

Collaborating across Industry and Academia to support the Development of Sustainable ICT: The GoForIT initiative - Extended Abstract

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Abstract

ICT plays an important role in assuring both environmental, economic, individual, technical and social sustainability. While it is commonly known what sustainability is on a high level, and why we need to change our ways, it was realized at a joint academia-industry panel at the Norwegian ICT conference in November 2019 that ICT-professionals did not necessarily know how they should change their ways. This also applied at the time to academia: Lecturers and those responsible for study programs did not know what should be taught in the different subjects.

On this background GoForIT (Grønn omstilling for IT-bransjen) was established in February 2020 by a small group of companies and universities. It has since grown to a national network with around 10 universities, 35 IT organizations and 5 interest organizations.

The development and use of the Sustainability Competence Toolkit is one of the major undertakings of GoForIT to be important both for practice and education. The ambition of the authors is to solve the systemic problems for operational sustainability in the industry and the society at large, moving the knowledge development and application in parallel in industry and academia. Developing the toolkit can be looked upon as a type of action design research, given that the developers of the artifact is also some of the main users of this in their day-to-day activities.

To understand how to best serve our audience, a group of design professionals have through a service design process undertaken interviews with people in various target audiences in the workforce and academia. Given the importance of collaboration across academia and industry to fast achieve sustainable ICT solutions, we hope our ways of organizing such collaboration is interesting for the ICT4S community at large.

Keywords

Design principles for sustainable ICT, Sustainable software engineering, Challenges for an environmentally sustainable ICT industry, Systematic interdisciplinary efforts in ICT for sustainability,

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1. Introduction

Climate change and its consequences will provide enormous challenges to society over the next decades [4,9]. ICT plays an important role in assuring both environmental, technical, economic, individual, and social sustainability. The need for the ICT field to address sustainability has been acknowledged for some time in areas such as Information systems [13], HCI, and software engineering, exemplified in the Karlskrona manifesto [1]. The impact of information technology can be seen as both direct and indirect effects of the software and hardware [7]. Third-order effects are seen as long- and medium-term change in behavior and economic structures.

At the same time as ICT can be used to address sustainability issues, there are also issues with the sustainability of the ICT-systems in themselves [2, 6]. Today, processes for designing and evaluating software are based on direct functionality, cost and traditional business value, without sufficient focus on the wider societal and environmental impact of software, which is changing the way software is developed. A shift towards a focus on sustainable development constitute a major change in perspective.

For modern ICT-solutions, sustainability can be considered a key non-functional cross-cutting requirement. Becker and colleagues [2] have developed a model structuring the effects of software systems into five dimensions. Three of them are used in several sustainability models and originate in [3]: The economic (monetary), the environmental, and the social dimensions. To this, Becker and colleagues add the individual and the technical dimension.

GoForIT is a Norwegian initiative focusing on how to build knowledge and competence on sustainability among ICT professionals. It started in the spring of 2020 right before the outset of the pandemic, and currently has around 50 organizational members, including around half of the higher education organizations (universities and university colleges) and main ICT-solution providers in Norway.

Due to the urgency of the sustainability challenges, both academia and industry has realized that we need to align the methods and techniques used in practice and taught in higher education. Thus, an important ongoing task for GoForIT is the development of a toolbox with common resources in supporting both academy and practice, also acting as a bridge between these different organizations.

2. Development Approach

The development of the toolbox can be regarded as a type of action design research [12]. An artifact is being developed to be taken into use, where the researchers and practitioners involved in developing this is also representing important user groups. A service design method has been used, following a double diamond approach.

Development of a common vocabulary and other knowledge resources has been done in parallel with work on identifying the important roles/profiles for such a toolbox and their concrete needs and expectations, and other more concrete resources, for instance techniques to be used in requirements specification to take sustainability into account.

To understand how to best serve our broader user group, a group of design professionals have undertaken interviews with people starting with two of our target audiences in the workforce and academia: Chief Sustainability Officers in and those who design Programs of Study at the university. This resulted in an unpublished report in Norwegian in Autumn 2022 (the toolbox itself is in English since most work in the area has been published in English), and some of the conclusions of this is reported here. Currently other target audiences (profiles) such as system architects, leaders, project managers, lecturers, system designers and service designers are being interviewed during workshops, and needed knowledge resources, methods/tools and success cases to be part of the toolbox are being identified. Profiles were originally identified in a workshop in GoForIT held in November 2021.

When a need for a knowledge topic is identified (solution), a separate sub-group has worked on developing this iteratively. It is not meant to produce new techniques and frameworks, but to summarize state of the art when it comes to relevant techniques and tools to support the development of sustainable ICT systems and using ICT for developing sustainable solutions in other fields. When the workgroup is satisfied with the current version, a peer-review involving other people in GoForIT not being involved in the original work is performed. The peer reviewers come from both academia and practice, and they

are asked to provide input on comprehensibility (for the core users), aspects that is missing (completeness), or should be removed or changed (correctness), and if the report followed the overall structure (following an agreed template, i.e. have high syntactic quality).

Knowledge topics are related to profiles, marking if they represent core knowledge (a person identifying with the profile should be able to actively use the tool/technique that is described in the knowledge topic) or strengthening knowledge (the person having the profile should know about the area and know who in the organization is able to use the technique/tool in practice).

When using the material in the knowledge topic it is possible to add comments to it in the toolbox, and also requesting further material on the topic. It is also possible to add experiences from the use of different techniques and tools, thus extended the knowledge base with own experiences. More rigorous research on the effect of using different techniques is also being planned.

3. Discussion and Conclusion

GoForIT is a collaborative project between academia and industry, with the goal of aligning the necessary focus on the development of sustainability expertise in the ICT industry. A toolbox for sustainability is being developed, where results from the insight work described in this paper lays the foundation for a common understanding of what needs exist and what challenges the target group faces. The most important findings from the process so far are summarized below.

- Absence of a common conceptual framework: The UN Sustainable Development Goals have been the gateway to the topic for many, and the high-level terminology is well known in the organizations. There are many ideas about how the concept of sustainability should be operationalized, but there was no consensus on a common approach and definition. For many, the concept of sustainability is difficult to relate to, and is often described as comprehensive and vague. At the same time, it is a danger that one simplifies the concept of sustainability too much, which means that the situation is perceived as unclear, characterized by debates about the way forward. The insight thus highlight the issue with lack of common terminology, which is one of the areas we are trying to address.
- Lack of collective competence development: The various players need to get a better understanding of sustainability issues more rapidly than today. The knowledge development that is being done today is based on sporadic measures and individual initiatives, which is no longer sufficient to reach the necessary pace of development we need.
- Sustainability work requires organizational anchoring: Enthusiasts and sustainability ambassadors have largely paved the way forward until now. To succeed with further investment, there is a need for stronger anchoring in the organization.
- More need for collaboration and sharing: There is too little connection between political guidelines, market demand and work being done in research and education. A common understanding and a holistic approach are lacking. Expectations must be communicated so that business and academia can deliver on each other's long-awaited requests and needs.

GoForIT started right before the pandemic and has been grown under a pandemic when it was not possible to meet physically. Given that it has from the beginning needed to be able to work in a distributed fashion using collaboration tools, it has brought enthusiast together across academia and industry, supporting a collaboration pattern across competitors that is not often witnessed, since it is a common understanding that there is a need to raise the competence level in the whole business area much more rapidly than we usually see to reach the goals of sustainability.

In this paper, we have presented early results from this work, in particular tapping into the work a group of design professionals have done as part of a service design process undertaken interviews with people in various target audiences in the workforce and academia.

The poster will further describe the result of the service design effort so far, including early result of the application of the collected resources on the toolbox within the network, both in academia and industry. Currently other target audiences (profiles) such as system architects, leaders, project managers, lecturers, system designers and service designers are being interview during workshops, and

needed knowledge resources, methods/tools and success cases to be part of the toolbox are being identified. A design effort of the physical toolbox is also being done, to replace the current MVP.

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