Middleware Solutions for Integrated Justice: Overview and Examples

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Abstract

This paper examines the use of middleware technologies for the purpose of integrating disparate justice information systems. Middleware approaches to linking disparate systems allow for individual agency information systems to pass information to other agency systems quickly and easily. Middleware can provide translation of data elements between discrete agency systems, and can allow for the embedding of workflow business rules as a part of the data routing and translation process. Middleware also allows for individual agencies to continue to manage system security and to control what data is sent where and when.

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Appoaches to Justice Systems Integration

When a jurisdiction is faced with the task of integrating all of its diverse criminal justice information systems it basically has two alternative approaches. The traditional approach is to combine all systems on one computer—typically a large computer like a mainframe. The alternative is to use software called translation middleware, to link existing separate systems—whether those systems reside on a mainframe or on smaller computers—into a group of systems that operate as one but allow a greater degree of autonomy for the involved agencies.

While the benefits of integration have become obvious to most criminal justice decision makers, the cost of integrating disparate systems can be quite high, especially if the existing autonomous agency systems are scrapped and then replaced by one consolidated system located on a central computer.

In addition to the high cost of implementing a completely new computer system large enough and complex enough to accommodate all justice agencies, a major disadvantage of combining all of a particular jurisdiction's justice entities on one large computing platform is the loss of individual agency autonomy, security and control.

Security Advantages Associated with the Middleware Approach to Integration

Justice agencies, particularly those that store intelligence data or sensitive information related to victims and witnesses, are usually uncomfortable with the idea of relocating their systems to a shared system that is solely under the control of another entity that might not have the same concerns about the importance of securing sensitive data elements.

Of course, security on a single system can be made as tight as desired, but the issue is who controls the actual switches that allow access to supposedly secure data elements. In short, there are risks associated with having outside agencies, whose employees may have conflicting loyalties, in control of your data.

By using middleware software to pipe data between agencies you can greatly limit your risk of a security breach by allowing your own agency's systems administrators to control what data goes to whom and when. Use of this software to link diverse systems not only reduces the risk of a security breach, but it will usually reduce the cost and complexity of an integration effort since existing investment in autonomous agency systems can be leveraged.

Because of these advantages, many jurisdictions are adopting the middleware approach to integrating justice information systems. This approach can be particularly advantageous for those jurisdictions having large investments in existing system infrastructures. By using middleware to create a “virtual system” agencies avoid having to migrate their data to a computer shared by all criminal justice agencies, and they can continue to operate using their existing data structures and business rules, as well as secure their own data. An added benefit is that workers who have become accustomed to old systems and

procedures may not require much retraining since they continue using the systems they have become accustomed to.

Virtual System Approach to Integration

An example of how virtual systems operate is when police enter arrest and incident data into their own system and that same data is immediately transferred to prosecution, defense, and court clerk systems in a way that eliminates re-keying of critical information. In turn, prosecution data is instantly transferred, in real-time, to the Clerk's system as charging decisions are made. At no time will the Clerk have access to the prosecutor's actual systems, but only to the data that the prosecutor transmits.

From the Clerk's system, information may be piped directly to state repositories as defendants' court cases are disposed of. None of these inter-systems data transfers require human intervention since the entire process is completely automated. This type of virtual system is best conceptualized as a consortium of different systems that instantly reuse the same data as cases travel upstream (or back downstream) through the justice process. The data itself is automatically made available as the agencies need it in a just-in-time fashion. The glue that holds the virtual system together is middleware software.

Middleware performs both routing and a translation functions so while agencies still maintain their own systems, information entered in those discrete systems can be used to populate databases in other agencies' systems and thus reduce or eliminate redundant data entry. Another way to put this is that middleware acts as a United Nations-style translator. The translation occurs immediately and accurately, the listener (receiving computer) hears in its own language what the speaker (sending computer) is saying in an entirely different language. This is made possible by use of a translator (the middleware).

One positive side effect of eliminating redundant data entry is increased accuracy, due to elimination of successive re-keying of data from one system to the next, which creates cumulative data errors. These errors then make it harder to link associated arrest and court disposition records. The net effect is that if the disposition records cannot be linked to arrest records at the state repository, the dispositions cannot be posted. When dispositions cannot be posted, they will not appear on rap sheets.

The Colorado Integrated Justice Infrmation System

The Colorado Integrated Criminal Justice Information System (CICJIS) uses the middleware approach to systems integration. The system is shared by prosecution, courts, probation, law enforcement, as well as adult and juvenile corrections. The system was mandated and funded by the Colorado legislature in 1995. Actual system design began in 1996 and initial implementation, which is still in process, began in 1998.

From the beginning, one of the main goals of the system was to keep autonomous agency systems intact while enabling communication between them in such a way as to create one unified virtual system. In order for this to happen, all agencies had to agree upon one unique defendant identifier that

would be used as a primary medium of exchange. The identifier selected was the SID (State ID number). This number is a fingerprint-indexed number assigned to defendants at their first arrest and kept by defendants for the remainder of their lives. Each time a defendant is re-arrested he or she is linked to the SID number. Of course, booking numbers, case numbers and other internal agency numbers are still used in the system, but all exchanges are keyed to the SID number.

The cost of system implementation was four million dollars and the annual budget is 1.1 million dollars. Mark Perbix, Colorado's Integrated Justice Chief Information Officer said that without the legislature's mandate, integration would not be a reality today in Colorado. "A big motivating factor for the legislature to fund the system was the realization that the criminal justice systems they had funded under the assumption that they would communicate with one another were not in fact communicating."

Another goal of the Colorado system was to increase the rate of disposition reporting to the Colorado criminal history repository. Legislators wanted one source of complete criminal history information, including court dispositions. In Colorado, there must be an underlying arrest, with a fingerprint-indexed identification, reported to the state central criminal history repository before a disposition can be posted. So even if a disposition is received from the courts, it cannot be posted unless the associated arrest has been reported.

The new system has significantly improved the rate of arrest and disposition reporting, but still relies on consistent business practices within law enforcement and the courts combined with electronic data sharing through middleware to further improve disposition matching.

The Los Angeles County Proactice Information Exchange (PIX) System

The first system that used the middleware approach was the Los Angeles Proactive Information Exchange (PIX) system. This system, first implemented in 1989, gradually brought individual agencies online.

Sherron Trawick, Systems Manager for the Los Angeles County District Attorney's Office and one of the charter PIX participants, said that "We knew we would never get all criminal justice agencies to agree on one common database so we sought a solution like PIX that would allow each agencies to determine what data they would give to other agencies."

PIX allowed each agency to determine what data they would send to other agencies and when they would send it. The high cost of replacing existing systems also influenced the choice of PIX. Trawick said, "we adopted the middleware approach because some agencies had legacy systems that we knew we couldn't afford to replace. In fact, thanks to the approach we took, we are still using some of these same legacy systems many years later."

A recent enhancement to the LA County system is the Consolidated Criminal History Reporting System (CCHRS). This system, which uses PIX for information exchange, records booking information from the Sheriff's system,

case rejections from the DA's office as well as critical court information including warrants and criminal charges. The system serves as a criminal history repository for anyone arrested in LA County.

Unlike Colorado, Los Angeles has succeeded in closing the loop on arrest and disposition reporting so arrests and dispositions are reported and posted at a much higher rate. This is partly due to the fact that Los Angeles has fewer agencies to bring into the loop so the problem of gathering fingerprint-indexed arrest data is much more manageable. Los Angeles also has a much smaller geographic area to deal with than Colorado even though the total population of Los Angeles is greater than Colorado.

As in many jurisdictions, defendants arrested in LA County are electronically fingerprinted and classified, but defendants whose cases are generated by summons are never printed or classified. Since many of the summons-generated cases pertain to defendants who have previous arrests, CCHRS developed automated processes for linking fingerprint-based records to records that are not linked to fingerprints. This has allowed for much more complete and accurate criminal history records within LA County. Of course, in the absence of definitive identification through the use of some kind of a biometric identifier like fingerprints, absolute accuracy can never be fully assured. Nevertheless, the linkage of cases initiated by summons with cases initiated by arrest is a significant development in the effort to improve criminal history records.

The system in Los Angeles County with its criminal history repository resembles a large state-level system and in many respects, Los Angeles County resembles a large state. Its geographic area is larger than some states, and with a population of over 9.2 million, the County has a higher population than all but eight states. However, what Los Angeles County has that states and even municipalities lack, is a strong combined city and county government that can mandate, direct and fund technology efforts that include all of the various players in the criminal justice system. It is perhaps for this reason that Los Angeles, despite its size, successfully implemented one of the earliest significant integrated criminal justice systems in the country.

Pennsylvania's Justice Network (JNET)

Another example of a virtual system is Pennsylvania's new Justice Network (JNET). JNET is a statewide integrated system that emphasizes the availability of timely, accurate criminal history and court information to criminal justice agencies in the state. This system was mandated in 1996 by executive order of Pennsylvania governor, Thomas J. Ridge, with the dual goals of improving operating efficiencies and enhancing public safety .

What is unique about JNET is that it is being implemented as an Internet browser-based system running on a state-operated Intranet. The ramifications of this are significant since almost all computers sold today have a built in Internet Browser.

Any authorized user having a computer with an Internet browser should be able to connect to JNET without any special programs or preparation. It should not matter if the computer is an iMac or a PC, as long as a recent Web browser has been installed on the computer.

This browser-based implementation is also expected to expedite training since many people are familiar with Web browser standards and will more intuitively adapt to JNET than they might to other types of interfaces.

JNET will connect to the state central repository for criminal history and other court-related information, and JNET will provide a middleware solution that will integrate disparate agency systems throughout the state in a phased modular fashion. This system will be a statewide, comprehensive solution that will include all criminal justice agencies in Pennsylvania.

JNET is a very promising model for statewide integration but it must still transcend the usual hurdles--both technical and human--that tend to plague large-scale information technology implementations. If successful, it will be the most advanced system of its type and could serve as a model for other states trying to accomplish a similar level of integration by using translation middleware as the glue to bind many disparate systems into a whole.

Conclusion

Leveraging existing investment in systems through the virtual system approach will usually be much less expensive than consolidating several diverse agency systems on one platform, but only makes sense when the existing infrastructure is sound. In the case where existing systems are in need of replacement, other approaches might be more appropriate. When the middleware approach is appropriate, significant data sharing improvements can usually be implemented relatively quickly and cheaply.

The quickest way to gain early benefits from an integration initiative is to identify the most crucial existing paper exchange points in the justice system and electronically bridge those exchange points. Once these crucial exchanges are automated then other less critical exchange points can be bridged. This approach allows for incremental adoption and lowers risk while maximizing benefits. The risks of adopting a middleware approach to integration are far less than the risks of completely building a system that will serve all parties in the justice enterprise. System building is risky in the first place, and creating a system that will serve many different agencies is especially risky since not only are the technical problems formidable, but the political problems and conflicts are potentially enormous. The middleware approach mediates risk by reducing the complexity of development and by concentrating only on the logical justice information exchange points. This, in turn, focuses the integration process on immediate, achievable benefits and greatly reduces the potential for turf battles.