

Introduction

Is the UK Ground Investigation industry in crisis? If not in crisis, does it need significant improvement? The answer to this second question is almost certainly 'yes'.

From an outside perspective, Ground Investigation (GI) practice does not appear to have changed much over the last 30 years or so. Perhaps due to this apparent lack of change, many people in the wider Construction Industry perceive GI as contributing limited value and benefit to projects.

From within the GI industry itself, many practitioners, whether 'Consultants' or 'Contractors', feel that what they have to offer is not fully recognised or appreciated by Clients, and even by each other. In some areas, morale is low and there is little appetite, or incentive, for innovation.

In order to understand the situation, the Association of Geotechnical and Geo-environmental Specialists (AGS) and the British Drilling Association (BDA) set up a joint Task Force to investigate, and shine a 'Spotlight on the Industry'.

They want answers to the questions:

- Why does the GI industry find itself in this position?
- Where does it need to improve?
- How should it instigate these improvements?
- What actions are required?
- Who should be involved?

Their initiative comprises three elements:

1. This 'Position Paper', which will identify the prescribed technical Standards within the GI industry, and look objectively at a few of the details;
2. A wide-ranging survey of opinions within the industry, open to all stakeholders, in July 2016; and
3. A series of discussions, media articles and seminars later in the year, spinning out of the results of the survey.

In due course, the three elements will be repeated, perhaps on an annual basis, to continue to challenge the GI industry to address any problems identified, and to track what change is actually happening.

Note that ground investigation techniques for Geo-environmental data are not considered in this initiative, but will be considered in a future initiative.

The long-term aim of the initiative is for the GI industry to improve its performance, to return to greater prosperity, to build its self-esteem, and once again to be recognised as a significant contributor to the success of the wider construction industry.

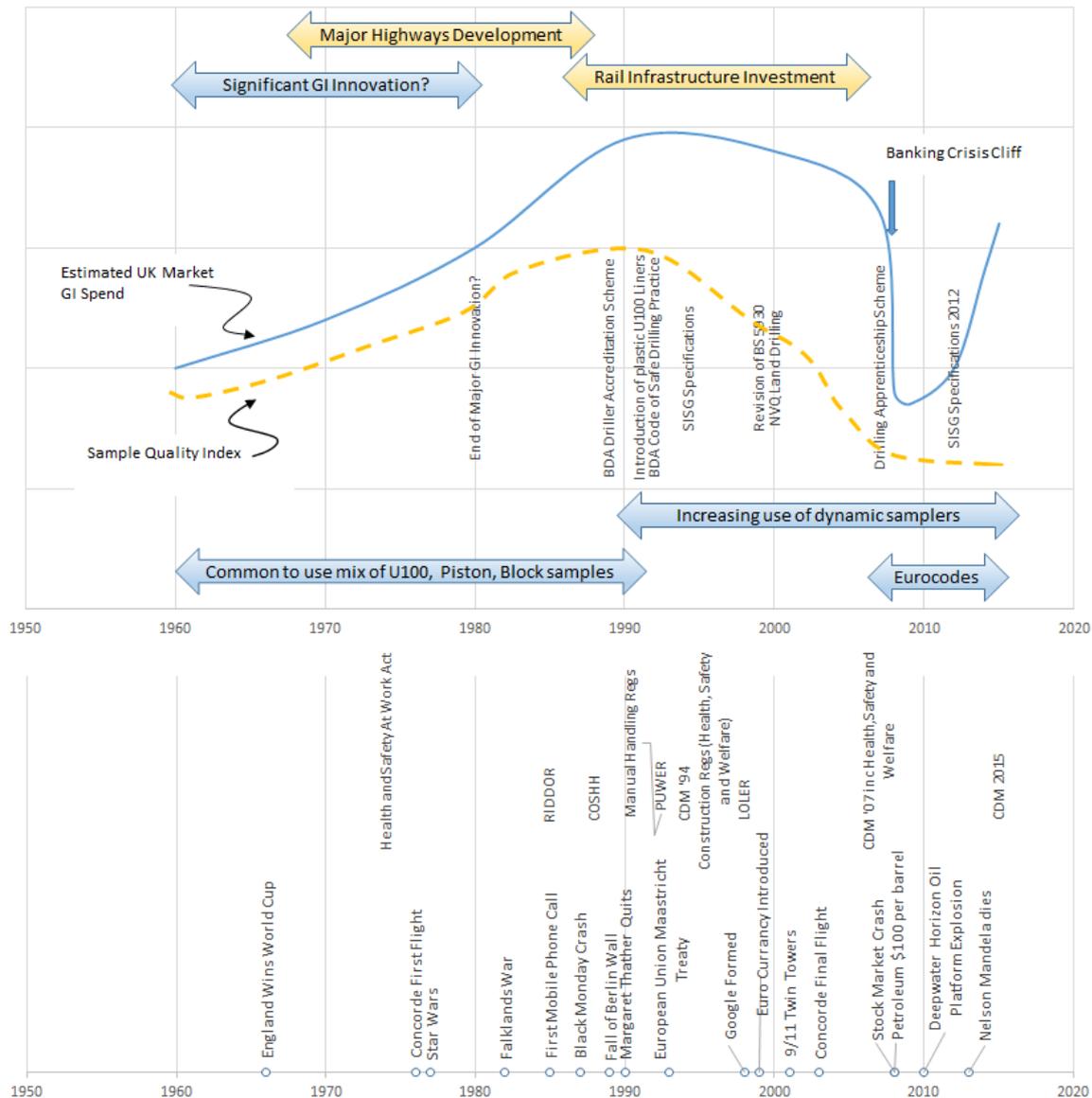
Some context

The diagram below was drawn up by Matthew Baldwin, the current Chairman of the AGS. It shows a time-line from 1960 to the present day of 'world events' alongside changes in technical Standards and practice within the UK Ground Investigation industry.

On to this are plotted two lines representing:

- (in blue) the Estimated spend in the UK GI market during this period, and
- (in yellow) the Sample Quality Index.

The two lines are speculative, subjective, unquantified and unsubstantiated! But they serve to provide some context to this initiative and may help to stimulate some debate in due course.



The 'official' technical Standards for the UK GI industry

Prior to 2004, there were two main technical British Standards for the UK GI industry. They were:

- BS 5930, which enshrined good practice in GI and associated in situ testing, and
- BS 1377, for geotechnical laboratory and in situ testing.

Together, these provided what was considered at the time to be a comprehensive and technically robust framework.

Between 2004 and 2010, British Standards and Codes of Practice pertaining to GI were substantially replaced or superseded by new British Standards, notably BS EN 1997, also known as Eurocode 7 (or EN 1997, or EC7). There are many supplementary and complementary documents supporting EC7.

EC7 Part 2 relates specifically to ground investigation, and has effectively been in place since 2010. All practitioners within the UK GI industry should now be working to this standard, and its associated documents.

There are six sections to EC7 Part 2, namely:

1. General
2. Planning of GI
3. Soil and rock sampling, and groundwater measurements
4. Field tests on soil and rock
5. Laboratory tests on soil and rock
6. Ground investigation report

Importantly, EC7 Part 2 provides a set of 'General and Principle Rules', and cites a number of individual complementary test standards. In particular, it:

- Sets rules for which no alternatives are allowed
- Provides a categorisation for Geotechnical Risk
- Establishes Sample Quality Categorisation
- Sets out defined Reporting formats
- Provides the basis of geotechnical design

It is the position of both the AGS and the BDA that all their members should either:

- Fully adhere to EC7 Part 2, or
- Openly and voluntarily identify where their practice deviates from them.

Deviation from the Standards might be justified for a number of reasons. These will hopefully be drawn out and considered through the forthcoming survey of the industry and subsequent discussion phase of this joint AGS and BDA initiative.

Lack of awareness or appreciation of the Standards should not be an excuse.

Health, Safety and Welfare

Health and Safety in the workplace, and indeed in all walks of life, is of paramount importance. The GI industry does not have a particularly good reputation in this area, and nor does the construction industry as a whole. There is much Safety legislation in place already, but organisations are increasingly having to consider Health and Welfare issues. At last, standards are beginning to improve, and incidents are steadily reducing.

It should be noted that some of the current GI techniques and practices may prove problematical to organisations if they are to adhere to Health, Safety and Welfare legislation. This may have significant consequences for the industry.

It is the position of both the AGS and the BDA that all their members should adhere fully to all Health, Safety and Welfare legislation, both in spirit and in practice.

Again, lack of awareness or appreciation of the legislation should not be an excuse.

With reference to EC7 Part 2

Did you know?

- Section 1 (General) links geotechnical investigation and testing to the design rules and philosophy of EC7 Part 1.
- Section 2 (Planning of GI) provides guidance and recommendations for the spacing and depth of ground investigation points, for a variety of proposed structures.
- Section 3 (Soil and rock sampling and groundwater measurements) provides guidance and recommendations for the categories of sampling methods and laboratory quality classes of samples. [Refer to the diagram below]
- Section 3 refers to the associated document BS EN ISO 22475–1:2006, 'Ground Investigation and testing - sampling methods and groundwater measurement'. This sets out the drilling and sampling techniques by which different classes of sample can be obtained.
- This document also identifies that some of the traditional techniques for obtaining samples of soil and rock are no longer appropriate for specific laboratory tests.
- Section 4 (Field tests in soil and rock) states that, for the Standard Penetration Test (SPT), the energy ratio (E_r) has to be known for every individual SPT hammer.
- Section 5 (Laboratory tests on soil and rock) sets out clear 'Principles' (for which there are no alternatives) for the handling and transporting of soil and rock samples.
- Section 5 also re-iterates the required quality classes of sample for each specific laboratory test. [Refer again to the diagram below]
- Section 6 (Ground investigation report) identifies the requirement for two separate reports: the Ground Investigation Report (GIR), and the Geotechnical Design Report (GDR).
- The GIR shall consist of the following:
 - a presentation of all available geotechnical information, including geological features and relevant data.
 - a geotechnical evaluation of the information, stating the assumptions made in the interpretation of the test results.
- EC7 Part 1, Section 2.8 requires that the GDR shall record 'assumptions, data, calculations and results of the verification of safety and serviceability' (relevant to the structure), parts of which shall be provided by the Client.

Soil properties & sample quality classes for laboratory testing

The following useful diagram is taken from BS EN ISO 22475 – 1, and is referred to twice in the previous section of this Paper.

Soil properties / quality class	1	2	3	4	5
Unchanged soil properties: Particle size Water content Density, density index, permeability Compressibility, shear strength	*	*	*	*	
Properties that can be determined: sequence of layers boundaries of strata – broad boundaries of strata – fine Atterberg limits, particle density, organic content water content density, density index, porosity, permeability compressibility, shear strength	*	*	*	*	*
Sampling category according to EN ISO 22475-1	A				
			B		
					C

Where does this leave us?

There is anecdotal evidence that the technical Standards set out for the UK Ground Investigation industry in EC7 Parts 1 and 2 (and associated documents) are not fully adhered to on all occasions. This would appear to be the case for some Clients, Consultants and Contractors alike.

All of them might adhere to the Standards some of the time. Some of them might adhere to the Standards all of the time. But it is doubtful that all of them adhere to them all of the time.

Why is this?

- Perhaps too few people in the GI industry (including the Clients) understand the Standards sufficiently.
- Perhaps it has to do with the procurement process – its speed, or the decision making process.
- Perhaps there are insufficient links between the Specification for a ground investigation and the Standards.
- Perhaps the Standards are not appropriately applied or enforced.
- Perhaps there are too few people within the industry with the appropriate skills.
- Perhaps there is too little plant and equipment available within the industry to work to the required Standards, and the investment barrier is too high.
- Perhaps the Standard is unworkable in some situations.

And then...

- Perhaps rigid adherence to the Standards inadvertently discourages further innovation within the industry, with what consequences.

Have your say

As mentioned in the Introduction to this Position Paper, the AGS and BDA 'Spotlight on the Industry' initiative comprises three elements:

1. This 'Position Paper', which will identify the proscribed Standards within the GI industry, and look objectively at a few of the details.
2. A wide-ranging survey of opinions within the industry, open to all participants, in July 2016, and
3. A series of discussions, media articles and seminars later in the year, spinning out of the results of the survey.

It is very much hoped that many people within the UK GI industry, from all types of organisation and at all levels, will now choose to participate in the forthcoming survey and in the subsequent discussions.

The survey will open at the beginning of July 2016; details will be circulated through all forms of media nearer the time.