Continued Quest for Building Department Quality Management: A Systems Approach to Data and Workflow

By Yves Khawam, Ph.D.

Problem Statement

The typical jurisdictional building development process has long been perceived as replete with bureaucratic barriers contributing to inflated costs and impeded customer service. This perception, in large part, stems from the manner in which the various jurisdictions' departments and agencies interface in generating a development instrument. Most if not all government institutions adhere to many practices pre-dating the advent of electronic information systems, whereby information lives more within static instruments than as dynamic data. Examples of instruments created within the development process include comprehensive plan policies, specific plans, rezoning ordinances, subdivision plats, development plans, improvement plans, certificates of compliance and building permits, to name a few. Each listed instrument typically builds upon the prior instruments created and, while there is new value-added information reflected within each one, some of it consists of reformatting information present in upstream instruments.

Furthermore, the workflow process contributing to the various instruments is not linear in that the inputs stem not only from clients, but also from the participating jurisdictions' departments and agencies, which may need to be polled as to the status of the developed land within their scope of authority with the creation of each new instrument. It is also labor-

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intensive to collate information from different sources and instruments in order to execute the next phase of a particular process. Hence, the issuance of a building permit requires analyzing multiple prior static instruments located in disparate locations for potentially pertinent information; once the pertinent information is located and validated, it is re-entered as part of the building permit instrument.

This article will provide a glimpse into the traditional instrument-based approach to information and propose a philosophical shift to a paradigm predicated on active information classification and storage integrated with process workflow and contributing to enterprise-level process efficiency gains, customer satisfaction and cost savings.

Data-Centric Approach

While much of a typical organization's data resides within databases, the standard approach to transferring information across divisions, departments and clients is mostly instrument-based (typically, forms or documents). Generation of these instruments – be they personnel time sheets, financial transactions, notices of violation or development plans – typically require the re-keying of data from existing database systems into the newly created instrument. This method of data processing is inefficient, subject to errors and not as useful to downstream processes that may be precluded from re-categorizing the data in a manner more adapted to their need. A few examples follow to illustrate the traditional approach, as well as identify the potential to realign processes within a more data-centric context.

Development review. The entitlement process of development review requires the coordination of multiple departments and agencies to include planning, transportation, water, wastewater, power and flood control, to name a few. In a typical jurisdiction, this process involves circulating a client-submitted proposed plan to the various departments and agencies that provide independent comments back to the applicant. Upon receipt of comments, the client revises the drawings and submits once more to the applicable reviewing entities, renewing the cycle until such time that the plans are approved. In so doing, the reviewing entities are typically recording information regarding the development project within proprietary information systems only used by that particular department or agency and the final product, collating all these reviewing authorities' results in a paper instrument assuming the form of an approved development plan. This final instrument exists solely as a paper plan set, which may be scanned and loaded into a document management system as an image file, but subsequent use of the information is limited to retrieval of the image and manually perusing it for pertinent information therein.

This approach limits the usefulness of the information that needs to be re-entered or re-processed for use within project modifications or by downstream processes, as we will see within the building permit example following. Instead, we could greatly enhance the implementation efficiency and effectiveness of modifications and downstream processes by creating a shared database structure within which respective departments/agencies could populate information related to the approval of the development. In so doing and once compliant with all departments, the approved development plan could be generated as a report from the active database approval fields. Security would be implemented to ensure that authorized departments have sole control of the active data within the system, though other departments for information-sharing purposes could view this data. Storing final approval information as active data provides access to this data in a centralized location for information research purposes, for future modifications and for use by downstream processes, thereby

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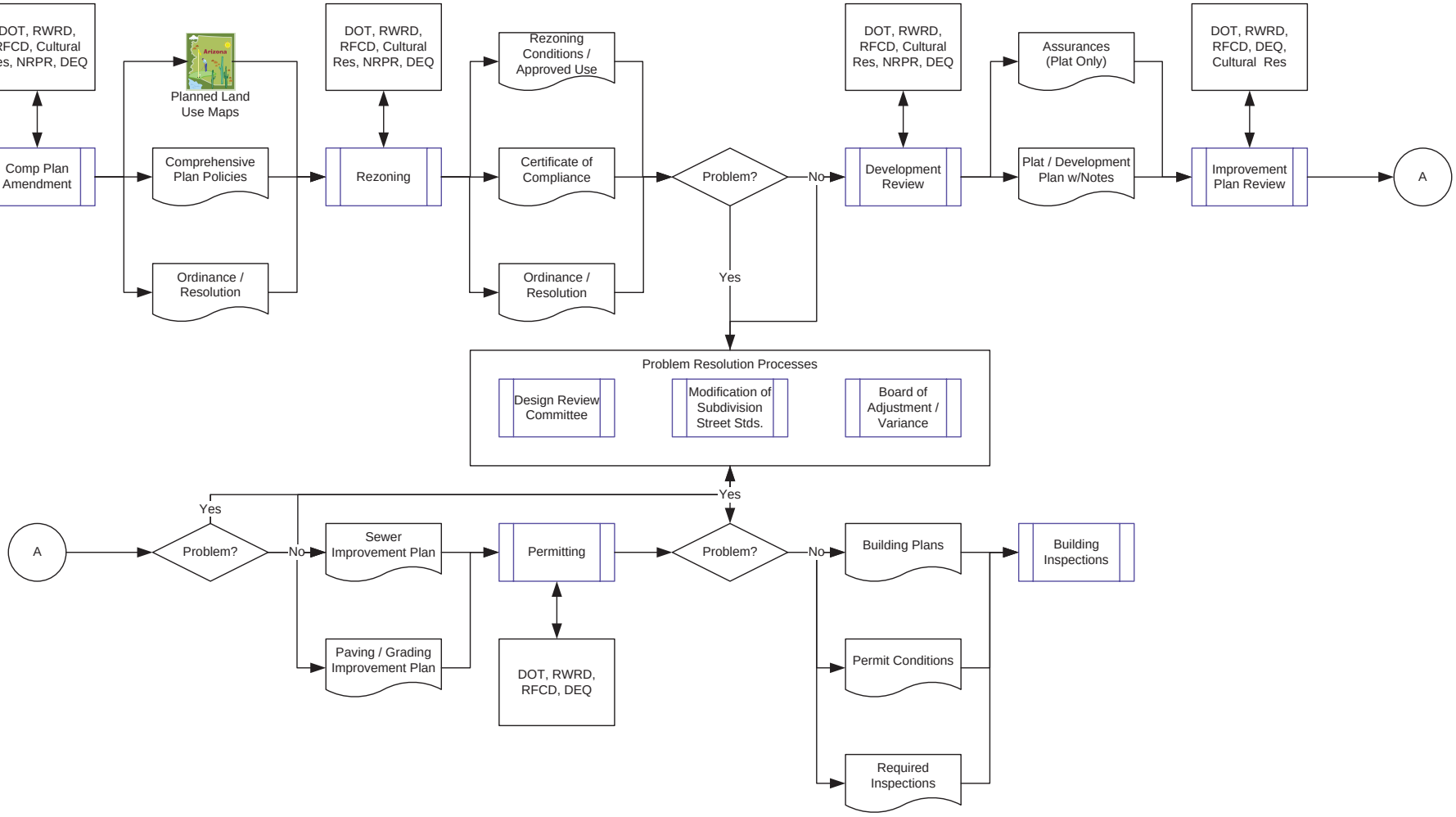
DEVELOPMENT SERVICES PROCESS FLOW OVERVIEW



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limiting the potential for omission errors and facilitating the automation of information transfer. In addition, customer service benefits from these efficiency gains translate into reduced turnaround times and real-time information sharing via a web client portal.

Building permit. Building permit application is typically made post approval of all land use and site infrastructure, which guide the interface between the building details and site elements. As such, a building permit needs to be reviewed for zoning, utilities, flood control and other requirements already typically addressed within upstream processes through instruments, such as specific plans, rezoning ordinances, subdivision plats, development plans, etc. Thus, to review compatibility between the proposed building design and the site, these instruments need to be analyzed for information that may be pertinent to the building elements. This process is highly labor-intensive, as many sheets of multiple documents need to be verified, which also results in a high probability of error relating to a missed element.

Instead, if an integrated data and workflow approach was implemented, data from upstream processes could flow down to the building permit process for two principal purposes. The first would be to categorize permit conditions in upstream processes, such that these could automatically flow into the building permit without intervention of the plan review staff; the second would be to provide guidance to plans examiners in reviewing site elements falling outside standard zoning or other code requirements. This data could be re-processed from the active data fields used to generate upstream instruments and categorized into discipline-specific areas for use by the plan review staff; i.e., building site location information could be grouped to include setbacks, number of stories, maximum height and surface area that differ from the default values allowed within that zone by code. Again, this approach would enhance efficiency/effectiveness of the building review process by generating greater staff productivity/reducing review error rate.

Coordination of requirements across agencies: sewer release. In many jurisdictions, building construction is allowed to begin prior to completion and release of the public sewer. However, a mechanism must be implemented in order to ensure that buildings do not actually connect or drain to the sewer prior to sewer approval. This could take the form of a letter from the wastewater department releasing actual subdivision lots or a Geographic Information System (GIS) layer indicating approved connections. Regardless of the methodology, manual intervention is required to verify that the sewer is released prior to allowing the building plumbing connection. Such interventions are labor-intensive, subject to human error and compounded by the hundreds of such items requiring cross-agency coordination throughout the development process. If, instead, workflow and data were integrated across departments, then the wastewater department could identify GIS land areas where sewer construction was under way (linked to the active development approval data for reference purposes) and place a hold on all sewer connections within affected areas. The sewer hold could thus automatically carry over to building permits initialized within the same land areas by precluding the scheduling of building sewer connection inspections, thereby maintaining connection integrity. Upon sewer completion, the wastewater department could remove the hold on the affected land areas, which could, in turn, automatically remove all downstream holds on building permits issued within these areas. The beauty of such workflow/data integration is that the omission error potential is decreased along with an increase in process efficiency since such a release does not require building staff intervention, thereby increasing staff productivity by streamlining data manipulation and control-related tasks.

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Land-Based Context

Stepping deeper into the data-centric approach allows one to re-evaluate the nature of information and its use within processes. Since public works departments are typically land-based in their approach to processing information, one needs to tie processes, work instruments and assets to land areas for easy access and retrieval. GIS can be adapted for tracking genealogy of land subdivision or aggregation, as well as linking mapped areas to database fields, thereby facilitating future reporting on a particular tract of land.

In addition, GIS data systems should not be limited to geographical layer views proper, but extended to integrate land plan views wherever possible. For example, traditional development plans may be available electronically as images or PDF files that need to be opened within a viewer independent of GIS layer views on the same area. However, since almost all public works land-based processes require evaluating information living within a GIS environment, it would be more useful to have the land-based graphic elements of development plans take the form of vector files comprising a GIS layer than as static documents outside this environment. Again, the vector drawing is more useful than the image created from a paper instrument for retrieval as well as for analyzing context specific information, as it can be overlayed with other layers available within the GIS environment. A vector development plan could therefore be viewed as a layer alongside other GIS layers, thereby providing an integrated graphic view regarding context and allowing viewers to glean all graphical data within a single platform. This methodology has already been successfully deployed by the Pima County Information Technology Department GIS Group as relating to incorporating Development Services planning and addressing AutoCAD layers within MapGuide, thereby yielding great gains in processing efficiency of related tasks.

Thus, linking the GIS environment to active database fields maximizes the potential for efficient workflow processes across the range of available information.

Process Efficiency Summary

To harness the potential for such efficiency gains across the organization, the data-centric approach requires identification and mapping of processes reflecting how data flows through the organization in order to create appropriate fields and tables, along with the links that exist among them. Doing so provides an ideal opportunity to re-engineer business processes aligned with information flow in order to obtain the greater levels of efficiency that this methodology can produce.

This data-centric process approach has been in use for some time within certain industries, such as banking, travel and insurance. The process of purchasing a plane ticket occurs in this manner as flight availability is checked, seats reserved, payment collected and electronic confirmation generated – all without requiring manual intervention by way of validation against a paper instrument. The product of this process is the boarding pass (instrument), which may be printed as

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a report off the active airline data, or which may be downloaded to a mobile device from which its screen can be scanned at the gate. Such efficiencies result in the ability to provide ticketing services in no more than a few minutes and at huge cost savings when compared to the days, multiple phone calls and process-related paper confirmations the travel industry required to generate the same a few decades ago.

The described approach thus provides for large process/efficiency gains and cost savings associated with a shift to instrument report generation through providing data that can be re-categorized for use in linked processes. Reports generated from databases can be created to replace most manually produced instruments, thereby providing for better data accuracy through eliminating re-keying information already present in the organizations' databases to include parcel information, owner, addresses, etc. In addition, a consolidated active database system provides for simplified IT management; storage volume reduction, when compared to the document-based image approach; and less costly maintenance/upgrades. Finally, centralizing inter-departmental data predicated on a systems approach to data and workflow provides for the bridging of traditional silos, thereby providing gains in organizational productivity, process effectiveness and customer satisfaction. **bsj**

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