

Does Better Math Lead to Better Business Processes?

Why Business Process Management and its predecessor, workflow management, are not simply an extension to the theory of pi-calculus and why pi-calculus is not the only answer to the BPM debate

Introduction

There is a wide-ranging debate on what the term Business Process Management means. We could quote any number of well-known and well respected analysts to get an idea. Why not take a definition of a process and then work from there to find out what we are trying to achieve and how best to achieve it?

The 1913 edition of Webster's Dictionary describes a process thus:

A series of actions, motions, or occurrences; progressive act or transaction; continuous operation; normal or actual course or procedure; regular proceeding...

But what does that mean? In simple terms it means that a process is a series of predefined actions that need to take place to achieve a set goal. It could be something as trivial as sending an e-mail from one individual to another in a one-off, never to be repeated action. Alternatively, it could be a well-defined sequence of events that must be performed in strict sequence to achieve a "line of business" objective such as processing an insurance claim.

So why is there confusion over how to define Business Process Management (BPM). Is it an extension of existing technologies, including workflow, Enterprise Application Integration (EAI), activity monitoring and Web services? In other words, is BPM an evolution and amalgamation of these? Or is it, as some argue, brand new – a revolution, a new way of doing things, a new model for software development, a "third wave"? Difficult isn't it?

What is BPM?

The widely accepted definition of Business Process Management is readily available. We need only look at a recent supplement published by the Financial Times (London November 6th 2003) which states: "Business Process Management is a series of software tools and management techniques...that allow organizations to modify core processes..."

The article goes on to list the components thus:

- modelling tools, allowing business to create or redesign business processes
- workflow management tools, which control the sequence of work involved in performing a process
- process monitoring tools which monitor the progress of work being done and alert management to problems
- enterprise application integration (EAI) tools which allow computer systems to communicate with each other, ensuring that processes are completed smoothly

It is interesting to note that the Workflow Mgt Reference Model, defined 10 years ago, also envisaged these required components and defined a series of generic interfaces to allow their integration.

A recent report from the Delphi group takes this one stage further. They say that BPM also provides a platform upon which process-centric applications can be built.

As mentioned above, a good deal of the technology that underpins BPM stems from the early efforts of the workflow community. Many of the offerings then were little more than simple document routing and integration tools. Companies such as Staffware, FileNet, Fujitsu, Action Technologies and IBM have since spent much time and effort turning their software into full-blown, robust, scalable, transactional BPM products. These incorporate all the features and functions that are generally considered necessary to design, execute and monitor a wide range of processes. They can deal with anything from simplistic procedures through to highly complex line of business applications. Just as you would expect, these products derive from a wide range of underlying methods and architectures, such as Petri nets.

The Workflow Management Coalition (WfMC) has also spent much time and effort developing a set of standards that allow computer-based business processes to operate between organizations. It has been doing so for more than 10 years. Indeed, until recently the WfMC was the only standards defining group focused on the needs of Business Process Management. That position has changed dramatically. There are now 10 groups working on process management standards, 7 of them dealing with process modelling alone.

The standards specifications have also grown. Those for the WfMC's reference models were, on average, 40 pages long. The average size of these new specifications is around 100 pages¹. We won't mention their complexity at this stage – it's too scary.

So far the greatest achievement of this increased activity of standards development is confusion. There is confusion over which standards fit where and to what situation. Unanswered are questions such as – do they compete, are they complementary, will we have to pay for them?

Before we can try to unravel the standards debate, we need to clarify what Business Process Management is. Well, it is not new. Business software has long supported major business processes. What *has* changed is the realization that business managers need to understand and improve those processes. This is the easiest way for their organizations to be competitive, adaptable and responsive and for them to manage costs. Using process-based software is the key to achieving that.

So we are not trying to solve any new problems – just to solve them differently. The old way was to create isolated 'stove pipe' solutions. These were rigid, difficult to maintain, costly to set up and, worst of all, often obsolete by the time they arrived. We want to solve problems cheaply, quickly and effectively. How? By seeing those problems as a set of well-defined and integrated processes.

Dave McCoy of the Gartner Group encapsulated this objective in his definition of Business Process Management. In March 2001, he referred to it as: "a blending of process management/workflow with application integration technology... to support rich human interaction and deep application connectivity."

¹ Michael zur Muehlen, *Workflow Modeling Languages for B2B Processes*. SAP Innovation Congress 2003, Miami, Florida, USA, 15 to 27February, 2003.

The Aberdeen group go one stage further. They describe the business benefits as "...the capability to design, deploy, execute, analyze, and optimize end-to-end business processes... coordinate the flow of tasks, access to resources and the exchange of information among employees, customers, and partners... capture information about the execution of the process to enable continuous process improvement."

Looking at BPM from a technical perspective, it allows us to create an independent process layer. This forms a level of abstraction, removing processes from the control of applications. In the same way as middleware provided a data abstraction layer, BPM provides a 'process abstraction' layer.

Without BPM, each application is in charge of a set of processes. BPM enables us to take the control of the process away from the individual applications. They then become equal partners with each other and are all subject to the control of a BPM layer. This 'decides' how and when processes run. It delegates tasks or activities to the individual applications according to their strengths and workloads.

To do this well, BPM needs to support all aspects of a business process. For example, it needs to be able to:

- manage applications in parallel as well as serially
- manage people-intensive applications
- work inside and outside the organization
- be continuous and discrete, allowing processes to change with time.

The potential of BPM, and the sheer magnitude of what it can help business achieve, is undoubtedly the main force behind the sudden interest in process standards.

The rise of Web services technology is also fuelling it. This undoubtedly has great potential. However, these applications must run as part of a well defined, controlled and audited business process. If not, they will be little more than simple extensions outside the firewall to EAI-related technologies.

This is important stuff, but is it important enough to warrant this much effort in defining how BPM should work?

Should we care?

We should, for one simple reason – one size will never fit all. No one solution, method, technology or mathematical notation can solve the hard problems we face. As Albert Einstein said: *"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."*

This is especially true of business processes. These exist because organizations evolve into animals that they were never intended to be. They do not just grow in size, they also grow in complexity and unpredictability. Because they so evolve, we need controls to make sure an organization ships products on time, remembers to ask to be paid, remembers to pay its suppliers, orders new stock on time and so on.

When the procedures for these were developed, it was normally because something went wrong. Processes were hardly ever engineered from the outset – they just happened. This is precisely why we need BPM – to manage and improve on what has happened. It’s a bit like genetically modifying the organization. We take what made it unique and make better able to respond, adapt and control itself.

This is why we need a wide and diverse range of computer-based solutions to improve our level of thinking.

One size doesn’t fit all

One of the major causes of confusion stems from the thoughts and positioning of the Business Process Management Initiative (BPMI). This is a group of software makers, systems integrators and computer users who have banded together to devise BPM standards.

BPMI’s promoting of its preferred methods as standards is not in itself a problem. The difficulty arises comes from the efforts BPMI is seemingly making to hijack the term “Business Process Management” and turn it into something else. This risks setting the industry back several years.

The Initiative recently added to its library a paper called *Workflow is just a Pi process*, by Howard Smith and Peter Fingar, dated November 2003². In this, the authors (and, by implication, the BPMI) take a limited view of workflow automation as a technology and a development tool for process centric applications. They suggest that only the simplest and most trivial of business processes can defined, run and managed using workflow automation software. The paper then puts forward a solution purely based on pi-calculus, Robin Milner’s mathematical tool for analyzing communicating systems.

Now, pi-calculus is not the issue. What is the issue is that the authors propose it as the only choice. Any product that is not based on pi-calculus cannot, by their definition, offer a true BPM solution. This is clearly wrong.

All organizations are different, and as we know, few processes were engineered in the first place. It follows that there needs be a wide range of methods and mechanisms to describe, model and manage them. This means that finding a single, overarching theory to account for all these (which we doubt Milner was looking for) will be difficult, if not impossible.

Michael zur Muehlen put it succinctly when he said:

“Will there be a ‘grand unifying theory’ of business processes? Since organizational theory tells us there is no single optimal way to organize, there is no single optimal way to do business. One size fits all? I don’t think so. If that were the case, we’d all write programs in one programming language, using one OS, on one hardware platform... Calculi may allow us to reason about all kinds of processes, but how are you going to explain that to somebody that believes a notation (BPMN) is a modeling language. You can’t outsmart your market that much.”

² See <http://www.bpmi.org/bpmi-library/2B6EA45491.workflow-is-just-a-pi-process.pdf> . Smith is Chief Technology Officer of CSC, a systems integration company and a BPMI founder member. Fingar is a partner in the Greystone Group, a consulting firm.

The Smith and Fingar paper takes a narrow view of process based technology. As a result, probably unintentionally, it presents a distorted picture of the constructs involved. To an extent, it also does so for the underlying history of information technology in general and the development of process-based technology in particular. This could damage the integrity of the BPMI and other standards bodies and some of the individuals quoted in the paper.

Here is one example. The report says that: “The term mobility refers to the way in which processes evolve as they execute, through the exchange of information among participants whose relationships evolve as a result.” That is not how Milner describes it. “... the mobility of interactive systems [is] the way in which pieces of information and even active computer programs (applets, or viruses) move from one machine to another and make themselves useful (or harmful) in a new environment.”³

Also disturbing is the assertion that process engines not based on pi-calculus are unable to support the information-passing model described by Robin Milner. The comment shows a lack of awareness of other tools in the market. Note what Milner also said in 1997: “Thus, while Standard ML [a language he’d helped devise in the 1980s] is a synthetic language, for building systems, the pi-calculus is an analytical tool for understanding them.” It is unlikely he has changed his mind since then.

Because pi-calculus is an analytical tool, it is meaningless to talk about a system *supporting* pi-calculus. You can use the calculus to compare existing systems but it is not an essential ingredient that makes one system or another unique in any way.

The paper complains there are many different approaches. A couple of paragraphs later, it then groups all workflow as taking one particular approach. The authors then go on to make over-generalized statements about workflow. This is ridiculous.

They also claim that, without exception, no workflow system can do the email pattern they describe. This is just false. You need only look at some early workflow products to see what was achieved using email as the fundamental basis for their technology. Examples include Action Technology’s *Coordinator* and Banyan Systems’ *BeyondMail*.

The assertion that Intalio has the first transactional BPM system is also false. There are several transactional BPM tools around, including Fujitsu IFlow and Staffware iProcess Engine. All that Smith and Fingar can claim with any degree of accuracy is that Intalioⁿ³ was the first system designed after they began promoting pi-calculus. (It is curious that Intalio is the only supplier mentioned in the paper, despite the big names represented on the BPMI management board.)

BPMI is, in effect, defining a programming language rather than a process engine or a platform on which to execute process based technology. Someone recently described it as “LISP on steroids”.

Despite the hype and the talk of a “third wave”, the proposed standards defined in the Business Process Modelling Language⁴ specification will probably wither on the vine. They will do so not because they are, so to speak, sub-standard, nor because they are essentially the product specifications for Intalio. They will fail because they are limited in process

³ From Robin Milner’s acceptance speech on receiving an honorary degree from the University of Bologna, in July 1997. See http://www.cs.unibo.it/~gorrieri/icalp97/Lauree_milner.html .

⁴ BPML is the base specification developed by the BPMI

functionality, too prescriptive and too difficult to implement. Vendors will find it too expensive, in every sense, to move forward with them.

Finally, the authors claim that: “Using a BPMS, a business team can develop a process model, from the highest level of abstraction down to the most intricate details, and deploy it directly, effectively creating an ‘instant’ new business application,” This is typical techie’s wishful thinking and points to the big weakness in this paper. Smith and Fingar are implying that better maths leads to better business processes. This might (but only ‘might’) lead to better BPM software. There are too many human, organizational, political, financial and trading variables to be dealt with on the road to a successful implementation to be able to say any further. At best, having better BPM software tends to produce better business processes, but even that is unproven. It cannot guarantee it.

In the end, there is only one real way to compare the effectiveness of the various approaches to BPM. One must define a realistic business scenario, use the various technologies to form potential solutions, and evaluate these on how well they solved the problem. Simply basing a product or technology on a particular mathematical formalism does not in itself ensure that it will solve the problem in the best way. It might be convenient for some to try to persuade others to believe so, but there are no such magic bullets.

Why does this cause confusion?

The cause of the confusion is obvious, and the solution shouldn’t be hard. If the BPM community can agree on what the technology entails – and most already do that – and we can agree there is more than one way to skin this cat – and most of us agree that too – then we can:

- explain more completely the business situations and problems that BPM applies to
- speed up its adoption
- get a clear and consistent message out to users (influencers, approvers, buyers, installer and so on)
- define ways to evaluate the effectiveness of particular approaches
- show that BPM can deliver provable financial and other benefits
- ride the wave – be it first, second or third – for the benefit of everyone.

In Conclusion

Business processes are the nervous system of an organization. They set a business apart from its competitors. Automating, and as result managing, these processes can increase their value to an organization, many times over.

Doing this demands nothing we have not done before. The need to understand all aspects of the processes before changing them is not new. The way we go about making those changes is also well established. So, too, is the need to keep people on side the whole way. And, behind it all, the technology of Business Process Management is not new.

The Smith/Fingar paper really gets into discussing processes, and that everything is a process. Even a task in that expression is a process. Yes, and so it is for most other advanced workflow systems. This implements the sub-process concept nicely with the workflow model. Furthermore coupling this meaning of process to pi-calculus - when in truth, the

meaning of process has little to do with calculus - they are simply using another notation to describe the process.

We are not saying that advances such as pi-calculus are bad – on the contrary – but to suggest there is one, and only one, right way is a flawed argument. Suggesting a ‘standard’ that appears to have only one company applying it in full means it is not a standard.⁵ It is effectively proprietary, despite the input from others on its development, and intent to use. Unless standards are of clear benefit and simple to use, they are at the least a distraction. At worst, they could lead to a damaging technology lock-in. Can you afford that risk? Can any of us?

Jon Pyke and Roger Whitehead

14 November 2003

Endorsed by:

Martin Ader, Workflow and Groupware Strategies, France

Mike Gilger, Identitech, USA

David Hollingsworth, Fujitsu Services, UK

Keith Swenson, Fujitsu Software Corp, USA

Dr Michael zur Muehlen, Stevens Institute of Technology, USA

⁵ Yes, we know that Microsoft sets *de facto* standards in many areas, but there is no similarly dominant supplier in BPM. We are all of us therefore in the business of creating *de jure* standards – open, jointly defined and jointly owned.