Information Flow for the Global Enterprise
Catching the Ball ("empowerment")
Before You Run ("*full* empowerment")

White Paper

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Introduction

The intersection within organizations between man and machines has become far too unwieldy. Technology should be the servant, not the master of organizations, their leaders, and members. Technology should be so effective that it effectively disappears. That, and things just get done. Language shouldn't matter. Everything should be clear and easily understandable – *especially* where complexity rears its opportunistic head. Complexity in what you do, based in your experience and unique knowledge, is what gives you your competitive edge.

There are two fundamental benefits to the enterprise from technology:

1. Top management needs to know what conditions are on a global level at all times to know how to act. *This is information-oriented empowerment*. Technology should support leadership seamlessly, providing leaders of the organization with information based on standard, time-tested models.

2. Others in the organization and its partners and clients should be guided at all times by technology to know better how to meet their responsibilities. *When determined by the leaders and experts of the organization, this is **full** empowerment*, a factor that is particularly important where complexity and change conspire with long distances to make it difficult for people to know what to do. In this, organizations need to transfer unique process-oriented models to technology-mediated forms in as easy and fluid a manner as possible.

Providing information to leaders so that they can always be informed regardless of time and place (**catching the ball**) and extending step-by-step processes to all others (**running with it**) are the subjects of this White Paper. Ultimately, organizations should be able to run free with the certainty that everyone will know what to do and how to perform their tasks, helping the organization meet its potential wherever it takes them.

Table of Contents

Table of Figures

A New Synthesis – Establishing a Better World

Peter Drucker wrote in his last years about the importance to the success of organizations of knowledge, its understanding and management. He coined the term knowledge worker. He made parallels between our time, the time of computers, and the early printing presses at the time of the Gutenberg Bible. His point is that managing knowledge – what information processing is all about – is something all of us will increasingly be involved with, something that all of us will do. Drucker stated that once the printing presses were running in the Middle Ages, for example, the monks that had controlled the knowledge dissemination process with their hand-copied books (typically in Latin) had to pass the gauntlet to authors and publishers that blew the doors open in terms of variety, volume, and low cost. This was an important and necessary step for the Enlightenment to occur.

Manuel Castells, over ten years ago, announced that the conversion had already happened to electronic networks and a kind of transfer of power described by Drucker. To some degree, this is true with respect to simple communication and the transfer for static forms of knowledge. This is decidedly not true with regard to the nuanced requirements of organizations, the knowledge of how to do things, step-by-step, in an environment of change and of complexity. Currently, technology is incapable of supporting the nuanced requirements of organizations. The pieces are there, organizations just do not take advantage of the right features of technology to become fully empowered.

Organizations Currently Hobbled

In the current environment, there are decided limits on how organizations are able to manage information. Most problematic is that there are limits to what knowledgeable people can do to extend their expertise to others. This is largely due to the fact that technologists, bless their hearts, put themselves at the center of the technology universe, just as the world was considered the center of all thins prior to Copernicus. In that general time-frame, as outlined by Drucker, books were copied by hand in dark-chambered monasteries. In defense of the management information systems crowd of our time, most of them do not know any better.

In the last twenty years, I have found very little documentation in computer-related literature about empowerment of subject matter experts and other authorities. The few hints to concepts like empowerment of key users that I have found in the literature have largely missed the point. Mostly, computer scientists attempt to "capture" knowledge from experts and others rather than to give them full rein. I was allowed to present at a conference of one Defense Advanced Research Project Agency (DARPA) project, for example, which was established around the idea of actually cutting knowledge in half. On one side, they charged themselves with collecting "facts" from experts. On the other, they retained the prerogative to connect those facts "in meaningful ways". Interestingly, and I would say predictably, they had a hard time getting experts to sit still and recite facts to them. Can you imagine? Mind numbing for sure, even if the refreshments were good.

In the marketplace, there have been about half a dozen attempt to make systems more responsive to deeper levels of knowledge, but each of these has fallen short of the ultimate objective, the empowerment of the principals of an organization and the positioning of computers directly in the service of the organization and its mission. COBOL did not become the *lingua franca* of managers. Relational databases did not become a clear view of the data of organizations. Open systems did allow for hardware interchangeability, but the gains were more than taken away by massive, arbitrary complexities in the ways that enterprise systems were designed. The result is worse than monks

copying the Bible in Latin by hand. _The current environment is more like chiseling in stone_. Complexity on top of complexity on top of complexity – little of it justified by the nature of the problems.

I have to mention one thing at this point. A large part of the problem is that technologists and their backers are bent on designing computers that will out-think us. You know, artificial intelligence. They have shown little interest in designing systems that will support our collective thought processes. Though compelling for the people involved, and not without research merit with regard to intelligent devices and automation, these efforts miss the point. _We need ways to use technology to support ongoing, cogent activities among living, breathing people_. Each of us has a marvelous, miraculous brain that can and will direct us to function together in perfect harmony so long as we know what to do. For this, the scale of organizations, their geographic spread across continents and borders, and complexity in general, we need the assistance of technologies.

Organizations Can Be in Perfect Harmony

You may bridle at my reference to "perfect harmony". Surely, such a thing is not possible in organizations, let alone likely. There are so many examples to the contrary. I am sure that I do not need to elaborate on this.

A more interesting question is whether there are examples supporting the idea of perfect harmony among the members of an organization – at least with regard to a combined purpose, high levels of collaboration and interaction, and concurrent feelings of good will and camaraderie. If there _are_ examples of these things, then it is not warranted to say that perfect harmony is not possible. Or even unlikely.

How about the great sports teams? The invincible armies? The excellent craftsmen and artists and members of their studios and shops? And my favorite, the entire population of musical composers, conductors, and artists that repeatedly create masterful instances of music based on a systematic means of documenting sound-creation processes in ways that apply to all instruments and the voice. If perfect harmony in the behavior of many individuals in an organization is not possible, let alone likely, how do we explain these examples?

On one occasion, immediately after demonstrating the means by which musicians consistently perform longstanding musical masterpieces to perfection, a university professor came up to me and said that behaving in harmony within organizations was against human nature. Wow! And the sun doesn't shine, genetic propagation doesn't work, and diamonds are soft and squishy. The level of denial that exists with regard to human and organizational potential in the academic community in particular is galling. Do not look to that quarter for answers.

Fully-Technology-Empowered Organizations

In the long run, due to their integrative and computational functions, computers and networks will be at the center of organizations, much more than they are now. Such technologies will be commanded by us all. They will best be put to use, not to out-think us, but to help us to think better collectively and to collaborate more effectively than we do now. We will be able to use them to continually improve on and performance, to introduce finer and clearer elements of detail in the how of knowledge as well as the what and the why.

Truly, the inability to harness computational power by organizations and their leaders has much to do with our global conundrum. Networks of rogue computers have been known to perversely buy and sell

financial instruments, worsening markets; many organizations are spiraling out of control in spite of massive expenditures information technologies; people guess at what they should do even though answers could be available if existing knowledge flowed readily through their organizations. Worst of all, people increasingly do the wrong thing because their systems constrict action even when the people in question are aware of what really should be done.

The artificiality that that we face now is supported by the *assumption* of our age, that modeling tools need be complex, difficult to master, and thus intimidating. This assumption has never been tested in any relevant literature – unless I have missed something in my twenty years of active looking, capped by doctoral and post-doctoral study of the subject. In my book *Methods-Based Management*, I outline three quite bizarre interactions when I attempted to publish some of my work on fluidity in the flow of knowledge between people and computers in academic journals. Paradigm shift-wise, this was not what they wanted to learn about. I was describing "printing press" while they were insisting on discussing "quill pens and good calligraphy" as being the keys to success.

Last week, I had a marvelous conversation with an individual that made reference to this as a time of "New Synthesis", where we have the capacity to create a world for future generations that is better than anything that we have known. This White Paper is a part of my contribution to this effort. I believe a new and better world resulting from such a New Synthesis to be highly desirable and achievable.

Running With the Ball – Process-Oriented *Full* Empowerment

Perhaps violating the fundamental premise of this White Paper, I think that it is important to first consider issues with respect to running with the ball before its necessary twin, hauling the ball in. Running with the ball is what it is all about.

Having established the basics – the models that everyone uses – it is important for organizations to define and extend what only they know and can do. The point is this: Your organization is what it is because you do something unique to your market and you do it well – at least to the point that others part with their precious money and time in your behalf. As leaders, this is likely the thing that keeps you up a night, how to keep in the lead in such matters.

Why You Haven't Been Able to Run With the Ball

After a little over a half century of use, the computer world offers you little in support of this task. Edward Feigenbaum, a leader in the artificial intelligence camp, indicated that "no tools" have been provided from the computer community to adequately model the knowledge of experts. My observation is that this problem results from a general malaise that has developed. We have little confidence that organizations can perform well in part because communication breaks down in the translation between people and machines. We depend on electronic networks, but they systematically disarm us.

Dr. Dell Allen, a professor at Brigham Young University (BYU) from the early 1960s to the mid 1990s developed an approach to managing process-oriented knowledge that constituted a breakthrough. The work received some attention toward the end of his career, which centered on the development of comprehensive approach to manufacturing. The development of the process model was actually a byproduct of his other work. The work involved a patent that has since expired as well as software that became outdated with time, particularly with the Internet.

I took up the mantel in the late 1990s, an effort that eventually caused me to get my doctorate. For one thing, at the time, it was very difficult to make the case for empowering experts, as the ERP movement

emphasized just the opposite – that solutions could be purchased right out the box. Why would organizations go to all of the effort I was describing to work through their knowledge issues when they could simply buy "best practices" from the ERP companies. One of the companies prominently made the pitch that organizations should simply [paraphrased] "cease and desist from their irritating tinkering with their software." They were simply advised to stop trying to change software. "Didn't they know that the changes would simply be overwritten by the next updates anyway?"

The standard ERP approach did not work. There were some improvements from consolidation of technologies, but consolidation needs to be viewed with some suspicion when it involves hundreds and thousands of data tables and tens of thousands of options for plugging in different software code. Coupled with the failure to make computers out-think us on their own, the arbitrary, self-serving complexity of enterprise software applications must sure has contributed to the inability of organizations to reach their potential and the general sense of malaise in the economy and the employment sector.

Why Your Organization Can Run With the Ball Now

Dell Allen's insight leads to a discovery of mammoth proportions. By understanding five fairly straightforward concepts, you can model your knowledge in process form, drilling down to levels of sophistication and detail that you may not be aware that you knew. With these Five Concepts in your arsenal, you can refine and extend your knowledge – along with your principal collaborators – to large numbers of people. Not only can people in your organization take advantage of them, others can as well. This includes your customers, partners, regulators, etc.

The generative taxonomy model is at its core a means of classifying things. This is something that as humans we cannot avoid doing. On a daily basis, we classify everything. If you say that something is good, you are classifying it. If you say that something is difficult, you are similarly subjecting it to classification. There are many varieties of wheat. Classification. There are various ways to track financial resources. Classification. The timing of projects? Classification.

There are some famous classification projects. Biology is based in this kind of thinking and everyone knows it. Every aspect of what organizations do is classification, but almost no one knows it. Dell Allen graciously gave a presentation for me at the Utah State University Center for E-Commerce in 2004, where he asked the students present – just under a hundred – if they had covered classification in their coursework their respective fields of study. No. None.

Application of the Five Concepts channels one's thoughts in ways that improve their reasoning about the subject at hand. It causes you think in terms of frames of knowledge – situations that can be defined and tracked using trees. Frame after frame after frame, you can

Some people take to tree design using the Five Concepts better than others. I have seen people who were off and running with ten minutes of introduction. In other cases, the paradigm shift has required careful, stepwise introduction of the new way of expressing thought. Notice, that I didn't say "a new way of thinking", because the power of this approach is that it reflects the way you have been thinking all along.

There is probably a means of predicting a person's capacity to readily absorb the generative taxonomy model, though I have not focused my research on that issue. Largely, the question is one of attitude and willingness to be an early adopter. I have focused more on acceptance of and interest in the design and implementation process – the idea of direct knowledge transfers – I don't know, the political stuff.

In the BYU experience as well as my own, there have been surprises as to where process-oriented knowledge existed in organizations. Sometimes it has been the "lab rat" or the "receiving clerk" who have been on the organization *forever* that have taken off, defining trees, frames, and systems based on their long experience. Ironically, it is the technologists that have a difficult time understanding the tree-based knowledge model, the generative taxonomy model. They are used to the "new idea, new data table and new programming code" approach that it is difficult to think in any other way. At one time, I oversaw the week long training of an engineer and a software programmer from a federal laboratory. The engineer, not a technologist, progressed well throughout the week. The programmer each night had to call the supervisor at the laboratory, who knew and understood the model from his studies at BYU, to try to bargain for more tables. Each night he would say, "I can see that with just a few more tables, you can get the job done". The engineer was just getting the job done with the tables as they were.

What to Expect As You Run With the Ball

Designing trees is not easy. This is one reason I emphasize "catching the ball" first. First, there is the "Aha!" moment when you understand the nature and scope of the Five Concepts. Once that occurs, however, there is the "Oh no!" moment in which you all of the things that you *could* do with the model rush into your mind and give you a headache. This is akin to the burden of freedom after spending years in prison.

At that point, you need to set priorities and invest some discipline into the process. Though you will be able to introduce a few ideas in a short period of time, most likely it will take the better part of a year to implement your more comprehensive ideas. I developed an approach I refer to as the Knowledge Swirl, Figure 1, which outlines that process. I do not want to go into a lot of detail on this at this point, but the graphic outlines the general process of identifying, organizing, and making full use of knowledge. Starting with organizing and grouping of tacit knowledge from the upper left of the graphic, the point is to progress in the development of knowledge forms one step at a time. Once a "slice" of knowledge has been brought through the cycle from tacit, to explicit and expressive forms, it can serve as a foundation for bringing additional slices of knowledge through the cycle.
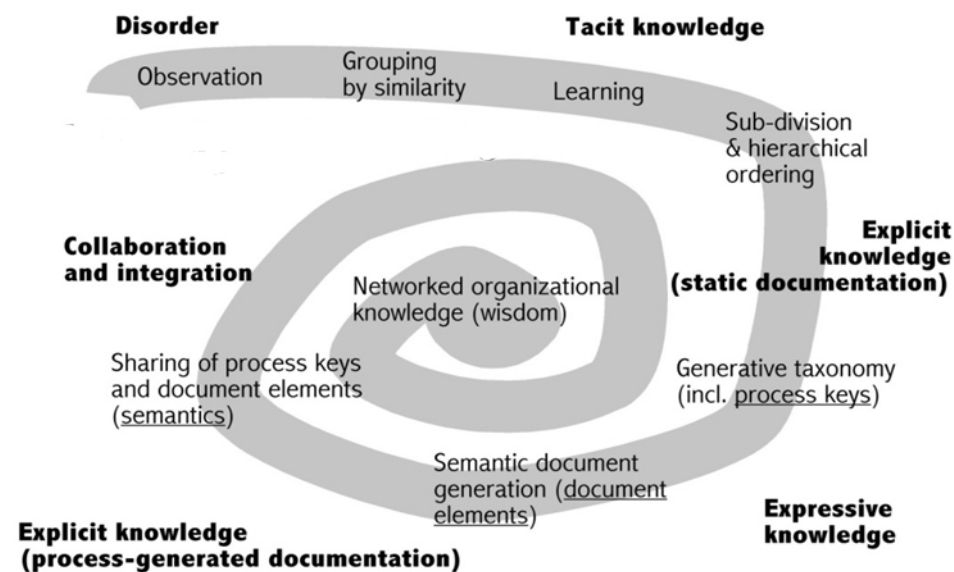

Figure 1: Knowledge Swirl, Path for Full Empowerment

Though the Five Concepts are the basis for this process, any organization is going to have useful fragments of knowledge lying around in documents, emails, handbooks, etc., that can help to jump-start the process. I developed the Tacit, Explicit, Expressive knowledge model, part of the Methods-Based Management book, as a guideline in achieving full mastery of the required knowledge to achieve full empowerment for the organization.

In one case, in a federal laboratory, an engineer working with me in a tree-oriented project achieved nirvana in terms of full empowerment. He developed the confidence to state to his colleagues that he could computerize anything his various teams could come up with, so they should open their minds to *any* possibilities that might beneficially be carried out. He said, "lets order pizza, lock the doors, and vow to not leave the [planning] meeting until we have resolved *all* of our issues and disagreements [on a particular process]".

This is the kind of confidence that you need within your organization. When you do, and you support your leaders in actualizing on this confidence, you will be able to provide products and services with a level of diversity and consistency that is unprecedented. All of your people will be able to act in concert with the knowledge of the most knowledgeable of your people. As you progress through iterations of the Knowledge Swirl, your organization will reach what I have referred to as organizational wisdom. You will be like those invincible teams and grand performing organizations that I made reference to earlier.

My sense is that typically such material – the majority expressed in data with regard to the generative taxonomy model – is and should be proprietary to the firm. This is not to say that some such material could not be made available to other organizations, but to the extent that it supports the unique processes that define the competitive advantage of the organization, it likely should be kept private.

Catching the Ball – Empowerment in the Use of Static Information Models

Complexity results from the simple act of being in business. Coupled by the trend to follow the business to global markets, organizations face a plethora of challenges. Fortunately, many models exist to help support the complexities of engaging in business on a global scale. Accounting is the first and probably most clearly defined of these. Modern accounting models date back five hundred years. Many others exist as well. Additional advanced approaches can be found in many other functional areas, including engineering, design, production, manufacturing, marketing, sales, inventory management, finance, human resources, and many other areas that apply to most organizations.

Simplicity the Key to Complexity

Integration and simplicity in the use of these models is critical. If science is to be the guide, the most simple, straightforward approaches to each kind of task should be uniformly chosen. Have you seen the movie *Contact*, with Jodie Foster as the irrepressible, highly intelligent scientist? One scientific concept, drilled home in the show, was the importance of simplicity. If two answers to a question, roughly equivalent, were to be found, the simpler would be better. This is famously called Occam's Razor, after the monk, many years ago, that thought it up.

The untold cost and inflexibility of most enterprise-level technology options lend credence to the belief that scientific simplicity is rare, if not impossible. The introduction of Enterprise Requirements Planning (ERP) software about fifteen years ago was less about integration of the various needs of an

organization and more about selling every possible thing that was being available from the Silicon Valley under the presumption that complexity, not simplicity, was the harbinger of all good things. In order to "catch the ball" as an organization, the ERP plan was to acquire the latest and greatest of everything in complex networks of hardware, software, and (occasionally) vaporware that was intended to support any conceivable thing that you may want to carry out in support of the above-mentioned business functions. In most cases, such purchases required parallel consulting arrangements with highly technical analysts and systems administrators to help their organizations to understand the complexity of the technology they were paying for.

Arbitrary technological complexity in this process was celebrated. With each new idea, each nuanced function, a raft of new data tables and scores of underlying software programs were required. Though the point was to introduce integration, duplication of data structures took on mythical levels of complexity. One major vendor provided a product with 8,400 data tables and 85,000 software options and updates. The process wasn't driven by coherent models of enterprise data, it was driven by a proliferation of design teams, each with full control of all of their design elements.

What is there in the business model, the organizational model, to support such flowering artificiality? Only three basic kinds of activity are actually involved. There is an acquisition cycle, where purchases are made, resources are accessed, and payments are made. There is a transformation or production cycle, where products and services are organized. Finally, there is a cycle involving the transference of these products and services to paying customers or clients. The question I raise, and others have meekly suggested, is "Why not unify these functions as much as possible and find flexible ways of expressing the differences?"

Interestingly, in my research I found the last references to this kind of thinking in the late 1960s and early 1970s in the fields of accounting and database systems. In 1969, George Sorter, an accounting professor, asked why systems couldn't be designed so that data could be used for unforeseen purposes and people could use them to support their own processes. In 1970, Edgar Codd, the father of relational databases, indicated that his objective was to assure that users would never have to wonder where there data was, to have to dig in and search for it. Forty years later, with 8,400 places to look in one case, we live in a world that is far more upside down than the one he was criticizing at the time.

The Open Source ERP Solution

Subsequent to the ERP commercial activity, the overwhelmingly complex systems, a class of software with related objectives surfaced based on considerably different strategies. Rather than establishing rigid systems based on the output of large companies of programmers, the newer systems, many of them from the open source community, started with a body of information about enterprise requirements that had been developed by knowledgeable parties. From that, software was designed with the idea of supporting those requirements in a flexible way that would allow for variation.

I have looked at a variety of these. Without going through the details, I must say that I bridled at the concept of such standard process models back in the 1990s when I first learned of the power of trees. My point was, why would you want to limit the capacity of the system by establishing borders – which ultimately become barriers? With the trees, you have no arbitrary limitations, a factor that is clearly harmony with George Sorter's event accounting concepts.

I still harbor that concern, but I think that that is overcome by the need to get up-and-running as soon as possible. Also, the growth of open source communities and their success convince me of their validity. In open source communities, the source code underlying the functionality of the software in question if

fully open and available for community members to evaluate and even modify. In fact, modification is encouraged. Typically, new code submitted to such communities is reviewed by moderators who check for the quality and appropriateness of the submissions. I have worked in a number of open source environments and I am impressed with what can happen within open source communities. Features in such communities are tested and evaluated and checked for security issues more than is the case with commercial software.

There are two issues driving the open source movement – each of these referred to as "free". Each of these has implications with respect to your "catching the ball". They are described as following:

1. *Free as in beer*. The software doesn't cost anything. This is a salient feature to be sure. For one thing, it allows potential users to test the software in its fully-functional state before making the decision to use it. As a practical matter, most organizations would either donate to projects supporting their software or lend their own technical personnel to support the project. Support services are typically provided by some or all contributors to the project.

2. *Free as in "libre", or "give me liberty or give me death", etc*. In other words, they are free in that they are intended and designed to provide user organizations with as few limitations as possible. This is a consideration that is clearly of benefit to user organizations. Commercial software almost always is closed. Users do not have the option of modifying the software to their own requirements. Furthermore, vendors try to enhance their revenues by bundling software, tying software with different functions together. While such kinds of tactics are prevalent in most markets, they serve to constrict options to companies in their attempts to compete when used in technology markets. I recently read a comment by a commercial software salesman who said, "Who would ever want to run a company based on just 'standards-based software'"? Umm. I would, if it was truly based on standards. Thus, participation in open source activities makes sense, particularly with regard to "catching the ball".

Some open source projects have been phenomenally successful. The Apache project, for example, is responsible for over half of all active Internet servers. I have successfully participated in some enterprise-level open source projects. In this case, I have selected a set of ERP open source projects associated with the Apache project for use, the combination of OfBiz and Opentaps.

The Apache/OfBiz/Opentaps Solution

OfBiz/Opentaps as shown in Figure 2 provides a suite of ERP functions based on published examples provided by Len Silverston, a specialist in data modeling. His work is published in three volumes, beginning with *The Data Model Resource Book*. Granted that any attempt at achieving universality in data modeling based on the "new idea, new table" philosophy is a huge task, quite impossible, my sense is that the Silverston approach is
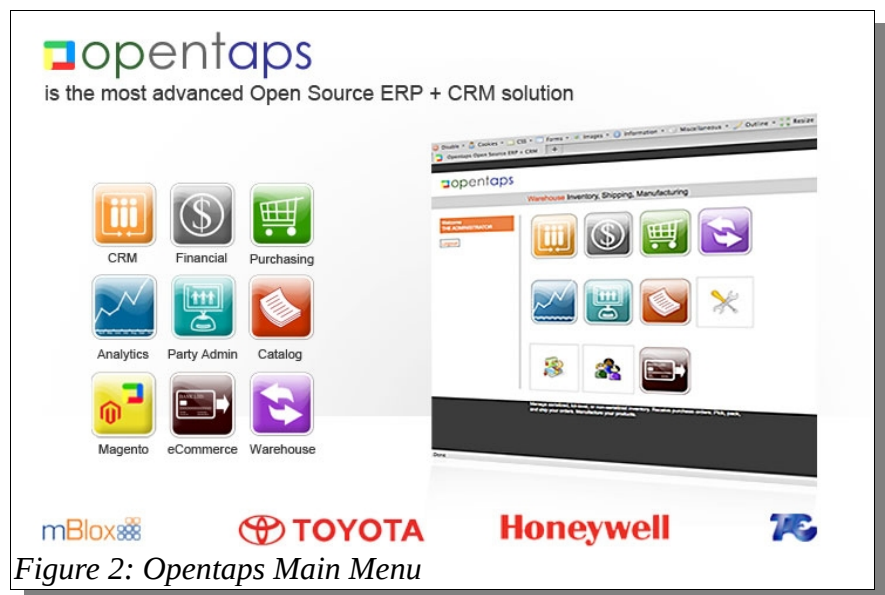
Figure 2: Opentaps Main Menu

defensible. Certainly, it is a good foundation for a "catch the ball before you run" strategy for organizations.

Here are the main areas covered by the Silverston data models:

1. Ordering and managing products
2. Handling shipments
3. Invoicing
4. Accounting and budgeting
5. Managing human resources
6. Contact management
7. Project management
8. Call center management
9. Product customization
10. Shipping and receiving
11. Budgeting scenarios
12. Employee qualification and performance
13. Financial analysis
14. Inventory management
15. Shipping logistics

The Opentaps project is based on the more fundamental OfBiz effort. OfBiz is the Apache project on which the Opentaps people expanded in some areas, including support for the full accounting model, which isn't a feature of OfBiz. Based, then, on the Silverston universal model, the OfBiz/Opentaps open source software provides this list of capabilities as outlined on the OfBiz and Opentaps sites:

1. Advanced e-commerce
2. Catalog management
3. Promotion & pricing management
4. Order management (sales & purchase)
5. Customer management (part of general party management)
6. Warehouse management
7. Fulfillment (auto stock moves, batched pick, pack & ship)
8. Accounting (invoice, payment & billing accounts, fixed assets)
9. Manufacturing management
10. General work effort management (events, tasks, projects, requests, etc)
11. Content management (for product content, web sites, general content, blogging, forums, etc)
12. A maturing Point Of Sales (POS) module using XUI as rich client interface
13. (from Opentaps) Ability to segment financial results using "tags" for divisions, departments, product lines, activities, etc.
14. Improved budgeting and encumbrance reporting in Financials
15. Improved Material Resources Planning (MRP) and supply chain management
16. Improved support for processing sales orders with multiple warehouses
17. Improved performance for order picking, inventory reservation and counting, and general ledger posting
18. Support for services, including ordering and invoicing of services
19. Shipping logistics

I have installed the OfBiz/Opentaps software in four different environments and have worked through the accounting cycle in one case. The association with the Apache Foundation is an important consideration for OfBiz in particular, which has achieved the status of a "top level project" within the Apache framework. Started in 2001 based on the Silverston material by David Jones and Andy Zeneski, OfBiz was brought into the Apache framework in 2006 after five years of development, reaching top level status after an additional year.

Opentaps is an extension of this, having expanded on the OfBiz foundation in a number of ways. The most compelling addition in my experience so far is in the full accounting implementation, which is clearly critical to all companies. So, by using Opentaps, nothing is given up in terms of the robustness of OfBiz. Such freedom of movement is a beneficial characteristic of the open source model.

Additional information is provided on the Opentaps site at http://opentaps.org. These are the underlying benefits to the OfBiz/Opentaps approach, supporting standardized as well as some unique processes.

Whether you're a manufacturer, distributor, retailer, or e-tailer, opentaps can help you manage your business faster and better:

- Customers and Sales:
    - Sell more effectively by tracking your leads to accounts sales conversion process
    - Manage orders more efficiently with opportunities, quotes, and sales orders entry
    - Improve customer service with customer case tracking tools
    - Market to your customers with campaigns and contact lists. Send email updates or print mailing labels.
    - Better understand your customers with opentaps Analytics
    - Sell online with the built-in online store from Apache OFBiz or integrate with the award-winning Magento eCommerce platform for a rich online shopping experience
    - Sell more by integrating with new sales channels such as Amazon.com, eBay, and Google Base
    - Give your sales team incentives to sell more with the commission management system
    - Empower your ERP and CRM system with Asterisk Voice Over IP (VOIP) telephony integration
    - Work together more effectively by connecting your Microsoft Outlook and mobile phone devices to opentaps with Funambol
- Inventory, Manufacturing, and Purchasing
    - Manage inventory better with inventory thresholds and inventory transfers between all your warehouses and distribution facilities
    - Plan and automate purchasing and manufacturing with Material Resources Planning
    - Manage the manufacturing process with bills of materials, production runs, marketing packages, and reverse assemblies
    - Ship more efficiently with picklists, packing stations, and integration with UPS, FedEx, and DHL
    - Track serialized, non-serialized, and lot level inventory and trace inventory usages
    - Standardize your product and pricing information with the product catalog manager
- Financials and Reporting
    - Integrated Accounts Receivable and Accounts Payable help you stay up-to-date with your customers and suppliers
    - Real-time accounting reports help you stay on top your business
    - Track profitability and control expenses across business segments with accounting tags

The point here is to dive into the implementation process to see far it will take the organization. This is a challenging prospect, one that inevitably involves transfer of data structures and functions to the new environment as it proves its merit.

Simplification and Merging the ERP and the Trees

As can be seen from my prior comments in this document, I am not please with the complexity of the data structures, even in the OfBiz/Opentaps environment. Over 800 tables are represented in this

structure. While only 10% as big as the commercial ERP tools that I mentioned earlier, still, such a complex structure surely violates the objects laid out by George Sorter and Edgar Codd.

Not to worry, however. Once the processes are in place and desired functionality is achieved, simplification of the data structures can occur as a matter of course. I do not wish to go into detail at this time in this area, but I submitted a patent application with USU that was not followed up on that laid out the process for accomplishing this. There is a paper that I put together with two colleagues at USU as well that demonstrates the simplification process as a direct result of the concepts of George Sorter and Edgar Codd.

You will learn of opportunities for improvement yet after having absorbed and applied the standard ERP processes as the present themselves in OfBiz/Opentaps and established some level of fluidity by means of the generative taxonomies and some iterations around the Knowledge Swirl. Where barriers have existed, you can build bridges. Having developed organizational wisdom to a degree, you will be able to develop a system that increasingly more valid and relevant, working its way into a more detailed representation of your world and discovering opportunities for improved products and services.

Just because processes are increasingly made up of trees, data structures are becoming more simple and programming code is converted to process trees reflected in data does not mean the underlying codes of the Silverston/OfBiz/Opentaps models need be abandoned in any way. The same codes and logical structures can be represented in trees to the degree that they continue to be valid.

New Expectations for IT Specialists

Currently, organizations spend under three percent of their revenues on information processing personnel and related technologies and operating budgets. Though not a dominating figure at first glance, it can become substantial when considering the scale and scope of many organizations. Costs, of course, can be considered in several ways. For one, the cost of not being able to be responsive and disciplined.

A forward march of commoditization is creeping up on information technologists. For example, substantial computational power can be obtained at amazingly low rates for use by organizations. Economies of scale allow vendors to provide raw computing power in environments that would be difficult to replicate for individual organizations: temperature controls; backup facilities; airflow patterns; and physical security. The computational requirements of even large organizations – hardware, operating systems software, and a few basic applications – are even more affordable, even cheap. Online computing power to operate a small business can be obtained for $19 per month in one case, with the ability to seamlessly ramp up capacity to eighteen such nodes at $13/each, providing substantial capacity for a much larger enterprise.

Invitation to Join the Fluidity Team

What is a self-respecting IT professional supposed to do? In such matters, when you can see a train coming your way, you can either attempt to stop it or find a way to take advantage of its power. In this case, I view that we are at the cusp of a computing singularity, but I do not mean of the artificial intelligence kind. My experience with fluidity lends me to believe that we can soon arrive at a time when computing technologies serve as a fully-functional reflection of the best thinking of our time – not to compete with human knowledge, but to empower it.

I have invested twenty years – the bulk of my professional career – in the pursuit of what I refer to as fluidity. This has been the case since I first learned of Dell Allen's development of tree-based management of logic, which will be discussed later. In this process, I have faced no substantive challenges to the concept of fluidity or to the nature of the supporting technology. What I have faced has been much more subtle. Cognizant of being embedded in the budgetary process of their respective organizations and armed with power derived from momentum in the computing field, they uniformly put me off and ignored me.

They wanted to know nothing of the development and they made sure that none of their managers would talk with me. In such cases as they did, the message was simple and clear. They would in no way support the initiative. In the spirit of the times, they, the technologists, would give the managers any and all that they would need, computer-wise. Many questions were left unanswered. In the traditional IT approach, many still are.

A Change of Head, Hand, and Heart

It is important that you *want* to make such a change as I am suggesting. Without belaboring the point here, there are three areas of importance in such matters. These are the domains of the head, the hand, and the heart. In making the case for catching the ball, etc., metaphorically, I am mostly making head (logical) and hand (engineering/implementation) arguments. I am providing evidence supplemented with argument, with examples, etc.

The question here, though, is how you feel about the points I am making? As a technologist, does it make you excited? Do you get emotionally worked up anticipating all of the benefits to your organization from self-designed systems by people that wouldn't know "an IRQ from a DNS server"?

I think not. If history serves, you want to but you know you do not need to. You simply need to ignore me and eventually I will go away. If management were to show the poor judgment to consider my proposition, you know that you can just whittle away at my credibility with a little comment here, a Dilbert cartoon there. In my experience, technologists enjoy a direct path to the boardroom because of the mystery of what they do. Why would they want to give that up?

Well, maybe the sound of the approaching train of network commoditization may have some effect. Possibly the effect of the economic downturn on the future existence of their organization. I can only hope that some factors will contribute to a change of heart in this matter.

How, then, can job security of a new kind be arranged? By learning more about the subject at hand. If your organization engages in agriculture, learn more about agriculture. If it makes things, learn more about the manufacturing processes involved and about the markets that are being served. Learn the law, master the regulations, deepen your knowledge of the biology involved and so forth. In this new era, the era of fluidity, there is going to be a great deal of demand for solutions – for grounded resolution to longstanding problems.

Figure 3 provides an excerpt from the score of Tchaikovsky Fourth Symphony. Notice the clarity and simplicity of the model. Though they must deal with differing technologies and performance requirements as per their various instruments, all of the performers have clearly-defined roles. What they are being called on to do is not vague. Though the music was written over a hundred years ago, we can still enjoy it as it was originally conceived and written. This is the kind of environment I describe with regard to information processing and organizations. This is the kind of world that I ask technologists to participate in and to encourage.

Figure 3: Musical Notation As Practiced for Hundreds of Years

Figure 4, I may say with some element of humor, is representative of the traditional ERP approach to clarity and fluidity for organizations. One probably does not need to be a musician to understand the degree to which the figure is indecipherable. Though parts of it could technically be performed, the document is, for the most part, useless – laughably so.

To date, information technology specialists have enjoyed a special position given their ability to leverage the complexity of systems independent of the purpose for which the systems where established in the first place. In some cases, such complexity has taken counterproductive forms. For example, some time back, I attended an information processing seminar in which the "chief technologist" of a successful company with a sizable market position announced that "everyone else in the organization was an idiot" [direct quote] that had to come to him for solutions to their "menial" problems. He indicated that he was the only person in the organization of several thousand people that was capable of carrying a project to completion. They all desperately needed him.

It is entirely possible that his statement was partially true. Armed with his knowledge of a possible "Figure 4"-oriented information infrastructure, he *would* be the only one in the organization that could make sense of it. This brings to light in my mind the "re-engineering" concepts that seem to have taken hold in the early 1990s that are still prevalent. "Process owner" is one example. "Process customer" is another. Well, if you "own" a process and you have a "customer" within the organization, you are likely to make that person "pay" to get it. My sense is that was what this person was making reference to. The price for him "stooping" to assist his coworkers was in part the need to suffer through his arrogance. Well, of course, and ignorance of the effects of trumping the contributions of people that actually were knowledgeable. The effect from his approach on the organization as a whole – catching or running with balls or whatever – cannot have been good.

Figure 4: Musical Notation in the Style of Traditional Enterprise Requirements Planning Software

I have developed an implementation model, Figure 5, that should help to shed light on the opportunities and challenges faced by information technology professions in this new age of pervasive fluidity of knowledge. This model is designed for managers and those who govern organizations to help them to understand improved possibilities for

Layer approach to Enterprise Technology for Managers

Onions have layers.

The outside layer protects it from the elements. Each subsequent layer has an organic purpose that enables the onion to be healthy and strong. Like onions, organizations have layers. For an organization to prosper, each layer must fulfill its purpose in terms of contributing to the overall objectives of the enterprise. A high degree of teamwork is required. Such teamwork involves people with many kinds of skills and unique orientations.

Layer	Comments on each layer:
layer 9 · Customers & End Users An organization's target audience, such as the general public, government agencies, foundations, and individuals.	(9) How to translate customer desires into results – fluidity opens new doors
layer 8 · Governance Ensures the needs of customers and end users are met in the best interests of the market, the public, and the law. Outlines and approves basic strategies.	(8) Full empowerment – it starts here
layer 7 · Executive Management Interprets and implements mandates and directives of *Governance*. Determines tactics, priorities, and processes.	(7) Modeling/computerization confidence revitalizes the management field
layer 6 · Logic & Knowledge Design Describes the requirements of an organization, such as steps in processes, classification of similar items or concepts, and priorities, converting them into useful computerized form.	(6) The future – fluidity, understanding complexity through simplicity
layer 5 · Gateway: Access & Security Regulates "front door" security and presents the organization to related parties, stakeholders, and others. Gateway to the system.	(5) Good design – front door and front door security
layer 4 · Applications Creates functional applications, such as taxonomy tools, that make use of other programs, such as email, desktop applications, web servers, databases, directories, and purchased software.	(4) Catch the ball, then run – just what we are talking about – improving fluidity
layer 3 · Data Management Manages file systems, databases, and directories, including hierarchical indexes, text files, documents, applications, data, user profiles, and data associated with networks and resources.	(3) Important/growing area – from simple schemas, understanding complex data
layer 2 · Operating & Network Systems Ensures the stability and security of a system. Establishes foundation for "back door" security, such as keeping hackers away from the system.	(2,1) These two bottom layers have reached commodity levels already, with virtualization and cloud services and economies of scale for data centers.
layer 1 · Processors & Devices Harnesses physical and electronic properties to provide computational power and data stores to the organization and its network of customers and partners.	

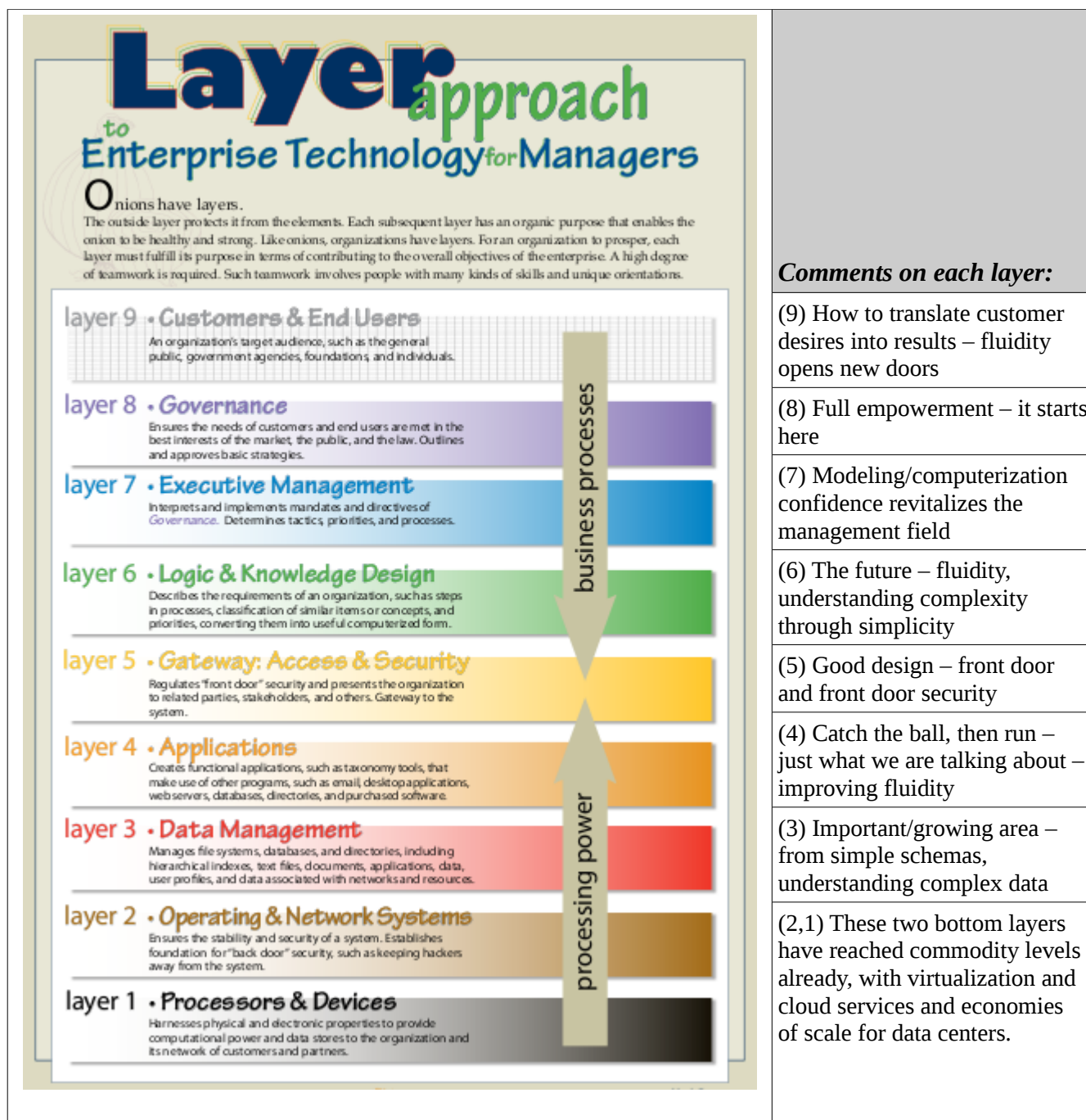*business processes* / *processing power*

Figure 5: Enterprise Technology Layers With Commentary

Under the Layered Approach, the layers are colored for the same reason personnel on U.S. aircraft carriers are colored – to distinguish the kind of work in effect and to point to the kind of expertise needed to carry out that work. Everything below Layer 6, the green layer involves technical skill. In this White Paper, we have considered issues with respect to Layer 7, Executive Management, Layer 6, Logic and Knowledge Design, and Layer 4, Applications. Typically, what I have referred to as Layer 6 is mostly subsumed in Layer 4, the orange/application layer. The point here is to pull more and more functionality, detailed business processes, out of Layer 4 and into Layer 6, which heretofore has been made up of static forms of knowledge such as documents, email message, presentations, and so forth.

Knowledge at Layer 4 is largely inert and inflexible – as in stone carvings referred to earlier. Knowledge at Layer 6 is subject to an ongoing flow of knowledge by the various parties charged with running and enterprise and carrying out its critical functions, the functions that justify the organization's existence. The fact is, this most basic understanding of how organizations can and should function is largely lost. The point of this message is to assist in restoring it.

In my experience, technologists can kill such an initiative by calling on their old friends, now famous. These are Fear, Uncertainty, and Doubt. Fear that new technologies will not work. Uncertainty as to what will happen if they do not. Doubt about the future and the future career paths of people that take the plunge into this new approach.

Resist me message if you will, but do so honorably. Find legitimate holes in my logic and technological preferences. Challenge the concept of fluidity. Make the cases for other valid options.

Better still, think about what I am describing. Wouldn't a world filled with fully-empowered, fully-functional organizations be a better world? Wouldn't such organizations be more competitive, more able to serve their customers and constituents, more profitable and viable? Wouldn't they waste less and have the capacity to extend their legitimacy over longer periods? Wouldn't they make better employers?

Finally, if such organizations were to achieve such beneficial objectives by means of technology – even if it were technology used in a different way than in the past – wouldn't they care more about technology in general? Wouldn't it be of more central importance to them, wouldn't it provide more opportunities? Wouldn't they *spend more* on it? As Peter Drucker indicated when reviewing the world of books hundreds of years in the past, as knowledge flowed, economies grew.

Catch the ball before you run, what could be more simple, but more basic, than that?