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Digital Transformation in Policing

How Esri's ArcGIS enables transformative change across policing

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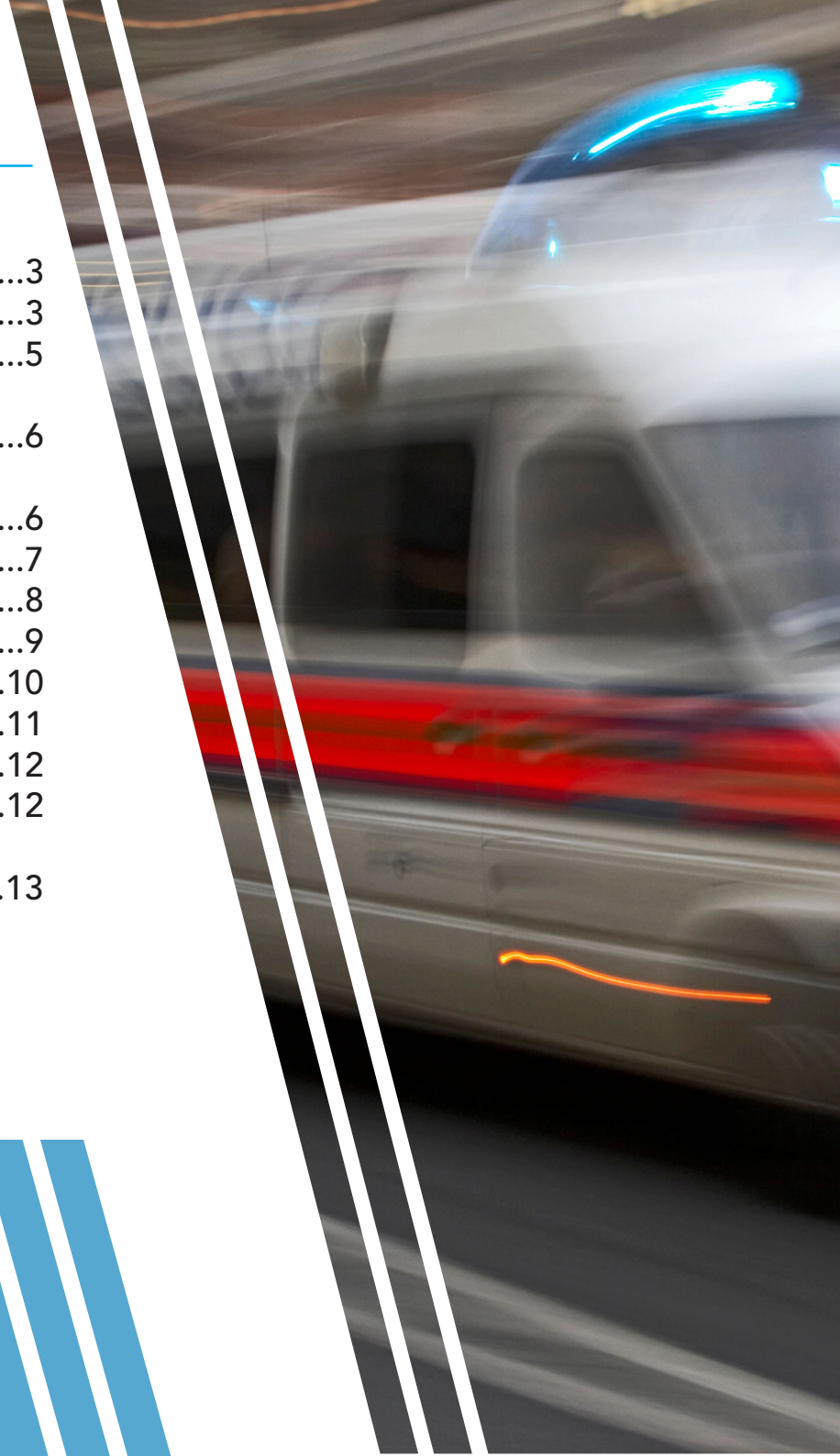

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TRANSFORMATIVE CHANGE ACROSS POLICING

Police Vision 2025,
National Police Chief's Council

"The communities we serve are increasingly diverse and complex, necessitating a more sophisticated response to the challenges we face now and in the future... if we are to meet our communities' needs, the service must continue to adapt to the modern policing environment."

"Local policing will be tailored to society's complex and diverse needs – with the delivery of public protection being informed by community priorities and robust evidence-based demand analysis."

How Enterprise GIS supports the realisation of the 2025 vision

Fundamentally policing deals with a set of geographic issues; Where and when are our communities most at risk, and where should we put the people and resources we have to mitigate these risks? UK policing has a significant opportunity to deliver service transformation through moving towards a more place-based approach to delivering policing. Implementing an Enterprise GIS (Geographic Information System) Platform across a police service (or services) enables data-driven decision making around these fundamental questions.

Local Policing needs to understand, relate to and communicate with the communities it serves and how these communities are changing over time. For example, if an area has emerging issues with exploitation of a particular demographic or ethnic group how do we know which other local areas are likely to be affected? Who are we engaging with in the community that might be able to help? What information do other agencies have in this area that can be shared to create a fuller picture of the extent of the issues?

How Enterprise GIS supports the realisation of the 2025 vision

Enterprise GIS analytics can assist policing in building risk models that help optimise the deployment of specialist resources and therefore to minimise the time it takes to respond to requests for service. This type of analysis has been done at a national level for CBRN resilience assets, by applying mathematical models to simulate a range of possible scenarios, estimate the response times for first, second, and third assets to a scene, in order to understand the optimum locations for the assets based on the current national risk assessment.

As well as optimising the deployment of specialist capabilities, an Enterprise GIS Platform can then make sure those teams have access to the very latest, dynamic briefing information on a mobile device, so they are fully aware of the risks and threats at any incident they attend.

Police services have plenty of digital information – we can help you turn that into intelligence. Countless GIS capabilities are available, including the mapping of mobile calls and data transmission against cell sites for a rapid understanding of criminal activity, leading to better evidence and assisting convictions. Better briefing, whether internally or externally, leads to better investigations, better convictions, particularly in complex cases.

A GIS system is one of the better operational tools for bringing diverse data sets together – graphically displaying them, showing what is or has happened in an area - an effective way to bring different partners together, e.g. utilising a location-based App for reporting overdoses, across multiple agencies, alerting them, live, when the density increases over a given time period in an area, instantly recognising repeat harm-zones. This is the 'thorough, evidence-based understanding of demand' to which the service refers.

Police Vision 2025, National Police Chief's Council

"Decisions on how specialist capabilities are positioned, structured and deployed will take into account the need to rapidly protect communities and the vulnerable, as well as provide value for money."

"Digital policing will enable us to make better use of digital intelligence and evidence and transfer all material in a digital format to the criminal justice system."

"Police forces and their partners will work together in a consistent manner to enable joined up business delivery around policing support services and community safety."

"Reducing crime and protecting the vulnerable are core priorities for the police service. To achieve this, the service must increase partnerships within the community and with other service providers."

Digital Transformation in UK Policing with ArcGIS

What is the Esri vision for using ArcGIS to support Digital Transformation in UK Policing?

Why is it important?

Esri can support you in delivering:

- Improved situational awareness
- Better briefing for officers
- Real time analytics – data driven policing
- A closer working relationship with public
- Collaboration – multi-agency and public interaction (data sharing)
- Adopting a "place based approach"
- Understanding demand for service and ability to respond
- Adopting technology – mobile, big data, remote working
- Responding to changing demands. Visualise those demands
- Responsiveness

What is ArcGIS?

ArcGIS is:

An enterprise platform for digital transformation, delivered to meet Home Office, Police ICT Co & National Police Technology Council principles

An open platform
Fit for the future
Cloud ready
Worth investing in

POLICING CAPABILITY

Understanding what has happened, or is happening, is core to policing – ensuring the right information is available to the right resources is key to coordinating an effective response. The majority of briefings, whether they concern incidents, operations or taskings, are currently given in person to officers - therefore getting accurate and easily-understood information to officers in a timely fashion is of paramount importance. The ArcGIS Platform provides powerful applications that enable police services to share with officers a vast range of information in a meaningful, easily understood way. That could include intelligence on live deployments and on historic crimes, whether in the last hour or the last decade.The information can be shared whether officers are at police facilities or mobile. Tasked officers can annotate, filter and query the information provided.

Intelligence can be provided to officers on the ground in the context of their location. An officer can see where they are on a map and ask questions such as:

- where were the latest incidents within a given radius of my position?
- what location based intelligence is there relative to this position?
- Are nominals of interest or outstanding taskings near me?

ArcGIS Applications also enable officers to see where colleagues are while out on patrol - improving officer safety and coordination. Location based alerts are also possible, providing up-to-date intelligence to officers when they enter a particular area. This could be safety information, or information about operations that are on-going, giving them context and situational awareness.

Esri's StoryMaps, offer a flexible capability to widen the briefing audience. A StoryMap combines location information / maps and analysis as well as other media such as text, images, video and web content. This enables rich tailored content, delivered through COTS (Commercial off the shelf) technology, to provide a dynamic briefing tool for all audiences, including Senior Investigation Officers, the Investigative teams, senior officers or the public.

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Self-briefing & Situational Awareness

Officers can:

- Self-brief – 24/7
- View in the field / via smart devices
- Update centrally – one version of the truth
- Push & pull information
- What's happening around me?
- Automated taskings based on location
- Brief the public – share relevant information

Improve Efficiency

Officers can:

- Ask the right questions, and get answers, about resource utilisation and demand
- Determine high, low or no crime area by type and time/date
- Find out where officers are
- Visualise where you have been policing and over what period
- Make this information available to the public
- Help drive efficiency in resourcing tactics and strategies

There is increasing focus on demand for service and efficiency as well as policing 'visibility'. Utilising ArcGIS: an advanced analytical and visualisation system we can offer police services an effective way of understanding the nature of demand and providing internal, and external, visibility of the way their scarce resources are managed.

At a strategic level ArcGIS uses modern technologies such as big data and distributed computing to efficiently analyse large datasets. On a tactical level, perhaps daily or weekly, our GIS capabilities empower analysts to find the patterns and to generate outcomes quickly. The results can then be shared with officers and/or the public via easy-to-use applications which are accessible at anytime, anywhere.

Contact Management and Command & Control

Esri provide a next generation location platform for Police Contact Management. Whilst most command and control systems just offer a digital Ordnance Survey map to show incident locations, ArcGIS provides real-time data feeds, including live traffic, resource status, aerial photography, and much more to enable the capability in this important area.

In addition to providing a next generation call handling and dispatch solution, ArcGIS provides real-time dashboards, which can be configured to show live performance metrics for your control room. These dashboards assist in understanding and responding to trends in calls for service and support forward planning of resource deployment to meet emerging demand. Temporary dashboards can be configured for managing specific events such as festivals, air shows, and sporting events.

The same real time information can also be provided to officers' smart devices, allowing them to see who's nearby, how to get from their location to an incident, and details about incidents around them or where they're attending.

With flexible delivery options including cloud hosted, on-premise, and hybrid, ArcGIS offers the most powerful mapping and gazetteering platform available to police services.

The maps can be layered with additional information including:

- Aerial imagery, CCTV and ANPR camera locations, and much more
- Ordnance Survey 'Sites' map layer shows dispatchers the entry and exit routes for large sites such as hospitals, schools, and prisons, ensuring officers aren't wasting time searching for the correct entrance
- Real time feeds such as officer and vehicle location, and traffic congestion help inform intelligent dispatch decisions

Event Management

ArcGIS allows Police services to improve the response to planned and spontaneous events, such as flooding. It provides a platform to fuse multi-source intelligence (incident data, police resources, weather information, flooding overlays, partner data) into a single view, and share that view with control room staff, command teams, and front line officers. This interactive event management solution can answer questions such as:

- How many properties are in the affected area?
- If the flood waters continue to rise, what critical national infrastructure is at the greatest risk?
- Where are the most vulnerable people and where should we evacuate people to?

ArcGIS also provides templates for publishing information to the public, such as:

- Where are the road closures?
- Where are the risks and hazards?
- Where are community resources such as evacuation centres, shelters, and sandbags?

The system can even be used to capture information from the public, for example allowing them to register as vulnerable or log flood water levels at their property, without clogging up already busy switchboards.

The same, easily deployed, solution also supports the management of pre-planned events such as air shows, festivals, sporting events, and public protests. Pre-event briefing documents can be created, with dynamic maps and charts, to replace cumbersome paper based operational orders. A significant advantage here is the ability to remotely update these briefings as new information comes in, for example: keyholder details, and opening times. These interactive briefing plans are typically shared with tablets and smartphones, providing real-time information to all involved.
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Understanding the Community

In the coming years the challenge for British policing is to engage ever-more effectively with the public they serve: Digital policing will support and enable that requirement. The first step in engaging with the public and local communities will be to better understand them in greater detail, particularly to ensure that the more diverse and complex communities are included. The creation of community or neighbourhood profiles can assist with this strategy. Rather than utilising paper based charts, tables and text for each area, however, this demographic information can be made available to officers and civil staff in a visual, dynamic fashion, enabling them to incorporate a range of data about the community to really understand the dynamics of the area. With resources stretched, more sophisticated crimes occurring, and risks of localised extremism and terrorism, ArcGIS helps police services rethink existing approaches in order to deliver new, smarter solutions that help to deliver effective local policing. Dynamic web based mapping and data means that the effort to update these profiles on a regular basis is significantly reduced.

As an example, Avon & Somerset Constabulary had over three hundred paper-based neighbourhood profiles, which needed significant time and resource to update every year. Now they have a single dynamic web application, called the "Neighbourhood Profile Atlas", which allows officers and the public to look at up-to-date datasets about their communities and these are accessible anytime, anywhere via the internet. This not only empowers the officer, providing knowledge at their fingertips but also empowers the force's relationship with the public, increasing trust and confidence in community officers. It is also much easier and quicker to update as the data is dynamic.

Taking vast amounts of raw data and representing this in a way that can be quickly understood at neighbourhood, borough, police service or national level, will enable police services to be more agile and outwardly focussed.

Providing members of the public with the ability to directly enter data relating to incidents, concerns or crime, with precise locations, will provide valuable opportunities to work more openly with communities and will also enable channel shift away from less efficient traditional methods of reporting. Partner agencies, including multi-agency teams would also benefit from being able to directly report incidents, helping to tackle community issues requiring broader intervention.

Criminal Intelligence, Crime Pattern Analysis & Operational Policing

We can help answer challenging questions, including:

- Where are we delivering policing at specific times of day, days of the week?
- Where have these mobile devices been used, located together?
- Have we repeat or near-repeat crimes – providing the basis for operational decisions?
- Where can we impact cross-border crime?
- Providing information directly to operational officers
- Integrate with and show me i2 (Analyst Notebook) charts as locations
- What is the likely criminal journey to crime?
- Where should I place an ANPR device?

The ability to utilise an ever-increasing volume, range and velocity of data, originating or processed from an array of sources can assist any business, and law enforcement is no different - so whether addressing crime or policing efficiency, analysts and others need to be able to interpret the data, recognise patterns and enable an effective approach to crime and disorder.

ArcGIS is utilised to detect patterns, to fuse an ever widening variety of datasets and thereby to discover new insights, for example relating to the impact on crime of social depravation, HARM indices and much more.

ArcGIS can also be used to support operational policing, such as surveillance operations, by providing intelligence reports through simple map based tools. The information is recorded into a location database which can be queried and linked to other information to show historic incidents or records at a location and this in turn can also be linked to real time feeds such as GPS, CCTV, and ANPR to provide a live operational picture. ArcGIS can even be used with digital terrain models to calculate line of sight from a location, allowing surveillance officers to plan observations effectively, and reduce the number of pre-event site visits conducted.

Big Data Analytics

Esri technology can help emergency services visualise and analyse big data in a way that reveals patterns, trends, and relationships that traditional reports will not. Moreover, we are only just witnessing how organisations, who handle or possess masses of data, some stretching over decades of public service, can utilise this to prevent crime and accidents and enhance public safety. Whether this data exists in disparate places, in streams, social media or web logs, whether it is structured or is unstructured, Esri technology can pull it all together to help decision making and analysis.

Visualisation establishes non-obvious connections between seemingly unrelated data; for example, it links persons, places or things to a past incident or to other information which can inform decision making in relation to future events or incidents.

Cell-site and ANPR Mapping

Mapping the cell sites and call data for devices used by suspects, crime victims, witnesses and missing persons can add significant value to the policing effort needed to deal with such events. Our technology ensures that location data relating to crimes, incidents and intelligence from other resources, such as data from ANPR systems and CCTV can be combined to provide a unique insight into what is happening or has occurred.

Cell-site tools can also combine cell site surveys carried out by qualified RF specialists, all of which are invaluable in helping to create, support or disprove lines of enquiry, thereby assisting with the timely case resolution and efficient use of scarce resources. Esri provides a tool set based on their familiar, desktop-based, GIS tools harnessing their power and capability in a way which Radio Frequency Analysts will be able to utilise and apply quickly.

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SOLUTION OVERVIEW

The ArcGIS platform is a commercial off-the-shelf ("COTS") enterprise GIS technology. Users work with information using applications that connect to the platform. The platform provides maps, data, analytics and apps using web services. It can be implemented on-premise or in your chosen cloud and this is called ArcGIS Enterprise. It is also available as a Software as a Service (SaaS) solution known as ArcGIS Online.

Several IT systems are used across policing, each often with their own silo of information. Accessing and sharing this information was previously difficult and prevented Police IT from advancing. Our platform works across those silos to unify the information using the power of location. We empower our users with a configure first approach to rapidly create solutions with the flexibility to accomodate changing operational requirements. Apps within the solution work across all the common mobile networks and devices and are underpinned by the same information model used across the platform so consistent information is available at anytime, anywhere.

Integration and Interoperability among Police IT systems is a key part of Policing Vision 2025. Esri's open vision unlocks the power of ArcGIS using open standards so that you can deploy an interoperable and common technology across your organisation. Offering economy of scale, controlling technical diversity and enabling you to rationalise various GIS systems onto one common platform.

The ArcGIS Platform Components

The ArcGIS Platform is made up of 6 components.

1. ArcGIS Enterprise
   - Web GIS Platform
   - Mobile Apps
   - Web App templates and builders
   - Distributed Analytics
2. ArcGIS Online
3. ArcGIS Desktop
4. Specialist ArcGIS Capabilities
   - Big Data – GeoAnalytics Server
   - Real-time GIS – GeoEvent Server
   - Data exploration tool – Insights for ArcGIS
5. Gazetteer
6. Developer APIs/SDKs

ArcGIS Enterprise is the core of the platform. A complete enterprise GIS deployed on your infrastructure or chosen cloud, ArcGIS Enterprise offers capabilities like officer briefing apps, event and operation management apps, as well as intelligence and investigation analysis tools. ArcGIS Enterprise also provides a corporate map server which delivers maps and spatial data across the organisation for use in business systems like command and control.

ArcGIS Online offers the same Web GIS platform available through SaaS. Customers have access to both ArcGIS Enterprise and ArcGIS Online giving them the flexibility they need.

ArcGIS Desktop is an enhanced geospatial data management, spatial analysis and visulisation tool used most commonly by GIS managers, intelligence, crime and performance analysts, to create mapping and analytical products. ArcGIS Desktop also has specialised tools for predictive analytics, radio frequency and mobile communications analysis and is used in evidential case preparation. Combined with ArcGIS Enterprise, ArcGIS Desktop enables analysts to get dynamic intelligence products out to the frontline through web maps and apps accessible on officer's mobile devices.

Our **real-time data services, big data analysis and data exploration tools** deal with the sophisticated problems that police forces are facing today such as understanding the totality of your demand and resources to improve decision making in the context of space and time. With the growth and potential of the Internet of Things, analysing this big data using GeoAnalytics server

can help you find the needles in the haystack. Enhanced situational awareness can be achieved through enrighing your officer location feeds with geo- intelligence using real time location services provided by GeoEvent Server. We can provide analysts with simple, engaging dashboards for data exploration which can be shared to the executive team to support decision making using Insights for ArcGIS.

The fifth component, our gazetteer product called LocatorHub, provides accurate and fast address management and search functionality across the organisation. LocatorHub has an open API which enables us to integrate it into other systems quickly and easily, such as records management systems or command and control. LocatorHub has advanced functionality to make sure the user gets the result they are looking for across multiple datasets. Esri also hosts a worldwide address search and geocoding capability for 135 countries, particularly useful on investigations across borders.

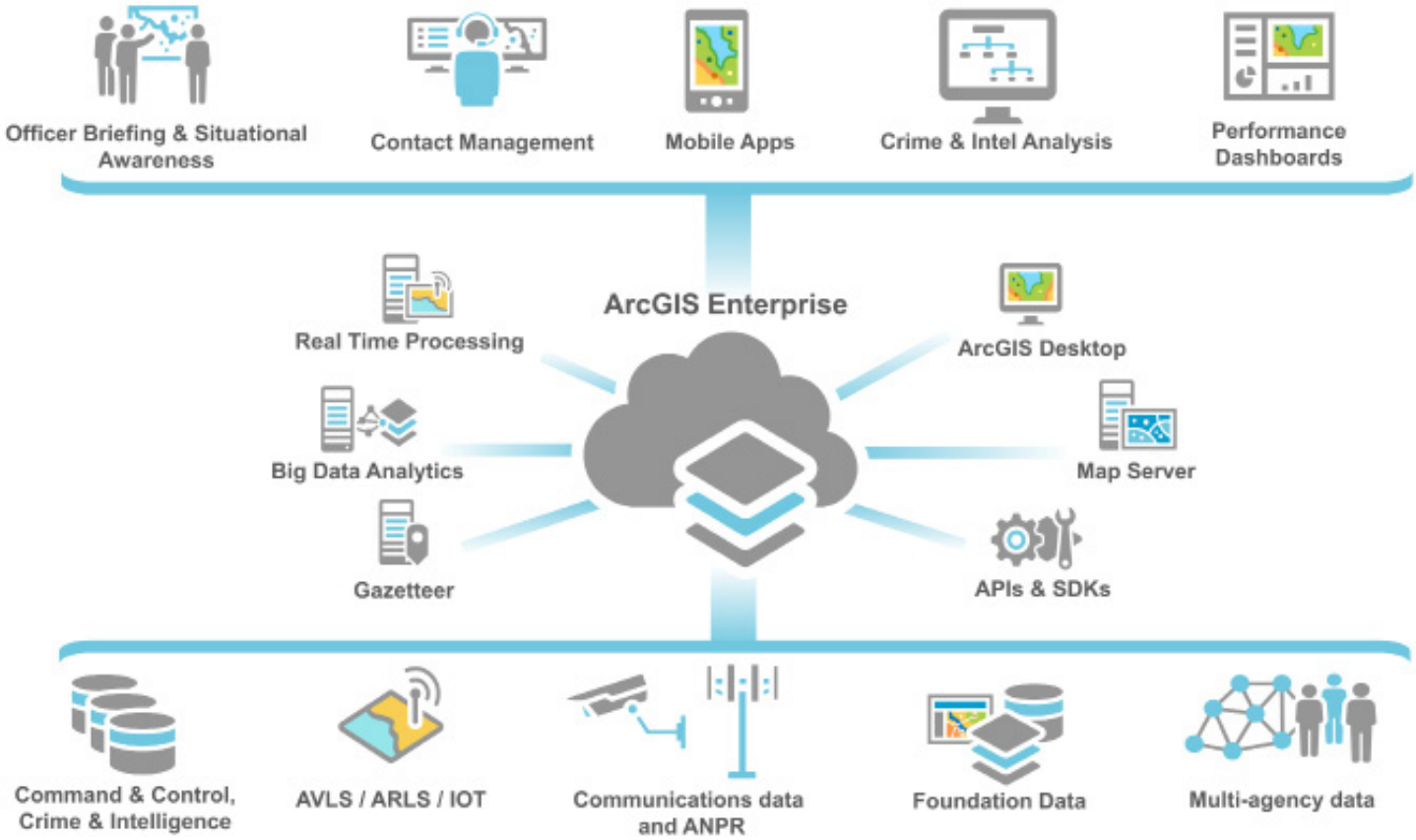
There are a range of developer API's and SDK's that work with the ArcGIS platform. This empowers developers to extend the platform above and beyond our out-of-the-box ("OOTB") configurable app templates to meet specific needs and provides the greatest overall flexibility. Mobile SDKs can be used to integrate our mapping and analytics into force wide mobile apps and Web API's allow creation of customised applications across your force intranet. We also have an extensive partner network including Microsoft, IBM, Motorola, Create Intelligence, Aligned Assets and many others who provide solutions already integrated with ArcGIS.

Esri's ArcGIS Platform is state of the art providing new capabilities to our police customers each year. Esri invests roughly $250m each year into research and development of ArcGIS technology which enables us to be truly innovative and deliver digital transformation. This includes recent developments in:

- 3D visulisation and analysis
- Drone Mapping
- AI and Machine Learning
- Augmented and Virtual Reality
- Big "Spatial" Data analysis

Esri UK's core value is Customer Success; to help our customers get maximum value from the ArcGIS Platform, delivering win-win solutions that solve business problems. We offer a range of services to support our customers in achieving true digital transformation including:

- Professional services consultancy
- Embedded product specialists
- Implementation services
- Training, from free online courses to on-site formal courses.
- A dedicated UK technical support team
- A Content team who source and process data for customers


Officer Briefing & Situational Awareness
Contact Management
Mobile Apps
Crime & Intel Analysis
Performance Dashboards
Real Time Processing
ArcGIS Enterprise
ArcGIS Desktop
Big Data Analytics
Map Server
Gazetteer
APIs & SDKs
Command & Control, Crime & Intelligence
AVLS / ARLS / IOT
Communications data and ANPR
Foundation Data
Multi-agency data

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Esri is the global leader in spatial analytics technology and our geographic information system (GIS) software platform, ArcGIS, helps customers unlock the full potential of data, to improve operational and business results.

Esri UK has the UK's largest team of GIS professionals able to provide customers with fully integrated GIS solutions. We have been offering GIS solutions to leading organisations and a wide range of markets including Police, Fire, Ambulance, Government, Defence and Utilities for over twenty years. Customers include Hampshire Fire & Rescue, Ministry of Defence, Birmingham City Council, Defra, the Environment Agency, Metropolitan Police Service, Ordnance Survey, RSA Group, Scottish Power and The Crown Estate.

Esri UK supports Police and Crime Agencies with skills, knowledge and resources in:

- Self-briefing & Situational Awareness
- Efficiency gains - Demand vs Visibility Analysis
- Contact Management and Command & Control
- Event Management
- Understanding communities
- Criminal Intelligence, Crime Pattern Analysis & Operational Policing
- Big Data Analytics
- Cell-site & ANPR Mapping

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