

Smart Core

# CAD4Data – White Paper

*Computer Aided Design (CAD) for Data is Smart Core's strategy for the application of data processing techniques to the software development industry.*

CAD4Data solutions have these characteristics:

- They create and operate on code stored as data on cloud and on-premise databases.
- They manage change through flexible rules that can propagate throughout environments so that a change to any part of the solution is applied in all other related parts.
- They capture and preserve information for reuse by additional outcome focused applications.

The application of CAD4Data solutions results in higher quality work, greater speed and productivity, and lower costs in the design, construction, and operation of software solutions. This paper discusses how the use of code as data in the IT industry has led to the idea of CAD4Data and the characteristics and benefits of modelling IT Solutions as pure data.

## Code Automation using Data

CAD4Data began by applying simplification and reduction techniques, already well understood within a factory setting, to computer code. Computer programs are stored as data patterns using relationship tables to direct the flow. The separation of logical flow from the arduous manual task of writing code allows increasingly complex solutions to be built with the minimum of human error.

CAD4Data starts with the idea of capturing and managing information about the solution, and then presenting that information back as drawings. Drawings become a view into the code that describes the solution itself. Using CAD4Data, the code is stored as generic data instead of as a language specific script. The CAD4Data modeler then presents the data flow using drawings for editing and review. Data Architects, for example, work on the information using the names of the data entities that their business uses, without IT

requirements obscuring the intent of the solution, and can engage with business users using terms and notations that they have worked with for years.

Software developers can work directly with automatically generated code which are visualised as process flow. Both developers and data architects are able collaborate through a common notation stored in a Smart Map which encapsulates the logical intent with the implementation. Whichever direction a Solution is approached either from a technical or logical discipline both methods work on the same information model. The Smart Map assures that any change is reflected in the code, data and drawings. The CAD4Data models can be distributed to individual team members working on a network or sharing files through collaboration tools such as MS-Office 360. Team members work independently on local data sets contributing to a centralised build through standard source control tools.

## Change Management

CAD4Data solutions manage iterative change throughout a software projects design, build, and operation. The understanding of a design problem develops during the design process. In addition to the refinements typical to any design process, a new insight into the design problem may lead the design team to discover that the solution could be quite different, and possibly better. At that point another iteration occurs that may reconsider earlier assumptions. Managing this iterative change is an inherent part of the design process. Technology tools and work processes that do not allow the design to be refined and reconsidered in an iterative way as the project develops discourage the best possible solutions to the design problem. CAD4Data solutions, because of the management of relationships within the data and change to that data, are ideal for this approach.

Using CAD4Data results in the highest quality project for the owner and the best possible work by the team. Maintaining an internally consistent representation of the software project as a Smart Map improves coordination and reduces errors in the software to the benefit of all development team members. Time that would otherwise be spent in manual coding, testing and coordination can be invested instead in the real work of making the software project better. The resulting solution components are of higher quality, and thus the costs of changes and coordination are reduced.

CAD4Data enables the design, build, and release of the software project to proceed with less friction and fewer difficulties than conventional tools. Estimating, procurement, and build are also iterative processes of definition and elaboration. Specific platforms and products are selected from among the range of possibilities that meet the project specification. Selection, refinements, and substitutions may result in changes to some

aspects of the design. Ambiguities in the design documents are resolved between the design and build teams before development. The development and design teams consider changes to improve sustainability and value for the client. Each of these decisions requires evaluation and that new information be captured to support later evaluations as well as operation and support of the solution. CAD4Data captures and visualises this information and makes it available to support the collaborative process.

The operation of solutions after completion is also an iterative process that is well supported by CAD4Data solutions. The first operational use of a Solution, the end of the conventional design and build cycle, is just the beginning of the life and use of the Solution. The evolving use of the Solution together with the support requirements result in changes throughout the life of the Solution. CAD4Data supports the Solution life cycle with solutions for the design and documentation of the continuing support, modification, and integration requirements of the Solution. For example, information about all the successive changes to a Solution can be maintained in a form separate from the language or platform that the solution is developed in. This enables changes to be traced across technology upheavals, forming a record of all changes that have been made to a Solution in the language of the business.

## Reuse of information

Data modelling solutions capture and preserve information for reuse by additional industry-specific applications. Successful information technology solutions are based on one primary principle: Data is captured once, as close to its point of origin as possible, and stored in a way that it is always easily available and can be presented in context whenever required.

The moment that a data architect sketches the outline of a Solution for a requirement gathering exercise, data is created. This data can be presented as a data flow diagram, an overview, or zoom on a specific area, elements of the data can be traced for impact analysis or rendered as code for prototyping or acceptance testing. Conventional tools require the data to be rederived for each purpose at the point in the project where the information is required in that form. CAD4Data captures this data at the moment it is created, stores it, and make it available for re-presentation as information in other documents and artefacts as needed. A Smart map can be used to render a process flow that would be drawn by an architect, represent the specification that would be developed by a business analyst, generate code that would be hand written by a developer or generate quality assurance processes that would be produced by a Tester. Or, if the project team is not ready for that level of collaboration, a data architect can iteratively develop production ready processes and achieve acceptance with users through provable, traceable compliant releases.

## The Benefits of CAD4Data

The application of CAD4Data solutions results in higher quality work, greater speed and productivity, and lower costs in the design, build, and support of information Solutions.

### Higher Quality

Higher Quality solutions allow exploration and changes to the project at any time in the design or documentation process without encumbering the design team with laborious re-coordination tasks. They also return more time for design and solving real architectural problems to the design team by minimizing coordination time and manual checking. By sharing common CAD4Data tools, more experienced team members work together concurrently with the production members of the project team through all phases of the project, providing close control over technical and detailed decisions about the execution of the design. In software the consequences of proposed or procured products can be studied and understood easily. The developer can quickly and easily prepare prototypes showing proposed changes for the owner, communicating and minimizing the impact of change on the owner's operations and personnel. The owner uses CAD4Data models to improve quality in the management of the software. The CAD4Data model provides a digital record of change and improves planning and management.

### Greater Speed

With CAD4Data solutions the design and documentation of the Solution can be done concurrently instead of serially. Design thinking is captured at the point of creation and embedded in the documentation as the work proceeds. Colour filled drawings are created dynamically while the design work is being done. When a change is made, all the consequences of that change are automatically coordinated through the project. All of this allows the design team to deliver better work faster. The production of key project deliverables, like visualizations and approval documents, requires less time and effort by the design team, so the project can move ahead faster.

In delivery the developer can use the Smart Map (or create one) to accelerate the quantification of the build for estimating and value proposition purposes. This same model is then reused for revised estimates and planning. CAD4Data accelerates the adaptation of standard prototypes to specific businesses processes.

## Lower Cost

Using CAD4Data, design teams get more work done with fewer people. A smaller design team means lower costs and less chance for miscommunication. Because the Smart Map is a complete definition of the Solution, the cost of changes and coordination is reduced.

Budgeting and cost estimating are easier with a CAD4Data model, and cost information is available earlier and can be updated more frequently than with conventional tools. Changes late in the design process to reduce costs are difficult, inefficient, and expensive for the design team. With better cost information available from CAD4Data visualisations and prototypes these kinds of changes are less likely. Less time and money are spent in process and administration because document quality is higher, and planning is better. More of the owner's budget goes into the Solution instead of administration and overhead in design and build. The CAD4Data model is also used to provide Solution transparency to meet compliance and audit requirements, asset usage, and lineage. Access to this information improves both revenue and cost management in the operation of the Solution.

## Conclusion

CAD4Data solutions create and manage change throughout information Solutions so that a change to any part of the Solution is coordinated in all other parts and capture and preserve information for reuse. Through the application of data to the problem of describing a solution, they enable higher quality work, greater speed, and improved cost effectiveness for the design, delivery, and operation of software projects. What all of us in the software industry are working toward is the building of quality solutions; that is our accomplishment and the value delivered. Every bit of time and effort in the process that goes into something not manifested in the solution itself is energy wasted; energy dissipated as heat from friction instead of energy used to make the solution better. The time spent coordinating the software isn't improving the data professionals real work nor making the solution any better. CAD4Data solutions allow more of the development team's effort to go into the result rather than the process.

Thank you for your interest in CAD4Data solutions for the software industry. If you have any questions about this paper or are interested in further information about CAD4Data solutions from Smart Core please contact us at [www.cad4data.com/contactus](http://www.cad4data.com/contactus)