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## ERROS and STIPPLE Screens

ERROS is a unique application development framework that stores all metadata, application definitions and user data in its own integrated connectionist database. Very complex internet enabled applications can be created using ERROS with little or no program coding. ERROS does not generate program code. No SQL is required for queries or to navigate the connections in the database. The concepts of ERROS have been successfully patented.

The ERROS framework provides a sound structured basis on which you can build your integrated applications. As ERROS allows incremental development, application creation can be done without a detailed system specification and without any physical data schema. Applications can evolve in line with the ever changing real-world of the business on a "grow as you go" basis. ERROS is therefore extraordinarily productive for both application development and for maintenance. It also offers very rapid response times that do not degrade as data volumes grow.

Users without any training and even without a demonstration have successfully created simple ERROS applications. Operating ERROS applications is easy, intuitive and straight forward. The concepts of ERROS are also simple. However, the underlying structure of ERROS is quite different from any other application development system, so it is not possible to explain it in just a few sentences or even a few paragraphs. It takes time to learn about the basics of ERROS and its unique facilities which result in a considerable increase in the business value of your information systems and which, at the same time, result in a considerable reduction in the costs of developing, maintaining and operating them.

All ERROS applications can be operated over the Internet with most standard browsers on PCs, Macs, tablets or smartphones, as well as with traditional 5250 terminals or emulators. Any ERROS application created for 5250 operation will work at once over the Internet in inquiry mode, without any new HTML or Javascript being created. There are no static HTML web pages in ERROS applications as ERROS generates HTML and JavaScript on the fly, using page layout definitions stored in the ERROS application.

Operating ERROS using a browser allows you to display rather more content than is posible with a 5250 screen. You can also change the font size at any time when operating any ERROS application, without having to change the default font settings for your browser. In addition, you can change all colours, including the background colour.

ERROS can display an application related banner image at the top of the screen if required.

ERROS **browser screens** from different ERROS applications operated in inquiry mode are included in this document. These were created using the standard HTML and Javascript generation facilities of ERROS. They were mostly rendered using Firefox or Chrome using a 1280 X 800 pixel screen and release V2R9 of ERROS. One screen was displayed on an iPhone 4S and any of the screens could have been displayed on the iPhone or on a tablet. No special or new HTML generation facilities were required for any of the screens in this document, even though some of them are very different.

The first screens are from STIPPLE which is a very complex application for cataloguing fine and applied art objects and for recording people, places and history. It was created using ERROS, without programming. The relationships in STIPPLE are much more complex than would be the case in most line of business applications.

The STIPPLE screens are followed by screens from other more standard ERROS applications, such as order entry.

Having selected STIPPLE from your list of ERROS applications, ERROS will display the STIPPLE Initial Menu, as in the following screen.

1 of 41

STIPPLE IV (An ERROS Application)	Rob Dixon	Rob Dixon Collection INDEX
STIPPLE IV Initial menu Public Menu Type No. of record (or full or partial	record ID) & press	ENTER
Or hover over highlighted links or in	nages for instructio	
<ul> <li>(Page DOWN for more)</li> <li>1 Current catalogues, exhibitions and view</li> <li>2 Genealogy and biography</li> <li>3 Bibliography, literature and the performi</li> <li>4 Gazetteer, including places, buildings ar</li> <li>5 Projects, collections and archives</li> <li>6 Index of STIPPLE Catalogues (fine &amp; ap</li> <li>7 Thesauri</li> <li>8 Events</li> <li>9 Multimedia and Internet</li> <li>0 Commerce, trade, transport and travel</li> </ul>	wings ng arts nd structures plied art, etc.)	
Enter PgUp PgDn ERROSO8 Help (F1) MSG Help (F2) JUMP BACK (F3) Report (F13) ADD Dupl. (F14) Operate (F15	) Refresh (F5) A	udit (F7) View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12) rigate (F18) Copy (F22)
The ERROS framework provides a standard user in ERROS <b>S</b> tandard <b>O</b> perator Interface, or <b>SOI</b> .	nterface, suitable for all app	lications, including line of business, transaction processing, etc. This is the

Considerable thought and experience has gone into the design and evolution of the SOI. This is the most productive and intuitive interface that we have been able to create. Having a standard interface ensures total consistency in the look and method of operation of all applications, ensuring high productivity from operators. SOI also relieves developers of the burdensome task of creating their own interface so that they deliver new and changed solutions to their users much more quickly and cheaply than would otherwise be the case, although they can create their own interface if they wish.

The screen is divided into five parts -

The **top part** identifies the application being operated, the name of the operator so that others can check that they are using their own user profile, followed by the name of the operator's employer. ERROS then shows where you are in the database. You may have reached that point by navigating through the menus in your ERROS application, or by taking a short cut to data and bypassing the menus or by navigating through a connection from another part of the database.

The **second part** contains one, or sometimes more, input boxes. There is always an input box displayed and this is generally located about 1/3<sup>rd</sup> of the way down the screen. In the main input box, you can type a record identifier or name (or a generic name) or a record number, such as a product number. If the record you require is already being displayed, then you can type the single digit number to its left to select it or you can click on it, in either 5250 or browser mode.

Immediately below is the **third part** with one or two message lines with yellow backgrounds. The first of these is used to display warning or error messages or operator instructions. The second is used to display operator prompts, including instructions when the operator hovers over a link. The operator can instruct ERROS to display error messages only. Having the input or search box and the messages next to each other helps to ensure that the operator really sees the messages.

The **fourth** part of the screen is used, in inquiry mode, to display the data found as a result of an inquiry. The format of these lines can vary considerably as will be seen in later screens in this document. The same space is also used in update mode to display screen formats for data entry.

Finally, at the base of the screen, ERROS displays the active function keys available and the equivalent buttons.

When you are using a browser, you can operate your ERROS application using point and click methods or you can operate it as though you were using a 5250 terminal, as the ERROS browser interface emulates 5250 style function keys that you can press and it also provides equivalent buttons that you can click. Keys or buttons that can only be used some of the time have a green background when they are available to draw the user's attention to them. F12 is similar to the browser back button. F3 takes you back many screens.

There is no menu bar at the top or at the side of the screen as it wastes space but, if a user hovers over INDEX at the top of the screen, ERROS displays a message giving instructions for accessing the menu.

All screens in this document show ERROS in **inquiry mode**, in which the main input box always has focus so the user can type at any time without first having to click on the input box.

The screen below shows an error message which is displayed by ERROS with a red background. The button for function key F2 (MSG Help) is also displayed with a red background and pressing F2 or clicking on the F2 button will cause ERROS to display second level text about the error message.

STIPPLE IV (An ERROS Application)	Rob Dixon Rob C	ixon Collection INDEX
STIPPLE IV Initial menu Public Menu		
Or hover over highlighted links or image	ges for instructions	identification and a second
<ul> <li>(Page DOWN for more)</li> <li>1 Current catalogues, exhibitions and viewing</li> <li>2 Genealogy and biography</li> <li>3 Bibliography, literature and the performing a</li> <li>4 Gazetteer, including places, buildings and s</li> <li>5 Projects, collections and archives</li> <li>6 Index of STIPPLE Catalogues (fine &amp; applied</li> <li>7 Thesauri</li> <li>8 Events</li> <li>9 Multimedia and Internet</li> <li>0 Commerce, trade, transport and travel</li> </ul>	js arts tructures d art, etc.)	
Enter PgUp PgDn ERROS08 Help (F1) MSG Heln (F2) JUMP BACK (F3) Report (F13) ADD Dupl. (F14) Operate (F15)	Refresh (F5) Audit (F7)	View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)
The yellow message and prompt lines can be switched	off by the operator changing the	'Help" level. Error messages will still be displayed in red.

On the initial menu screen above, type "6" and press enter, or double click on "Index of STIPPLE Catalogues". Then type "3" and press ENTER or double click on "STIPPLE Print catalogue". ERROS provides access to the STIPPLE Print catalogue. As menus can be bypassed in inquiry mode, the same

result could have been achieved at any point in the application by typing ".p[rint]" and pressing or clicking on ENTER. Type "boarstall" and press or click on ENTER. ERROS will display the following screen -

STIPPLE IV (An ERROS Application)	Rob Dixon	Rob Dixon Collection INDEX
STIPPLE Print catalogue name and/or number	e¬(by Title or STIPPLE #	for date)
# (Number) 0	Date 0 /0	
Type No. of record (or full or partial	record ID) & press	ENTER
Or hover over highlighted links or in	nages for instructio	
<ul> <li>S 1 Boarstall House and Tower</li> <li>2 Boarstall Tower, N.Whittock after N. Whittock after N. Whittock after Miss Chri</li> <li>3 Boarstall Tower, J.Basire after Miss Chri</li> <li>S 4 Boarstall Tower and House</li> </ul>	iittock #40574 stabel Airy #42161	
Enter PgUp PgDn ERROS08		
Help (F1) MSG Help (F2) JUMP BACK (F3)	Refresh (F5)	udit (F7) View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)
Report (F13) ADD Dupi. (F14) Operate (F15)	Options (F16)	vigate (F18) Copy (F22)

ERROS has retrieved four prints whose names or synonyms begin with "Boarstall". The two records with the letter "S" to the left are synonyms of the

print of Boarstall required as that has the title "Illustrissimo Domino Domino Johanni Aubrey Baronetto" which is difficult to remember. That name could also have been used. Selecting either of the synonyms by typing "1" or "4" and pressing ENTER or by double clicking on them will cause ERROS to navigate to the required print and display the following screen -

STIPPLE IV (An ERROS Application)       Rob Dixon       Rob Dixon Collection INDEX         Illustrissimo Domino Domino JOHANNI AUBREY Baronetto #000042764       Rob Dixon Print Collection       #000001339         print details       summary information with image       Public Menu       Press ENTER to continue         Or hover over highlighted links or images for instructions       Instructions       Instructions
The second secon
Enter Papp   Help (F1) MSG Help (F2) JUMP BACK (F3) Refresh (F5) Audit (F7) View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12) Report (F13) ADD Dupl. (F14) Operate (F15) Options (F16) Navigete (F16) Copy (F22) Copy (F22)

The screen above may look like a standard static HTML screen, but in fact all the data has been retrieved from the STIPPLE database and the

necessary HTML and Javascript have been generated by ERROS on the fly, using instructions stored in the STIPPLE database and retrieved by ERROS. Although this sceen is very different from the previous screens, the same mechanism for generating HTML and Javascript is used for all screens in all applications in this document. All the navigable connections are displayed in yellow, comments on the connections are displayed in azure, text in white and some meta data (attribute names) are displayed in green. Any of these colours can be changed. Attribute names are only displayed where they make the screen easier to read.

If you double click on Boarstall Tower, ERROS will display the following screen -



displayed, but, for buildings that are not open, no space is reserved for the non-existent data and any textual data will be moved up the screen.

In the above screen, a 2003 photograph of Boarstall Tower is displayed together with an engraving published in 1695 and a Google Map for Boarstall Tower.

The Google map is "live" as it would be when accessed directly through a browser, and, even though it is being displayed through ERROS, you can click on any of the buttons and change from a map to a satellite image, or zoom in or out, etc.

You could click on one of the ERROS links or press or click on ENTER to find further information and images about Boarstall Tower. However, if you type ".a[ddress]", ERROS will display the following Screen -

STIPPLE IV (An ERROS Application)	Rob Dixon	Rob Dixon Collection INDEX
STIPPLE Address		
Public Data		
Type request (e.g. record name or o	ther ID) and press	ENTER
-		
Enter PgUp PgDn ERROS08		
Help (F1) MSG Help (F2) JUMP BACK (F3)	Refresh (F5)	udit (F7) View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)
Report (F13) (ADD Dupl. (F14) (Derate (F15)	Uptions (F16)	

ERROS has moved from the STIPPLE Print Catalogue to STIPPLE Addresses. You could also have reached this screen by returning to the STIPPLE initial menu and navigating through the "Gazetteer" link, but using ERROS short cuts allows you to access any table in one step. To find an address record in STIPPLE, type, say, "shoe" and press ENTER.

## ERROS will display the following screen -

STIPPLE IV (An ERROS Application) Rob Dixon Rob Dixon Collection INDEX	
STIPPLE Address	
Public Data	
Type No. of record (or ID) & ENTER; F9 to add Or hover over highlighted links or images for instructions	
(Page DOWN for more) 1 Shoe Lane,Fleet Street,London number not given 2 Shoe Lane,Aberdeen,Aberdeenshire number not given 3 Shoe Lane,Exton,Hampshire number not given 4 Shoe Lane,Oxford,Oxon number not given 5 1 Shoe Lane,Fleet Street,London 6 2 Shoe Lane,Eteet Street,London 8 5 Shoe Lane,Fleet Street,London 9 7 Shoe Lane,Fleet Street,London 0 12 Shoe Lane,Fleet Street,London	
Enter       PgUp       ERROSOB         Help (F1)       MSG Help (F2)       JUMP BACK (F3)       Refresh (F5)       Audit (F7)       View (F8)       Greate (F9)       Update (F10)       Delete (F11)       BACK (F12)         Report (F13)       ADD Dupl. (F14)       Operate (F15)       Options (F16)       Navigate (F18)       Copy (F22)       Image: Copy (F22	
The first ten addresses whose names begin with "Shoe" are displayed in street name and street number or building name sequence, the sequence in	

four addresses are where an address is given without a building name or street number.

Note that there are two "2 Shoe Lane" addresses, one in Exton (line 6) and one in London (line 7). You can restrict the list to a single place by going to the county (".county") or city (".city") or town (".town") or village (".Village"), etc. first, selecting the place by name and then the attribute "streets, roads, lanes, squares, etc." and then typing "shoe". If you are not sure whether a place is a city or a town or a village, then you can type ".l[ocality]/[placename]" and ERROS will tell you which it is. If you go to London (".county/london"), ERROS would only display "Shoe Lane" and "Shoe Maker Row" when you type "shoe". Select Shoe Lane and then ERROS will display the first addresses in Shoe Lane, London.

If you want, say, 48 Shoe Lane, you can Page Down until you find that address or you can type "shoe lane 48" and press ENTER. You could have done this in the first STIPPLE address screen.

STIPPLE IV (An ERROS Application)	Rob Dixon	Rob Dixon Collection INDEX
STIPPLE Address		
Public Data	new ID & ENTER: or	r F9 to add
Or hover over highlighted links or in	nages for instructio	ons
1 48 Shoe Lane,Fleet Street,London		
Enter PgUp PgDn ERROS08		
Help (F1)         MSG Help (F2)         JUMP BACK (F3)           Report (F13)         ADD Dupl. (F14)         Operate (F3)	Refresh (F5)           15)         Options (F16)	Audit (F7)     View (F8)     Create (F9)     Update (F10)     Delete (F11)     BACK (F12)       Navigate (F18)     Copy (F22)

You could have achieved the same result in one step by typing ".a[ddress]/shoe lane 48" and pressing ENTER.

Press or click on ENTER and ERROS will display the following screen.

STIPPLE IV (An ERROS	Application) STIPPLE Address	Rob Dixon	Rob Dixon Collection	INDEX		
6 2	address 18 Shoe Lane,Fleet Stree pittal display	t,London				
Public Menu	unitation of managements					
Press ENTER to o	ontinue					
Or hover over hig	hlighted links or ima	ages for instructior	15			
1776 1780 Benjamin W ç 1781 -before/on 9/1	Whitlow 1788 Richard Jones (?? -	1788)				
1806 19/11/1812 Willi	am Pontifex, Russell Pont	ifex, & Company				
Help (F1) MSG Help Report (F13) ADD Du	(F2) JUMP BACK (F3) upl. (F14) Operate (F15)	Refresh (F5) Au	dit (F7) View (F8) Cre gate (F18) Co	ate (F9) Update (F10) Delete (F11) oy (F22)	BACK (F12)	
			loss 49/" and proceing ENC			

You could have achieved the same result in one step by typing ".a[ddress]/shoe lane 48/" and pressing ENTER.

As already mentioned, ERROS shows, above the input box, the context of the data retrieved and, below the input box, the data retrieved in that context.

In this case, the display is of the attributes defined by STIPPLE in the initial menu for STIPPLE Addresses. Stipple instructs ERROS to display all the data found in the selected attributes. Not all attributes for STIPPLE addresses are included in this initial display. STIPPLE also instructs ERROS not to display the name of each attribute as it is self evident what the data represents.

This screen shows an image of the interior of 48 Shoe Land and, in date sequence, the names of people or businesses who are known to have lived or worked at 48 Shoe Lane. The print inscription states that the view is of the interiors of 46, 47 and 48 Shoe Lane, so it has been connected to each of those addresses. Nevertheless, the image and its URL are only stored once within STIPPLE and are retrieved automatically for each of the addresses by ERROS through the connections.

Click once on Richard Jones and then press F18 (shift and F6) or click on Navigate or double click on Richard Jones and ERROS will display the following screen.

STIPPLE IV (An ERROS Application) Rob Dixon	Rob Dixon Collection INDEX
STIPPLE biographical dictionary	
name and/or number	#000100400
initial digital	*000120880
Duble Meen	
Public Merid	
Press ENTER to continue	
Or hover over highlighted links or images for instructi	ons de la constante de la const
died 1788	
-before/on 1781 19 Gray's Inn Lane,Holborn,London	
ç 1/81 -before/on 9/1/88 4/ Shoe Lane,Fleet Street,London	
conner plate maker, inventor	
children Richard Jones	
married Mary Jones (née Bailey) 7/7/1789 at St. Bride's Church, Fle	et Street
Enter PgUp ERROS08	
Help (E1) MSG Help (E2) UMP BACK (E3) Refresh (E5)	Unit (E7) View (E8) Dreate (E9) Unitate (E10) Delete (E11) BACK (E12)
Report (F13) ADD Dupl. (F14) Operate (F15) Options (F16)	avigate (F18) Copy (F22)

ERROS has navigated to the record for Richard Jones, and so moved from the entity type Stipple address to the entity type Stipple Biographical Name. The first line shows his date of death. As his date of birth is not known, that attribute name is not displayed. "Null" values are not required in the ERROS database so no space is wasted where there is no data in an attribute. The next three lines are the places at which Jones is known to have resided or worked in date sequence. There could be any numer of such places. Then his job functions are displayed, followed by the name of his son and that of his wife (and the date and location of their marriage). The two attribute names "children" and "married" are only displayed if there is data in the attributes.

There is much more data about Richard Jones that could be displayed in this initial display. The attributes retrieved and their sequence are defined in STIPPLE and can easily be changed, whilst the system is live.

Double click on "copper plate maker". ERROS will display the following screen.

STIPPLE IV (An ERROS Application) Rob Dixon Rob Dixon Collection INDEX Richard Jones (?? - 1788) #000120680
is a copper plate maker
Public Data
Type No. of record (or ID) & ENTER; F9 to add
Or hover over highlighted links or images for instructions
1 Diana, Viscountess Crosbie at 19 Grays Inn Lane 2 Emily, Mary, Countess of Salisbury
Enter PgUp FgDn ERROS08 Help (F1) MSG Help (F2) JUMP BACK (F3) Refresh (F5) Audit (F7) View (F8) Create (F9) Update (F10) Deleta (F11) BACK (F12) Report (F13) ADD Dupl. (F14) Operate (F15) Options (F16) Navigate (F18) Copy (F22)
Copper printing plates from the 18 <sup>th</sup> century are very scarce as most were used to make shell cases in the first World War. Only two made by Richard

Type "2" and press ENTER or double click on "Emily, Mary, Countess of Salisbury". ERROS will display the following screen -

STIPPLE IV (An ERROS Application) Rob Dixon Ro STIPPLE Printing Plate Catalogue	b Dixon Collection INDEX
name and/or number Emily, Mary, Countess of Salisbury #0 initial display	0000002
Public Menu	
Or hover over highlighted links or images for instructions	
Emily, Mary, Countess of Salisbury #2 copper plate maker Richard Jones (?? - 1788) print(s) etc. taken from this plate Emily, Mary, Countess of Salisbury. # Rob Dixon Print Collection RSD P # 1318	60 (embossed stamp on back of plate)
Enter       PgUp       ERROSO8         Help (F1)       MSG Help (F2)       JUMP BACK (F3)       Refresh (F5)       Audit (F         Report (F13)       ADD Dupl. (F14)       Operate (F15)       Options (F16)       Navigate	7) View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12) (F18) Copy (F22)
for the printing plate "Emily, Mary, Countess of Salisbury".	ype STIPPLE Philling Plate Catalogue and displayed the record

The STIPPLE definition for this page defines that the names of the copper plate and of the related print are both printed in italics.

Click on the yellow link to "Emily, Mary, Countess of Salisbury" and ERROS will display the following screen -

STIPPLE IV (An ERROS Application)       Rob Dixon       Rob Dixon         Emily, Mary, Countess of Salisbury.       #000000         Rob Dixon Print Collection       #000000172         print details       summary information with image         Public Menu       Press ENTER to continue         Or hover over highlighted links or images for instructions	Collection INDEX 360
Emily, Mary, Countess of Salisbury. #60 Mezzotint Valentine Green after Sir Joshua Reynolds P.R.A. 1 606 x 384, Pl 634 x 385 mm (RSD P # 172) 	The Right Honourable Lady Elizabeth Compton. #5552 Mezzotint Valentine Green after Sir Joshua Reynolds P.R.A. I 609 x 384, Pl 639 x 384 mm (RSD P # 176) portrait of Elizabeth Cavendish, Countess of Burlington (née Compton) daughter of 7th Earl of Northampton; married Lord George Cavendish, 3rd son of 4th Duke of Devonshire, WL, Standing Our Impressions RSD P # 176; RSD P # 177
Enter PgUp ERROSOS Help (F1) MSG Help (F2) JUMP BACK (F3) Refresh (F5) Audit (F7) V Report (F13) ADD Dupl. (F14) Operate (F15) Options (F16) Navigate (F18)	iew (FB) Create (F9) Update (F10) Delete (F11) BACK (F12)

ERROS has moved from the entity type "STIPPLE Printing Plate Catalogue" to the entity type "STIPPLE Print catalogue" and displayed the record for the print "Emily, Mary, Countess of Salisbury". STIPPLE had instructed ERROS that, when retrieving the initial record for any print, ERROS should check

to see if any other print was published as a pair to that print and, if so, to retrieve and display information about that print, in this case *The Right Honourable Lady Elizabeth Compton*, published on the same date by Valentine Green. Because of the connection with that print in the attribute "Published as a pair with", ERROS is automatically able to retrieve the data and image for the second print through that connection. If there is no pair to a print, then the attribute name will not be displayed.

STIPPLE has instructed ERROS to display the print titles in italics. Attribute names are only displayed for some attributes. This makes the screens less cluttered and much easier to understand. There are further attributes defined in the "summary information with image" menu but these are only displayed if they contain data.

Users with any experience of prints would know that mezzotint was the method of engraving for these two prints, that Valentine Green was the engraver and that he reproduced an original image painted by Sir Joshua Reynolds.

The dates of Lady Salisbury's birth and death and the text describing her as a "society leader ..." and the text for Lady Compton were retrieved automatically from the Biography table and the same text is displayed on every print of them (all without SQL!). The ERROS Output Description Language (ODL) has been used to define that this data, which is not part of the print record, is displayed in a smaller font. This definition only needs to be stored once and will be applied to every portrait print.

There are a large number of navigable links displayed. Double clicking on any of them will allow you to navigate to the connected record. For instance, you might wish to see if there are any other images of Lady Salisbury recorded in STIPPLE, or look at her lineage if this has been recorded, or you could click on WL (whole length) to look at other whole length portrait prints.

There is a very variable amount of data stored about each print. The definition of the print "summary information with image" screen in STIPPLE determines which attributes for each print will be displayed on this screen. Some of the attributes may have more than one iteration - in this particular example there are two impressions of both prints in the Rob Dixon Print Collection. These both have the name Rob Dixon Print Collection associated with them but STIPPLE has instructed ERROS to display the name once only yet display the two accession (stock) numbers. ERROS options such as this make screens simpler and easier to read.

To access further information about the first print, the operator simply presses ENTER as instructed. To find out further information about the second print, double click on the link of the name of the print given as the pair (in yellow). If you do so, then ERROS will display a screen similar to the one above but with the positions of the prints reversed. Any number of other screens about prints (and any other entity type) can be defined in STIPPLE.

The accession numbers of other impressions of the two prints in other collections are not accessible to the Rob Dixon Print Collection. When a member of the staff of another collection is signed on, they would only see the accession numbers for impressions belonging to that collection as in the following display. All other data about the prints is identical for all collections as it is only stored once in a *Catalogue Raisonnée*. Within this, STIPPLE allows the creation of "Union Catalogues". At present, the same picture is displayed for a particular print in this screen for all collections but a future change might be to use the image of an impression in the owning collection but using a "libary" image if the collection's impressions have not been photographed or if they do not have an impressions of a print. ERROS can handle this sort of problem without using SQL.

In the screen below, the same prints are displayed but using the user profile of the C.A.Lennox-Boyd Collection (see top line). This has different impressions of both prints and so the accesssion or stock numbers for those prints in his collection are displayed. STIPPLE allows the creation of Union Catalogues that combine objects from multiple collections, sharing standard descriptions of those objects yet only allowing employees of the owning collection of particular objects to change information about their own objects, such as accession numbers, location, condition, etc.



screen (for either user but I have used my own user profile as in the earlier screens).

STIPPLE IV (An ERROS Application)	Rob Dixon	Rob Dixon Collection INDEX	
Public Data // (Number)	0		
Press ENTER to continue or type Or hover over highlighted links o	new request (e.g. i r images for instruc	record name) ptions	
Beauties of the Present Age #37 A set of eleven mezzotint female portrait contains	s after Sir Joshua Reynd	olds, engraved and published by Valentine Green.	
[main record] Pl. 1 (1st pair)         The Right Hon: ble Lady Louis         to the Earl of Dysart. #3701         mezzotint         Valentine Green after Sir Josi         P.R.A.         1 595 x 382, Pl 657 x 384 mm         published 24/12/1779 by Vale         1/1/1790 by John Brydon         portrait of Lady Louisa Manners Countes         Tollemache)         Our impressions - RSD P # 160; RSD P #	A Manners, Sister 6 hua Reynolds n (RSD P # 179) entine Green; s of Dysart (née 163; RSD P # 179	ain record] Pl. 2 (1st pair) The Right Hon:ble Lady Jane Halliday, Sister to the Earl of Dyfart, #35458 mezzotint Valentine Green after Sir Joshua Reynolds P.R.A. I 597 x 386, Pl 630 x 386 mm (RSD P # 1278) published 24/12/1779 by Valentine Green portrait of Lady Jane Ferry (olim Halliday, née lemache) Impressions - RSD P # 1278	[main record] Pl. 3 (1st extension) Jane, Countess of Harrington. #5547 mezzotint Valentine Green after Sir Joshua Reynolds P.R.A. I 596 x 387, Pl 630 x 388 mm (RSD P # 1279) published 1/5/1780 by Valentine Green; ç 1890 by P.& D.Colnaghi and Co. portrait of Jane Stanhope, Countess of Harrington (née Fleming) as Aurora Our impressions - RSD P # 1269
[main record] Pl. 4 (2nd pair) Mary, Isabella, Duchess of Ri- mezzotint Valentine Green after Sir Jos P.R.A. I 598 x 385, Pl 631 x 386 mm published 1/7/1780 by Valenti by Charlotte Brydon portrait of Mary Isabella Man Rutland (née Somerset) The head was altered in 1793 to represe York. Our impressions - RSD P # 174; RSD P #	utland #5994 hua Reynolds n (RSD P # 174) tine Green: 1793 ners, Duchess of ent the Duchess of 1333	ain record] Pl. 5 (2nd pair) Georgiana, Duchess of Devonshire #432 mezzotint Valentine Green after Sir Joshua Reynolds (P.R.A.) I 599 x 385, Pl >614 x 385 mm (RSD P # 323) published 1/7/1780 by Valentine Green portrait of Georgiana Cavendish, Duchess of Devonshire (née Spencer) Impressions - RSD P # 323; RSD P # 1211; RSD P #	[main record] Pl. 6 (although engraved first) The Right Hon.ble Lady Betty Delmé. #35356 mezzotint Valentine Green after Sir Joshua Reynolds P.R.A. I 595 x 385, Pl 626 x 385 mm (RSD P # 288) published 1/7/1779 by Valentine Green: 4/1790 by William Richardson: ç 1890 by P.& D.Colnaghi and Co. portrait of Lady Elizabeth Garnier (olim Delmé, née Howard); John Delmé; Miss Isabella Delmé Our impressions - RSD P # 288; RSD P # 1375; RSD P # 1376
Enter PgUp ERROS08 Help (F1) MSG Help (F2) JUMP BACK ( Report (F13) ADD Dupl. (F14) Operate (I	F3) Refresh (F5) F15) Options (F18)	Audit (F7) View (F8) Create (F9) Update (F10) De Navigate (F18) Copy (F22)	lete (F11) BACK (F12)

## Many systems find sets or groups very hard to handle.

This screen can be reached by navigating from the record for any of the prints in the set. The print of Emily Mary, Countess of Salisbury was 8<sup>th</sup> in the

set so this is not displayed in this screen as the first six prints in the set are displayed in the sequence in which they were published. You can press ENTER (as instructed) to display the other 5 in the set, the second of which will be the print of Lady Salisbury.

The operator could have gone straight to this set of prints by typing "./set/beau\*/"

Slightly less detail for each print is shown for each print in this screen. To look at any print record in the same format as shown earlier, the user can click on "main record" This screen has over 50 navigable links (including my accession numbers) - still no SQL. Notice that there are no slider bars - I try and avoid them - not always possible.

The content of all the screens is defined in STIPPLE. The same definition is used for each print - only stored once. All the HTML and Javascript is generated by ERROS.

STIPPLE IV (An ERROS Application) Rob Dixon Rob Dixon Collection INDEX	
# (Number) and an and a press ENTER to continue or type new request (e.g. record name)	
Dr Hover over Highlighted links of Hindges for Histractions         Beauties of the Present Age #37         A set of eleven mezzotint female portraits after Sir Joshua Reynolds, engraved and published by Valentine Green contains         Find record J PL 1 (18 pol)         Find Reprint Ministrik Carton	
Imain record) Pl. 4 (2nd pair)       Mary, Jasballa, Duchess of Rutland #3994         Mary, Jasballa, Duchess of Rutland #3994       Main record) Pl. 5 (2nd pair)         Mary Laboline, Creen after Sir Joshua Reynolds (P.R.A. 1596 x 385, Pl 631 x 386, mm (RSD P # 322))       Discussifier (P.R.A. 1595 x 385, Pl 631 x 306 mm (RSD P # 322))         Valentine Green ; 1793 by Charlotte Profile       Disbleted 1/7/17790 by Valentine (new starts of Georgiana Cavendal), to fee starts of Georgiana Cavendal, to fee starts of Georgiana Cavendal), to fee starts of Georgiana Cavendal, to fee starts of Georgiana Cavendal), to fee starts of Georgiana Cavendal, to fee starts of Georgiana Cavendal), to fee starts of Cavendaline (née somersec), to fee starts of Georgiana Cavendal), to fee starts of Cavendaline (née space) and to fee starts of the starts	

This image is a photograph of an iPhone operating STIPPLE and displaying the same screen. Although there are no function keys on a mobile phone, the application can still be operated using the buttons. ERROS applications also work on tablets.

The following screens are from other ERROS applications, which like STIPPLE, were created using ERROS without any programming. All work using a

## browser without any new HTML or Javascript programming being necessary. They can also be operated using a traditional 5250 terminal if required.

Stock Level Adjustment (An ERROS Application)	Rob Dixon		Erros plc.	INDEX										
product name and/or number Our Data <b> </b> # (Number) <mark>0</mark>														
Type No. of record (or full or partial rec Or hover over highlighted links or imag	ord ID) & press El es for instructions	NTER												
(Page DOWN for more) 1 2 Drawer metal filing cabinet 2 3 Drawer metal filing cabinet 3 4 Drawer metal filing cabinet 4 A4 Paper, ream, 100 gsm 5 Board Room chair 6 Board Room chair 7 Economy typist's chair 8 Executive chair 9 Executive desk 0 Inkjet printer A4	Cur U Sts T # 13 # 8 F # 9 # 12 # 4 # 4 # 7 # 6 D # 3 # 5 # 10	nits otal 5 GBP 11 GBP 16 GBP 60 GBP 12 GBP 3 GBP 17 GBP 6 GBP 2 GBP 3 GBP	Total Cost 123.67 230.45 483.61 75.23 1390.12 1897.00 345.76 701.54 1501.93 35.23	Units Avail 5 7 15 40 10 1 7 5 2 2 2	Sales Outs. 1 20 2 2 10 1 1	Purch Expec	Int.Or I Due Ou D 1	int.Or vue In	Ret.to Supp. 1	Ret.by Custon 1	/ Loans ) Etc Ou	Loans Etc In	Units Alloc 1	Future Avail. 8 15 40 10 1 7 5 2 5
Enter FgUp PgDn ERROSOS Help (F1) MSG Help (F2) JUMP BACK (F3) Report (F13) ADD Dupl. (F14) Operate (F15) C	Refresh (F5) Audit	t (F7) View ate (F18)	(F8) Creat	e (F9)	Jpdate (F	10) Del	lete (F11)	BACK (	F12)					

When using 5250 terminals or emulators, a screen like the one above will not fit in a standard 80 character wide display, so ERROS automatically

enables F20 (window right) and F19 (window left) in all ERROS applications in 5250 mode when required, allowing a line length of up to 356 characters.

All records in the table above are indexed by name and by product number and you can access any record by typing in the first word (or more) of its name (e.g. "board" for the products on lines 3 and 4) or a generic search term such as "E\*". Typing "\*" and pressing ENTER will display the records in product name sequence from the beginning of the table. Typing "\*" and pressing or clicking on Page Up will cause ERROS to display the records in product name sequence, going backwards from the end of the table. Typing "#\*" and pressing or clicking on ENTER will cause ERROS to display the records in product number sequence from the beginning of the table. Typing "#\*" and pressing or clicking on ENTER will cause ERROS to display the records in product number sequence from the beginning of the table. To access a record by product number (shown to the right of the product name), you can type, for instance, "#12" in the main box or type "12" in the number box. You can use relative operators "<", "<=", "=", ">=" and "

Because each attribute iteration is indexed, response times are extremely rapid. Even if there were, say, one million different products in stock, ERROS can find any record in a tiny fraction of a second. Only enough records to fill the screen are sent to the browser or 5250.

Some businesses sell low volumes of high value products and others sell high volumes of low value products. As part of the ERROS framework, a record can be stored for each ERROS customer company defining the maximum number of digits and decimal points for values, for prices and quantities. It also stores the accounting currency, VAT rates and the date from which they applied on a country by country basis, VAT scheme, etc. ERROS automatically expands the column display widths in both 5250 and browser mode. The above screen allowed for 5 digit quantities whilst the one below allows for 8 digit quantities. The data is the same. With this and other similar features, software packages can easily be tailored to suit individual businesses or divisions within a business without any program change being required.

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ERROS & STIPPLE Screens
```

Stock Level Adjustment (An ERROS Application)	Rob Dixon	Erros plc. INDEX
product		
name and/or number		
Uur Data # (Number)		
Type No. of record (or full or partial record	ID) & press ENTER	
Or hover over highlighted links or images	for instructions	
(Page DOWN for more) 1 2 Drawer metal filing cabinet 3 Drawer metal filing cabinet 4 A Paper, ream, 100 gsm 5 Board Room chair 6 Board Room table 7 Economy typist's chair 8 Executive chair 9 Executive desk 0 Inkjet printer A4	Cur Sts         Units Total           13         5           8         F         11           9         16           12         60           4         12           7         3           6         D         17           3         6         2           10         3         3	Total CostUnits AvailSales Outs.Purchase ExpectedInt.Or Due OuInt.Or Due InRet.to Supp.Ret.by CustomLoans Etc OuGBP S1501.93 GBP 
Enter PgUp PgDn ERROSOS Help (F1) MSG Help (F2) JUMP BACK (F3) Re Report (F13) ADD Dupl. (F14) Operate (F15) Optio	resh (F5) Audit (F7) Vie ns (F16) Navigate (F18)	ew (F8) <mark>Greate (F9) Update (F10) Delete (F11)</mark> ВАСК (F12)
×		

Of course, the data no longer fits within the width of the 1280 X 800 screen used here although it would fit on a higher definition screen. In all ERROS applications, the operator can change the font size within ERROS at any time, without altering the default values set in his browser, so he or she could reduce the font size here with the following result.

Stock Level Adjustment (An ERROS Application)	Rob Dixon	Erros plc. INDEX
product		
our Data		
# (Number) <mark>0</mark>		
Type No. of record (or full or partial re	cord ID) & press E	ENTER
Or hover over highlighted links or image	ies for instruction	
(Page DOWN for more)       Cu         (Page DOWN for more)       St         1 2 Drawer metal filing cabinet       # 13         2 3 Drawer metal filing cabinet       # 8 F         0 4 Drawer metal filing cabinet       # 9         4 4 Paper, ream, 100 grm       # 12         5 Board Room table       # 7         7 Economy typist's chair       # 6 D         8 Enecutive chair       # 3         9 Enecutive desk       # 5         0 Inkjet printer A4       # 10	c Units Tot Total Co 5 GBP 122 11 GDP 220 16 GBP 483 60 GBP 75 12 GBP 1390 3 GBP 1897 17 GBP 345 6 GBP 701 2 GBP 1501 3 GBP 25	Units         Sales         Purchase         Int.0x         Ret.to         Ret.by         Loans         Loans         Units         Puture           Lost         Avail         Outs.         Expected         Due Ou         Due In         Supp.         Custom         Etc Ou         Etc In         Alloc         Avail.           0.67         5 <t< td=""></t<>
Enter PgUp PgDn Excosos Help (F1) MSG Help (F2) JUMP BACK (F3)	Refresh (F5)	dit (F7) View (F8) Create (E9) Update (E10) Delete (F11) BACK (F12)
Report (F13) ADD Dupl. (F14) Operate (F15)	Dptions (F16) Navig	gate (F18) Copy (F22)

As a business expands, it may need to handle an ever increasing number and range of products. Finding a product if you don't know its product number and are not sure of its name can become a problem.

It is simple in ERROS to categorise products into hieriarchies, such as Office furniture/chairs. This can be done at any time, without programming and

whilst the application is live, without changing or disturbing the existing product records.

A continual problem with most applications is providing access to associated or connected data, solved either by new program coding for each link or perhaps by using SQL. A solution may have to be created on a table by table basis. **With ERROS, no action is required as, because ERROS is based on its connectionist database, ERROS knows where to find the related data.** Security can be set to prevent this navigation if required.

Double clicking on, say, A4 paper (line 3) will immediately cause ERROS to display the following screen (reverting to standard size font and 5 digits for quantities) -

Stock Level Adjustment (An ERROS Application)	Rob Dixon	Erros plc. INDEX
name and/or number A4 Paper, ream, 100 gsm	#000000012	
orders received Our Data		
# (Number) <mark>0 Date</mark>	0 /0 /0	Time <mark>0 0</mark>
Type No. of record (or full or partial record ID	) & press ENTER	
Or hover over highlighted links or images for	instructions	
Description 1 10/01/13 12.24 Esmond Estates Ltd 2 24/01/13 17.37 Thomas Linley Baths Ltd	Number # #	Quan.         Price         Incl.         Quan.           Ord.         Incl.VAT         Total         Due           1         10         4.00         40.00         10           2         10         4.00         40.00         10
Enter PgUp PgDn ERROSOS		
Help (F1) MSG Help (F2) JUMP BACK (F3) Refresh Report (F13) ADD Dupl. (F14) Operate (F15) Options (F	(F5) Audit (F7) Vi 16) Navigate (F18)	ew (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)

As already mentioned, ERROS shows, in all screens, above the input box, the context of the data retrieved and, below the input box, the data retrieved in that context. The Stock Level Adjustment application defines how ERROS is to display the data.

The Create, Update and Delete keys are not active and the operator cannot change the data.

Throughout the screens in this document, attribute iterations displayed in yellow, or reference numbers in silver, represent connections that can be navigated.

The layout of the detail lines in this Sales Order is different from those for products in the previous display. With traditional application development methods, a separate solution has to be created for each table for accessing the records, displaying them, ensuring that the solution can handle the situation when there are too many records to fit on a screen, providing a means of finding individual records in the table, allowing navigation to connected data, etc. Whilst this may not be particularly technically demanding in a traditional environment, it is time consuming and error prone and means that many new programs have to be created as well as SQL. These all need documenting and controlling.

On the IBM i, many solutions would include the use of sub-files defined in DDS to display the detail lines, with a separate sub-file being defined for each record type. This again is very time consuming. In ERROS, there is just one standard ERROS mechanism for this. This doesn't use IBM i sub-files even though it may look the same. This standard mechanism is used for all detail line displays in all applications. When adding new types of data in a traditional environment, new table objects are created. Within ERROS, no new table objects are created for new data types as these fit automatically within the existing ERROS framework.

Double clicking on an order, say Esmond Estates, or typing "1" and pressing or clicking ENTER, will result in the following screen -

Stock Level Adjustment (An ERROS Application)	Rob Dixon	Erros plc. INDEX
date and/or number	*0000000	
product ordered.	*0000000	
Our Data		
Type No. of record (or full or partial reco	ord ID) & press ENTER	
Or hover over highlighted links or image	es for instructions	
(Page DOWN for more) 1 3 Drawer metal filing cabinet 2 4 Drawer metal filing cabinet 3 Å4 Paper, ream, 100 gsm 4 Board Room chair 5 Board Room table 6 Economy typist's chair 7 Executive chair 8 Inkjet printer Å4 9 Laser printer Å4 0 Stacking chair	Quan.         Price           Ord.         Incl.VAT           #         8         1         48.00           #         9         1         56.00           #         12         10         4.00           #         4         2         80.00           #         7         1         1200.00           #         6         10         35.00           #         3         1         120.00           #         10         1         80.00           #         10         40.00           #         11         1         150.00           #         1         10         40.00	Incl. Quan. Total Due 48.00 1 56.00 1 40.00 10 160.00 2 1200.00 1 350.00 10 120.00 1 150.00 1 150.00 1
11 Items EX VAT 2270.00 VAT	454.00 40 GBP	2724.00 40 OVERALL TOTALS
Enter PgUp PgDn ERROSO8 Help (F1) MSG Help (F2) JUMP BACK (F3) Report (F13) ADD Dupl. (F14) Operate (F15) O	Refresh (F5) Audit (F7) Viev tions (F16) Navigate (F18)	w (F8) Create (F9) Update (F10) Delete (F11) BACK (F12) Copy (F22)

The Create, Update and Delete keys are not active and the operator cannot change the order.

The first 10 order lines are displayed in the sequence of their product names. Typing "#\* and pressing Enter will result in the order being displayed in

product number sequence. Any order line can be retrieved by product name or number in a fraction of a second, however many lines there are in an order.

You can double click again, on, say, Boardroom Table and ERROS will display the following screen -

Stock Level Adjustment (An ERROS Application)	Rob Dixon	Erros plc. INDEX
name and/or number		
Board Room table orders received	#00000007	
Our Data		
# (Number) <mark>0</mark> Date	0 /0 /0	Time <mark>0 . 0 </mark>
Type No. of record (or full or partial record ID	) & press ENTER	
Or hover over highlighted links or images for	Instructions	
Description 1 10/01/13 12.24 Esmond Estates Ltd 2 14/02/13 13.49 Boarstall Aggregates	Number # #	Quan. Price Incl. Quan. Ord. Incl.VAT Total Due 1 1 1200.00 1200.00 1 3 1 850.00 850.00 1
Enter PgUp PgDn ERROSOS		
Help (F1) MSG Help (F2) JUMP BACK (F3) Refresh	(F5) Audit (F7) Vi	iew (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)
Report (F13) ADD Dupl. (F14) Operate (F15) Options (F	16) Navigate (F18)	🔲 🕘 💼 Copy (F22)) 💼 🛄

You can double click on one of the orders to look at that order. Alternatively, you can single click on an order (or type the number to the left of the line), and press F7 or click on the Audit button and ERROS will display the following screen -

Stock Level Adjustment (An ERROS Application) Board Room table orders received 14/02/13 13.49 Boarstall Aggregates audit trail information	Rob Dixon #000000007	Erros plc. INDEX
Public Data	20 20	
To accept, click on ENTER; else type new ID &	click on ENTER	
Or hover over highlighted links or images for in	structions	
1 14/02/13 13.51.56 Trans #100202897 Relate Use	r E000070001 Employe	yee 00000002 Application 100000001
Enter RgUp RgDn ERROSO8 Help (F1) MSG Help (F2) JUMP BACK (F3) Refresh (F3	5) Audit (F7) View	w (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)
Report (F13) ADD Dupl (F14) Operate (F15) Options (F16	) Navigate (F18)	Сору (F22)

This shows that the product was related to the order at 13.51.56 on 14th February 2013 by the operator with User Profile E000070001, who is employee number 2. It was that operator who authorised the sale of the Board Room table at a much reduced price compared to the previous order.

Every single change to the metadata, application definitions and user data, including every individual line of text, is recorded in the ERROS audit trail.

The next screen is for a sales order in a Sales Order Entry application.

Sales Order Entry (An ERROS Application) Esmond Estates Ltd	Rob Dixon Erros plc. INDEX #000000032	
date and/or number 10/01/13 12.24 Sales order	#00000001	
product ordered		
# (Number) 0		
Type No. of record (or ID) & ENTER; F9	to add	
Or hover over highlighted links or image	es for instructions	
(Page DOWN for more) 1 3 Drawer metal filing cabinet 2 4 Drawer metal filing cabinet 3 Å4 Paper, ream, 100 gsm 4 Board Room chair 5 Board Room table 6 Economy typist's chair 7 Executive chair 8 Inkjet printer Å4 9 Laser printer Å4 0 Stacking chair	Quan.         Price         Incl.         Quan.           ord.         Incl.VAT         Total         Due           #         8         1         48.00         1           #         9         1         56.00         1           #         12         10         4.00         40.00         10           #         4         2         80.00         160.00         2           #         7         1         1200.00         1         10           #         6         10         35.00         350.00         10           #         3         1         120.00         120.00         1           #         10         1         80.00         10         1           #         10         40.00         400.00         10	
11 Items EX VAT 2270.00 VAT	454.00 40 GBP 2724.00 40 OVERALL TOTALS	
Enter PgUp PgDn ERROSO8 Help (F1) MSG Help (F2) JUMP BACK (F3) Report (F13) ADD Dupl. (F14) Operate (F15) Op	Refresh (F5) Audit (F7) View (F8) Create (F9) Update (F10) Delete (F11) BACK (F12)	

In this application, the operator has authority to change, delete or add to the lines in this order so the relevant buttons are now active and have a green background. Once order entry has been completed, then the order could be marked closed and this would no longer be possible.

The definition of the data ensures data integrity so that, for instance, an order header cannot be deleted leaving order details still there.

In the above screen, there is a total line that displays the values in the order header record. As order lines are added or changed, the order header in the database and its display on the screen will also change. In addition, the stock record for the product is updated as are other relevant records. In traditional systems, this might be done with trigger programs. There is no need for these in ERROS as the Sales Order Entry application definition instructs ERROS which records are to be updated. The operator will be unaware of these changes. Commitment Control is used to ensure data integrity. If journalling is accidentally or deliberately switched off, ERROS will stop working.

Sales Order Entry (M EXEC Application) Rob Dixor Esmond Estates Ltd date and/or number 10/01/13 12.24 Sales order product ordered Our Data # (Number) (M EXEC		Erros #00 #00	pic. INDEX 0000032 0000001				
Or hover over highlighted links or images for	a instructions						
		-	-		20000000		
(Page DOWN for more)		Quan.	Trol VAT	Incl.	Quan.		
1 3 Drawer metal filing cabinet	# 8	1	48.00	48.00	Due	2. 12.2	64
2 4 Drawer metal filing cabinet	# 9	ĩ	56.00	56.00	î		
3 A4 Paper, ream, 100 gsm	# 12	10	4.00	40.00	10		
4 Board Room chair	# 4	2	80.00	160.00	2		
5 Board Room table	# 7	1	1200.00	1200.00	1		
6 Economy typist's chair	# 6	10	35.00	350.00	10		
7 Executive chair	# 3	1	120.00	120.00	1		
8 Inkjet printer A4	# 10	1	80.00	80.00	1		
9 Laser printer A4	# 11	1	150.00	150.00	1		
0 Stacking chair	# 1	10	40.00	400.00	10		
11 Items EX VAT 2270.00 VAT	454.00	40	GBP	2724.00	40	OVERA	
			•	Section)	:	M	

This image is a photograph of an iPhone operating ERROS and displaying the same screen. Although there are no function keys on a mobile phone, the application can still be operated using the buttons. All ERROS applications have very high security levels that add to the already high existing IBM i security. These are not changed when using a mobile phone or a tablet.

The next screen shows the ERROS System Operator Save Options in System Operator tasks, a simple ERROS application that allows the System Operator to back up all parts of the system and to perform other tasks.

	tasks (An ERROS Application) System Operator tasks	System Operator	Erros Ltd			
	System Operator ERROS group job name	QSYSOPR				
Our Data	ERROS System Operator Save Option	5				
Type No. of re	cord (or full or partial record ID	) & press ENTER				
Or hover over	highlighted links or images for	instructions				
1 Hourly Save 2 Daily Save 3 Weekly Save 4 System Save 5 Initialise Ta 6 Remote Journa	LAST SAVE Last Date Time Vol.Id 17/02/13 10:34:51 E08HA1 00/00/00 00:00:00 E08DA1 16/02/13 16:36:09 E08VA1 16/02/13 17:31:00 E08SA1 ape Al 1 ERROSO7 ERROSBCKUP/EPR	No. Nxt SCHEDULE Tps Cyc Sts From To 1 & OK 05:00 21:0 1 B 1 B 1 B 1 B	Tape Save Device Type O TAPO1 TAPO1 TAPO3 SavF then T TAPO1	ape		
Remote Journa	I 2 ERROSBERUPY					
Help (F1) MSG	Help (F2) JUMP BACK (F3) Refresh ) Operate (F15) Options (F16) Na	(F5) Audit (F7) View (F wigate (F18)	8) Create (F9) Update (F10 (F22)	) Delete (F11) BACK (F1	<u>12)</u>	

ERROS exit program and passed to the main ERROS programs for display, in exactly the same way whether they are to be displayed using 5250 or a

browser. The ERROS main program inserts the necessary 5250 attributes or HTML and Javascript code into the datastream using the standard HTML and Javascript generation facilities of ERROS.

All ERROS physical files (ERROS does not use logicals) are journalled. The hourly save backs up all changed objects, including journal receivers, and changed objects on the IFS, so I have no need to use the Daily backup. The first 4 lines call separate backup programs - Hourly, Daily, Weekly and System Save and the 5th line calls a simple program to allow the operator to initialise tapes using standard ERROS tape naming conventions.

The Hourly program is submitted to batch during the specified hours at half past the hour from a non-stop ERROS supervisor program. It can also be operated at any time by typing 1 or clicking on the first data line.

You can use ERROS to access external data, both standard database files in DB2 and files in the IBM i IFS (Integrated File System). In the following screen, ERROS is displaying entries in a folder called "ERROSHOME".

IFS ACCESS (An ERROS Application)	Rob Dixon	ERROS plc INDEX	
directory, folder or file ERROSHOME			
cirrectory, folder or file EXTERNAL Data			
Type No. of record (or full or partial re Or bover over highlighted links or ima	cord ID) & press E des for instruction	ENTER	
(Page DOWN for more) 1 Pat_Minkley (DIR) 2 ERROS (DIR) 3 IMG_4169T2-Banner.jpg Width 1400 X 140 4 Home_1.htm 5 ERROSTips1.htm 6 ERROSTips2.htm 7 erros_mission2.htm 8 ERROS_Corporate_Organiser_II.htm 9 400Times (DIR) 0 AH (DIR)			
Enter     PgUp     PgDn     ERROSOB       Help (F1)     MSG Help (F2)     JUMP BACK (F3)       Report (F13)     ADD Dupl. (F14)     Operate (F15)	Refresh (F5) Options (F16)	Audit (F7)         View (F8)         Create (F9)         Update (F10)         Delete (F11)           Navigate (F18)         Copy (F22)	BACK (F12)
To the left of the main input box, ERROS informs the op	perator that this is EXTER	RNAL data, not stored in the ERROS database. The path is shown above	

To the left of the main input box, ERROS informs the operator that this is EXTERNAL data, not stored in the ERROS database. The path is shown above the input box. The data has been accessed through an ERROS exit program called by ERROS that retrieves the image size of jpg and gif image files. It does not have any HTML code. The data can also be retrieved and displayed in 5250 mode but the exit program does not write to the display file. It passes the data to the main ERROS programs for display over 5250 or with a browser or for printing.

Exit programs can be created to read comma separated or other files on the IFS or to read standard DB2 for i files and pass data to ERROS for loading into ERROS. Equally, exit programs can be used to write IFS or DB2 files.

This document shows above a variety of ERROS browser screens in inquiry mode from different ERROS applications. They have all been displayed by ERROS using the same HTML and Javascript generation facilities of ERROS, even where the data is not stored in the ERROS Connectionist Database. They demonstrate the power of ERROS, which can be used to create new applications that are internet enabled, and to modernise existing applications.