

Violent Crumble Do Buildings Stand and Systems Tumble?

or

Benchmarking Information Systems Development Against Architecture

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ABSTRACT

This paper introduces the notion that systems develop is not as bad as reported in the literature, but nonetheless there is some room for improvement. It sets out to enhance the outcomes of information systems development. The technique employed is to benchmark systems development against architecture. At first glance one may say that the two disciplines have nothing in common. This concern is shown to be false. In fact there are many lessons to be learned from architecture.

Keywords and phrases: systems development, architecture, benchmarking, systems failure, design.

1.0 INTRODUCTION

What is a fork? What is its purpose? When was the first fork created? Why? These questions should interest you.

Forks are known in the Old Testament that possibly started life more as a cooking or a fireside utensil than an eating implement. It doesn't take an exceptional intelligence to see that some industrious person saw either the chance or need to develop it further. To go from fire to table was no doubt, at the time – creative and innovative. Here was an implement that could be modified, and utilised in another context. Someone had observed, wondered, analysed and then been creative. The primary function of the fork hadn't really changed, it was to spike, prod, spear or hold. Its context was still associated with cooking, food, people and the kitchen. All that had changed was its use. But equally, its general design, shape, the type of handle, the number of prongs (or tines) were undoing change without, it would seem, significant impact on use. Sure it's no pitchfork, but the eating fork came in many forms. Form followed function. Context, use, and users change.

So it is for buildings too, and may be, just may be, for information systems.

This paper observes how human-made structures are fashioned and then creatively applies this knowledge to improve information system's development processes.

2.0 SYNOPSIS

Do information systems fail? The common consensus is that they do – and all too often it seems. Figures suggest that 30% to 70 % of systems fail. What a catastrophe! Where are the government enquires? What are

the consequences? Doesn't anyone care? Are the figures wrong? These are just a few of the questions that motivated this book. Three internationally notable systems' failures are: first, the system software failure aboard the Mars Climate Orbiterⁱ, second, the Denver Airport's baggage handling systemⁱⁱ, and third, the New Zealand, Integrated National Crime Information System (INCIS) Projectⁱⁱⁱ.

But questions need answers. From reviewing the literature of the past thirty years it *does not* appear that information systems technically fail, run over cost and time, or fail to meet users' expectations close the figures stated above. A whacking 70% is truly staggering. So began this quest – how can such failures come about and how can the success rate be improved?

Benchmarking is a means by which a process can be improved by comparing it with other like processes that are known to be better or exemplar. For example, if an airline wanted to improve the turn around of its aircraft between flights then it could compare its performance against another airline. But wait – is that going to really stretch the performance of the airline? Quite possibly not. However, if the benchmark is arranged so that the airline compares itself with a Formula One racing team then it might get somewhere. The change over of a plane between flights is – you can imagine – very similar to a pit stop in Formula One racing. The ingredients are similar – stop, change and clean, refuel and off again in the shortest time humanly possible – all in a setting of pressure and with high regard for mechanical and human safety. Slow turnarounds in either industry cost the respective companies money, and plenty of it. Another example might be a University enrolment system being compared to a hotel chain's best practice check-in/check-out system. There are numerous other examples – and some recent information technology cases may be found in a special issue of *Benchmarking – The International Journal* (2003)^{iv}.

So with that as background, how could information system's development be improved? Benchmarking may not provide all the solutions. What industry or process could be used for comparative purposes? Some might spring to mind earlier than others – engineering for example – after all, some say system's development is a subset of software engineering. And what too, of the film industry? To make a movie is a complex and (very)

expensive process, where the ultimate success rests with the public – the perceptive user. The producer and director of a motion picture, as talented and experienced as they might be, may not get it right, the movie flops simply because the public didn't like it. It becomes a financial flop; it cost too much, didn't satisfy the users and possibly took too long to produce. And in any case no one was really sure of the plot and not at all sure of what it was that the public wanted. Starting to sound familiar?

Well it could be engineering, the motion picture industry, but the one chosen here is the profession of architecture. Why? Architecture, on close examination is very similar to system's development. Both start with clients' wishes, desires and demands, these are translated into plans, plans are converted into a virtual design and something physical is created. In the end the client is the foremost arbiter of success. The process from ideas to fruition – involving a client – is core to both activities. But as a benchmark partner, architecture has more, more in a sense that system's development will be stretched in any comparison. This then is a good test, much like the airline and a Formula One pit stop team. It is this so called stretch that makes architecture so compelling.

Over and above the similarities architecture has a few advantages. First, architecture is a much older occupation – certainly greater than 2000

The Architectural Process

- initial planning ...functional needs
- schematic design ...rough sketches
- design development ... scale drawings
- construction drawings
- bidding
- construction supervision

The Information System's Development Process

- initial scope and design
- requirements detailed
- logical design
- physical design
- development
- evaluation

years as evidenced by the writing of Vitruvius (Kruft, 1994)^v. As a contemporary consulting practice architecture is possibly 150 years old. It has had the time to mature, to understand and define itself, and to weed out most of the systematic faults. Second, architecture displays a challenge not yet (universally) acknowledged by information technology industry – a responsibility to the community. The creation of building, monuments or space, has an impact on the client but also the wider community – architecture seems to accept this bi-modal force on its outcomes. Information technology is yet to mature to that level. Third, architecture is deeply rooted in function and form. While there are many, many books written on the subject, suffice to say here that aesthetics, even beauty, are integral to architectural outcomes. May be not all, but for most outcomes an architect will strive to meet the expectations of a client *and* provide the client with an enjoyable stimulus. Down through the ages architecture has moved inexorably from securing a safe human space to increasingly providing comfort, pleasure and satisfaction to individuals and communities. This is what information science and system's development might aspire to achieve. One of the difficulties of course is that there are no rules in architecture (other than gravity) as there are in science (Snyder and Catanese, 1979)^{vi}; and as a consequence, system's development has a modicum of additional constraints.

The challenge from architecture is clear – develop and create information systems that are both functional and pleasing. Why shouldn't an information system have beauty? Is it impossible to create the Egyptian pyramids^{vii}, the Taj Mahal^{viii}, the New York Guggenheim Museum^{ix}, the Falling Waters^x of information systems? The partial answer to that rests on whether those involved in system's development can manage or balance the opposing imperatives of technology, users and society.

On the other hand architecture has its failures too – buildings do collapse, costs do exceed budgets and customers are less than satisfied. The recent collapse of part of terminal 2E^{xi,xii} at Charles de Gaulle airport and the cost overruns of the Scottish Parliament^{xiii,xiv} are but two of the more notable ones.

So there are good comparisons between the two disciplines. There are lessons to be learned, and best practices to be followed.

The choice of architecture is not without coincidence or bias though. There have been four events that have had a large and personal impact. In near chronological order: first, – and many years ago – to witness the City of Canberra was a wonderment of excesses, alien town planning and something that wasn't Australia. Time changed that, a more mature head started to understand that this living breathing metropolis – indeed a living system – embodied what was the essence of Australia. The achievements of Burley-Griffin^{xv} had to be admired. Second, wandering the corridors of a Toronto Art Gallery, admiring the sculptures of Henry Moore, a sketchbook of works by Frank Lloyd Wright protruded from a shelf in the gallery shop. It beckoned – there must have been a story to tell and a willing reader. One of the sketches was a transmogrify of a stem of roses into a windowpane design. It was a wonderment that nature could produce such an exquisite flower and then Wright in turn – and so perfectly too – had transformed nature into design. The process of nature and the process of design were one of the same – given the right masters. A personal disappointment remains that the book stayed on the shelf. Third, software engineering is an important element of system's design so it is not incongruent that comparisons are made, as suggested above, between the activities of an engineer and those of



an information scientist. Santiago Calatrava's^{xvi} designs span the professional gore that is between engineer and architects. He creates structures, bridges in particular, that seem to defy gravity and are the essence of physical beauty. His own comment on the Bilbao Volantin Footbridge^{xvii} that is, *The tilted steel arch of the bridge with its sweeping parabolic form appears graceful and slim*, encapsulates his belief in design. What's more he has shown that elegance is part of design and thus seeds the notion that it could also be found in information systems.

Lastly, and by no means least, there is the book by Louis Sullivan,

Kindergarten Chats and Other Writings^{xviii}. The function of the book, the fifty-two lessons from master to pupil, leads to the eventual enlightenment of the pupil. It is a tutorial that many architects, engineers and system's developers alike might advantageously endure. Sullivan is credited with the saying "form ever follows function" the connection between Burley-Griffin, Lloyd Wright and Sullivan should not go unnoticed.

If there is a comparison to be made between information systems and buildings then some connection between them needs to be firmly established or conversely, firmly refuted. As the adage goes, *you can't compare chalk and cheese*. In the present context, the purpose of the comparison is to ascertain if lessons learned in creating buildings can be employed to create better systems. Furthermore, the intent here for example, is not to say Jorn Utzon's Sydney Opera House^{xix} is like the Delta Airlines' new baggage handling system in Atlanta^{xx}. In that sense, the two can never, and possibly should never, be compared. To stress the point though, may the processes and procedures that helped create a building (e.g. Petronas Towers in Kuala Lumpur^{xxi}) be usefully and gainfully employed in the creation of a new information system (e.g. a homeland's security system)?

This exploration of a, or any, nexus needs to be built on a thorough understanding system's development and an appreciation of architecture.

Initially an opinion on any connection between them, intuitive or otherwise to the demos, could be as follows. Architecture – or should it be architects – when designing and creating a building understands and responds to its position in, and effects on, society and the environment. Information system's development – or might it be information scientists – when even in its most creative mode, is either or both, self-centred or business process centred. It pays little credence to its wider interaction with society, and even may perilously, largely ignore its immediate user. Frank Gehry^{xxii} wrote on these issues, at least where they are of concern to architects^{xxiii}. It seems, at least initially, that an architect rises to loftier heights than an information scientist. The architect has personal design criteria that are important – influenced presumably by exogenous forces – and mightier than the self or the user. But is that true – if it is pondered and thence examined more closely? Could not Gehry be discussing professionalism, pride and the inevitable pursuit of excellence? If so it would be equally true of the information scientist. Both the information scientist and the architect – within a wider context of the self and client – want excellence in design and to intersect that with the requirements of a client.

In defence of system's development, or information science in general, there is a large body of literature and research being conducted around the interaction of users and systems. The Centre for Social Informatics^{xxiv} (CSI) and The Newcastle Centre for

Social & Business Informatics (SBI)^{xxv} are outstanding examples of user-centric research. The CSI has been recently focussing on work practices, but wider societal issues are on the research agenda. CSI was responsible for a significant report on the matter (Kling, *et. al.*, 2000)^{xxvi}. Davenport (Davenport, p125, 1998) succinctly justifies most of this interaction research by saying: *In short, the design of technology-based products is inextricably entwined with social and organisational dynamics*^{xxvii}.

The full paper explains; what are systems, examines some catastrophic failures and the reasons they happened, and gains evidence from systems and architectural practitioners to demonstrate how we can improve our discipline.

ENDNOTES

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