Digital Impact Assessment in Practice

Summaries of best practice in applying digital tools and technologies in Impact Assessment

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GUEST EDITORIAL

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Digital Impact Assessment in Practice

I'm honoured to be guest editing Volume 6 of the Impact Assessment Outlook Journal on this exciting area of practice. Building on the insights presented in the recently released Digital Impact Assessment Primer this Outlook Journal offers a great opportunity to illustrate how Digital Impact Assessment and the key messages of the Primer are being delivered in practice.

I strongly believe that Digital Impact Assessment (IA) deserves the excitement it is building. For various reasons, it is clear that IA practice is behind the curve in its utilisation of available technology. A motivated drive under the badge of 'Digital IA' by IEMA members to advance practice is an exciting development and will help us to achieve greater efficiency and effectiveness in IA. I hope the momentum seen in recent years will build so that soon digital working and innovation are standard practice and Digital IA simply becomes IA.

With the application of digital technology and approaches in IA practice growing at such a racing pace in recent years, it is important that we take stock of what has been learned and share experience. The Primer document is the first comprehensive attempt to define this surge in Digital IA activity and set out what opportunities and challenges it presents and the key messages that practitioners need to know.

The Primer was written with the experience of practitioners that are implementing Digital IA in practice, and the articles in this Outlook Journal have all been written specifically to share this practical experience. In the Primer we did not include case studies of Digital IA in practice, so I hope this Outlook Journal helps give practitioners a clearer picture of how the messages of the Primer are being delivered and the experience the Primer draws from.

Digital IA requires collaboration across specialisms and organisations to be delivered to best effect, and this Journal has sought to live up to this principle! The articles draw on the experience of the IEMA Digital Working Group and the range of organisations its members represent. Many of the articles include inputs from multiple organisations.

A key message we wanted to emphasise through the Primer is that Digital IA is much more than reporting and requires proactive digital working throughout the IA process to deliver effective solutions efficiently.

Data management is a fundamental part of this way of digital working, and **Sarah Pyatt's** article provides a valuable overview of the best practice in how this should be done.

Data collection forms the basis of IA and is a stage where digital can address many of the existing surveying challenges we face while also giving us new datasets and insights. **Phoebe Cox's** article explores widely used and innovative methods of digital data collection and some of the benefits and savings they bring.

Richard Shortridge then provides some valuable guidance on the practical steps needed to plan and develop new digital products or tools. An awareness of this process, alongside the digital skills to support you through it, can help IA practitioners turn their ideas or pain points into new digital products or solutions.

The highest profile and currently most valued opportunity that digital IA presents however is for more effective communication. Articles on digital reporting, consultation and infographics from **Naushad Tahsildar**, **Ross Stewart** and **Lee Wallace** respectively illustrate the wealth of digital innovation taking place in these areas to ensure IA is communicated to maximum effect.

To deliver quality development and effective mitigation, the post-consent stage and monitoring need to be delivered in an informed and joined up way. Digital approaches can also add value in these crucial phases.

This is explained in **Georgina Cutler's** article along with an overview of some of the tools being applied for this use.

And finally, **Alistair Walker** finishes the journal with an overview of how Digital EIA has been explored in a government backed project, which has exciting prospects to provide practitioners with new tools and platforms and a common direction of travel. This presents an opportunity to ensure digital EIA is implemented more widely across industry, and to facilitate and encourage digital and innovation being embraced at a faster pace.

A Microsite to Highlight Best Practice and Innovation

The articles in this Outlook Journal can also be found on the IEMA Digital Microsite at the link here. On this website you can find the latest content and information that illustrate the examples of Digital IA practice described in these articles. This includes images, videos, further links and information on how to get involved.

With the application of digital technology and approaches in IA practice growing at such a racing pace in recent years, it is important that we take stock of what has been learned and share experience.

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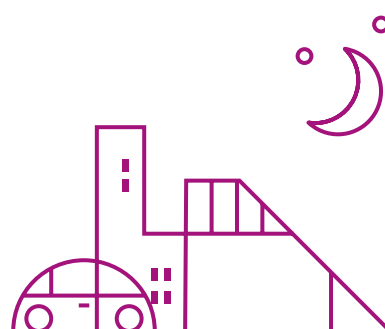
Digital data management throughout the Impact Assessment process

As stated in the IEMA primer, Digital IA is relevant to all stages of a project life cycle. It is a collection of data, technology and behaviours, rather than any one individual tool. All these different aspects can be used together for consistency and efficiency across the assessment process, but there needs to be certain management procedures in place to do so. This article provides an overview of key considerations for data management, the digital tools that this enables when applied effectively and how this approach is being followed on Crossrail 2.

Quality and Control

Data underpins the whole digital process. It is continuously evolving and increasing as the user needs change and design maturity increases. We need to understand the flow of data across the different stages – who needs what, as well as when and why they need it. It is this availability of data that enables the different digital tools and technology.

Infrastructure projects are moving towards having a single source of data, or Common Data Environment, which all users can access, regardless of format or the software they are using. Progress is being made towards this by having connected systems and procedures in place to manage data exchange between them. Conversions and exchange of data are getting quicker and easier with automation and improved systems architecture,

but we also need to ensure there is control of quality and versioning throughout. Automation, analytics and data driven reporting are only possible if quality and standards are agreed, followed and regularly checked.

In Practice on Crossrail 2

An example of this approach is Crossrail 2 where TfL, Network Rail and their consultants are using a Common Data Environment underpinned by a Digital Strategy, standards, methods and procedures. The MTEW consortium (Mott MacDonald, Temple, ERM and WSP) are providing environmental and sustainability services for the project. As part of that contract, Mott MacDonald are providing the single web GIS platform which is part of the project's Common Data Environment.

Accessibility and currency of data is vital for such a large project to ensure all project teams are using the same information for a consistent, common understanding of the project and its surrounding environment. A robust spatial data methodology that is owned and led by the client has been applied throughout the project to drive lower costs and higher value through improved information management. This data management has enabled the digital approach across the environmental assessment, including the opportunity to present this data digitally at the scoping stage.

Data, data everywhere...

Impact assessments require huge numbers and amounts of data to be collected and acquired, from a vast range of sources including surveys, design teams, statutory bodies, external data providers, local authorities and modelling results. If this was to be done in different ways by multiple parties, there would be duplication and differences. If the data being used for one part of the assessment is different to another, the answers and outputs are not going to be compatible or comparable. This is why data must be managed centrally in a transparent, accessible and secure way where all the different user needs are understood and accounted for.

This process has not been without barriers and problems. The provision of data from design teams to others on the project, including environmental teams, often faces a difference in terminology and language when looking at exchange between BIM models and GIS. The actual conversion can be relatively easy and is continuously improving. It emphasises and relies on standards and quality assurance being followed. The main barrier tends to be a difference in how data is structured and the level of detail that are needed by an engineering team compared to environmental, land and consents. These user requirements are critical, especially in early phases on a project and must be understood and communicated from the beginning. It is important that there are regular reviews of the requirements and whether the current data management procedures meet them.

Informing the Design

It is important we also look at how environmental information is fed back into the design development, not just in early stages, but throughout detailed design, construction and operational modelling. It is important that this information is also produced in a way that meets the requirements of the whole team and can be used without having to be recreated or interpreted from different formats. Currently this communication is still largely through text and reports,

but this needs to move to a more digital approach by utilising all the technology available for this important information to be considered, understood and applied in the latter stages of development.

Data for Digital Communication

As well as communicating environmental information within the project team, the output methods for sharing impact assessment results with the public and stakeholders is also becoming more digital (see Ross Stewart's article). These digital communication methods create huge opportunities to help drive the approach throughout the rest of the IA process. If the end output can be data driven, then the whole assessment needs to enable that. This is what we have seen on Crossrail 2.

How data is captured, what the purpose was and the accuracy of it must all be detailed within attribution and metadata. This information about data is vital in understanding the different levels of details at each stage, as well as whether it is suitable for a different purpose. This is particularly important between stages and where handover of data takes place. These standards and the data must be led, owned and assured by the client, with support from the consultants.

Data that is shared throughout the IA process must be accurate, fit for purpose and meet quality standards in order for the digital tools that use it to be effective and beneficial. These data management measures are required at all stages to help enable a digital way of working that will lead to delivering better outcomes for all.

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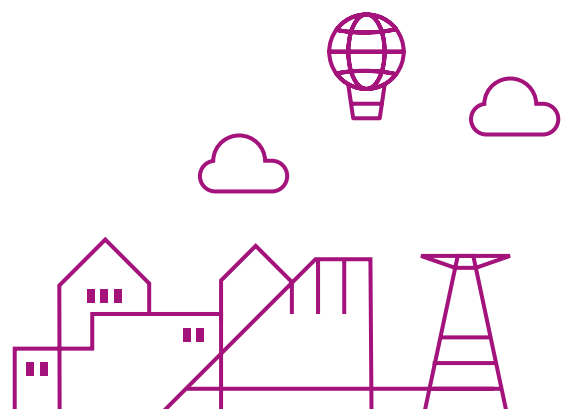
Digital data collection – helping us understand the environment more safely and efficiently

Data collection and survey work form the basis of every IA. However, this essential stage of IA is not without its challenges. Widely recognised as one of the most costly and time consuming stages, data collection also poses challenges associated with health and safety, accuracy and access. Fortunately, our rapidly digitising world is leading to developments in the industry which are revolutionising traditional methods of data collection and processing.

From digital collector apps to machine learning, this article explores some of the most widely used and notable developments in digital data collection and processing, highlighting the benefits and savings that they can bring to IA.

Collector Apps and mobile mapping systems on phones and tablets can be used to digitally record and georeference data and images collected on-site. Collector apps can also be used to 'ground truth' existing data, for example FieldNow, developed by Arcadis, was used by the Landscape team working on the Lower Thames Crossing to verify desk-based Zone of Theoretical Visibility (ZTV) calculations. Using the collector app allowed the surveyors to visit exact points identified by the ZTV model, of where the scheme would/ would not be visible, to verify their accuracy and record what was visible from each point. Collector apps not only improve the accuracy of data collection and verification, but also result in time saving through eliminating the age-old task of digitising manually recorded notes.

360 Cameras are another form of technology that are used when undertaking site visits. The camera, often mounted on a helmet, collects 360-degree imagery of the site. Uploading the imagery into software such as Holobuilder (a software originally used to create and share 360° views of construction sites) allows the site to be virtualised, so it can be (virtually) revisited and verified multiple times by any member of the team. Through reducing the number of site visits and surveyors required, the use of 360 Cameras leads to cost and time savings, and reductions in travel and the exposure to health and safety hazards.

The use of 360 cameras and Holobuilder can replace the written element of walkover surveys and improve accuracy by viewing sites holistically rather than through a series of isolated 2D images. This was used by Arcadis's Heritage team on a large-scale town/ housing development in Northstowe, to create an interactive story of the site's history and archaeology. The interactive walkover was shared with stakeholders during consultation and resulted in the inclusion of an interactive heritage trail as part of the future development, to allow the future communities of Northstowe to remain connected with the past.

Remote sensing and the use of Unmanned Aerial Vehicles (UAVs), are becoming increasingly popular surveying tools, particularly for pre-classification of Phase 1 habitat mapping. Sensors from satellites, aircraft and UAVs can produce datasets varying from typical

photography through to elevation datasets such as LIDAR and vegetation indices such as NDVI. Such data makes it possible to characterise habitats according to Phase 1 Habitat Survey classes, and in some cases identify the boundaries of homogenous vegetation stands from just an image. The data provides an initial classification prior to any on-site survey work that it can be 'ground-truthed' on-site or used to support early-stage feasibility or strategic assessments.

Combining the aerial data with Collector Apps or mobile mapping systems reduces the 'head-down' cartographic tasks typically required when visiting sites. This, and the reduction in the extent of site visits, allows surveyors to focus on the key site constraints and any potential health and safety hazards. WSP were able to use remote sensing and Ordnance Survey datasets when preparing the biodiversity baseline for all of Transport for London's estates. In doing so, WSP were able obtain data for areas that would have been unsafe to access in person. Additionally, remote sensing and UAVs allow large areas of land to be covered relatively quickly compared to using traditional methods, with cost savings passed on to the client. This was also demonstrated by Arcadis on the *A66 Northern Trans-Pennine project*, where undertaking UAV Phase 1 habitat surveys realised 34% cost savings and allowed the project to overcome both time and access constraints.
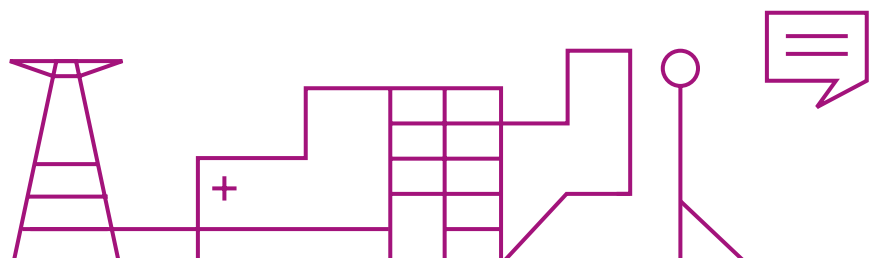
UAV collected data has many other applications. This has included collecting LIDAR data for identifying unknown archaeological remains, building 3D models for detailed viewshed analysis or providing detailed imagery for visualisations.

Utilising nearly every tool cited in this article, AECOM, in partnership with The Lifescape Project, have been

developing the '*Natural Capital Laboratory*', which has implemented several innovative approaches over the past year (UAVs, AI (artificial intelligence), robotics, and remote sensing) to support the 'rewilding' of 100 acres of land in Scotland. Using Phase 1 Habitat survey data as the basis for machine learning, AECOM have developed an AI which is able to classify habitats using land satellite and UAV imagery (with results periodically verified by ecologists). To enable the application of AI across other projects and a greater range of geographies, AECOM will need to collect and upload a greater range of Phase 1 habitat data. Alongside the AI, AECOM have created a virtual reality model (or digital twin) of the site which they aim to develop into an accurate and interactive virtual map of the site.

As our industry evolves, digital methods of data collection and analysis are likely to become more integral to the projects we work on. Demonstrated through the case studies in this article, such practices are overcoming challenges, such as health and safety and access, and realising cost and time savings. As well as resolving existing problems, digital methods are creating new opportunities to expand the capacity and improve the accuracy of data collection.

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Piloting the Digital Journey: The Path to Successful Digital Adoption

Embedding successful digital working in our organisations can streamline our methodologies, reduce costs, allow us to focus on other technical challenges, and grow new and exciting workstreams.

This article is written to help those who are considering building (or commissioning) new digital applications or workflows and have not yet got the experience. Many of the terms can be easily looked up on the internet, where greater detail can be found.

What is digital?

Digital isn't all about stand-alone application development (e.g. mobile apps); in IA it is often about putting a digital 'wrapper' around or between existing workflows, optimising not only your own work, but also how well your work connects with the work of others. So, digital very much needs to encompass both the reporting (e.g. Digital Environmental Statement websites) and also the actual assessment itself.

For example, at Atkins we regularly run automated distance calculations during Environmental Impact Assessments (EIA), where in seconds we have the distance of all environmental designations to a development site boundary. Previously these distances were measured more manually in a GIS package. Now a coding engine (Python or FME) uses opensource environmental designations and engineering design datasets stored in the Spatial Common Data Environment (sCDE).

This represented the transfer to digital of a relatively small task but achieved significant cost savings thanks to the iterative nature of design. To have success in other similar digital methodologies there are two components required. Firstly, there was a willingness from the task holder to make improvements; the job of manually measuring hundreds of designations to the site boundary is tedious and error prone. Then there is the demand from the (internal) client. Development site boundaries often change during the iterative design process and automated distance calculations can overcome this challenge by being run multiple times in very short timescales, to rapidly supply environmental decision makers with the evidence they need to inform design and IA.

Go agile

For managing the creation of digital workflow or applications we would recommend using the Agile project management methodology. At its heart, this entails those developing the application regularly checking in with key stakeholders and not having to define the whole product at the start. Typically, this is done by working in two-week sprints where development tasks are clearly defined. At the end of the two weeks, a review takes place and development can change as successful or less successful application aspects are discovered. This approach is different to what would be considered traditional where review periods occur after a lengthier development phase, allowing problems to build up and potentially snowball.

Objective, method and requirements

When considering the building of a digital application or digital workflow, the starting process is to determine your objective. Recent examples of objectives for us have been "capture great habitat data" or "convey a non-technical summary (NTS) for an EIA". With your objective determined a method is required, for example "use GPS enabled devices to collect habitat data which can be used in biodiversity net gain calculations".

While determining your objective and method, the audience must always be a consideration. Who is going to use the application or workflow and what do they need in order to succeed in using it? We can all relate to the experience of being handed a shiny new tool which doesn't, in some way, work with our methodologies or simply isn't explained to us. Then who is going to be instrumental to make development successful? Identifying key stakeholders and budget holders will push development through the finance channels. Super-users and digital champions can also play a part in the mass adoption of an application.

Requirements gathering is the next step and forms part of the business case. The MoSCoW prioritization technique is a tried and tested framework helping stakeholders reach an understanding of what form the digital application will take. MoSCoW stands for must, should, could and would:

- Must – Must have this requirement to meet the key objective of the application
- Should – Should have this requirement, but the application does not necessarily have to have it.
- Could – Could have this requirement.
- Would – Would have this requirement but perhaps not during an early rollout.

MVP

With the requirements gathered you can set your minimum viable product (MVP); an agreed minimum level that will enable full testing and demonstrate digital workflow value. An example of this MVP for the distance calculations is a semi-automated application where a GIS data expert runs the processing and the actual measure of distance is automated. The next step to automation is where an environmental discipline expert is able to select some environmental data inputs and then press GO! They then receive a file telling them distances measured. This information then informs the wider judgements that the environmental discipline expert might make.

Pilot, roll out and maintenance

Piloting your application or digital workflow avoids a large untested rollout, which if technical problems occur is a sure-fire way to prevent mass adoption. A pilot application must go to selected individuals who are suitably removed from the application development team and who will give unbiased independent feedback. From this pilot phase you will get enough feedback to adapt your MVP and integrate into your next development stage.

Once your application is ready for a full roll-out training is vital to ensure users get the most out of what has been developed. A plan for future maintenance and upgrade also needs to be put in place, to keep the application current and useable.

Final Word

Following the guidance above will help you create successful digital solutions to resolve a wide variety of problems or identified opportunities. One overarching aspect we need to ensure continues when becoming more digital is that the technology we create complements the skill and judgement of the professionals working in IA. Our projects after all are about people and the environment.

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Creative Info-Graphics (CiGs) – The need for a creative approach in the IA process

A picture is worth a thousand words

This famous English language adage meaning that complex and sometimes multiple ideas/processes can be conveyed by a single image or illustration is often a hugely missed opportunity in IA. Effective communication is key to IA and CiGs are a powerful tool for achieving this kind of effectiveness, particularly in modern society where we have less time and are increasingly familiar with digesting information in more succinct, creative and visual ways.

CiGs are concise visual representations of technical information and processes used to express complex ideas and diverse data as simple conceptual diagrams. They can be either static or interactive/dynamic, and comprise data/charts, images or illustrations and icons alongside text. CiGs can easily be integrated into IA reports (both PDF and web-based) and can also be used for public consultation materials.

This article discusses how CiGs can be embedded and implemented in IA practice and how in making information more accessible and understandable can lead to better IA outcomes.
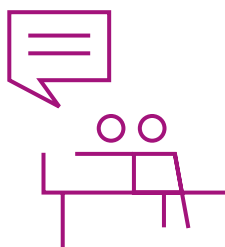
A creative approach in practice

The uses of CiGs vary depending on the nature of the Project and a creative approach would need to apply at the early stages of the project. The following are some examples in which CiGs can be applied to a project or a complex process:

- Conceptualisation - in their simplest form, CiGs can explain complex processes in a clear and concise way; using conceptual diagrams to show relationships between project goals, working methods and regulatory frameworks. Report structures, goals and outcomes can be translated into easy-to-read diagrams, showing the whole process at-a-glance.

- Integration and presentation - more advanced info-graphics can integrate key project information, such as traffic flows, usage figures and technical processes into site-specific illustrations. The effects of change can be presented in situ, demonstrating contextual relationships and the impacts on the locality using imageries and real time information.

- Visualisation and communication - the visual nature of CiGs aids communication across boundaries. Visual representations of processes can bridge differences in technical knowledge or even language barriers. This makes CiGs a particularly useful tool for community consultations, or where translations are required and information would need to be presented in a simple language.

Examples of CiGs can be found on the IEMA digital microsite here.

Plugging the gaps

Infographics should not be just 'pretty pictures' or extractions of large amounts of words in a figure. A poor infographic could be misleading if it is confusing and therefore requires skilled creative inputs. Summarising technical information in a creative way is a skilled task and needs support of creative professionals. In practice, a creative approach should be developed by a graphic/creative content specialist with a good understanding of technical content or jointly with EIA professional(s) with a creative flair. Strong liaison between EIA technical discipline specialists and a professional graphics lead is critical for a creative process which can bring benefits throughout the IA process.

The creative professionals within the IA project team should be able to understand the technical content, pick out the key messages and then be able to present that information in a creative way using a variety of skills and software available for creative work such as Microsoft Publisher, Abode InDesign, Photoshop and Illustrator. More efforts and emphasis should be placed to understand who the audience is and where non-technical or jargon-free language is required, such as a Non-Technical Summary of an EIA. Where creative professionals are not available in-house, efforts should be made to collaborate with external creative professionals.

The benefits of creative outcomes

If CiGs and a creative approach are incorporated into IA as described above, it is likely to bring numerous positive outcomes. Extensive and imaginative use of CiGs can reduce IA reports in scale and make them easier to understand by their target audiences. This can mean that consenting authorities, regulators, businesses, NGOs, community groups and members of the public understand more quickly and more

fully what a development project is about, what its impacts would be and how these will be managed.

Such benefits can justify or offset any additional time and costs. The experience of ERM has been that using a creative approach at early stages of the EIA process has led to less concerns from stakeholders and regulatory bodies, significant reduction in review time and avoid misunderstandings between the client, project core team and technical disciplines. This has all led to significant cost savings for the projects where a creative approach was applied and has the potential to speed up consenting processes.

There is also no reason why greater use of CiGs should conflict with meeting statutory requirements or guidelines for IA – the EIA directive (2014/52/EU) acknowledges the need for EIA reports to be more understandable and streamlined. In doing this CiGs also support the proportionate EIA agenda.

CiGs play a crucial role in streamlining the IA process and should be an integral part of the Digital IA process. With a right approach and the help of creative professionals and industry, CiGs in future could bring in a new outlook for EIAs.

CiGs can reduce IA reports in scale and make them easier to understand by their target audiences.

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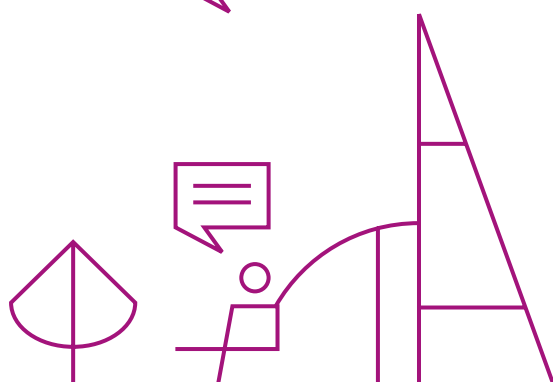
Digital reporting – A step-change in reporting for the 21st Century

The Status Quo – Obese. Impenetrable. Unengaging.

Delivery of an environmental impact assessment (EIA) requires the preparation and publication of multiple externally facing reporting outputs – chief among them the environmental statements (ES). Often described as 'obese' and 'impenetrable', these documents communicate essential information but the sheer weight and complexity of them make it difficult for stakeholders to access and digest it. At the other end of the EIA reporting spectrum, the ES Non-Technical Summary (NTS) is often accused of being too high-level and lacking context, so being void of useful information.

Experience of public consultation demonstrates that stakeholders, including those with a material interest in a scheme, are struggling to properly engage with these traditionally formats, suggesting that we're failing to maximise the potential of the stakeholder engagement and consultation processes.

Digital Reporting, the web-based integration of spatial data, visualisations and other forms of media with the text narrative, presents itself as the sweet spot between too much and too little, as a medium that encourages participation and increases the value of our outputs by making them more accessible, more engaging and more readily understood.

The State of the Art

More than one way to skin a PDF

Though still in its infancy, there seems little doubt that Digital Reporting will continue to grow in relevance and prominence going forward. As EIA practitioners reflect on what Digital Reporting might mean for them and their clients, we are seeing several approaches to the digitalisation of our reporting outputs, a reflection of the wide range of tools and techniques available to us.

- Off-the-Shelf Solutions – The pioneering use of ESRI's StoryMap software by Royal Haskoning, in 2017, demonstrated the potential for off-the-shelf products to deliver this much-needed digitalisation. Since then, Haskoning, with its StoryMap-powered iReport, has been prolific, and use of the ESRI tool is increasingly more widespread. StoryMap benefits from ESRI's ongoing support and maintenance, as well as integration with ESRI's ArcGIS, a staple of most in-house GIS teams. However, off-the-shelf products lack the tailoring and freedom of other approaches and practitioners should be mindful of ongoing licensing requirements.

- Purpose-Built Solutions – An alternative approach is the development of novel solutions, such as AECOM's proprietary Digital Reporting Platform.

Purpose-built solutions are the product of subject matter experts coming together with software developers to address specific problems and allow for greater flexibility and creative control compared with off-the-shelf products. This approach doeshoweverrequire upfront investment and ongoing maintenance commitments.

- Bespoke Websites – The development of bespoke websites is also an option. The bespoke website approach offers high-quality presentation and visuals, with a slick finish, but perhaps lacks the depth, interactivity and scalability of other approaches.

Digital Reporting in Practice

Discussion of Digital Reporting has, unsurprisingly, focused largely on the digitalisation of the ES, the NTS, or a combination of the two, and there are some compelling examples of these:

- The A303 Stonehenge Digital Environmental Statement, developed by AECOM, for Highways England, uses the NTS narrative and full environmental baseline, presented spatially, with unique baseline descriptions of each receptor and page-specific links into the full 7000+ pages of the ES to give layers of EIA 'story', from receptor name to full impact assessment.

- The A9 Tay Crossing to Ballinluig Digital Non-Technical Summary, developed by Jacob's, for Transport Scotland, presents the NTS within the ESRI StoryMap, marrying text narrative with relevant spatial data, images and plans.

- The Illuminated River Project Interactive Environmental Summary (IES), developed by Temple, for the Illuminated River Foundation, uses the ESRI StoryMap to show the proposed illumination of the 15 bridges, the surrounding environs and introduce the likely environmental effects.

- The West Cambridge Masterplan NTS, developed by Atkins for University of Cambridge, uses a bespoke website solution.

However, the benefits of digitalisation should not be solely reserved for these aspects of EIA, and a look further afield highlights a plethora of business-as-usual reporting outputs that are in dire need of a digital face-lift. Some examples of non-ES digitalisations include:

- The Crossrail 2 Environmental Scoping platform, developed by MTEW consortium, with Transport for London, integrates a Content Management System (CMS), ESRI StoryMaps and stakeholder comment database to present, share and capture feedback on the Crossrail 2 Environmental Scoping.

- The Bradwell B Interactive Stage One, developed by AECOM for Bradwell B Gen Co. Ltd is an example of a digitalised consultation report. Launched in support of the Stage One Consultation to compliment the traditional formats, the website provides an interactive summary with links to the more detailed consultation information and the consultation questionnaire.

- Examples of Haskoning's iReport include, for example, a Coastal Protection Strategy for Tacloban & Palo in the Philipines and a Digital Asset Management & Monitoring Report for the Environment Agency in the UK.

In support of 'traditional' submissions, each approach has merit, and each digitalised document will add value to the projects on which they are implemented. And while we are still required by statute to prepare and submit pdf, and in some cases print, documents, it doesn't really matter which approach we take, only that the industry is working with clients to push boundaries and make projects more accessible.

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Next Steps – Can 'Digital' replace 'Traditional'?

The implications of a wholesale move to digital reporting, in particular as part of a holistically digitalised EIA, are tantalising, with far reaching implications for better decision making, workflow efficiency, more accurate assessments, streamlined consenting and more effective monitoring and management. But are we ready to go there?

Engagement with regulators and key Digital EIA stakeholders suggests no, not yet. There are several blockers to the wholesale migration to the digital format, with the legislative requirement for pdf and print submissions being the most prominent, and lack of standardisation being a close second.

However, as clients increasingly invite practitioners to 'innovate' as a requisite for winning work and as examples of Digital Reporting and other aspects of Digital EIA are more frequently cited as best practice by statutory stakeholders, these approaches will move from leading-edge and fringe to business-as-usual, with regulation catching-up in due course.

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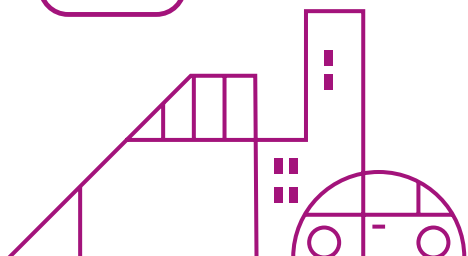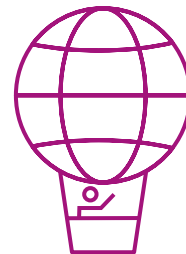
Enhancing the consultation process: Innovating communication

Consultation occurs across most projects in one way or another and is a key tool which forms part of the design development and approvals process. It is a legislative requirement intended to inform stakeholders of the key design and environmental information, whilst also giving them the opportunity to participate in the decision-making process. This benefits the impact assessment as any feedback can be incorporated into both the design and the assessment which improves the quality and effectiveness of the assessment.

Traditionally consultation occurs in the format of a series of workshops, public events or meetings using technical reports and plans. Digital technology offers the opportunity to develop immersive and informative experiences as a more accessible and interactive consultation experience, to help engage stakeholders.

Digital technology has increasingly been used in consultations to offer an alternative communication approach which allows us to bring complex designs and impact assessments to life. One of the early examples of its successful deployment within Arup was the use of visualisation to demonstrate the planning, staging, and legacy of the London 2012 Olympics to show stakeholders the life cycle of the development. Digital technology has continued to grow and there are numerous examples of how it has been harnessed to enhance consultations.

Digital innovation opening the doors to consultation

Public consultation events can be restricted in their effectiveness due to accessibility, which includes the language used and the ease with which stakeholders can view the information they need. Arup has worked with Highways England to create multiple online virtual public consultation portals. The portals allow stakeholders to access the design and impact assessment documentation, remotely and at their convenience, which helps the consultation process integrate with the stakeholder's daily life.

The Highways England A417 Missing Link scheme used a virtual public consultation portal. The technology placed the stakeholder in the centre of the consultation room where users could pan around the room to view all the information banners, technical reports and plans. The virtual experience integrated multiple videos, including a project 'fly-through'. The video delivered the key scheme messages without relying on text-heavy technical documents and plans. This included an overview of the integrated design approach of key elements such as a green bridge, communicating key issues such as ecology and biodiversity as well as key landscape considerations given the proximity to the Cotswold Area of Outstanding Natural Beauty.

Immersive experiences

Digital technology offers stakeholders the opportunity to fully immerse themselves into the immediate surroundings of a development as if it were operational. The A417 project included a 3D model which enabled stakeholders to position themselves anywhere in the local landscape to understand what the scheme would look like from a viewpoint of their choosing. A driving simulator allowed stakeholders to experience the proposed scheme in a digital environment to understand how it might look and feel. The immersive tools not only helped stakeholders understand the operational scheme in more detail, but they added a fun and engaging element to the event which helped to widen the demographic of attendees.

Immersive technology has been developed further to incorporate multiple senses in a virtual reality (VR) environment. Arup developed award-winning VR Soundbooths for Heathrow Airport's public consultation events. The demonstrations combined a virtual user interface, a 360-degree video with aircraft visualisations and audio recordings of the aircraft at different background soundscapes. The Soundbooths provided an interactive and immersive experience that helped consultees understand the potential changes in aircraft noise exposure that might affect their own communities. The Soundbooths helped stakeholders engage more effectively with the design, which in turn, increased the quality of the consultation feedback and promoted an inclusive decision-making process.

The power to drive change

Digital tools can be used to facilitate new insights and perspectives to help drive positive change. Developed alongside the Bernard Van Leer Foundation, the Urban95 virtual reality experience has been used to raise awareness around the challenges that children face in cities around the world. The tool has been used to inspire designers, planners, policymakers, and decision-makers into thinking from the perspective of a three-year-old, by making the user of the headset feel 95cm tall. The technology has been successfully used to help promote and inform better decision making and the inclusive planning of urban spaces to enhance the experiences of younger members of society.

Within not only Arup, but also across IA practice, consultation is a key area where the boundaries of innovation are being pushed. Digital technology can create a suite of tools which can increase accessibility, improve engagement with a wider audience and provide more effective communication. Digital technology will become an increasingly important tool for consultation across all phases of the IA process. By embracing these methods it is possible to enhance how the public and stakeholders engage with projects and IA.

...a suite of tools which can increase accessibility, improve engagement with a wider audience and provide more effective communication.

Georgina Cutler

BSc (Hons)

GIS Practice Lead

Royal HaskoningDHV

Post consent and monitoring: Recognising the value of digitisation

In recent years practitioners across the IA industry have recognised the benefits of utilising data and digital technologies throughout the lifecycle of a project including post consent and beyond. Nowadays there is a greater focus on a joinedup approach where data gathered and managed during the assessment phase is then passed on to help reinforce post consent activities. The quality and ability to share data becomes fundamental when changing ownership throughout the different project stages and can vastly increase productivity. If data is packaged and made available from the assessment stage, even with years in between, it still provides a useful baseline to feed into the project's environmental management and monitoring plans.

Generating value from data

Greater availability of data and tools can facilitate a more in-depth and transparent refinement process during the assessment phase which in turn reduces the risk of vast amounts of rework during post consent. Throughout the implementation/construction and operational phases information will come from a variety of sources including consultants/contractors, construction teams, consenting authorities and key stakeholders. In amongst these, practitioners are faced with the challenge of spending a lot of time gathering and reporting on data, dealing with complex and disconnected platforms, and a lack of knowledge transfer between projects. Common Data Environments (CDE) and shared digital platforms can be put in place to reduce these issues

while managing alterations and proposed mitigations as they arise. These systems have the ability to automate data analysis, forecast environmental risk, automate reporting and evaluate compliance against a given set of conditions. There are numerous environmental risk management platforms already available off the shelf depending on the scope and functionality needed.

There are many tasks that are required to take a project from post consent through to construction and monitoring including the creation of management plans, carrying out site specific surveys, and acquiring permits and licences.

Digital Tools in Practice

- *Mi.License* has been developed by Royal HaskoningDHV for permitting of industrial sites in the Netherlands. It is a digital platform to collate and share all the information required for permit applications and gain agreement across multiple stakeholders in order to develop industrial sites faster and with lower impact. The goal of *Mi.License* is to make the licensing process faster, more transparent and easier to understand. *Mi.License* combines the gathering of information, establishing the legal framework and generating the application in one step. As a result of standardisation and automation, the time is shortened to arrive at an admissible permit application and has currently been used to carry out a revision permit for DSM Emmen.

- As part of the **Bacton Sand Engine** project, Royal HaskoningDHV developed a Digital Sand Engine Twin. Essentially, a 3D model of the beach, fed automatically by regular surveys, and a module that enables semi-automated predictions of future beach development, to identify when the triggers for intervention are reached. The tool was provided in a web-based portal with other functionality needed for fulfilling the client's beach management role.

- To support coastal monitoring surveys Royal HaskoningDHV created a tool for the Environment Agency to report on their asset monitoring data. RHDHV regularly undertake asset inspections for the Environment Agency on both coastal and fluvial assets across the UK. The traditional approach was paper based reporting with large amounts of raw survey data being stored away out of sight. As part of a drive for digital innovation, the **NICAS project** team (Non-Invasive Coastal Asset Surveys) provided the EA with an online reporting tool using ESRI's Storymap functionality. A recent set of asset inspections were undertaken using a combination of UAV drone and geophysical surveys for a defined number of assets including sea walls and embankments. The data was then analysed in-house to identify defects and areas of concern along the length of the assets. The customised report provided the client with an interactive digital platform, allowing them to interrogate the asset analysis and the UAV data stored on the cloud. This method of reporting significantly enhances the traditional methods of asset inspection, with geo-located defects identified on the 10 interactive maps covering sites across the south coast. Embedding a point cloud viewer also gave the client access to the raw data from the UAV surveys, removing the need for specialist software and high-end hardware.

The use of digital tools will create many opportunities in the management and coordination of post consent activities. Online management systems and communication platforms will provide the basis for successfully coordinating tasks, while high end visuals such as data viewers and dashboards provide clear reporting and direction of effort. On-site data collection tools play a key role including UAVs, mapping tools and automated forms and it is this combination that enables teams to effectively communicate environmental risk and mitigation.
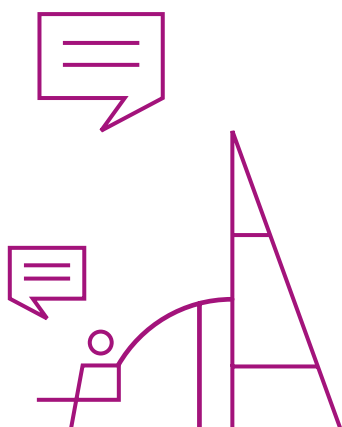
...a joined up approach where data gathered and managed during the assessment phase is then passed on to help reinforce post consent activities.

Alistair Walker

CEnv, MSc, MSCi, MIEMA, MEnvSci

Senior Consultant

Quod

With contributions from:

Exploring a future vision for Digital EIA

Quod, Temple Group, Liquorice, ODI Leeds and Connected Places Catapult (CPC), with backing from Innovate UK (a Government-backed funding agency for innovation and research), have recently completed a feasibility study to explore a future vision of how a better designed, data-informed and digitally delivered Environmental Impact Assessment (EIA) process might be beneficial for developers, planners and members of the public. The study identified the need for a wholesale digital transformation of the EIA process and sought to create a roadmap and recommendations to central government around how the sector can achieve this shift in practice. Full details and prototype concepts relating to the project can be found on the project website here.

This has been carried out in parallel with the IEMA Digital Working Group initiative to stimulate discussion around the changes needed in our current system and how we can start overcoming the barriers and obstacles ahead of us.

How can we transform the sector?

This project was carried out in three distinct phases; the first consisting of a technology and stakeholder review to understand the core elements and "pain-points" within the current EIA process. This explored the user journey through the process, and what ideas and/or products could potentially be applied at each stage to achieve digital transformation. Through

stakeholder interviews and research, the project team identified seven interlinked components that underpin the EIA process and were identified as being core opportunities for further exploration. These were:

- Automated Screening

- Assisted Scoping

- National Environmental Data Hub

- Digital EIA Workspace

- Impact Modelling Ecosystem

- Interactive & Accessible ES

- Post-development Monitoring

Following feedback received from further consultation on the concepts, three of these were taken forward for further development with the creation of wireline user experience (UX) prototypes; these being the Data Hub, Digital EIA Workspace and the Post-development Monitoring. Finally, and in parallel to this process, interviews were carried out with government, regulators and other key stakeholders to better understand the financial, regulatory and technical obstacles to implementation of these concepts and how they can potentially be overcome.

Further details of these concepts can be found on the website or through the downloadable summary report.

The reality of making this happen

Key barriers identified were the current discrete and separate hubs of, and barriers to, data ownership; lack of legislative controls to ensure data and platform consistency and compatibility to maintain an open system; and a cultural shift in the application of EIA and the new range of skills and expertise required in both the private and public sectors to facilitate this change.

Key opportunities are the potential for a unified source of all passive and active environmental data; a far more streamlined, standardised and integrated IA process that proactively influences design; and the integration of monitoring feedback to improve current and future environmental performance and project efficiencies.

Through this process, we have reviewed the existing and emerging technology and tools in the sector that are attempting to provide a solution to some of these aspects. One example is where Xodus Group have developed and implemented a cloud-based software platform called 'eBase'. This is a digital IA tool that facilitates the impact assessment process in a collaborative, standardised online platform that makes EIA more transparent and robust. It can:

- Store commonly used EIA data including activity and receptor descriptions, impact summaries, mitigation and guidance;

- Complete accurate, efficient and systematic environmental impact identification and assessment; and

- Develop reports.

While previously developed and utilised outside the UK, Xodus are applying this tool in the UK and demonstrating the potential of a Digital EIA Workspace.

Final word

Looking ahead to what needs to happen to stimulate a full digital transformation in reality, it is essential that private innovation works in full consultation with statutory public bodies and government to ensure that tools created to fulfil these needs are compatible and aligned with a fully representative and agreed vision for the direction of travel. This will ensure that this concept can be delivered at an institutional and nationwide scale in practice and is fully accessible to all stakeholders, and avoid a potential 'wild west' scenario of siloed products creating new technical or financial barriers to widespread adoption. IEMA can act as a bridge to facilitate these discussions. In relation to this project, it is likely that relevant funding institutions will seek to understand and develop each of these concepts further in liaison with regulators and Government with a long-term vision of having fully integrated digital tools aligned to a government policy framework. This should create a common digital EIA space that allows for innovation of new tools and working practices.
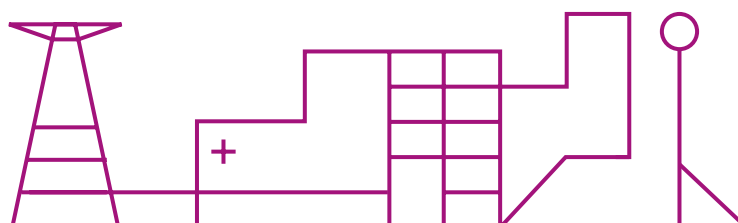
Do you make effective use of ALL of IEMA's IA member resources?

IEMA's website contains a treasure trove of IA related content, as well as information about IEMA's volunteer network groups, from regional groups, through UK impact assessment to ESIA across international finance. But not everyone makes the most of this free member content, including:

- Future events and webinars.

- Recordings of past webinars, with over 24 hours' worth of IA content.

- IA Guidance & advice: From Effective NTS, through materials and waste for EIA, health, influencing design and delivery, to forthcoming documents on climate change adaptation and major accidents & disasters.

- The Proportionate EIA Strategy.

- Over 400 EIA articles and 200 case studies related to EIA, developed by Q Mark registrants in recent years.

- Individual and organisational recognition specific to EIA, through the EIA Register and EIA Quality Mark schemes respectively.

- Contact details to engage with the steering group members for the:

  - IA Network
  - GESA Group (Global Environmental & Social Assessment)
  - Geographic/Regional Groups

www.iema.net

Summary

Tom Gold - Guest Editor

The articles included in this Outlook Journal provide an insight into a growing body of activity, knowledge and best practice in this space. We are however conscious that this is not a complete record of all the good Digital IA practice taking place. To help us widen the pool of knowledge and drive this agenda forward we would welcome learning of any other relevant practices or insights. Please see the 'Next Steps' section of the Microsite for details of how to get in touch.

Innovation in practice looks likely to move quickly in future years, with the consequence that many of the tools and methods described here may be standard practice or outdated in a few years. The potential benefits of Digital IA however, justify a concerted effort to move wider practice to a state of realising these benefits as soon as possible. These benefits can include more efficient and effective IA at a time when IA needs to prove the great value it has in addressing the urgent sustainability issues of our times. Bringing Digital IA to bear quickly as a widely used tool in this will require a wider group of practitioners embracing these examples of best practice and adopting the cultural changes and habits required.

Practitioners should therefore seek to engage with the draft principles for Digital IA set out in the Primer, share best practice and work collaboratively to implement Digital IA practice. I hope in this, the IEMA digital working group will continue to provide the materials to help facilitate this change.

Finally, thank you to all the authors, reviewers and contributors for giving their time to make this Journal happen.

Acknowledgements

IEMA's EIA Quality Mark - a scheme operated by the Institute allowing organisations (both developers and consultancies) that lead the co-ordination of statutory EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. The EIA Quality Mark is a voluntary scheme, with organisations free to choose whether they are ready to operate to its seven EIA Commitments: EIA Management; EIA Team Capabilities; EIA Regulatory Compliance; EIA Context & Influence; EIA Content; EIA Presentation; and Improving EIA practice.

Digital Impact Assessment in Practice
Summaries of best practice in applying digital tools and technologies in Impact Assessment

This sixth edition of the Impact Assessment Outlook Journal provides an overview of how Digital IA is being implemented in practice and guidance on implementing best practice. This edition has been prepared by the IEMA Digital IA working group as a follow up to the Primer document titled 'Digital Impact Assessment: A Primer for Embracing Innovation and Digital'. These articles have been prepared between February and May 2020 for this Outlook Journal. The result is an informative summary of Digital IA practice intended to illustrate the concepts and principles set out in the Primer and inspire practitioners to embrace Digital IA.

About the Guest Editor: Tom Gold BSc, MSc, PIEMA
IEMA digital working group chair and Senior Consultant at WSP

Tom is a Senior Consultant at WSP with four years' experience as an Environmental Assessment and Management Consultant. Before an MSc in Environmental Impact Assessment & Management at the University of Manchester, Tom worked for three years as a GIS technician providing GIS support to planning and environmental disciplines. His main experience at WSP relates to the environmental assessment and management of a range of projects but with a particular focus on highways and sustainable transport schemes.

Further to Tom's early experience delivering GIS and data support to environmental assessments in a GIS role, Tom now implements digital practices as an environmental coordinator and project manager. This included the delivery of WSP's first Digital Non-Technical Summary. Since November 2019 Tom has been the WSP Environmental Assessment and Management (EAM) team's digitalisation lead, responsible for developing and delivering a Digital IA strategy

About IEMA

IEMA is the professional body for everyone working in environment and sustainability. We're committed to supporting, encouraging and improving the confidence and performance, profile and recognition of all these professionals. We do this by providing resources and tools, research and knowledge sharing along with high quality formal training and qualifications to meet the real world needs of members from their first steps on the career ladder, right to the very top.

We believe that together we can change perceptions and attitudes about the relevance and vital importance of sustainability as a progressive force for good. Together we're transforming the world to sustainability.

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