

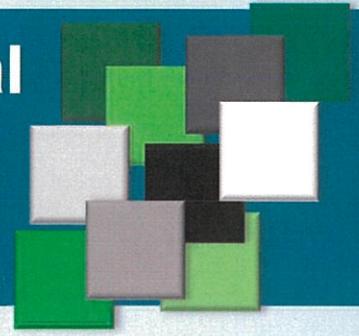
 #CAGS2014

2014

Commercial Archaeological Geophysics Seminar

Bradford, West Yorkshire

14 - 15 March



PROGRAMME & ABSTRACTS

ORGANISED & HOSTED BY



Bradford Centre for Archaeological Prospection

in association with



TIMETABLE

Friday 14th March

REGISTRATION & WELCOME	09:00 – 09:45
SESSION 1A	09:45 – 10:45
Filling in the blanks: supplying context and efficiency to an excavation strategy <i>Jimmy Adcock (GSB Prospection)</i>	Page 4
Geophysical survey strategies: some considerations and case studies <i>Duncan Hale (Archaeological Services, Durham University)</i>	Page 5
Using Geophysics – A Consultant’s Perspective <i>Hannah Smalley (CgMs Consulting)</i>	Page 6
TEA BREAK & DISCUSSION	10:45 – 11:15
SESSION 1B	11:15 – 12:15
Archiving: 2014 <i>Armin Schmidt (GeodataWIZ Ltd)</i>	Page 7
‘The curse of the newbie!’ An appeal on behalf of junior members of staff <i>Peter Ahern</i>	Page 8
Ad Summa Tendendum: Quality and development management <i>Ken Hamilton (Norfolk County Council Historic Environment Service)</i>	Page 9
LUNCH & DISCUSSION	12:15 – 13:15
SESSION 2A	13:15 – 14:15
Exploring the divide between research-based and commercial archaeological geophysics <i>Alice James (AOC)</i>	Page 10
Commercial Archaeological Geophysics in Norway – learning by doing? <i>Arne Anderson Stamnes (The NTNU Museum of Natural History and Archaeology)</i> <i>Lars Gustavsen (Norwegian Institute of Cultural Heritage [NIKU])</i>	Page 11
Tales From Across the Water: Analysing the Irish Experience of Geophysical Surveys <i>James Bonsall, Chris Gaffney and Ian Armit (University of Bradford)</i> <i>Rónán Swan (NRA)</i>	Page 12
TEA BREAK & DISCUSSION	14:15 – 14:45
SESSION 2B	14:45 – 16:15
A tall order? Efficiency, flexibility and comprehensive interpretation in commercial magnetic prospection <i>Cornelius Meyer (Eastern Atlas GmbH & Co.)</i>	Page 13
Multiple Methods: Geophysical Necessity or Optional Luxury? <i>Fry. R., Roseveare. M., Roseveare, A., Purvis. S. (Archaeophysics)</i>	Page 14
Should 0.5m traverse spacings be the new standard for commercial magnetic surveys? <i>Mark Whittingham (Phase Site Investigations Ltd.)</i>	Page 15
Are we doing enough? How increased sampling density and alternative techniques can increase our understanding of buried archaeology <i>Finnegan Pope-Carter (GSB Prospection & University of Bradford)</i> <i>Graeme Attwood (GSB Prospection)</i>	Page 16
TEA BREAK & DISCUSSION	16:15 – 16:45
SUM UP & CLOSE	16:45 – 17:15
<hr/>	
DRINKS & BUFFET @ GUMPTION	18:00 – END

Welcome to CAGS 2014

Dear Delegate,

First and foremost we would like to welcome you to Archaeological Sciences at the University of Bradford and thank you for making the effort to attend this inaugural meeting. We hope that you will find today's programme interesting and informative - there is a good mix of topics amongst the papers and posters, with common themes starting to emerge. We have a number of workshops running tomorrow morning which we would encourage you to attend and please try to find time to look over the poster displays in the common room. Not only do we have contributions from commercial groups but also a selection of posters by students from Archaeological Sciences highlighting the kind of research being done by the next generation of archaeological geophysicists.

With so many people joining us today, we hope that the talks will stimulate plenty of questions and discussion. To that end, we have kept the sessions short with just time for quick 'clarification' questions after each presentation. This should allow us plenty of time to discuss the content of the talks in the more relaxed confines of the common room over some refreshments.

It is always a nervous time waiting to see how many people will sign-up to a new conference in the calendar so we endeavoured to keep the registration cost to a minimum in order to encourage as wide a participation as possible. We would not have been able to achieve this had it not been for the generosity of the B-CAP member groups and we would therefore like to thank:

- **Bradford University - Archaeological Sciences** for provision of the facilities;
- **Geoscan Research** for sponsoring lunch today as part of their 30th anniversary celebrations;
- **GSB Prospection** for subsidising the evening reception at *Gumption*.

Additionally, we are very grateful to the **Institute for Archaeologists**, for funding the production of this abstract booklet, as well as all of our commercial exhibitors and advertisers whose fees have further helped subsidise the registration price.

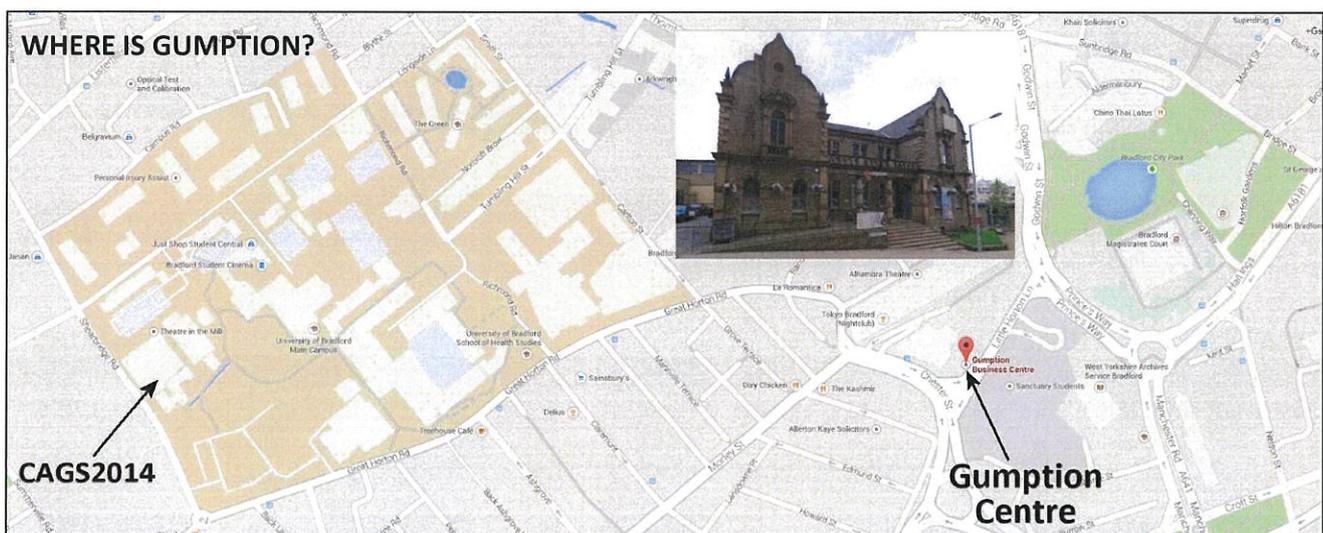
We hope you enjoy the meeting and we would love to hear what you thought of the event. At the back of this booklet is a feedback slip which you can post in the comments box in the Common Room. Feel free to also note down any suggestions for themes and content for future CAGS meetings that you may have.

Regards,

The CAGS2014 Organising Committee:

Jimmy Adcock, Graeme Attwood, Finnegan Pope-Carter, Tom Sparrow & Pete Turner

CAGS2014@B-CAP.co.uk



TIMETABLE

Saturday 15th March

WORKSHOP SESSION 1	10:00 – 11:30
Common Room: <i>A Basic Introduction to Planning and Development</i>	
Lecture Theatre: <i>Handheld Conductivity and Magnetic Susceptibility Meters for Archaeology Applications</i>	
TEA BREAK	11:30 – 11:50
WORKSHOP SESSION 2	12:00 – 13:30
Common Room: <i>IfA GeoSIG Consultation Workshop</i>	
Lecture Theatre (and outside): <i>Manufacturers' Hardware Showcase</i>	

WORKSHOP ABSTRACTS

A Basic Introduction to Planning and Development

Kirsten Holland, Principal Archaeologist, WYG

This workshop will be a brief introduction to the planning context for development projects and how heritage assessments, including geophysics, integrate with it. The workshop is designed for those who contribute to development projects going through the planning application and post-consent stages, but don't always understand where they fit into the bigger picture. It will be most appropriate for early career archaeologists and geophysicists who may not have completed heritage management modules as part of their degree.

The workshop will cover:

- Legislation and planning policy hierarchy and how they are used
- Types of applications, consents and conditions
- Typical stages of work
- Pre-determination or post-consent?
- Survey strategies and issues of scale
- Group exercises – identification of survey strategies for typical sites
- Feedback on group exercises
- Discussion and questions

Handheld Conductivity and Magnetic Susceptibility Meters for Archaeology Applications

Matt Guy – Geomatrix Earth Science limited

Handheld conductivity and magnetic susceptibility meters are a simple means of recording quantitative information about the physical properties of archaeological contexts, but are currently infrequently measured as part of commercial archaeological projects. This workshop will explore the application of these instruments within archaeology and discuss how the data can be utilised.

Manufacturers' Hardware Showcase

An opportunity for our exhibitors to give a brief overview of their latest products followed by some hands-on demonstrations (weather permitting) over the university's amphitheatre; unfortunately, this feature dates to the mid 20th century rather than the mid-2nd—but there are still features to be found.

IfA GeoSIG Consultation Workshop

Jimmy Adcock - GeoSIG Chair

The Admin team at the IfA have asked the Geophysics Special Interest Group their opinion on whether the current Technical Paper No.6 "*The use of geophysical techniques in archaeological evaluations*" (now well over 10 years old) is still relevant, whether it requires updating, or whether it should be abandoned. A recent survey carried out by GeoSIG shows that although the document is still in use, people are aware of its limitations and the need for an update. This workshop will put forward a proposed format for the replacement document and seeks to consult with the ultimate end-users to ensure that the content is not just relevant to today's commercial geophysics industry but presented in a readily useable format. GeoSIG would like to hear the views of archaeologists, consultants, geophysicists and those in curatorial roles as to what content they feel should be included in such a document.

PRESENTATION ABSTRACTS

GSB
PROSPECTION Ltd

Filling in the blanks: supplying context and efficiency to an excavation strategy

Jimmy Adcock, GSB Prospection
jimmy.adcock@gsbprospection.com

A cross-section of people working within the heritage sector were asked to fill in a short questionnaire and this paper is structured around the responses they gave. The three questions, which were sent to archaeologists, consultancies, units and planning departments, were:

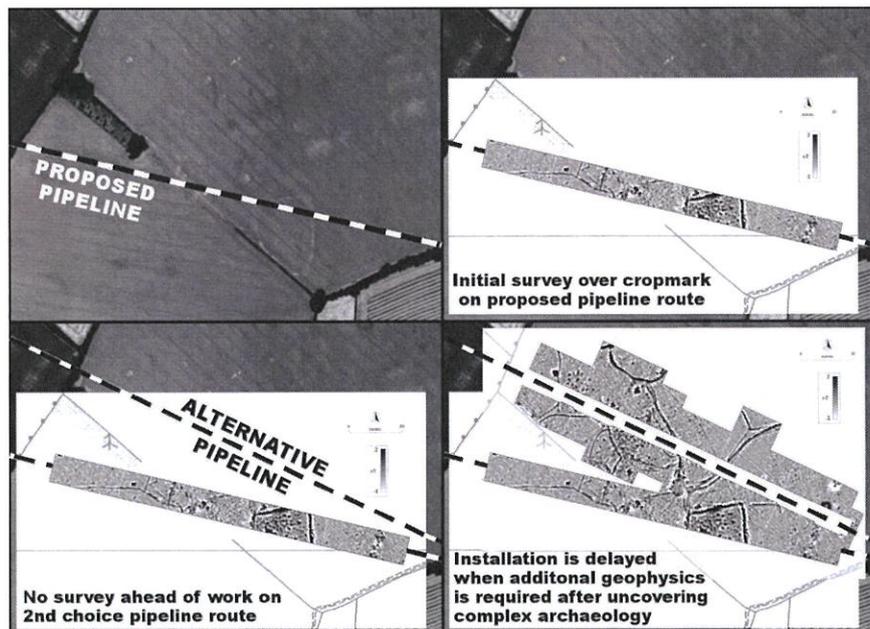
1. *How would you use geophysics as part of an evaluation strategy?*
2. *Does geophysics improve efficiency and lower costs?*
3. *Does geophysics offer value for money?*

Not all of the answers were complimentary....

The first set of case studies, from guardianship sites down to 'run-of-the-mill' evaluations, are presented to illustrate a selection of the positive responses. They highlight how geophysics can avoid the need for extensive invasive strategies, improve the efficiency of archaeological projects and reduce the overall cost of evaluations.

The second set of case studies defend the application of geophysics in response to the negative questionnaire replies. The majority of these answers were the commonly encountered arguments against geophysics such as the costs involved, the fact that existing archaeological records render it unnecessary, or a blanket assumption that it will not work in certain areas of the country.

The paper reiterates that geophysics can reduce the overall cost of an evaluation, despite being an extra line on the balance sheet of the project. Even in those instances where this is not true, the additional costs incurred through commissioning a survey can be seen as an insurance policy against encountering something 'unexpected' and having to pay mitigation costs potentially well in excess of the original geophysics.



In order to maximise the value of a geophysical survey and report, the presentation concludes that consultation with survey companies should occur at more stages in the life-cycle of a project than simply immediately before and after the fieldwork. This would ideally extend to an increased flow of feedback on how well, or otherwise, the excavation results match the geophysical interpretations provided by the survey company.

Geophysical survey strategies: some considerations and case studies

Duncan Hale (Archaeological Services, Durham University)

ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

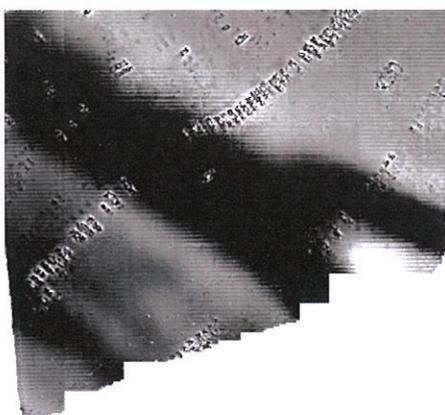
A typical aim of a commercial archaeological evaluation in the UK is to assess the nature and extent of any sub-surface features of potential archaeological significance. In many circumstances a geophysical survey will be the most rapid and cost-effective way to achieve this; a non-intrusive approach which can then inform intrusive investigation. However, there are many technical and practical factors to be considered when planning or specifying a commercial geophysical survey. This presentation will highlight some of these issues and discuss how they might affect the outcome of a survey. Technique selection is one such issue. There are different techniques available for different circumstances, and their application can often be tailored to suit a particular circumstance, but which is most suitable for your site? One selection criterion has been challenged in recent years. Recent research has demonstrated that a geomagnetic technique, which might not traditionally have been employed over igneous stata, has been particularly effective at a number of sites. Occasionally within commercial fieldwork, it may be both appropriate and possible to employ more than one technique. In exceptional circumstances, a sampling strategy may be employed, rather than conducting survey across the whole evaluation area. Examples of some sampling strategies are presented, with a discussion of their relative merits, or otherwise. Although this approach may at first seem preferable to a developer, there is considerable risk involved.



Geomagnetic survey over basalt (unfiltered)



Survey of 60% sample of site



Geomagnetic survey over granitic geology with dykes, raw (left) and filtered (right).

Using Geophysics – A Consultant’s Perspective

Hannah Smalley, Archaeological Consultant

CgMs Consulting

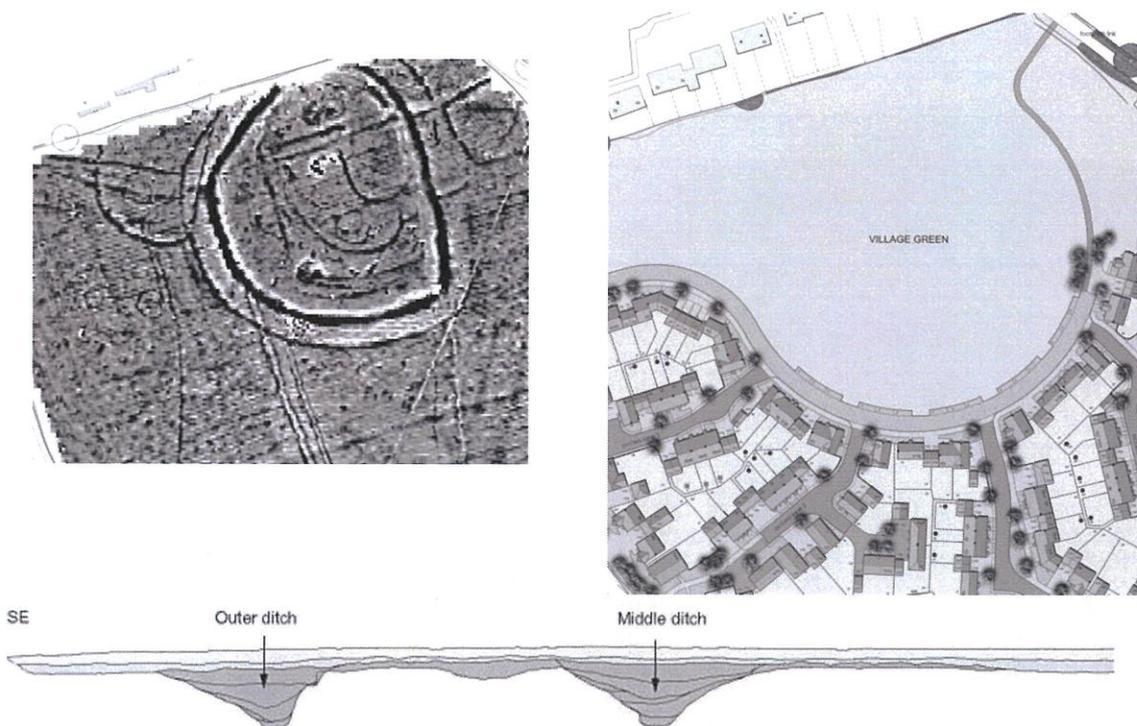


Geophysical survey often forms part of a programme of archaeological investigation undertaken to inform planning decisions on proposed development schemes or conducted as part of a condition to planning consent.

CgMs are the leading providers of independent heritage advice to land owners and developers, free of links to local authority departments and field units. Working nationwide, with seven regional offices, CgMs commission a large number of geophysical surveys each year.

This presentation will provide an overview of CgMs’ experience of commissioning geophysical surveys, examining survey types and methodologies used.

The presentation will outline key priorities when commissioning surveys. It will provide a context to where geophysical survey results fit within the planning framework/determination of proposals and will offer a personal view of the principle outcomes the geophysical survey report should achieve.



Finally, there will be an examination into the validation of geophysical survey results by subsequent evaluation/excavation and a look into how the process of obtaining feedback of geophysical results to surveyors can be improved.

Archiving: 2014

Armin Schmidt, GeodataWIZ Ltd



Most people will agree that archiving of geophysical data is a good thing. Nearly every geophysical practitioner has a systematic way of storing their data and backing them up. So why is 'archiving' of these data still considered problematic? This presentation will consider the various steps that are required for the archiving of data (in contrast to a backup) and look at some perceived or real obstacles. Some suggestions for simple solutions will be discussed so that 2014 may become the year of geophysical archiving.

Dividing 'archiving' into several smaller steps makes the process far easier to manage. The principal tasks of compiling the Archive are:

1. sorting all files into a logical folder structure (in most cases this has already been done when setting up a contract/project)
2. exporting the raw and final processed data into a preservation format
3. creating a brief description of the files in these folders
4. creating a record of 'metadata' describing the geophysical survey; this can be derived from a local project database, from an OASIS record or typed up manually

Once this Archive is complete, it is submitted to an Archiving Body. Depending on the requirements there are several choices.

1. In-House Archiving: a solution whereby the Archive, as a set of files or packed into a single zip/tar file, is maintained by a contractor or academic department themselves.
2. File Repository: a commercial storage facility to which the Archive is submitted, for example via the Internet, sometimes also referred to as 'Cloud Storage'.
3. Managed Archiving: in addition to a file repository, this is providing migration and indexing of the content of the Archive.
4. Accessible Archiving: making a managed archive available to other users, usually over the Internet.

It also needs to be considered that the Intellectual Property Rights in the data are initially held by the individuals who carried out the survey, or their employer, but may be transferred to the commissioning body or another organisation. As the data may have monetary value such a transfer should be specified at the outset of the work.

'The curse of the newbie!' An appeal on behalf of junior members of staff

Peter Ahern

In 2009 I completed a BA (Hons.) in Archaeology at the age of 53. I have now completed an MA in Medieval Archaeology and a (hoped for) PgDip. in Landscape Archaeology with GIS so I am a relative newcomer to this industry. Whilst studying Archaeology I have developed a passion for surveying and have geared my postgraduate studies to learn as much as possible about archaeological surveying. I have been fortunate enough to be offered a job by a leading geophysical surveying organisation but, after a few projects I have not continued to be employed by them. It appears that some commercial companies do not have the time to train or closely supervise new recruits because of the constraints placed on them by contractual obligations. This, I feel, is inhibiting both commercial companies and enthusiastic junior staff from progression. I will argue that junior members of staff are a key element within an organisation. I will also argue that training is a very important element of the developmental process that all members of staff should be encouraged to embark upon. I believe that these components will bring considerable benefits to organisations. If companies were able to offer places to trainees with an enthusiasm to progress then there would be a ready supply of experienced professionals in the industry. Companies who had a rigorous programme of continuing professional development for their staff would increase their standing in the industry because it shows that they are prepared to employ highly trained and skilled staff who are on a continual learning curve. This paper will appeal for companies to explore the various methods that may be available to them and their staff.

Ad Summa Tendendum: Quality and development management

Ken Hamilton
Senior Historic Environment Officer
Historic Environment Service
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The publications of Planning Policy Statement 5 and its successor, the National Planning Policy Framework have altered the emphasis of archaeological development management to front load the planning process. Developers are now required to describe the impact of development on the historic environment, with that description being in keeping with the significance of heritage assets affected (NPPF Para. 128).

These requirements should have led to a boom in archaeological geophysics and yet we have instead convened a seminar to discuss a disenfranchised archaeological geophysical sector. The reason for this is simple: cheap and easy to use equipment has led to a large rise in surveys conducted by people who frequently do not fully understand the physics behind what they are doing. This, in turn, has placed a financial squeeze on more reputable companies, meaning that in order to turn a reasonable profit they cannot resource jobs effectively and their work (or their well-being!) may suffer.

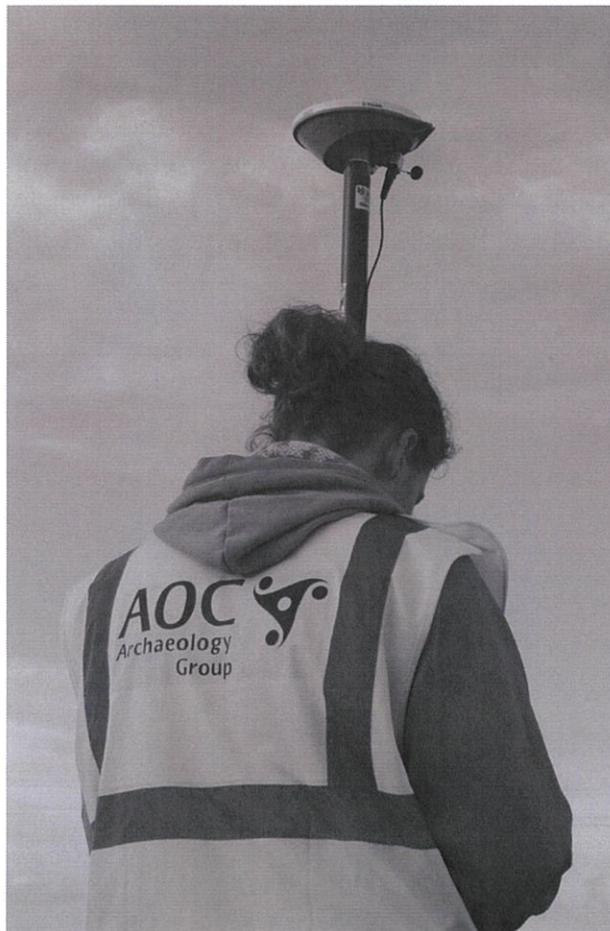
This talk will look at data, interpretation and reporting from a number of anonymous case studies, and look at the implications of these case studies for the developer, the curator, and the public perception of geophysical prospection. From this, it will draw a number of conclusions about the way to address these issues as an industry (both geophysical and archaeological), and hopefully stimulate discussion on the way forward.



Exploring the divide between research-based and commercial archaeological geophysics

There is a clear distinction between geophysics based research projects and commercial work, with the agendas set in commercial geophysics being far more constrained by time and cost in comparison with most research projects. Using examples from Britain and Italy this paper aims to discuss whether a balance can be achieved to the benefit of both of these two strands of prospection. In Italy, the British School at Rome works widely with academic institutions on a range of research ventures, but also maintains an extensive commercial practice. In Britain, AOC Archaeology produces high quality commercial archaeological work whilst, through community outreach and publications, is able to incorporate a substantial level of research within the organisation. Focusing on several areas within the sector, this paper will examine the differences between research and commercial driven geophysics agendas and explores the potential of the role commercial geophysics within 'research'.

Alice James



www.aocarchaeology.com



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Commercial Archaeological Geophysics in Norway – learning by doing?

*Arne Anderson Stamnes, The NTNU Museum of Natural History and Archaeology
Lars Gustavsen, Norwegian Institute of Cultural Heritage (NIKU)*

By creating a database over all surveys performed, it was possible to get an exact overview over the amount of surveys performed within Research and Development compared to pure Cultural Heritage Management purposes. The statistics compiled makes it possible to sum up typical choice of geophysical method applied, number of geophysical techniques used per survey scheme and typical archaeological targets. This made it possible to review the way geophysical methods have been used in Norway, and gain a better understanding of the role and status of geophysical survey methods within Norwegian Cultural Heritage Management. The amount of geophysical survey work performed within archaeology has dramatically increased within the last decade, and it is clear that the use of geophysical methods is nothing new in Norway. 64 % of all surveys were initiated for research purposes and 36 % were for management purposes- a number much lower than in England and Ireland. Only 29 % of all surveys involved more than one geophysical method. While strategic documents and signed treaties justify the usage of geophysical methods, the analysis show that the application of such methods has yet to be generally accepted within the existing Cultural Heritage Management in Norway. The reasons for this is a combination of the lack of resolution and technical limitations of earlier surveys, challenging natural conditions and ephemeral archaeology, combined with a lack of trained personnel and competence. Recent research initiative by domestic institutions related to the application and research on geophysical methods is considered to be a step toward building up domestic experience and knowledge.

Tales From Across the Water: Analysing the Irish Experience of Geophysical Surveys

James Bonsall, Chris Gaffney and Ian Armit, University of Bradford

Rónán Swan, NRA Head of Archaeology

Over the last 3 years the University of Bradford have assessed legacy data generated from 10 years of archaeological geophysical surveys on Irish road corridors on behalf of the National Roads Authority (NRA). These extensive surveys were used by the NRA over the past decade to prospect for previously unknown archaeological sites and to investigate known or suspected sites on 70 new roads across Ireland, covering more than 1,700 hectares of survey. The surveys were carried out by a number of geophysical consultancies from the UK as well as Ireland and Germany, resulting in more than 170 individual reports available for analysis.

A key objective of the NRA is to ensure that the vast quantity of archaeological information generated by road scheme activity feeds back, not only into the decision-making and project-planning process, but also that this knowledge is disseminated and is transparently accountable to the Irish public, who have funded much of the work.

The major outputs of the assessment include a reappraisal of the geophysical data in light of subsequent excavations, a guidance document advising the NRA on the best practices for future geophysical assessments and a publicly accessible database of the geophysical reports (<http://www.field2archive.org/nra/>), made available by the NRA. The reappraisal of geophysical data has facilitated a technical review of the success or otherwise of detailed magnetometry and scanning surveys across a range of geologies and soils for which quantitative data is now available.

The research has served to place the NRA in a unique position with respect to development and application of new archaeological geophysical investigation technologies and techniques. This has direct benefits for the efficiency and suitability of the NRA's work on road schemes. The assessment of geophysical survey 'success' will lead to a sustainable future for geophysical survey on linear projects in Ireland, while some of the conclusions to the research are likely to have ramifications beyond the Irish road corridors from which the data derives.

A tall order? Efficiency, flexibility and comprehensive interpretation in commercial magnetic prospection

Cornelius Meyer

(Eastern Atlas GmbH & Co. KG, Berlin, Germany)

How many sensors? Today this is an usual question. The development of multi-sensor Fluxgate arrays brought a quantum leap in the archaeological prospection. Now, dozens of hectares can be investigated in an one-week-campaign. But there is need for more questions: For example: How precise are data registration and positioning? Faster does not necessarily mean better. The technical issues can be illustrated by numbers and hard facts. But the increasing amount of data rises more fundamental questions: What to do with this enormous data pile? And, it is not only the mere quantity of data. Covering large areas may possibly result in a new quality of data sets regarding their archaeological information value? However, very seldom archaeologists ask archaeogeophysicists how much time they dedicate to data analysis and interpretation. In the daily business of archaeological prospection the pure measurement is more or less adequately paid, but interpretation and reporting suffer from chronic lack of both time and funding.

These special challenges of contemporary archaeological prospection require a new awareness of both technical and epistemic aspects. Eastern Atlas as contractor and developer in the field of archaeogeophysical prospection accepted this. The development of the multi-sensor array LEA MAX did not stop at the solution of technical problems. Experiences at archaeological sites often lead into technical modifications of the array for more flexible operation in field. In addition, the ongoing software engineering incorporates the special requirements of archaeological research. Already at the data collection the subsequent processing and interpretation workflow is anticipated in order to ensure an optimised use of the archaeological information. The presentation of the flexible multi-sensor system, the script-based software components and the interpretation tools underline this.

All that can not fully compensate the careless neglect and literal underpricing of data analysis and interpretation. But yet, only cutting-edge results and survey reports can convince commercial clients, academic researchers and investors.



Figure: Multi-sensor Fluxgate array LEA MAX in operation (Ruhof, Lower Austria)

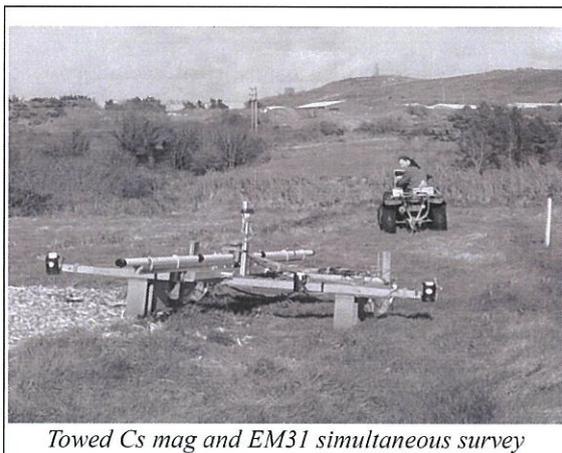
Multiple Methods: Geophysical Necessity or Optional Luxury?

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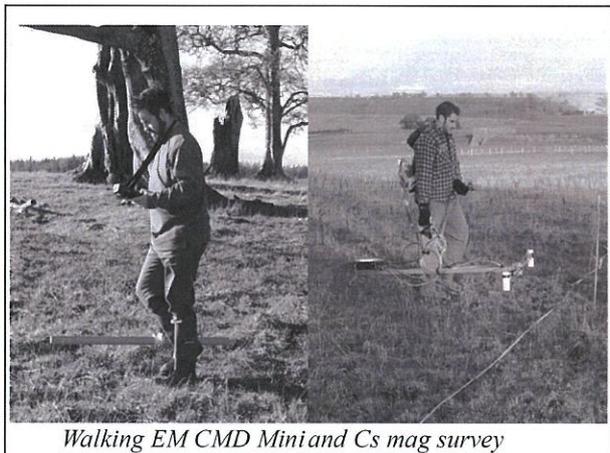
R.Fry@archaeophysica.com

ArchaeoPhysica Ltd. (www.archaeophysica.com)
Harewood End, Hereford.

For the majority of commercial geophysical surveys, survey specifications are selected by a non-specialist curator or commissioning party and are generally still treated as a 'one method fits all' solution to distinguishing the presence/absence of archaeological features. Such surveys are usually limited to, for example a fluxgate gradiometer survey, conducted at the coarsest English Heritage sampling guidelines. Such single method methodologies can (and do) work effectively to suitably detect archaeological features, however, they also risk not detecting important features and landscape scale information. Better understanding of both the possible features sought and the geology of the landscape can help inform survey specifications and reduce the risk of improperly supported subsequent investigations, e.g. trenching and ultimately development itself. This can be especially true for large surveys (e.g. > 30 ha) where both the geology and archaeology are likely to change across the landscape within the survey. Some current survey methodologies are able to undertake multi-method surveys simultaneously, allowing for example both a magnetic and quadrature conductivity survey to be undertaken without requiring large amounts of extra survey time. More often than not, in cases where clients have agreed to undertake a combined survey both methodologies have provided extra information to the interpretation and understanding of the site.



Towed Cs mag and EM31 simultaneous survey



Walking EM CMD Mini and Cs mag survey

A key to escaping the over-reliance upon magnetometer surveys in particular is for the specialist to be able to recommend appropriate and complimentary techniques as part of the tendering process. Contractors also need to not limit the survey methodology to standard equipment in their store. Finally, better advice must be available to all archaeologists engaged in specifying and commissioning geophysical survey.

ArchaeoPhysica are also on Twitter: [@archaeophysica](https://twitter.com/archaeophysica)
and Facebook: www.facebook.com/archaeophysicaltd



Should 0.5m traverse spacings be the new standard for commercial magnetic surveys?

Mark Whittingham, Director, Phase Site Investigations Ltd. markw@PhaseSI.com

With the increasing availability and use of multi-sensor systems for commercial archaeological magnetic surveys should we now be looking at improving the standard spatial resolution of surveys to 0.5 m traverse intervals?

The significant advantage of a multi-sensor system is that the data quality is generally higher compared to hand-held instruments. If this is combined with closer spaced sensors then it also provides higher resolution data.

Some years ago technology improved with the greater memory capacity of instruments and the standard spatial resolution for commercial surveys increased from 1 m by 0.5 m intervals to 1 m by 0.25 m. The technology is now available to get 0.5 m by 0.2 m (or better) intervals so shouldn't we be looking to use it where site conditions allow?

Cost is not a significant limiting factor as the rate per hectare to use a multi-sensor system with the sensors spaced at 0.5 m intervals is comparable to the rates for a hand-held survey. For larger sites it is often cheaper and it is only for small sites that it may be more expensive.

Another approach to using multi-sensor systems is to use sensors spaced at 1 m intervals. This will still generally give improved data quality compared to hand-held instruments, due to the greater instrument stability and more accurate locating of individual data points, but the areas that can be covered in a day will increase significantly. Costs per hectare can be reduced slightly with greater profitability for the geophysical company.

So which way do we go? Greater coverage with some improvements in data quality but with little increase in spatial resolution, or improved quality and greater resolution?

Fundamentally this comes down to what the purpose of a geophysical survey is. Is it there just to highlight areas of potential archaeology, in which case resolution and even to some extent data quality aren't too important. If you can identify 'blank' areas or find linear anomalies is that enough, given that excavation will provide more detailed information? Or should a geophysical survey for commercial surveys, provide as much information as possible? Adding value to any intrusive work by allowing the best identification and informed interpretation of anomalies.



Multi-sensor magnetic data, -3 nT to 3 nT range

I firmly believe that it is the latter and so we utilise a 6 sensor system with the sensors spaced at 0.5 m intervals. This gives us the equivalent of a 3 m wide survey corridor when we could have gone for a 1 m spacing and a 6 m wide corridor. Our coverage could have almost doubled but we decided against this as I believe that we should be doing the best surveys that we can, within the financial constraints of competitive tendering.

As a group we have an opportunity to demonstrate to other geophysicists and the wider archaeological community that data quality is the prime imperative for a geophysical survey. I'm very interested to see if we take this opportunity in the coming years.



Are we doing enough? How increased sampling density and alternative techniques can increase our understanding of buried archaeology

Finnegan Pope-Carter - University of Bradford & GSB Prospection
Graeme Attwood - GSB Prospection

Over 95% of tender requests received by GSB Prospection in 2013 specified purely 'detailed magnetometry', this compares with c. 80% a decade ago and c. 50% in the mid 90's. Since the underlying geologies remain the same and the scientific principles behind the techniques have not evolved, this reduction in requests for alternative survey is unlikely to be related to a lack of success with these 'other' techniques. It is therefore assumed the recent dominance of magnetometry is related to the increase in speed initially seen with dual-sensors, and the subsequent reduction in cost of this technique. Although the speed of alternative techniques has increased over the last decade this has been largely ignored as the techniques had already become somewhat side-lined.

Through the use of GSB's archive and recent survey conducted alongside the University of Bradford we will highlight the limitations of 'detailed magnetometry', showcase the additional information that can be obtained from complimentary survey techniques and highlight new equipment that can address both the speed (and therefore cost) and resolution limitations of traditional alternative techniques.

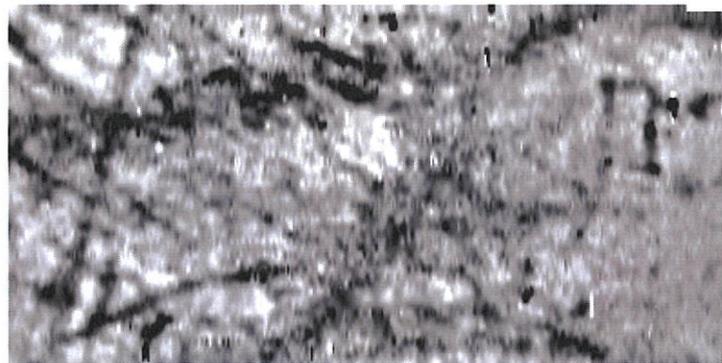


Figure 1 - GNSS located resistance survey

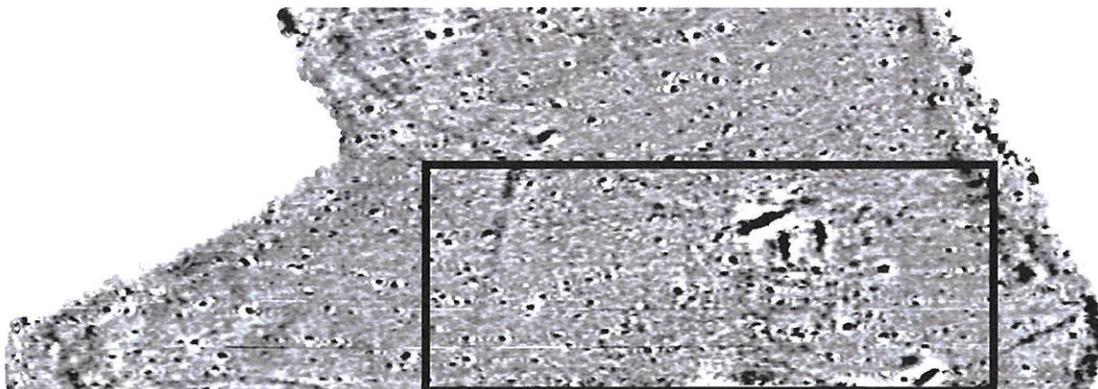


Figure 2- 0.25 x 0.125 m GNSS located magnetic survey. Box marks the area of resistance survey.

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The poster features a large blue graphic of a leaf or drop shape on the left side, containing a photograph of a stone building. To the right of this graphic, the text reads: 'IfA 2014 Glasgow', 'Research in practice', '9 - 11 April 2014', 'Marriott Glasgow', and 'Annual conference and training event'. Below this, there is a grid of smaller images and text boxes. The grid includes: 'CPD' with a stone bust image; 'Research' with a stone archway image; 'Networks' with a stone archway image; 'Innovation' with a stone archway image; 'towergate insurance' logo; 'HISTORIC SCOTLAND ALBA AOSMHOR' logo; and the 'IfA' logo. The bottom of the poster features the text 'INSTITUTE for ARCHAEOLOGISTS'.

IfA 2014 Glasgow
Research in practice
9 - 11 April 2014
 Marriott Glasgow
 Annual conference and training event

CPD
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 Networks
 Innovation

towergate insurance
 HISTORIC SCOTLAND
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Our 2014 conference will be held in Glasgow and examines **research practice** in current **archaeological investigation**, highlighting how archaeologists contribute new knowledge to a wider understanding of the human past. The **three-day programme** includes a stimulating mix of academic debate, informative discussion and opportunities for **learning new skills**. For those who want to explore the city and landscape we have excursions in and around Glasgow, and social events allow delegates to **relax** while enjoying the company of colleagues and friends.

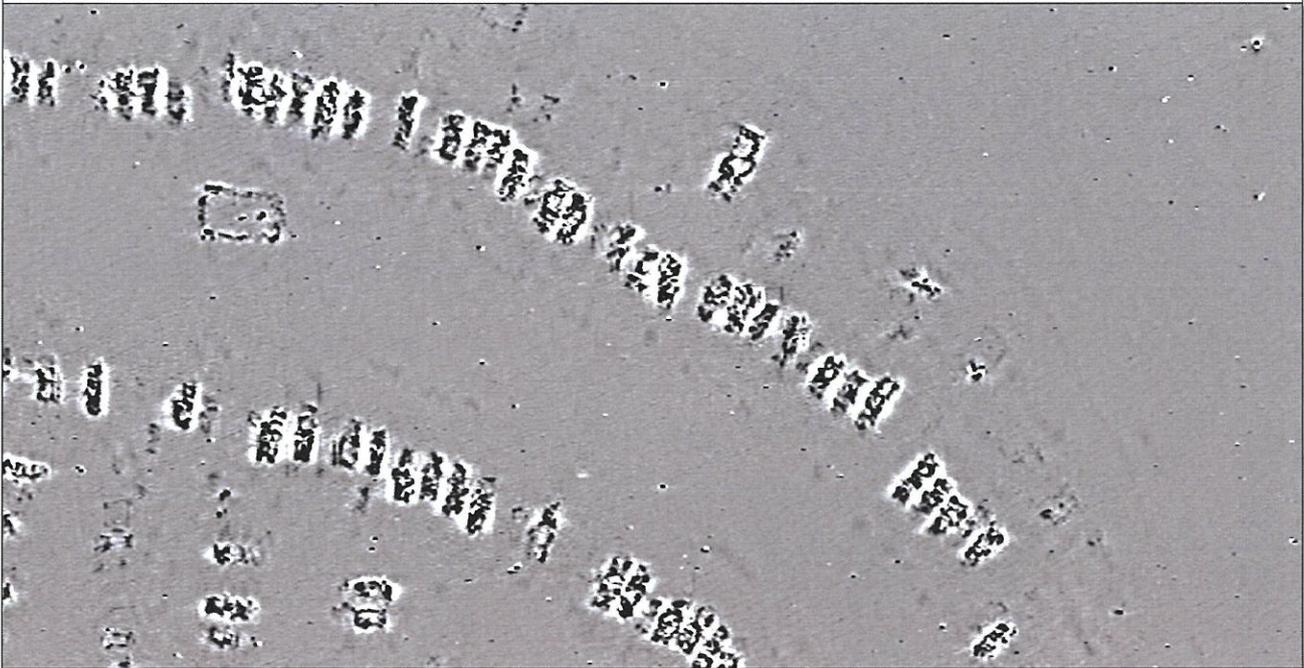
The programme session list will be available from September 2013, with the *Call for papers*. Bookings can be made from October 2013.

For more information, or to look at options for exhibiting at IfA 2014, check online at our conference webpages:

www.archaeologists.net/conference2014

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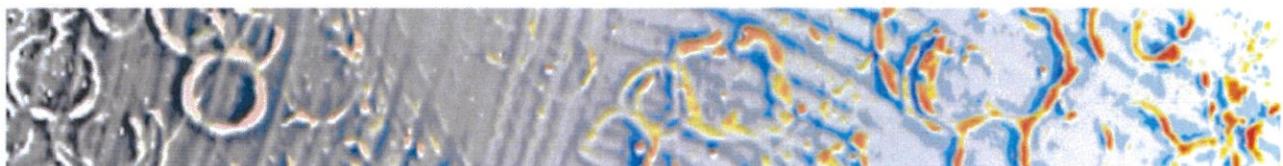


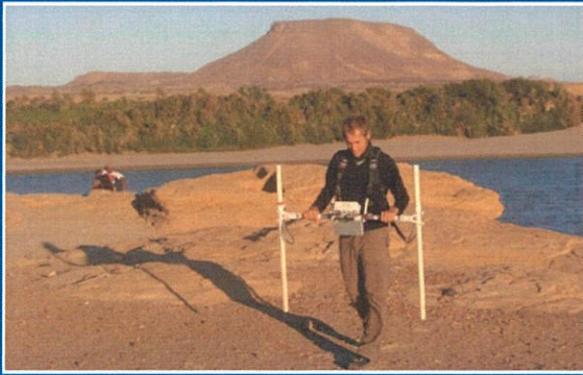
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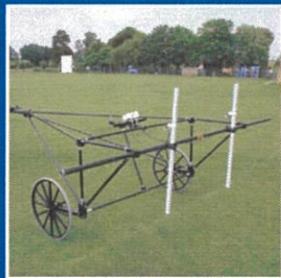
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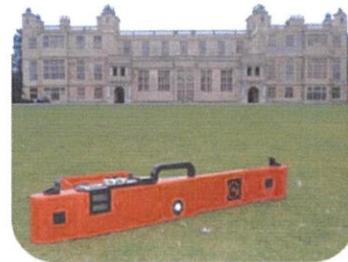
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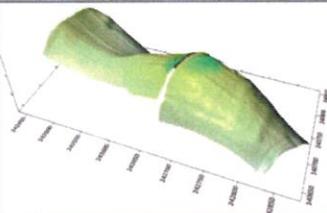
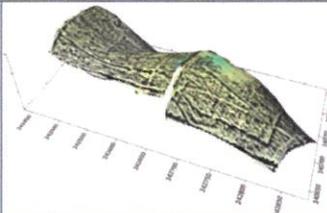
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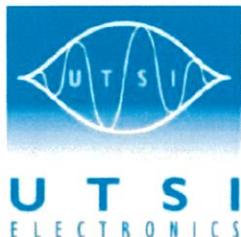
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Photo courtesy of IFFSTAR, Nantes

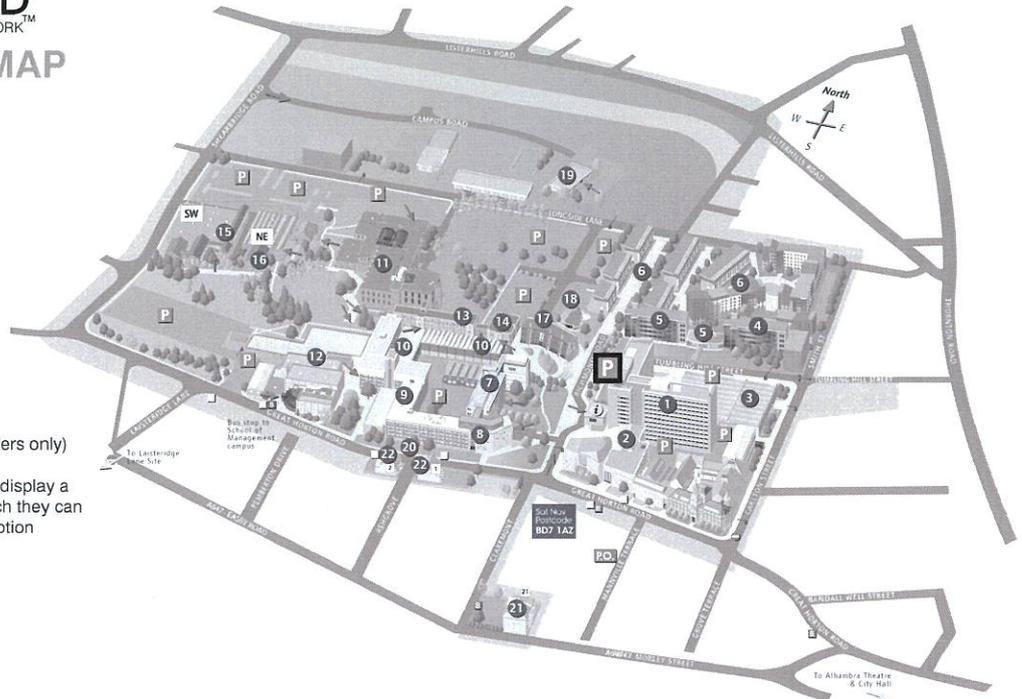


CITY CAMPUS MAP

- ➔ Main Entrances
- ┘ Bus Stops
- ⓑ Free City Bus Stops
- ⓑ Bus Stop for the A99 free bus to the School of Management Campus
- i Information

Main roads only shown
Map not to scale

- P** Controlled parking areas (permit holders only)
- P** Visitor car parking only. Visitors must display a visitor parking permit in their car, which they can obtain from Richmond Building Reception



City campus key:

- | | | |
|------------------------------------------|------------------------------------------------|---------------------------------|
| 1. Richmond Building | 9. Chesham B Building | 16. Phoenix Building North East |
| 2. Atrium, Richmond Building | 10. Chesham C Building | 17. re:centre |
| 3. Richmond Building Workshop Block | 11. Student Central and J B Priestley Building | 18. The STEM Centre |
| 4. ICT Building | 12. Sports and Amenities | 19. Forster Building |
| 5. Norcroft Building and Norcroft Centre | 13. Pemberton Building | 20. Peace Garden |
| 6. The Green (student accommodation) | 14. Ashfield Building | 21. Forensic Crime Scene House |
| 7. Horton D Building | 15. Phoenix Building South West | 22. Chaplaincies |
| 8. Horton A Building | | |

Tear along dotted line

COMMENTS & SUGGESTIONS

If you have any comments about today's seminar or suggestions on how we could improve future events please summarise them below and leave in the Comments Box in the Common Room. We would also be interested to hear any ideas for themes that you would like to see covered at future CAGS events.

With thanks, CAGS2014 Committee