Agenda No

AGENDA MANAGEMENT SHEET

Name of Committee	**Resources, Performance & Development Overview & Scrutiny**
Date of Committee	**14 November 2006**
Report Title	**ICT Date Problem**
Summary	This document reports on a problem experienced earlier this year by some of the Authority's computer systems.
For further information please contact:	Tonino Ciuffini Head of ICT Tel: 01926 (41)2879 toninociuffini@warwickshire.gov.uk
Would the recommended decision be contrary to the Budget and Policy Framework?	No.
Background papers	None

CONSULTATION ALREADY UNDERTAKEN:- Details to be specified

Other Committees	☐	.....
Local Member(s)	☒	Cllr David Booth – For Comment Cllr George Atkinson – For Comment Cllr Bob Hicks – For Comment
Other Elected Members	☐	.....
Cabinet Member	☒	Cllr Alan Cockburn, For Information
Chief Executive	☐	.....
Legal	☒	Sarah Duxbury – Comments included
Finance	☒	David Clarke, Strategic Director of Resources – No comment
Other Chief Officers	☒	David Carter, Strategic Director Performance & Development
District Councils	☐	.....
Health Authority	☐	.....

Police	☐	.....
Other Bodies/Individuals	☐	Paul Williams, Scrutiny Officer, Performance & Development

FINAL DECISION NO

SUGGESTED NEXT STEPS: Details to be specified

Further consideration by this Committee	☐	.....
To Council	☐	.....
To Cabinet	☐	.....
To an O & S Committee	☐	.....
To an Area Committee	☐	.....
Further Consultation	☐	.....

Resources, Performance & Development Overview & Scrutiny Committee

14th November 2006

ICT Date Problem

Report of the Director of Resources

Executive Summary

The following report summarises the problems experienced earlier this year by some of the Authority's computer systems. It reports on:-

- the cause of the problems,
- actions taken and
- lessons learnt to avoid any future recurrence.

Resources, Performance & Development Overview & Scrutiny Committee are asked to note the report and the actions taken.

Agenda No

Resources, Performance & Development Overview & Scrutiny

14th November 2006

ICT Date Problem

Report of the Director of Resources

Recommendation

Resources, Performance & Development Overview & Scrutiny Committee are asked to note the contents of the report and actions taken.

1. Introduction

1.1 This document reports on a problem experienced earlier this year by some of the authority's computer systems. It reports on the cause of the problems, actions taken and lessons learnt to avoid any future recurrence. Resources, Performance & Development Overview & Scrutiny Committee are asked to note the report and actions taken.

2. Background to the problem

2.1 Several years ago our computer systems suffered some significant system non-availability when some of our key computer systems servers developed differences between their system clocks. In response we introduced a synchronisation process to keep our dozens of servers' time clocks in line, and procured a product that used the GPS Satellite system to provide a single, accurate date and time source.

2.2 Unfortunately on Sunday 11th June 2006 this system informed our servers that the date was the 25th January 2026. Fortunately many of our systems on newer versions of servers had a facility to trap out such a dramatic change and ignored the new date. Hence our financial systems, our key network servers used by staff and Notes mail were unaffected. Unfortunately some of the older infrastructure such as we use for Notes applications accepted the date, and on the Sunday night triggered off a series of programmed time related actions as if the date was really 2026, e.g. deleting files from the Bulletin Board that were over 1 year old, as this is the corporate policy in this area.

2.3 Despite extensive investigation, and discussions with our system supplier, we are still unable to 100% confirm the cause of the problem. We have been able to identify that the date change was related to a known week rollover problem on GPS satellite systems similar to a year 2000 issue. These systems only hold the week as a number between 1 and 1024, when this limit is reached the satellite signal will effectively go back 1024 weeks, just over 19 and a half years. This was a known problem that occurred on the 22 August 1999. Companies that built systems such as the one that we were using had to develop a programme to deal with this issue, by adding 1024 weeks when the roll-over occurred. The GPS system date was moved forward exactly 1024 weeks, so somehow it would appear that this addition was invoked on our system on the 11th June.

2.4 How this problem was introduced is still not proven.

(i) The company who supply the equipment we use, have only had one previous report of such an incident. They had not appreciated the 1024 week relevance until we pointed it out. They had assumed it was a hardware failure. Their product does have facilities built in to check for major date/time discrepancies for more recent operating systems, and indeed it was this that protected our newer servers. However they implicitly trusted the time delivered by the GPS receiver at start-up. They are also now utilising different GPS receivers in their product. They have offered us a programme and system update to protect against this issue again.

(ii) A UK distributor for the company that supply the GPS Signal receiving component have verbally confirmed that there is a known bug that could cause 1024 days to be added at start up. However anecdotally they believe that this has only occurred on a few occasions.

(iii) This would suggest that the system must have restarted itself on Sunday the 11th, however we are unable to confirm this, as: -

- No staff were in the building on that day
- There is no evidence of a power cut that could cause it to restart
- The server is in a rack protected by an Uninterruptible Power Supply, which would protect the server in the case of a power cut until the emergency generator stepped in.

(iv) We do not believe that we can pursue this any further at this stage. As the problem was due to a rare, intermittent bug, we do not believe that any other organisation was affected at the same time.

3. Actions taken in response to the problem

3.1 The problem was discovered by our out of hours support desk at 6:00 Monday morning. It was believed to be a background server related error that had

occurred and actions were taken to return the systems to service and this was achieved about 8:30 on Monday morning.

3.2 We have two Notes applications servers for resilience. Our investigations into the problem suggested that the Lotus Notes System primary server was confused with regard to dates, and this system was removed from service at 10:45. At this stage it was assumed that secondary server (used as a 'duplicate copy' in the event of problems) was okay, as it did not appear to have suffered the data loss, and so again in the interest of service continuity we kept this facility on-line and the systems remained available. The first bulletin to all staff was circulated shortly afterwards, warning of a potential risk of data loss. We also contacted IBM as our external Notes Support Company.

3.3 Unfortunately testing confirmed that there was an issue with the secondary server and following discussions with IBM the secondary server had to be removed from service on Tuesday 13th June.

3.4 Options for 'cleaning up' the servers were investigated, however after 24 hours of work and discussions with external support it was concluded that this was not possible, and both servers had to be restored to before the clock change.

3.5 An alternative method of collecting time was implemented which still uses the GPS based system, but also three different sources from the Internet. It also utilises the system to reject large time changes that protected our other servers.

3.6 Work started immediately on recovering data that may have been lost due to the need to restore our systems back to the previous back-up copy.

4. Impact of problem

4.1 Most servers and systems including financial systems, Notes e-mail and key Directorate applications such as our Social Care and Highways systems were not affected.

4.2 Servers affected were Notes systems, Property Services Systems and elements of the website, systems that use advanced time related facilities to implement actions on data and documents, resulting in the following:-

- There was 24 hours non availability of notes systems not including e-mail.
- Areas of the public web site were not updated for 3 days, including job vacancies. All live had been removed, as they were 'out of date'.
- Systems had to be restored back two working days with immediate loss of information. However because we had taken additional backup copies during the incident the ICT Systems Centre team were able to investigate all **1557** databases on the Corporate servers to track any data that may have been lost and retrieve everything required as follows:-

- Public facing applications on the web site were prioritised to ensure that nothing coming in from the public was lost.
- Of the databases analysed, 1335 were found to have no problems.
- Of the remainder, a further 57 had changes that were more up to date on the live servers, so no further action was needed.
- For another 185, there was successful follow up with the database owners to ensure that any missing data was identified and re-input.

4.3 In successfully restoring all the Property Systems we also needed to invoke some disaster recovery facilities with our external supplier. Even though the facilities that needed to be restored were not directly covered by our contract they helped us, and we were successful in retrieving the information. This was a useful test of our disaster recovery arrangements, and provided lessons on this process as it took longer to restore than we expected. This lesson will inform our wider disaster recovery plans..

4.4 The only external costs incurred as a result of the incident was £350 paid for third party support from a company recommended by IBM. They confirmed that our approach was correct.

4.5 As a result of the incident we did need to use 123 days of internal systems development and technical support resources. Due to the critical nature of the incident, a number of staff were immediately redirected onto this incident. The staff identified the externally approved approach to the incident resolution, and were able to recover all information. Although there was no external cost, the staff were redirected from other New Ways of Working, Corporate and Directorate Priorities.

5. Lessons learnt

5.1 With hindsight we should not have trusted a single source of time, even though the suppliers initial reaction to our problem was that their system was always accurate.

- We now utilise four sources, and have built in a ‘time change’ check.
- We have the option of a free upgrade of GPS equipment with their fixes since our issues. This was not taken up until we investigated whether it was possible to make a claim against the company. The upgrade option will now be explored.
- As part of the implementation of this upgrade we will look to further strengthen the time checking by replacing the internet time checks with atomic clock checks at two different locations.

5.2 Again, with hindsight we should have taken both servers down rather than try and maintain service, even though one appeared okay. We would not have avoided downtime, as again we would have still needed to investigate the

options. We would however have reduced the amount of data 'lost' when we did restore, and reduced the effort that we had to put into recovering the data.

5.3 We will consider the balance of maintaining the service against a 'safety first and restore' approach in the event of any future similar incident, with lessons learnt from this event informing our future decisions.

5.4 The longer time that it took to achieve the disaster recovery of information is being used to inform our wider disaster recovery plans and expectations.

DAVID CLARKE
Strategic Director of
Resources

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16 October 2006