



Class Notes: BPM Research and Education

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Green, Greener, BPM?

I am sure you've heard it too: Green is the new Black. While this was true back in the days when Henry Ford introduced process standardization with his assembly line for the Ford Model T (over 15 million of these were sold!), Green is also the color of choice for many business organizations, private and public. I am not talking about the actual color of their business shirts or their logo 2.0.; I am referring to the eco-aware movement that has pushed sustainability into the top ten list of business buzz-words.

What used to be a boutique market for tourism and political activists has become the biggest business revolution since the e-commerce boom. Public and private organizations alike push towards "sustainable" solutions and practices. That push is partly triggered by the immense reputational gains associated with branding your organization as "green", and partly by emerging societal, legal and constitutional regulations that force organizations to become more ecologically aware and sustainable. But the boom goes beyond organizational reality. Even in academia, sustainability has become a research "fashion wave" (see [1] if you are interested in research fashion waves) similar to the hype around Neuroscience that our colleagues in the natural sciences are witnessing these days.

Mind you, I'm a fan. A big fan in fact. As academics, we are constantly searching for problem areas that are characterized by an opportunity to do rigorous research (studies that are executed to perfection) on relevant topics (studies that have applied practical value and provide impact to the community). What would be a better playground than exploring the options that Business Process Management provides for creating a sustainable, green future? I'm getting excited just writing about this!

So, join me in exploring some of the current thoughts around how BPM can contribute to the sustainability fashion parade and let me introduce you to some of the works that scholars have produced recently in their attempts to identify solutions.

Green Organizations, Green Technology and Green Processes

With the growing awareness of global crises such as rapid climate change, the social divide, and great economic imbalances; individuals, organizations and governments increasingly recognize the need for sustainable development in living as well as in organizing, performing, and managing work. The notion of sustainability has evolved around economic, social, and ecological issues. It has been defined by the United Nations Brundtland Commission as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" [2], and concerns the delivery of economic, social, and environmental benefits simultaneously with classical organizational performance.

In the academic community, the interest has been primarily in the area of environmental sustainability. Different topics related to sustainability have been discussed under labels such as “Green Technology,” “Green Management,” “Energy Informatics”, or even “Sustainable Computing”.

What you will notice is that the discussion to date has not produced the buzzword “Green BPM”. But why not? If we look at the suggested capabilities of Green IT (information technology), for example, we learn that the value of Green technology lies in its transformative power to create sustainable business processes by reducing logistical costs, facilitating virtual collaboration between distributed teams, supporting remote work, monitoring and analysing environmental information, and providing information in order to facilitate decision-making under consideration of “green” choices [12].

There is truth in this argument. Green technologies may indeed lead to better (i.e., greener) processes – but is this the result of the Green technology or a result of the process changes that may (or may not) be enabled through Green technology? I’m sure you can guess my opinion.

The essence of my argument goes as follows. Technology – green or traditional - can be an important *enabler* to the appropriate management of business processes. In turn, the well-managed business processes can lead business benefits in terms of costs, flexibility, time savings, quality, or indeed sustainability considerations. Still, technology is the enabler of process change, not a direct antecedent of business benefits per se. Similarly, green technology, if deployed and appropriated effectively, can enable green process change. The change in processes can then lead to sustainability benefits. Figure 1 shows this view.

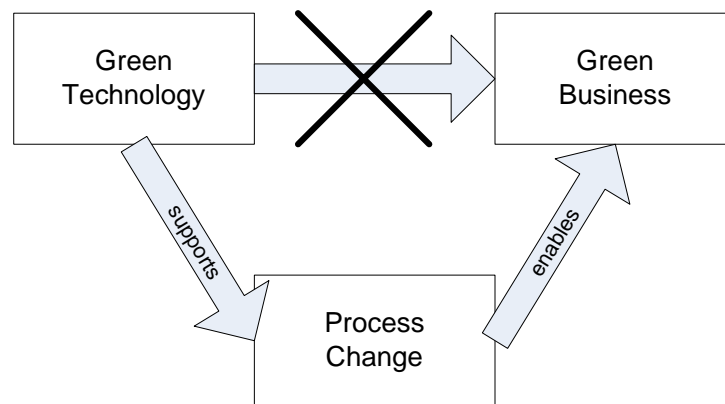


Figure 1: The Role of BPM in IS-enabled Sustainability Initiatives

In fact, I believe the true potential for sustainability transformations lies at this intersection of technology enablement and carefully managed process change. The key premise is that we need to align our green thinking with business and technology imperatives in order to effectuate a change towards a sustainable society. To achieve this alignment, I believe we require a process-focused discussion.

Think about it. The consideration of those potentials that come out of green technologies and other sustainable solutions is too limited to facilitate discussions that can help business executives put these “green solutions” to work. A cloud-based network server platform characterized by reduced energy consumption (a form of green technology) still remains a mere network server platform. If the business processes that run on this platform themselves are not designed to be ecologically sustainable, the positive effects of an underlying green technology solution will remain minimal – if present at all.

Now, don't get me wrong. I too believe that it is impossible to think of undertaking a major sustainability change initiative (involving the redesign of major business processes) without considering which current and future technologies can enable or assist this change. Still, if there is one thing we learned from the "technology does or does not matter" debate [3, 11], it is that major business transformations are a complex and highly interwoven undertaking that require technology, people, processes, culture, strategy and many other aspects of corporate reality to work together.

The good thing is that BPM as a discipline exists precisely to address such complex transformation problems. If you don't believe me, just look at Paul Harmon's BPTrends review of the different BPM maturity models and the different capability areas that are critical to managing an enterprise [6]. Indeed, I believe BPM provides *just* the perspective that enables an integrated, holistic approach to the management of sustainability change.

Only through the dedicated management of process change and the application of techniques that we know from BPM (such as process analysis, process performance measurement, and process improvement) can the transformative power of green technology or other solutions be fully leveraged. Such an approach is the only way towards environmentally sustainable organizations and, in turn, an environmentally sustainable society. My argument, therefore, is that the management techniques associated with BPM will allow us to better understand the transformative power of technology in the context of sustainable development.

This process-centric view suggests that a faithful application of green technology requires a sound understanding of how the technological capabilities facilitate a change in the business processes of an organization. The promise of business process management is that it enables analysts and managers, but also researchers, to understand these change capabilities, understand the implications of the change, and manage the change itself.

Still, contemporary business process management to date has not strongly focused on environmental sustainability as a change objective or driver. I see a need for the BPM community, and BPM researchers in particular, to extend our current view of business process management towards the notion of 'green BPM' that incorporates sustainability as an objective and as a vehicle for managing business process change. I will outline some suggestions below.

What Green BPM Needs to Deliver

I have identified the following exemplary working areas for research alongside a classical process management lifecycle [5]. This is not an exhaustive list. Instead, I have merely suggested these four areas of BPM as examples of solutions that are slowly but surely emerging in academia as tentative suggestions to BPM practitioners that have a 'green view' on their processes.

Process Design

One of the fundamental challenges will be to provide the ability to design "greener" processes. Current process design practices, therefore, will need to accommodate sustainability-related concepts, such as carbon emissions or energy consumption of business activities in the design of business processes. This will allow for analysis and improvement that not only consider economical but also ecological targets.

In the context of process design, most efforts center on the use of process modeling to describe current or future processes. Process modeling is essentially used to describe the activities, tasks, and processes of an enterprise [7]. Process modeling is essentially a cognitive design tool. Its role is to help you understand what you do now and what you might want to do in the future. Because process modeling encompasses IT systems, information, activities, actors and business

rules, and other documentation; it appears to be an adequate tool for designing sustainable processes [10]. Especially since resource consuming activities can be captured.

Now, imagine we can extend our current modeling of business processes to capture some green information alongside a business process: say, the extent of greenhouse gas emissions produced by the various activities in a business process. An extended process modeling notation could provide appropriate graphical symbols to document and analyze data about the waste associated with each process. **Figure 2** shows an example for how such green process diagramming might look, based on some initial research I have undertaken together with some of our post-graduate Masters of BPM students at Queensland University of Technology [8]. The example shows a (fictional) direct invoicing process of a shared service provider and also captures the sources and extents of carbon emissions alongside the flow of activities.

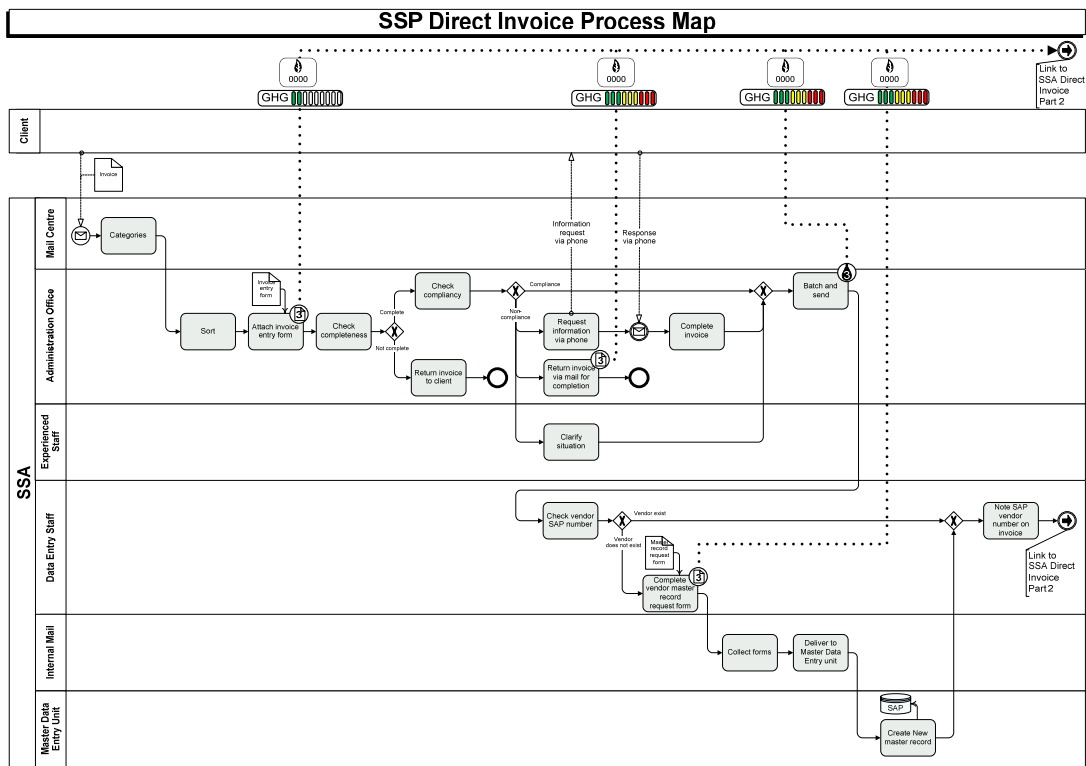







Figure 2: An Example Extended “Green” Business Process Diagram in BPMN

Table 1 summarizes our current suggestions for an extended process diagramming approach that can be used by practitioners in the design of green business processes. We are currently exploring how this approach can be used by organizations in Australia and Europe. The verdict is still out; I implore you to go and try for yourself and get back to me with your findings, suggestions and comments.

Table 1: Suggested Process Diagramming Notation Extensions [8]

Construct	Notation	Specification
Fuel consuming activity		This notation is attached to an activity that produces greenhouse gas by using fuel as main source. Examples include business travels, transportation, and others.
Paper consuming activity		This notation is attached to an activity that produces greenhouse gas by using paper. Examples include creating paper invoice, filing paper report, and others.
Greenhouse gas emission indicators	 or 	These notation constructs can be assigned to each pool or swim lane to indicate the level of greenhouse gas (mainly CO ²) emissions in the relevant (part of the) process. Color coding can be used to display the overall level of greenhouse gas emissions in the process. Elsewhere, the precise amount of greenhouse gas emission produced can be specified.
Greenhouse gas flow		The greenhouse gas flow construct is used to show the flow of greenhouse gas in a process and to connect emission producing activities to the greenhouse gas emission indicators.

Process Measurement

Aside from providing extended tools for process design, organizations also need to embed sustainability-related targets and green key performance indicators at all levels of business, starting from the strategy level all the way down to an activity level. Consequently, process measurement needs to accommodate sustainability-related factors such as carbon emissions, energy consumption, and paper consumption. The measurement of these factors not only allows for controlling the accomplishment of sustainability-related targets, but also creates transparency and awareness that is needed in order to reach employees throughout the organization. It will therefore be necessary to develop a thorough understanding of the required measurement systems, as well as to develop information systems that collect data and allow for detailed monitoring and analysis of sustainability-related measures.

Again, let me give you an example from our own research. We have studied processes at a Government agency in Australia and at a large airport in Sweden and attempted to measure the 'greenness' of some of the processes by using an adaptation of activity-based costing, that we labeled 'Activity-based Emission (ABE) Analysis'. Originally, activity-based costing describes a costing model that identifies activities in an organization and assigns the cost of each activity resource to all products and services according to the actual consumption by each: it assigns more indirect costs (overhead) into direct costs. In this way, an organization can precisely estimate the cost of individual processes (for both products and services) so they can identify and eliminate those that are unprofitable and lower the costing and pricing of those processes that are overpriced. Our idea is now that Activity-Based Emission Analysis allows you to determine the emission of greenhouse gases for each activity as well as the overall business process. We believe that ABE allows the calculation of greenhouse gas emissions accurately by focusing on every step of a business process by identifying the so-called emission drivers (the equivalent to a regular cost driver) and by considering the impact of alternative resources that facilitate the process execution. In fact, by estimating and measuring the greenhouse gas outturn of each

activity, the greenhouse gas emission of all services and products across all business processes of an organization can be calculated. ABE analysis can in turn provide a more precise and specific insight into the actual processes, activities and resources that directly contribute, positively or negatively, to the carbon emission of an organization. I refer you to our chapter in the forthcoming book “Beyond Efficiency: Business Process Management for the Sustainable Enterprise”, which will be published by Springer later this year, if you want to find out more about this approach [8].

Process Change

Having outlined some ideas on how to describe and measure the greenness of business processes, let us turn to the key challenge of all process managers: making our processes better (or in this case, greener).

To date, “making processes better” has typically meant a focus on business improvement drivers such as time, cost, quality, or flexibility – the so-called ‘devil’s quadrangle’ [9]. Green organizations, however, need to improve their processes such that they are successful in terms of their economic impact, *but also their ecological and social impact*. Exemplary ecological key performance indicators that are increasingly finding their way into the agenda of managers include carbon emissions, data center energy, or renewable energy consumption. The key challenge is therefore to extend the devil’s quadrangle of business process change to a devil’s *pentagon*; including sustainability as an important fifth dimension in process change.

What is required, is a more detailed understanding of approaches and solutions which aid the deliberate improvement and redesign of processes in light of sustainability targets. While some processes may become more sustainable through rather simple improvements (e.g., eliminate paper production alongside a process), others may require a fundamental redesign (e.g., virtualize a process on basis of collaborative technology).

Now, I would love to give you some examples from current research on green process change but unfortunately I am drawing a blank. Green process improvement is still a white spot on the map of academics – actually quite similar to the area of “normal” process improvement, an area where our consolidated knowledge can still be summarized as the ATAMO theory (“And Then, A Miracle Occurs”) [4]. But I see this as a challenge and an opportunity, and would like to invite you to contact me if you have ideas or opportunities to create new, important and relevant knowledge about how we can assist organizations in making their process greener.

Process Implementation

Sustainable processes must be implemented. In order to do so, organizations need to allocate sufficient resources, provide eco-aware training to employees, and put into action the previously defined measures and green performance indicators. Dedicated information systems are required to collect data, monitor performance, and create the transparency that is required in order to involve people across the entire organization. We need to investigate the factors and dynamics that are relevant in the context of implementing sustainable business processes and which technological and organizational capabilities assist with this challenge. The key challenge will be to examine the extent to which traditional change management practices are effective and efficient in green transformations. And again, I can’t tell you the answer - yet.

Acknowledgments

In this Column I draw upon research work I have been doing with my colleagues Dr Jan vom Brocke and Dr Stefan Seidel, from the University of Liechtenstein, as well as work I have done together with students at Queensland University of Technology. The credit of the knowledge contribution is obviously shared amongst the members involved in these research projects. The views expressed in this Column, however, are my own and are not meant to represent those of my colleagues or students.

If you are interested in Green BPM, aside from the literature I referenced in this Column, I can also recommend waiting for the upcoming book “Beyond Efficiency: Business Process Management for the Sustainable Enterprise”, edited by Jan vom Brocke and Stefan Seidel, as well as a related discussion forthcoming in one of our academic journals:

Loos, P., Nebel, W., Gomez, J. M., Hasan, H., Watson, R.T., vom Brocke, J., Seidel, S., Recker, J. (2011): Green IT: A Matter of Business and Information Systems Engineering? Business and Information Systems Engineering, Vol. 3.

And of course, please feel free to contact me with your suggestions, feedback and comments – or for a copy of some related articles.

About Me

Jan Recker is Associate Professor for Information Systems and Business Process Management at Queensland University of Technology in Brisbane, Australia, where he is co-leader of the BPM research group. Jan's research interests centre around the use of process design methods in organizational practice, the quality of process designs, and the development of innovative and sustainable process (re-) designs. He is globally recognized for his research on the industry adoption of the BPMN process design standard. Jan has written a book on evaluations of the BPMN notation, co-authored over 25 academic journal papers and presented his research at over 60 conferences all over the globe. He holds a PhD in Information Systems from Queensland University of Technology and a MS in Information Systems from the University of Muenster, Germany.

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