and full property. They gave special names to each of these border stones and used secret code to denote the distances between border stones. This code was known to surveyors only, each of whom adopted a code name.

This we learn from a rare treatise by Pierre Gallard, "*De Agrorum Conditionibus & Constitutionibus Limitum*," published in Lyon, France, in 1554. Gallard based his treatise on an old Roman text which modern history traces to the library of Boblio in 1000 A.D. and the Abbey of St-Bertin in northern France in the 16th century; then, the manuscript vanishes from public eye. Gallard's treatise was mentioned in another rare text on surveying, the "*Codices Artis Mensurione*" (1994-95).

In the Herzog August Library, I examined a fascinating document translated from Latin, and illustrated by, surveyor Bertrand Boysset, bourgeois d'Arles, some time between 1401 to 1405. Scholars consider this text to be the "missing link" between the *Corpus Agrimensorum Romanorum*, better known as the *Codex Arcerianus A*, dating to the late 5th and early 6th century AD and the first legal texts or professional codes for land surveyors appearing in Western Europe in the 15th and early 16th century, which then were assimilated in their first English translation in 2000—"The Writings of the Roman Land Surveyor."

In Boysset's 315-page treatise, we read that "Christ himself gives the instruments for measuring and the border stones to be used."

This statement is a testament to the vital role the land surveyor was seen to have in protecting private property.

The evolution of the art of surveying in the Middle Ages and the Renaissance period is well documented in two works by Jean Mosselemans and myself—"Des Agrimenseurs Romains aux Arpenteurs du XVIe siècle" (2001) and "Les Géomètres-Arpenteurs du XVIe et XVIIIe siècle" (1976).

Surveying is not only one of the oldest professions: it is an exacting art. In China, for instance, local land surveyors were "consumed" by calculating correctly the areas of triangles, circles, and trapezia (see "*History of Mathematics*" by David E. Smith).

Surveyors are credited with a high dose of reality. As J. F. Finch writes in his book "*Our Indebtedness to the Old Surveyor*:"

All through the ages the surveyor has not only been an essential figure to the progress of civilization, the maintenance of property rights and the building of engineering works, but due to the fact that he dealt with careful measurements and facts, he has had a steadying influence on man's efforts to advance.

A more modern definition of the art and science of surveying was developed by the FIG Congress of Rome in 1933 and refined by the 1964 FIG Congress of London. According to this definition, a person providing surveying services is "a qualified practitioner, with a legal diploma or certificate who was chartered by law and who is entitled to identify, delimit, measure, and value all real estate, private or public, and the buildings there upon or in the underground, and the works on it, and who organizes the registration of legal rights attached to property."

In many countries, the surveyor "studies, projects and executes" ... which is not unlike many other related professions do. Because of this "extension of surveyor's functions," the definition of surveying was extended at the Sofia General Assembly and debated (under the direction of Jacques Tassou) for almost two decades before it was published.

FIG Brochure no. 2 describes the evolution of techniques, language, and the way in which the surveyor performs his duties and activities in various parts of the world.

² In 1978, to commemorate the 100th anniversary of FIG, the Italian Surveyors Association published a remarkable work by Evaristo Luciano: *History of Land-Surveyors and Surveyors from the Origins up to 1900* (in Italian).

³ Terminalia, the feast celebrating the boundary stones, was held annually on February 23^d.

AUSTRALIA IN 2010!

Timed for attending the F.I.G. meeting in Sydney, and by arrangement with Qantas, the Australian International Airline, we are assembling a group of interested people to take advantage of group rates for visiting the great people of Australia and exploring the sights of the country.

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Basic airfare from LA to Sydney is expected to be about \$1,600.00, plus taxes. The airfare includes one Australian domestic flight. There is also a possibility of visiting New Zealand, in addition to Australia. The price of the air fares and tours for the combined Australia and New Zealand trip will depend on how many people show interest in this option, and the extent of sightseeing they will want to include in the trip. More detail on the itinerary will follow. Please indicate your interests to the questions below and respond quickly to Gerry Curtis at Fax no. 817-334-0381, or email gerry.gcasurveyors@att.net.

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F. I. G. is the international association of surveying and mapping professional organizations. Attendance at the conference is optional. Registration fees and other expenses at the conference will not be included in any tour fare. The dates of the conference are 11-16 April, 2010, and tours will be timed to place interested parties in Sydney at the time of the F.I.G. conference and to return by the time of the ACSM meeting in Phoenix, Arizona, begins.

In the U.K., for instance, a land surveyor very rarely works as an individual or private person. Surveyors are organized in associations, small firms, limited companies or in larger juridical entities where they often work together with other disciplines.

Their activities are categorized as "function;" they are not recognized as "knowledge, skills, and methods applied by a person." Border disputes are rather rare in England as there is no cadastral survey. Hence the English public does not see the land surveyor as "the geometre" who settles the problems of property rights. This is done by lawyers.

The Royal Institution of Chartered Surveyors considers the small, although highly qualified and respected group of land surveyors to be part of an umbrella grouping comprising general practitioners, estate agents, building surveyors and quantity surveyors, building economists, and others—a mixture of commercial and non commercial, qualified and intellectual activities.

Most European (land) surveying associations do not agree with this classification, arguing that it is in direct contradiction with the traditional function of surveyors as "protectors" of public land interests.

Apart from issues with classification, there are also issues with the terminology. Some national surveying associations contend that "terminology does not fit with the profession; that the primary function of a surveyor is not identified with that of another professional person."

For the Germans, for instance, the term "Vermessungsingenieur" defines a person working in private practice or as a civil servant, performing a function of public interest—surveying.

In the French-speaking world, "un Géomètre-expert, a person whose function is of public utility. The géomètre's function is "to identify, define, measure, and value all real estate, whether private or public."

At issue here is that a land surveyor performs a function of public utility in private practice and as a civil servant. Both are important.

Time may be ripe to revisit the Code of Ethics adopted by the FIG General Assembly in 1981 in Montreux—which defines these two complementary sides of a surveyor's professional responsibilities. The challenge before all of us is to promote, worldwide, the public and private functions of a surveyor.