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“The future is digital”

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The Charles Close Society was founded in 1980 to bring together all those with an interest in the maps and history of the Ordnance Survey of Great Britain and its counterparts in the island of Ireland. The Society takes its name from Colonel Sir Charles Arden-Close, OS Director General from 1911 to 1922, and initiator of many of the maps now sought after by collectors.

The Society publishes a wide range of books and booklets on historic OS map series and its journal, *Sheetlines*, is recognised internationally for its specialist articles on Ordnance Survey-related topics.

The future is digital? A review of two mapping apps

Jack Kirby

In an age when so many familiar features of life – from newspapers to music – are becoming digital-first or even digital only in format, it is reasonable to ask whether paper mapping might be going the same way. Already the rise of the satnav means that paper road maps and atlases are in probably terminal decline, while large scale plans have been printed on demand from digital databases for decades. Small scale mapping at (in the UK) 1:50,000 and 1:25,000 has seemed more durable in its traditional paper format, with sales stabilising.¹ Ordnance Survey's output has of course been available digitally via websites and desktop PC software (including Memory Map and Anquet) for many years, but the advent of smartphones and tablets has now given rise to new ways of presenting the existing mapping to a mass audience that, perhaps for the first time, start to suggest that a different future may be within sight.

In January 2013, OS launched its own 'app' for (initially) Apple devices, OS MapFinder.² This was not as much of an innovation as it might have seemed, for commercial apps utilising OS mapping had been available for some time previously. Arising from a recent conversation on the *ordnancemaps* email discussion group,³ the purpose of this article is to thoroughly compare OS's own offering with arguably the leading commercial competitor reusing OS data, ViewRanger, produced by Cambridge-based company Augmentra. (Other apps are available, notably Memory Map, but not reviewed here).

New technologies and their benefits

Before getting to the products themselves, it is worth defining some of the terms used, for those less familiar with the technologies involved. An app is an application, the equivalent of a program on a desktop or laptop computer: a piece of software for a specific purpose. A handheld device is a handheld piece of electronic equipment, which may (for our purposes) be a smartphone or a tablet. Both smartphones and tablets are essentially small portable computers operated principally by touching their built-in screens. Smartphones are smaller (with screens of typically three to five inches, measured diagonally) and have telephone functions built in. Tablets are larger, with screens above seven inches in size, and telephone functions are optional.

Different devices run particular operating systems, in the same way that we are familiar with the difference between Microsoft's Windows and Apple's OS X on desktop computers and laptops. For handheld devices, Microsoft's Windows Mobile has not proved as popular as Apple's iOS, which is instead rivalled by Google's Android. OS MapFinder and ViewRanger are now both available for recent versions of iOS (which runs on Apple's iPhone smartphones and iPad tablets) and Android (which runs on a variety of smartphones and tablets made by multiple manufacturers). Neither app is currently available for Windows Mobile devices, although ViewRanger is also available for some other devices.

¹ Press release, <http://www.ordnancesurvey.co.uk/about/news/2015/paper-map-revolution.html>

² Press release,

<http://www.ordnancesurvey.co.uk/about/news/2013/os-mapfinder-launched.html>

³ <https://uk.groups.yahoo.com/neo/groups/ordnancemaps/conversations/topics/5200>

I am indebted to all who contributed to the conversation, particularly Richard Oliver and Steve Braim.

Just to complicate matters a little further, Amazon produces the Kindle Fire, a tablet version of its Kindle e-book reader. The original Kindle e-book reader is distinguished by using black and white electronic paper and cannot be used to run mapping apps. The Kindle Fire has a colour LCD screen, uses a customised version of Android as its operating system, and will run both OS MapFinder and ViewRanger.

Having digested the definitions above, one key point about tablets for mapping is that they allow a much larger section of a map to be viewed at a time than has hitherto been possible on a handheld device. The area covered on the screen of a tablet is still, depending on device size, generally slightly smaller than a single panel of a folded OS map, but it is sufficient in area that a decent amount of map is viewable at a glance, and the need to scroll around the map is much reduced compared to a smartphone.

A second significant factor is that tablets and smartphones have built-in GPS receivers, meaning that at a stroke the apps under review turn a device into a GPS unit suitable for location and navigation purposes, and often of surprisingly good quality, even if compared to a dedicated GPS. The apps also store maps on the devices, enabling them to be used whether or not there is an internet connection, which is inevitably an advantage when using a device for the sorts of outdoor activities for which paper maps are traditionally used.

This review is based on using the apps on Android devices, principally a Google Nexus 9 tablet, manufactured for Google by HTC, with an 8.9 inch screen. ViewRanger was also used on a Motorola Moto G smartphone with a 4.5 inch screen.

Buying the maps

Both OS MapFinder and ViewRanger are free to install via the App Store on iOS, Google Play on Android, or Amazon Apps on Kindle Fire. Use of OS mapping requires purchases, most easily available through in-app purchases via the source of installation. ViewRanger however can be used additionally with freely available online mapping, by default the crowd-sourced OpenCycleMap, with OpenStreetMap also available along with Bing aerial imagery. Portions of the OpenStreetMap data can be saved in advance for use when out of reach of an internet connection. ViewRanger also offers the OS 1:250,000 map of Great Britain as a free download, which is not a scale available in OS MapFinder.

The two apps offer very different options for purchasing OS mapping. OS MapFinder is based on 10x10km tiles, derived straight from the National Grid and costing 69p each for 1:50,000 tiles and £1.99 for 1:25,000 tiles. For example, I bought 1:50,000 tile SO24, which covers Hay-on-Wye and the area to the north-east. An irritation is that tiles can only be selected and purchased one at a time. To my mind, the tile-based system ignores the potential of digital delivery and just imposes a different set of sheet-lines to the paper maps. The mildly tedious repeat purchasing arrangement is a disincentive to buy large areas.

The makers of ViewRanger, by contrast, have given a lot of thought to how typical users might want to purchase mapping. Its in-app store (some slightly different products are offered by its website shop) offers various options for buying popular areas: 1:50,000 mapping of GB National Parks is split into three groups, with North England and North Wales available at £3.99, South England and South Wales at £2.99, and Scotland and Northumberland at £2.99. For these prices, the entire *Landranger* coverage for the relevant national parks is supplied, at a fraction of the price it would cost in OS MapFinder. Regional 1:50,000 maps are available at £7.49 each, with the actual coverage depending on area and popularity: Devon and Cornwall are the same price as the

whole of the West Midlands. The whole of Great Britain at 1:50,000 is available for £89.99. In one of ViewRanger's occasional sales, I purchased this at a bargain £70, which I consider to be excellent value for my purposes, compared to buying 204 paper *Landranger* maps.

ViewRanger also offers purchases of tiles, each covering a very slightly larger area than OS MapFinder for 1:50,000 (104.9sq km), and a smaller area for 1:25,000 (26.2sq km). The logic of the different areas is not immediately evident, but like OS MapFinder, selection is via an overview map. Tiles are purchased using a credits system: 1:50,000 maps cost 7.1 credits per tile, while 1:25,000 maps cost 20 credits per tile. Credit packs cost from £5.99 for 400 credits, and all work out at just below 1.5p per credit. It can therefore be seen that a 1:50,000 tile costs just under 11p in ViewRanger, albeit with a higher initial outlay.

Where OS MapFinder scores over ViewRanger, however, is in the quality of the map images. OS MapFinder images are advertised as being at 660dpi (dots per inch), and it is possible to zoom smoothly some way into the maps before there is any significant pixilation. ViewRanger does not state the resolution of its tiles, but it is clearly slightly lower, and the zoom function is less smooth. Therefore while OS MapFinder maps are more expensive, it is a slightly better quality map – although for my own purposes, I haven't found any occasions when the resolution in ViewRanger has been an issue – zoom in too far, and it's generally an indication that one really needs a larger scale map.

It is also important to be aware that high resolution means large file sizes. Each OS MapFinder 1:50,000 tile takes up about 2.5MB of storage, on top of a large initial download. The regional ViewRanger files are around 250MB in size. Many budget devices have limited storage and sometimes no potential for expansion, and anybody intending to install either app should ensure that their device has sufficient space available.

It will have been noticed from the OS MapFinder example that 1:25,000 maps are considerably more expensive to buy digitally. ViewRanger again offers maps for popular areas, broadly those covered by *Explorer* Outdoor Leisure sheets on paper, but with some additional popular areas such as Cornwall and the National Trails. The 1:25,000 prices are much more comparable with buying paper *Explorers*, ranging from the Cairngorms at £54.99 down to £7.99 for the New Forest, and a bargain £3.99 for the Isle of Wight. One inference that can be drawn is that OS may be selling and licensing digital 1:25,000 mapping at prices that seek to avoid jeopardising its income from paper map sales and the costs of maintaining the 403 sheet paper *Explorer* series.

A further advantage of ViewRanger is that it can be used with maps of over twenty other countries, produced by both state and commercial cartographers. Of particular interest to CCS members will be maps produced by OS Northern Ireland and Ordnance Survey Ireland, and the 1:25,000 map produced by the Isle of Man Survey. In contrast OS MapFinder is solely for OSGB mapping.

Using the maps

At their most basic, the two apps provide a way of viewing maps. They have broadly similar features, including zooming in and out via both buttons and the intuitive 'pinch and zoom' technique familiar to users of handheld devices. Each has a button that will centre the map on the user's location, as identified by the device. I find this particularly useful when I want to check I'm on the correct path, or make a quick check on my position in remote areas – it's faster than identifying features and taking bearings with map and compass.

One result of zooming is that the scale will alter from the scale of the published map. As a result each app automatically adjusts the scale bar. OS MapFinder has a short scale bar that adjusts to display both metric and imperial units, for example 200 metres and 200 yards. ViewRanger has a longer scale bar that can be set to either metric or imperial via the app settings. Annoyingly whatever the length it represents, the bar is always divided into five sections, which is not always intuitive when displaying imperial distances such as two miles. With National Grid lines present, it is however easy for experienced map users to judge distances in both apps.

Searching in both apps will locate places and postcodes, but OS MapFinder has a more detailed gazetteer database that includes street names. This is a mixed blessing: obviously beneficial if a street address is all that is known, but making it harder to search some common names, particularly as only the first ten results are displayed. An unadvertised feature is that OS MapFinder returns the ten results closest to the user's current location: ideal for identifying locally relevant results, but less so for armchair trip planning. A little experimentation shows that the desired result can still be returned by entering more details to narrow the search, for example 'Fleet Street, London' instead of just 'Fleet Street'.

OS MapFinder will locate four- and six-digit National Grid references through its search bar. ViewRanger permits searching of a range of coordinate types through an Enter Coordinates option: formats include six-, eight-, and ten-digit National Grid, three Lat/Long options, ITM, UTM WGS84, and UTM NAD27. ViewRanger will also display the coordinates of the centre of the map at the top of the screen in whichever available format is preferred.

Tracks and trails

Common to both apps is the ability to plan and record routes, for example the route of a walk. OS MapFinder calls both planned and recorded routes 'trails', while ViewRanger calls them 'routes' when they are planned, and 'tracks' when they are recorded. Planning involves entering waypoints on the map. The route can then be followed, with an arrow on screen indicating the direction to the next waypoint. This is one feature that I personally don't use, as I prefer to plan on a paper map and navigate with paper map and compass, so my observations are not informed by a lot of experience. However, as with most other features in the two apps, OS MapFinder is simpler, while ViewRanger offers more options.

It is also possible to import routes in the common GPX format into both apps. GPX files can be found on walking websites, sometimes free of charge, and ViewRanger also offers both free routes from its community of users, along with routes to purchase, using credits, from Walkingworld and other publishers. One glaringly obvious omission in OS MapFinder is direct integration with the OS *getamap* website and the routes that it offers, I suspect because the two products are independent in technical terms. OS *getamap* relies on Microsoft's now obsolete Silverlight browser plugin, which will not work on handheld devices operating systems.

A feature that I use on every walk is the ability to create a trail/track tracing the route that I've taken. I do this on my smartphone rather than tablet, as it's easier to carry. Simple record, pause and stop buttons operate the tracking, which produces a line on the map and some additional data including duration and speed (*figures 1 and 2*). ViewRanger also produces nice graphs showing speed and height, though the accuracy of altitude readings from the device's GPS is not wholly reliable (*figure 3*). (Occasionally a rogue trough in the graph will appear to suggest that I have done a

bungee jump off a cliff edge then resumed walking.) I have not installed an optional file to apply a mean sea level correction which may also account for some of the differences seen.



Figure 1 (top): A 14.2 miles walk from Hay-on-Wye, tracked in ViewRanger. The position of the North arrow indicates the orientation of the tablet at the time the screenshot was taken, rather than the orientation of the map



Figure 2 (centre): The same walk, imported as a trail into OS MapFinder

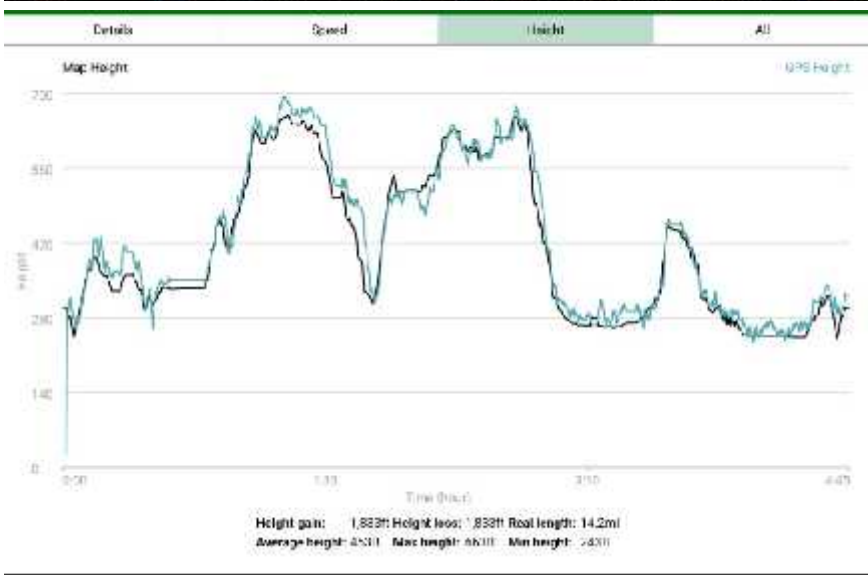


Figure 3. (bottom): ViewRanger's graph of the altitude on the walk, showing both map height (downloaded as an optional altitude file, and stated by Augmentra to be based on a ninety metre grid) and the height recorded by the GPS in a smartphone

Overall, I find the tracks a good way of logging the distance I've walked, and they build up into a record of walks. OS MapFinder also allows an image to be saved to identify the walk, if desired. Routes can be exported from both apps as GPX files and used elsewhere, including importing into OS *getamap*. ViewRanger also allows sharing of tracks via its website, including links via social media and BuddyBeacon, enabling realtime sharing of location: useful for groups that may become separated. Most of these extra features seem a bit unnecessary to me, but from the amount of community-generated ViewRanger content clearly some people are making use of them.

Some conclusions and predictions

It should be clear from the comparison that ViewRanger is a much more sophisticated product than OS MapFinder. If one wanted a very simple tool to use in a limited geographical area, then OS MapFinder might fit the bill. ViewRanger does take a bit of getting used to – it's one of the more complex apps that I use – and benefits from exploring and customising the various settings it offers to set it up as desired (I found a few of the default settings, such as automatically starting tracking, annoying). While I wouldn't necessarily recommend it to novice users of handheld devices, there is very good documentation available online with a user manual in the form of a wiki for each operating system.⁴

Overall, I really like ViewRanger, and within a matter of months it has become a highly valued companion on my walks. Even on a smartphone, the area of 1:50,000 map visible is good; on a tablet, while it can't compare with the majesty and ability to read a large area of landscape offered by a whole unfolded paper map sheet, it does a very good job and has advantages over the two panels that will fit (folded) in a typical map case, in that scrolling rather than refolding is all that is required to see the adjacent area. The standard disadvantages of using electronic devices outdoors obviously remain. I have a waterproof case for my smartphone when walking, but would require a considerably more robust and waterproof case for my tablet if I was planning on using it in the field regularly.

Returning to the issues raised at the start of the review, to what extent are the apps a replacement for paper maps? The OS MapFinder FAQ answers the question "Can I throw out all my paper maps now?" by warning, "No. We don't recommend that at all. Ordnance Survey recommends that users of this app, and any mapping apps, also carry a paper map with them as a back-up when out and about, in case the device runs out of power."⁵

Cynics might say that users therefore need to purchase the same map twice, once electronically and once in paper format. However, the British Mountaineering Council has a good online article that quotes Simon Steer, a mountain rescue team leader summing it up nicely by saying, "Advances in technology are a great addition to the range of navigational aids, [but] they do not remove the two key requirements to travel safely in the mountains, which are the ability to navigate using traditional map and compass, and the need to go to the hills properly equipped for mountain weather."⁶ This is sound advice. A short-to-medium length walk on a summer's day in reasonably populated parts of lowland England could be undertaken using only maps on an app on a reliable, fully charged device with only minimal additional risk. Yet I would not set foot in any serious walking terrain without my paper map and compass (and a lot of other essentials besides).

Personally, I enjoy practising my navigation skills using map and compass, but it is also reassuring to have the ViewRanger app in order to check my position if in doubt, particularly in terrain such as largely featureless moorland. It has occasionally come in use for other purposes, such as one walk where (for reasons too complicated to explain) I deliberately deviated off the originally intended route and indeed a few

⁴ <http://www.viewranger.com/en-gb/support/support/manuals>

⁵ <https://www.ordnancesurvey.co.uk/shop/mapfinder/mapfinder-android-faq.html>

⁶ Ed Douglas, 'Smartphone apps: handle with care', <https://www.thebmc.co.uk/smartphone-apps-handle-with-care>

kilometres off the paper *Explorer* sheet I was carrying; I was able to use the *Landranger* mapping in the app to navigate to a railway station where I finished the walk.

From an armchair point of view, ViewRanger offers a quick and easy way of looking up a location for which I don't own a paper map (not being an active collector, more of a passive accumulator). I wouldn't shell out for the *Explorer* mapping, given the much higher price, but having access to all the *Landranger* maps in such a compact format is more than adequate for most purposes.

For casual leisure purposes, a smartphone is now a reasonable alternative to a dedicated GPS device. I haven't used a dedicated GPS myself, but it appears that GPS devices are currently converging with smartphones, as a number of handheld GPS devices are now running Android. The advantage of a dedicated GPS (whether traditional or running Android) is that the GPS is better quality than a smartphone or tablet, and the device is more rugged for outdoor use. The disadvantages that I perceive with GPS devices running Android is are that they are considerably more expensive than a reasonable Android phone, the screen size remains smaller than a tablet/Kindle, and one still needs to carry a separate phone for communications if using out in the field. That said, if I was actually navigating by GPS rather than with map and compass I might still consider a dedicated GPS.

There are signs that OS MapFinder is merely a first step into the new market by Ordnance Survey. In the small print on the OS website is a note that "tile uploads [biannual updates of purchased map tiles] will be free for the life of the application or until 31 March 2016 (whichever is longer)."⁷ This does not suggest a strong commitment to update the app for years to come.

Moreover, a recent article on technology news website *The Register* reports that OS is developing a next generation app that goes beyond the current apps' use of existing raster mapping to use OS data in a new way.⁸ Ben Scott-Robinson, OS Head of Interactive Experience, is quoted as saying "We're tying together the new slippy map (web style)... and the UI [user interface] itself." What this means in practice remains to be seen. Images in the article imply use of vector mapping, yet do not suggest anything as attractive as the existing *Landranger* or *Explorer* cartography.

Ultimately, the future for OS mapping may well be entirely digital, but the apps under review are merely a staging post on the route to a wholly digital future. (As a side note anybody purchasing digital maps now may yet need to repurchase them in the future – they are tied to the apps of today). Devices continue to advance, and the tracking functions of ViewRanger (but not the maps) are now available on certain smart watches.⁹ Significant advances in device battery life, reliability, and durability will be required before digital maps can replace paper entirely, and it is likely that both devices and software will continue to develop new features. I'd recommend ViewRanger to walkers like myself, but mass market paper maps will still be around – and essential – for a while yet.

⁷ <https://www.ordnancesurvey.co.uk/shop/mapfinder>

⁸ Andrew Orlowski, 'First look: Ordnance Survey lifts kimono on next-gen map app', http://www.theregister.co.uk/2015/02/05/exclusive_os_lifts_kimono_on_nextgen_map_app, 5 February 2015.

⁹ Press release, <http://www.viewranger.com/en-gb/about-us/media-centre/2014/06/26/viewranger-offers-active-navigation-through-android-wear>