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# **The role of Organizational Change in Green IS: Integrating Sustainability in Projects**

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## ***Abstract***

Sustainability is without doubt one of the most important challenges of our time. How can we develop prosperity, without compromising the life of future generations? Companies are integrating concepts of sustainability in their marketing, corporate communications, annual reports and in their actions.

Information systems (IS) provide organizations with the ability to change and improve business processes to better support sustainable practices. Therefore, IS can make a contribution to the sustainable development of organizations. However, the organizational change aspects of 'Green IS' are covered only marginally in literature. This paper aims to contribute the debate on Green IS, by highlighting the role of sustainability in the organizational process of implementing IS and organizational change resulting from IS. Based on a literature review of the concepts of sustainability, and the role of IS in sustainability, we will apply the concepts of sustainability to IS projects and create a checklist for developing sustainability indicators in IS projects.

## ***Keywords***

Sustainability, Green IS, Projects, Project Management.

## **1. Introduction**

Sustainability is recognized by the United Nations as one of the most important challenges of our time (Glenn and Gordon, 1998). The pressure on companies to broaden its reporting and accountability from economic performance for shareholders, to sustainability performance for all stakeholders has increased substantially (Visser, 2002). The recent world crises may even imply, that a strategy focused solely on shareholder value, is not longer viable (Kennedy, 2000). Following the success of Al Gore's 'inconvenient truth', awareness seems to be growing that a change of mindset is needed, both in consumer behavior as in corporate policies. How can we develop prosperity without compromising the life of future generations? Proactively or reactively, companies are looking for ways to integrate ideas of sustainability in their marketing, corporate communications, annual reports and in their actions (Hedstrom et al., 1998; Holliday, 2001).

The growing concern about sustainability and the preservation of our planet is increasingly being recognized by the information technology (IT) and information systems (IS) disciplines. CIOs identified "Green IT" as an important strategic technology (Thibodeau 2007) and it is expected that the Green IT service market will reach nearly \$5 billion by 2013 (Mines 2008). In the academic world, the recognition of Green IT or Green IS as an emerging field of study is

acknowledged by specialized tracks or contributions to recent IS conferences and scholarly journals (Ghose et al., 2009). However, Watson et al. (2010) still conclude that “the IS academic community seems largely ignorant of the challenge of sustainable development”. Given IS’ ability to understand, change, and reinvent business processes to better support sustainable practices (Kazlauskas and Hasan, 2009), the IS academic community cannot afford to be a bystander in the debate on sustainable development.

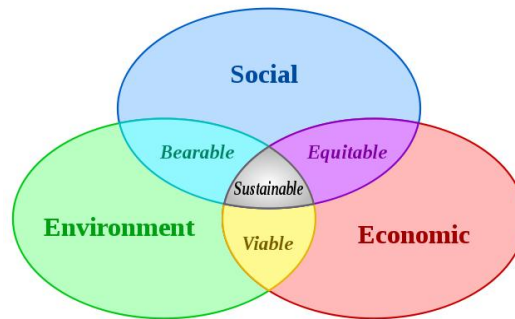
This paper aims to contribute to the discussion on Green IS, by adopting dynamic perspective on Green IS: that of the organizational change related to the implementation of Green IS. And because this organizational change is most often organized in projects, the paper will analyze how the concepts of sustainability are addressed in projects and project management. The paper will be concluded by suggesting a ‘sustainability checklist’ for Green IS projects.

## **2. Sustainability and IS**

Societal concerns about the balance between economic growth and social wellbeing has been around as a political and managerial challenge for over 150 years (Dyllick and Hockerts, 2002). Also the concern for the wise use of natural resources and our planet emerged already many decades ago, with Carson’s book “Silent Spring” (Carson, 1962) as a launching hallmark. Propelled by the World Commission on Environment and Development (1987) and the 1992 Rio Earth Summit, the opinion that none of these three goals, economic growth, social wellbeing and a wise use of natural resources, can be reached, without considering and effecting the other two, got widely accepted (Keating, 1993). With this widespread acceptance, sustainable development became one of the most important challenges of our time.

Sustainability in the context of sustainable development is defined by the World Commission on Environment and Development (1987) as "forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs". This broad definition emphasizes the aspect of future orientation as a basic element of sustainability. This care for the future implies, among others, a wise use of natural resources and other aspects regarding the environmental footprint. This green aspect of sustainability is recognized in many other definitions of sustainability, but by stating that “In its broadest sense, sustainable development strategy aims at promoting harmony among human beings and between humanity and nature”, the World Commission on Environment and Development (1987) implies that sustainability requires not just an environmental “green” perspective, but also a social one, next to the traditional economical perspective on development and performance. Elkington (1997), identifies this as the ‘triple bottom line’ or ‘Triple-P (People, Planet, Profit)’ concept (illustrated in figure 1): Sustainability is about the balance or harmony between economic sustainability, social sustainability and environmental sustainability (Elkington, 1997).

In the debate on the relationship between sustainability and IT/IS, a commonly used term is ‘Green IT’. However, a distinction can be made between ‘Green IT’ and ‘Green IS’ (Kazlauskas and Hasan, 2009; Watson et al., 2010), whereas Green IT refers to the energy efficient utilization of IT equipment and Green IS to the use of IS to enable more sustainable business processes. In this paper we focus on Green IS, as it incorporates a greater variety of possible initiatives to support sustainable development, but if applicable we will mention Green IT, as it is logically included in Green IS (Watson et al, 2010).



**Figure 1:** The Triple-P concept of sustainability

Sustainability in IS, or Green IS, can be defined as “the design and implementation of information systems that contribute to sustainability of business processes” (Boudreau et al., 2008). It requires an “integrated and cooperating set of people, processes, software, and information technologies to support individual, organizational, or societal goals” (Watson et al, 2010).

The environmental impact of IS has been subject to discussion. The promise of a decreased environmental footprint because of paperless offices and tele-working has been opposed by claims of increased power consumption and hazardous waste because of the use of IT needed to operate the systems.

According to Erdmann (2008), the environmental footprint of IS can be considered on different levels.

- The first level being environmental effect because of the physical existence of IT equipment, causing increased consumption of energy, increased emission of greenhouse gas and increased non-recycled solid waste. IT is viewed as a ‘dirty’ industry (Fulcher, 2009), because of the toxic chemicals used in manufacturing IT equipment and the waste generated.
- The second level concerns environmental effects of use and application of IS, that use the IT equipment. On this level effects are generated by virtual goods, virtual stores, tele-working, tele-meetings, tele-collaboration, etc.
- The third level of consideration are the systemic effects of the use of IS. These effects include impacts on facilities managed, on supply chains, on total freight transport and on total passenger transport.

Because of this diversity of direct and indirect indicators, the overall effect of IS/IT on environmental sustainability is not easy to determine. Kazlauskas and Hasan (2009) talk about a “wicked” problem: a problem in which issues are ill-defined and potential solutions have heterogeneous and complex effects on the environmental indicators (Erdmann and Würtenberger, 2003). Plepys (2002) concludes “The discussion on what the role is of IT and, particularly, Internet for sustainability is still going on and will hardly reach any definite conclusion, as the environmental impacts of the new technologies will depend on how they are used.” This conclusion emphasizes the importance of organizational change in realizing sustainability benefits from IS.

The concepts of sustainability mentioned above suggest that in the debate on Green IS not just the environmental effects are considered, but also include the social effects of IS use. The United Nations (UN) concluded that IS has the ability to be a powerful enabler of social sustainability and contributor to development goals, because of its unique characteristics to dramatically improve communication and the exchange of information to strengthen and create new economic and social networks (United Nations Development Program, 2001). As reasons for this conclusion, the UN indicates that:

- IS is pervasive and cross cutting  
IS can be applied to the full range of human activity from personal use to business and government. It is multifunctional and flexible, allowing for tailored solutions based on personalization and localization, to meet diverse needs.
- IS is a key enabler in the creation of networks  
IS thus allows those with access to benefit from exponentially increasing returns as usage increases i.e. network externalities.
- IS fosters the dissemination of information and knowledge  
IS has the ability to separate content from its physical location. This flow of information is largely impervious to geographic boundaries, allowing remote communities to become integrated into global networks and making information, knowledge and culture accessible to anyone.
- IS can radically reduce transaction costs  
The digital and virtual nature of many products and services allows for zero or declining marginal costs. Replication of content is virtually free regardless of its volume, and marginal costs for distribution and communication are near zero.
- IS can enhance efficiency  
IS' power to store, retrieve, sort, filter, distribute and share information seamlessly can lead to substantial efficiency gains in production, distribution and markets. IS streamlines supply and production chains and makes many business processes and transactions leaner and more effective.
- IS enables innovation  
The increase in efficiency and subsequent reduction of costs brought about by IS is leading to the creation of new products, services and distribution channels within traditional industries, as well as innovative business models and whole new industries. Intangible assets like intellectual capital are increasingly becoming the key source of value. With the required initial investment being just a fraction of what was required in the more physical-asset intensive industrial economy, barriers to entry are significantly lowered, and competition increased.
- IS facilitates disintermediation  
IS makes it possible for users to acquire products and services directly from the original provider, reducing the need for intermediaries.

In some parts of the world, IS is contributing to revolutionary changes in business and everyday life. In other parts of the world, the lives of people have hardly been touched by these innovations. If people in developing countries are unable to acquire the capabilities for using IS, they will be increasingly disadvantaged or excluded from participating in the global information society. The social and economic potential of these new technologies for development is enormous, but so too are the risks of exclusion (Mansell, 1999). Economic research suggests a

positive correlation between the spread of IS and economic growth (Siegel, 2003). IS can contribute to income generation and poverty reduction. It enables people and enterprises to capture economic opportunities by increasing process efficiency, promoting participation in expanded economic networks, and creating opportunities for employment (Organization for Economic Cooperation and Development, 2005).

### **3. Sustainability and Organizational Change**

Although not specific to Green IS, the relation between IS and its benefits or economic value is a complex and often disputed one (Stewart et al., 2007; Silviu, 2008). The empirical studies in this field produced mixed results (Soh and Markus, 1995). For example, several studies showed that the relationship between IT investments and organizational performance could not be proven (Loveman, 1988; Kauffman and Weill, 1989; Salmela, 1997). Dedrick et al. (2003) state that a clear relationship between IT/IS investments and the benefits of these investments in terms of organizational performance cannot be established, because benefits result from how IS is used in a specific context. The same IS investment can have a positive effect in organization A and a negative or neutral effect in organization B, depending on when, how and why it is used in an organization (Soh and Markus, 1995). Stefanou (2001) notes that organizational change is required if any benefits are to be realized. This conclusion again emphasizes the importance of organizational change in realizing sustainable benefits from IS. Therefore it should be concluded that organizational change is an inextricable aspect of Green IS. Also in the definition provided by Boudreau et al. (2008), the implementation of more sustainable business processes is mentioned and this implementation requires a process of organizational change. The sustainability aspects of this process of organizational change, however, are hardly ever covered in studies on Green IS. Most studies focus on the outcome or effect that IS can have on sustainability (Ghose et al., 2009) and not on the change process to realize this effect.

Beckhard and Harris (1987) characterize organizational change as the process of moving from a present state of the organization, to a future state. Several authors (Bresnen, 2006; Biedenbach and Söderholm, 2008; Gareis, 2010) refer to projects and programs as a way of organizing change. Given the importance of organizational change in reaching sustainability effects from IS, the concepts of sustainability should also reflect in the way organizational changes and projects are designed and managed.

This development is recognized by leading professionals in the field of project management. Association for Project Management (past-) chairman Tom Taylor states that “the planet earth is in a perilous position with a range of fundamental sustainability threats” and “Project and Programme Managers are significantly placed to make contributions to Sustainable Management practices” (Association for Project Management, 2006). And at the 22nd World Congress of the International Project Management Association (IPMA) in 2008, IPMA Vice-President Mary McKinlay stated in the opening keynote speech that “the further development of the project management profession requires project managers to take responsibility for sustainability” (McKinlay, 2008). Her plea summarized the development of project management as a profession as she foresees it. In this vision, project managers need to take a broad view of their role and to evolve from ‘doing things right’ to ‘doing the right things right’. This implies taking responsibility for the results of the project, including the sustainability aspects of that result. Also in academic research, the relationship between project management and sustainability is explored

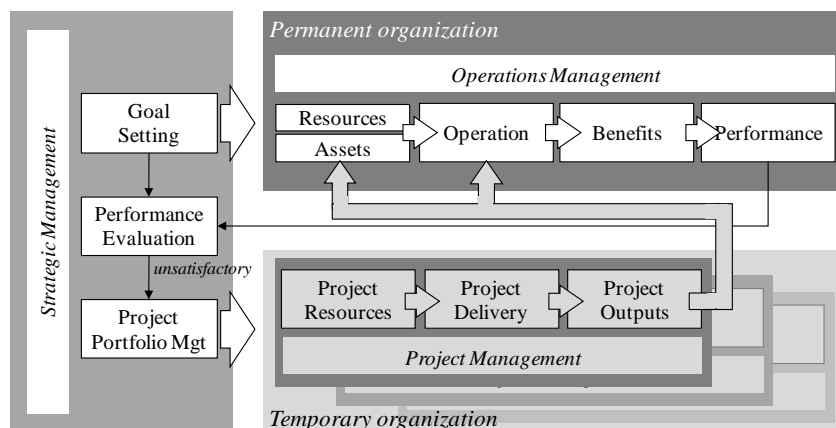
(e.g. by Gareis et al., 2009; Labuschagne and Brent, 2006; Silvius et al., 2009) as one of the (future) developments in project management.

#### 4. Sustainability and Project Management

Projects can be considered as temporary organizations (Lundin and Söderholm, 1995; Turner and Müller, 2003) that deliver (any kind of) change to organizations, products, services, business processes, policies or assets. These project-organized changes, or simply projects, are characterized by:

- A temporary nature or temporary organization;
- Most often across organizational structures and boundaries;
- A defined deliverable or result, logically or preferably linked to the organization’s strategy or goals;
- Specified resources and budget.

In this definition, projects are, as temporary organizations, related to a non-temporary ‘permanent’ organization, and realise changes that benefit the strategy or goals of this organization. The permanent organization utilizes resources and assets in its operational business processes to deliver benefits or value to its customers and ultimately deliver business performance (e.g. profit, market share, return in capital, etc.) to the organization and its stakeholders. Its activities are based on goals that are developed or set in a strategic management process. The strategic management of the organization, however, not just includes setting goals. It also includes evaluating the business performance of the organization against these goals. If the performance is satisfactory, the operations may continue. But if the performance is unsatisfactory, because of lack of performance or because of changing goals, there may be reason to change something in the organization. In that case, a temporary organization, in the form of a project, is commonly used to create this change. The change may concern the resources, assets or business processes of the permanent organization, but also the products/services rendered or the internal policies and procedures. The selection of the ‘right’ changes for the organization is usually part of a process called ‘portfolio management’. Figure 2 illustrates this relationship between projects as temporary organizations and the permanent organization.



**Figure 2.** Project as temporary organizations that deliver changes to the permanent organization. (Silvius et al., 2012)

Elaborating on the view of projects as instruments of change, it is evident that a (more) sustainable society requires projects to realize change. In fact, this connection between sustainability and projects was already established by the World Commission on Environment and Development (1987). However, Eid concludes two decades later that the standards for project management “fail to seriously address the sustainability agenda” (Eid, 2009). The most widely accepted standard for project management, the “Guide to the Project Management Body of Knowledge (PMBOK)” (Project Management Institute, 2008) does not mention sustainability as a relevant perspective on projects. Both index and glossary do not list the term and also in parts of the guide where a reference to sustainability aspects would be quite logical, this reference is not made. For example Paragraph 1.8, Enterprise Environmental Factors, mentions the organization’s human resources and Marketplace conditions as “internal or external environmental factors that surround or influence a project’s success”. But the paragraph fails to more explicitly identify potential social or environmental interest resulting from sustainability policies as factors of influence.

Given the temporary nature of projects, project management and sustainable development are probably not ‘natural friends’. Table 1 illustrates some of the ‘natural’ differences in the characteristics of the two concepts (Silvius et al., 2012).

<b>Sustainable Development</b>		<b>Project Management</b>
Long term + short term oriented	↔	Short term oriented
In the interest of this generation and future generations	↔	In the interest of Sponsor / Stakeholders
Life-cycle oriented	↔	Deliverable/result oriented
People, Planet, Profit	↔	Scope, Time, Budget
Increasing complexity	↔	Reduced complexity

**Table 1.** The contrast between the concepts of Sustainable Development and Projects.

## **5. Integrating Sustainability in Project Management**

The relationship between sustainability and project management is still an emerging field of study (Gareis et al., 2009). Some first studies and ideas were published in recent years. And although the studies differ in approach and depth, a few conclusions can be drawn.



#### Conclusion 1:

##### *Sustainability is relevant to projects and project management.*

As stated earlier, APM's (past-)chairman Tom Taylor was one of the first to suggest the project management community to familiarize themselves with the issues of sustainability, recognizing that more should be done to contribute to a more sustainable society (Association for Project Management, 2006). This appeal was the output of a small working party in APM, that recognized that project managers were not well equipped to make a contribution to sustainable development and decided to investigate this issue.

On the 2008 European conference of the Project Management Institute (PMI), Jennifer Russell elaborated on what Corporate Social Responsibility means for project managers (Russell, 2008). She pointed out that a project manager, being in the frontline of new or changed activities within an organization, is perfectly positioned to influence the organization's operations towards greater sustainability. Russell also argued that this position is not without responsibility, both for the organization as for the project manager. She concludes that "Corporate social responsibility is too big an issue to leave to someone else to address."

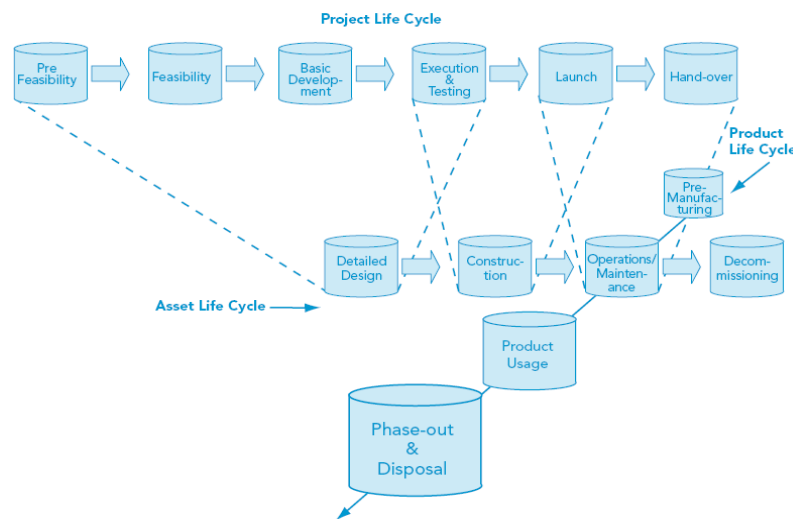
#### Conclusion 2:

##### *Integrating sustainability stretches the system boundaries of project management.*

In some of the first publications on sustainability and project management, Carin Labuschagne and Alan Brent of the University of Pretoria link the principles of sustainable development to project life cycle management in the manufacturing industry (Labuschagne and Brent, 2006). They suggest that the future-orientation of sustainability implies that the full life cycle of a project, from its conception to its disposal, should be considered. Elaborating on this life cycle view, they argue that when considering sustainability in project management, not just the total life cycle of the project (e.g. initiation-development-execution-testing-launch) should be taken into account, but also of the 'result' the project produces, being a change in assets, systems, behavior, etc. This result, in their words: the 'asset', should also be considered over its full life cycle, being something like design-develop-manufacture-operate-decommission-disposal. And taking the life cycle view even further, also the life cycle of the product or service that the asset produces should be considered. Figure 3 visualizes how these three life cycles, 'project life cycle', 'asset life cycle' and 'product life cycle', interact and relate to each other. Including sustainability considerations in projects therefore suggests that all three life cycles are considered.

Because Labuschagne and Brent include the result of the project, the asset, in their framework, it is sensitive to the context of the project. Their studies regarded the manufacturing sector in which projects generally realize assets that produce products. In other contexts, the result of a project may be not an asset, but an organizational change or a new policy. The general insight gained from their work, however, may be that integrating sustainability in projects should not be limited to just the project management processes. It suggests that also the 'supply chain' of the project is to be considered, including the life cycle of whatever result the project realizes and also the life cycle of the resources used in realizing the result. Integrating the concept of sustainability in project

management may therefore very well stretch the ‘systems boundaries’ of project management.



**Figure 3.** Interrelating life-cycles (Silvius et al., 2009, based on Labuschagne and Brent, 2006).

Another view on the scope of integrating sustainability in to projects can be found in the ‘SustPM’ research project (Gareis et al., 2009 and 2011). This projects focuses on integrating the concepts of sustainability specifically in project management processes and methods, and not the project management result or deliverable. This specific focus is motivated by the temporary character of projects, which causes the project management processes to be ‘overlooked’ in organizations, when striving for a more sustainable business. In the SustPM study, the concept of sustainability is detailed in six characteristics: Economic-oriented, Ecologic-oriented, Social-oriented, Short, mid, long-term oriented, Local, regional, global-oriented and Value-oriented. Project management is subsequently confronted with these six characteristics in order to develop additions to the project management standards and methodologies.

### Conclusion 3:

#### *Project management standards fail to address sustainability*

This conclusion was most clearly drawn by Eid (2009) in his book “Sustainable Development & Project Management”. Eid studied the integration of sustainable development in construction project management. Some conclusions from his study included:

- Project management is an efficient vehicle to introduce a more pro-found change, not only to the construction industry’s practice, but more importantly to the industry’s culture.
- Project management processes and knowledge fall short of committing to a sustainable approach.

- Mapping sustainable development onto project management processes and knowledge areas, identifies opportunities for introducing sustainability guidelines in to all project management processes.

Eid also identified a number of ‘leverage points’ where sustainable development can connect into project management. These leverage points include the contribution to business strategy, the business justification, the procurement strategy, the readiness for service and the benefits evaluation of a project. The leverage points cover the whole life cycle of the project.

It should be mentioned, that ‘help may be on its way’ with regards to the integration of the concepts of sustainability into project management standards. For example, in the PMI sponsored ‘SustPM’ research project, the focus is on integrating the concepts of sustainability specifically in project management processes and formats (Gareis et al., 2011). And also Silvius et al. (2012) provide insights, tools and instruments to consider sustainability in project management.

Taylor elaborated on his earlier appeal to the project management profession (Association for Project Management, 2006), by publishing ‘A Sustainability Checklist for Managers of Projects’ (Taylor, 2008). This checklist contains a list of suggested considerations for project managers, with which they can incorporate sustainability aspects in their projects. And although the checklist lacks a systematic approach to the concepts of sustainability. It is a meaningful attempt to translate the ‘abstract’ concepts of sustainability to the daily work of the project manager.

A more academic study into the operationalization of sustainability in projects was done by Iris Oehlman (Oehlman, 2011). She developed the so called ‘Sustainable Footprint Methodology’ to analyze and determine the relevant social, environmental and economical impacts of a project. This methodology confronts the life cycle of a project, consisting of three phases: project pre-phase, project execution and operation of the asset, with the three pillars of ‘the triple bottom line’: People, Planet and Profit. Each of the nine cells of the resulting framework is detailed in a set of sustainability indicators relevant to the respective sustainability perspective and the phase in the project life cycle.

#### Conclusion 4:

*The integration of sustainability may change the project management profession.*

The 2010 IPMA Expert Seminar ‘Survival and Sustainability as challenges for projects’, featured several papers and discussions on the integration of sustainability in projects and project management (Knöpfel, 2010). At this seminar, it was concluded that the influence of the project manager on the sustainability aspects of his or hers project at hand is substantial, regardless whether he/she actually bears responsibility for these aspects (Knöpfel, 2010). This conclusion may actually change the nature of the project management profession. From a managerial role aimed at realizing delegated tasks, it may need to develop into a more advisory role with autonomous professional responsibilities and aimed at the right organizational changes.

The studies summarized above illustrate the current state of knowledge on sustainability in projects and project management. The current state of research on sustainability in projects and

project management is mostly interpretive, giving meaning to how the concepts of sustainability could be interpreted in the context of projects, rather than prescriptive, prescribing how sustainability should be integrated into projects. Different authors pose different ideas and insights, containing many interesting suggestions about how project management should develop. However, most ideas and suggestions are of a rather conceptual nature and need elaboration to be of more practical value for the profession. The studies provide ideas and questions, rather than answers.

## 6. A Sustainability checklist for IS projects

As stated earlier, the integration of the concepts of sustainability in (IS) project management has only just begun (Gareis et al., 2009). The current state of research on sustainability in projects and project management is therefore mostly interpretive, giving meaning to how the concepts of sustainability could be interpreted in the context of projects, rather than prescriptive, prescribing how sustainability should be integrated into projects. The studies provide ingredients, but no clear recipe.

As a first step towards integrating sustainability IS projects, a group of project management and sustainability experts jointly developed a 'Sustainability Checklist'. This checklist was developed, following a focus group approach on an Expert Seminar of the International Project Management Association (Silvius in Knöpfel, 2010). Table 2 provides this Sustainability Checklist.

Elaboration on the interacting life cycle view posed by Labuschagne and Brent (2006), the indicators of this checklist should be considered on the level of the *project life-cycle* as well as the level of the *asset life-cycle* of the 'asset' or result the project realizes and the *product life-cycle* of the products the asset produces. This implies that Green IS projects should not just consider the sustainability aspects of the result of the project, being an information system with related organizational change, but also the sustainability aspects of the project realizing that result.

Applied to the process of delivering a Green IS project, the considerations of sustainability would impact:

### Project context

How does the project management perceive and consider the relevant project context? Is only the organizational context considered, or also the societal context? And how is this consideration translated to the project?

### Stakeholders

One of the logical aspects of the project in which a broader consideration of the project context may show is the identification of stakeholders. Typical 'sustainability stakeholders' may be environmental protection pressure groups, human rights groups and nongovernmental organizations..

### Project content

Typical for Green IS is the consideration of sustainability aspects in the definition of the intended result, deliverable, objective, conditions and success factors of the project.

<b>Economic Sustainability</b>	Return on Investment	<ul style="list-style-type: none"> <li>- Direct financial benefits</li> <li>- Net Present Value</li> </ul>
	Business Agility	<ul style="list-style-type: none"> <li>- Flexibility / Optionality in the project</li> <li>- Increased business flexibility</li> </ul>
<b>Environmental Sustainability</b>	Transport	<ul style="list-style-type: none"> <li>- Local procurement</li> <li>- Digital communication</li> <li>- Traveling</li> <li>- Transport</li> </ul>
	Energy	<ul style="list-style-type: none"> <li>- Energy used</li> <li>- Emission / CO2 from energy used</li> </ul>
	Waste	<ul style="list-style-type: none"> <li>- Recycling</li> <li>- Disposal</li> </ul>
	Materials and resources	<ul style="list-style-type: none"> <li>- Reusability</li> <li>- Incorporated energy</li> <li>- Waste</li> </ul>
<b>Social Sustainability</b>	Labor Practices and Decent Work	<ul style="list-style-type: none"> <li>- Employment</li> <li>- Labor / Management relations</li> <li>- Health and Safety</li> <li>- Training and Education</li> <li>- Organizational learning</li> <li>- Diversity and Equal opportunity</li> </ul>
	Human Rights	<ul style="list-style-type: none"> <li>- Non-discrimination</li> <li>- Freedom of association</li> <li>- Child labor</li> <li>- Forced and compulsory labor</li> </ul>
	Society and Customers	<ul style="list-style-type: none"> <li>- Community support</li> <li>- Public policy / Compliance</li> <li>- Customer health and safety</li> <li>- Products and services labeling</li> <li>- Market communication and Advertising</li> <li>- Customer privacy</li> </ul>
	Ethical behaviour	<ul style="list-style-type: none"> <li>- Investment and Procurement practices</li> <li>- Bribery and corruption</li> <li>- Anti-competition behavior</li> </ul>

**Table 2.** A checklist for integrating sustainability in IS projects and project management.

#### Business case

The influence of the considerations of sustainability on the project will logically also reflect in the project justification. The business case of the project may need to be expanded to include also non-financial factors that refer to for example social or environmental aspects.

#### Project success

Related to the project justification in the business case, it should be expected that the considerations of sustainability are also reflected in the definition or perception of success of the project.

#### Materials and procurement

Also the materials and equipment used in Green IS projects provide a logical opportunity for sustainability considerations. This connects Green IT to Green IS. However, next to the actual materials used, also the process of acquiring the materials should be considered. For example non-bribery and ethical behavior in the selection of suppliers.

#### Project reporting

Since the project progress reports logically follow the definition of scope, objective, critical success factors, business case, etc. from the project initiating and planning processes, also the project reporting processes will be influenced by the inclusion of sustainability aspects.

#### Risk management

With the inclusion of environmental and social aspects in the project's objective, scope and or conditions, logically also the assessment of potential risks will need to evolve.

#### Project team

Another area of impact of sustainability is the project organization and management of the project team. Especially the social aspects of sustainability, such as equal opportunity and personal development, can be put to practice in the management of the project team.

#### Organizational learning

A final area of impact of sustainability is the degree to which the organization learns from the project. Sustainability also suggests minimizing waste. Organizations should therefore learn from their projects in order to not 'waste' energy, resources and materials on their mistakes in projects.

## **7. Conclusion**

IS can make a contribution to the sustainable development of organizations. However, the sustainability effects from IS require changes in processes, organizations and procedures. This organizational change perspective is covered only marginally in the emerging literature on Green IS. Especially on the integration of the concepts of sustainability in projects and project management, as the often used organizational structure of managing change, literature is scarce. Industry standards, like the *PMBOK® Guide*, fail to recognize sustainability as a relevant perspective for projects and project management. The way projects are managed, measured and reported doesn't reflect the different aspects of sustainability that can be derived from the concepts of sustainable development.

Based on the studies and ideas on the integration of the concepts of sustainability in projects and project management, we developed a 'Sustainability Checklist' for IS projects. The criteria and

indicators of the checklist should be applied on the level of the IS project itself, its result (the system, process of change) and its effect (what is it that the process or system delivers). It is clear that still a lot of work has to be done on the implications of Sustainable Project Management and that there is a growing need of expertise, criteria and concepts to practically implement the concept in the management of projects. The consequences are not at all clear yet and may even be underestimated. The checklist we developed, however, provides a foundation for further development.

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