



TOOLBOX

Implementing Social Robots - LOVOT as case

ABSTRACT

This article explores the background for a toolbox for implementing Social Robots in a care-setting environment. What special - and more generic - tools are needed when you try to implement a new technology – such as Social Robots?

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Contents

Abstract	2
LOVOT	2
Methodology.....	2
Methodological framework and literature	2
The five domains and how they were addressed.	3
Characteristics of the individuals.....	3
Knowledge and beliefs.....	3
Self-efficacy.....	4
Structure of the toolbox.....	4
Characteristics of the intervention	5
Quick evaluation guide.....	5
Outer setting.....	6
Effect studies: Do the LOVOTS create value?	6
Communication materials.....	6
Inner setting.....	7
Infectious stories, education/guidance, and a personal twist	7
Process	8
Conclusion	9
Literature	10

Toolbox – implementing Social Robots

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Abstract

This article explores the background for a toolbox for implementing Social Robots in a care-setting environment. What special - and more generic - tools are needed when you try to implement a new technology – such as Social Robots?

The article builds on experiences from a test of the Social Robot LOVOT at three danish nursing homes. In supplement to the article, the authors have created a toolbox with a range of tools, that can be downloaded at the website: <https://lovottoolbox.mystrikingly.com>. The toolbox is also created in physical form.



LOVOT

The Social Robots LOVOT is a 45 cm high and 3 kg heavy robot that can move around freely. It is developed to mimic a pet. It will seek human contact and it will respond positively when you speak to it, wanting to be cuddled. LOVOT will develop its personality and “language” in response to how you interact with it.

Its basic function is to love you – unconditionally. It is originally developed as a consumer product for the Japanese market.

In a Danish setting the robot was tested at three nursing homes. The goal was to create a positive environment for people with dementia.

The core collaborators in the project included:

- University of Aalborg, Laboratory for Welfaretechnology
- Viborg Municipality
- Aalborg Municipality
- Skive Municipality
- Test- and Development Center for Welfaretech

The project was financed by the Ministry of Health in Denmark

Methodology

The mission of the toolbox was to find out what tools you need when implementing Social Robots in at health care setting.

The initial step was to do an exploratory study involving several observational studies, and semi-structured interviews with frontline workers and managers at the three nursing homes in question.

The focus was to:

1. Find out how to structure a useful toolbox, which addresses the specific needs among staff.
2. Identify what kind of tools would be useful for future implementation of Social Robots.
3. Develop the relevant tools for ease-of-use.

During the development, the toolbox was validated over two consecutive workshops, which included representatives from the nursing homes, the University of Aalborg and the municipalities.

Methodological framework and literature

Implementation is a science and a craft. The scientific and more popular literature is full of models and strategies that can be employed when a certain solution, a new set of thoughts, a new product or the likes, are to be implemented into daily practice.

One of the most proliferate and evidence-based methodologies from the health care sector is CFIR or “A consolidated Framework for advancing implementation Science” (Damschroder et. al. 2009). Damschroder et. al point to five major domains, that you need to observe when you implement new solutions – especially within health- and social care:

- Characteristics of the individuals involved.
- Intervention characteristics.
- Outer setting.
- Inner setting.
- The process of implementation.

Bendix et. al (Bendix et.al) builds on the work of Damschroder. They explore how implementation works on a case-by-case basis. Most cases are taken from the Danish and international health care sector, but cases from education and the social sector are also considered. They describe a comprehensive implementation model and provide ideas for tools, that can be employed when disseminating or implementing good solutions.

The insights from both CFIR and Bendix et.al provide the framework and the starting point for our quest to develop the toolbox.

The five domains and how they were addressed.

Below we will explore the five domains identified in the CFIR model. Under each domain we will describe what tools and strategies that have been developed to address the challenges which the frontline workers experienced.

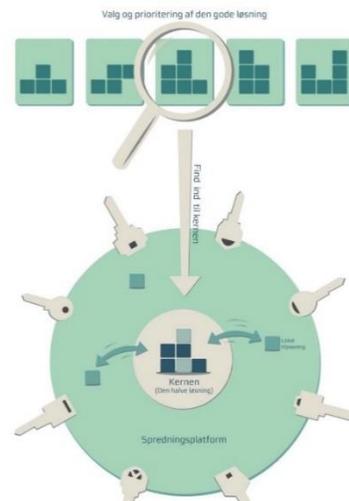


Figure 1: Implementation model: Bendix et al.

Characteristics of the individuals

When implementing new solutions such as Social Robots, it is important to take the individuals in the organization into account (Damschroder 2009): What is their knowledge and beliefs about the intervention? Do they have belief in their own capabilities to execute and engage (self-efficacy)? What is their motivation, their intellectual ability, values, competencies and learning styles?

These basic questions were our starting point:

“A toolbox needs to address and be meaningful to its intended users.”

Knowledge and beliefs

Social Robots are a novel and not necessarily widely accepted tool among employees in the care sector. Rightly most employees, and relatives, are of the belief that the best possible care is provided by humans and not robots.

In this view Social Robots are a poor solution to a more fundamental problem, which is lack of resources. At the same time employees are somewhat afraid that the robots will take away some of the most cherished parts of the job, that of engaging with and caring for other people.

A toolbox for implementing Social Robots must take this fundamental reservation into account. For this reason, the very foundation of the toolbox is, that:

LOVOT is NOT a substitute for human interaction, but rather a supplement.

Consequently, all tools without exception must have this as a given.

Luckily during discussions one frontline staff quoted:

“We as caregivers can do so much... but when I see, that the LOVOT can create this amount of engagement and happiness amongst my seniors, I become happy. The LOVOT can do something I cannot do. It is not a substitute, but a great tool.”

Self-efficacy

During our discussions and observations, we had a long interview with a manager of a nursing home. Her main point was that the employees who are implementing and engaging with the LOVOTs are skilled care givers. But many have low skills in reading and technological understanding. Very often Danish is their second language and English perhaps their third.

In addition to this, they are people of action – not reaction. The solution should therefore be fast and easy to use, and each component must be actionable.

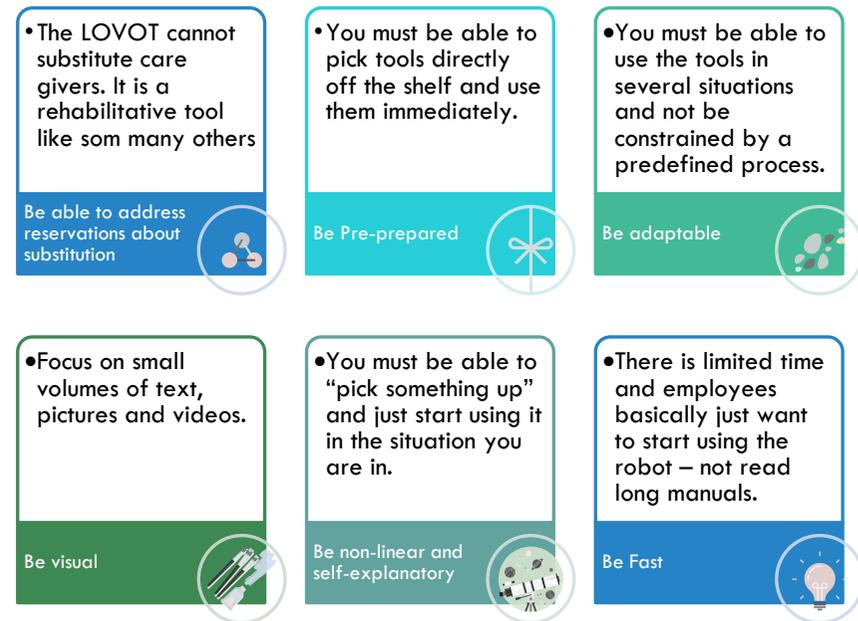
These insights led us towards answering our first question stated above:

“Find out how to structure a useful toolbox, that addresses the specific needs among staff”

Structure of the toolbox

We came up with the following directions related to the structure.

Figure 2: Requirements of the toolbox - based on the traits of our audience



These requirements resulted in a realization, that the toolbox must be created as both a physical and a digital toolbox. *It must be immediately available, tangible – and “ready out of the box”.*

The fact, that the toolbox must be visual and pre-prepared also led to the realization, that the *toolbox in question cannot be a generic toolbox that relates to all Social Robots*. It must be “LOVOT branded” for it to make immediate sense to the front-line staff.

The intention is then, that the toolbox can be used as an inspiration when we in the future will implement other kinds of Social Robots.

As a result, we created:

- A. A small suitcase, that LOVOT can bring with him/her when they move in at a nursing-home. In this suitcase we packed all the developed tools (described below).
- B. A digital version. It can be found at: <https://lovottoolbox.mystrikingly.com/>

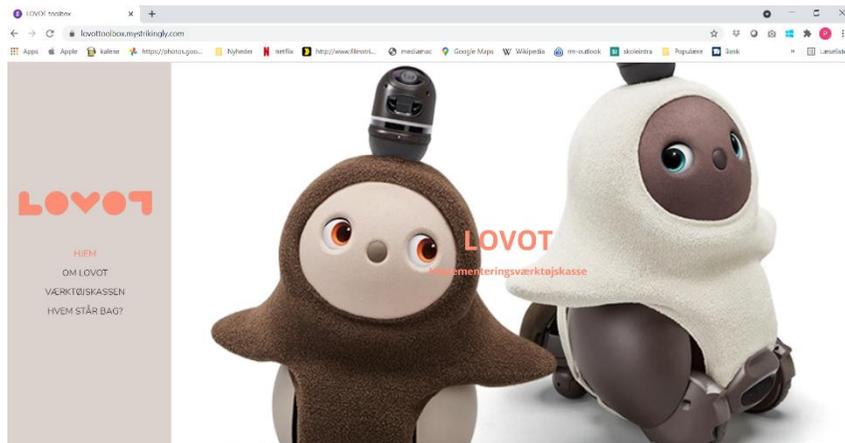


Figure 3: LOVOT Toolbox webpage

Characteristics of the intervention

One of the most predominant traits of a successful implementation is, that it requires adaptation: No matter how great and how well executed a solution might be it needs to be adapted to the organization in question. If there is a poor fit, there will be animosity and resistance.

Creating fit requires that you are able to “Identify the core of the solution” (Bendix et. al.) or as Blase and Fixsen talks about: “create an adaptable periphery”. (Blase, K. & Fixsen, D.)

By implementing a Social Robot, the solution as such is not adaptable at all. The robot can do what it is programmed to do and that is it.

Therefore, the process of identifying the core or creating an adaptable periphery was tricky.

Quick evaluation guide.

To address this issue, we introduced the “quick evaluation guide” inspired by the PDSA circle (Deming). The guide is created by Duvald et. al (Duvald et. al.). It is a general framework created for the health-care sector, that can be used when trying out new ideas. Here the employees at the nursing homes can use the tool when they engage with the robots and when the robots are used in a new situation.

The key to the tool is, that before trying a new intervention with the robot you consider the expected advantages and disadvantages of the

Evalueringsskema	
Patient:	
Handling:	
Forventede fordele:	Forventede ulemper:
Uventede fordele:	Uventede ulemper:
Hvad skal vi gøre fremadrettet?	

Figure 4: Quick evaluation guide

intervention.

You then carry out the intervention and reflect:

- Were my expectations correct?
- Did unexpected advantages/disadvantages occur?

You then start over again with a new intervention inspired by the reflections from the first action.

The tool provides the possibility to adapt the LOVOT to the environment and the needs of the seniors and care takers, whilst project managers can stay vigilant of possibilities and dead ends. In this way you create an “adaptable periphery” by being open to where the solution fits and you can then identify the core of the solution.

Outer setting

The outer setting of an organization is primarily comprised of the demands of higher-level entities, expectations of peers and external stakeholders (Damschroder et. al) – in this case relatives to the citizens at the care homes. The gold standard here is related to the needs of the seniors.

To create a positive environment for implementing the Social Robots you must ensure:

- Dedication and focus from the management.
- Accept and dedication from main external stakeholders – this involves relatives and peers.
- That the solution at hand is effective and provides positive results to the citizens.

It is hard to create a positive environment for implementation as a tool in a toolbox. We therefore needed to change the focus somewhat and create tools to help the organization gain understanding and accept from management and external partners.

Effect studies: Do the LOVOTS create value?

Documentation is one of the most effective ways of gaining respect and providing continued external respect and accept of what you are doing (Bendix et. al). Proving that the solution is effective was the objective of the main project partner Aalborg University Laboratory for Welfare Technology.

The university has carried out extensive effect studies of the LOVOTs at the three nursing homes. The studies are published as scientific articles in peer reviewed journals. This documentation is an integral part of the toolbox. By pointing to hard evidence, both external and internal

pressures can be curtailed. This will again help push the implementation process forward.

Communication materials

Apart from hard evidence the staff needed easy-to-use visual tools, which can help communicate externally, what exactly the Social Robots are there for.

Creating this kind of communication is time consuming and requires special skills. Employees at nursing home have very little time and very few have the required skills and/or equipment to implement a professional communications strategy (see above: “Be fast”, “Be visual”, “Be pre-prepared”).

One of the main requirements from the employees at the nursing homes was therefore to have easy access to materials related to the LOVOTS that look good and is easy to use in different situations (“Be adaptable”).



The solution was to develop:

Folders with basic and easy-to-understand information about the LOVOT and how they are used at the nursing homes. These folders can be printed and distributed to colleagues, new seniors and relatives.

Posters (A1 and A3) that can be printed and hung around the nursing home. The title says “LOVOT works here”. This is to underline the fact, that the social robots are not toys. They are tools used as part of the rehabilitative care.

A powerpoint template, that can be used by project managers when communicating the LOVOT project and



Social Robots as tools for rehabilitation. This ppt. includes basic findings from the scientific reports as well.

Inner setting

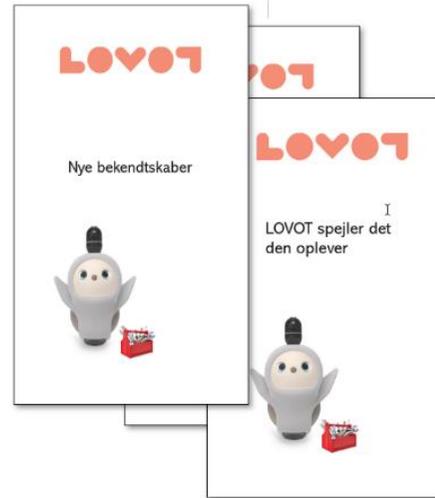
The inner workings of the organization in question are paramount to the success of implementation. Aspects such as degree of specialization, culture, stability (low turnover of employees) strong/weak networks and general climate related to new solutions are central to a successful implementation (Damschroder et. al.).

These issues are out of the reach of a physical toolbox such as the one in question here. But when we listened to the project managers at the nursing homes, one of their main takes related to implementation was to use the LOVOTs main asset: Cuteness and the fact that both seniors and staff react immediately and positively to the robot.

Telling stories, showing videos, letting other employees experience the robots firsthand, was the most effective way to win over critics and create engagement. This is a way to improve the implementation climate of the inner setting.

Bendix et. al address three points, that are paramount to implementation:

- “People moving people” – the fact, that personal relations and engagement is infectious.
- “Infectious stories” – real life success stories and experiences create engagement.
- “Guidance/education” – easy “how-to” and knowing what to do.



This and the insights related to “visuals”, “adaptability”, “non-linearity” and “fast” was the starting point of a discussion with our collaborators at the nursing homes.

Infectious stories, education/guidance, and a personal twist

The result was the following tools

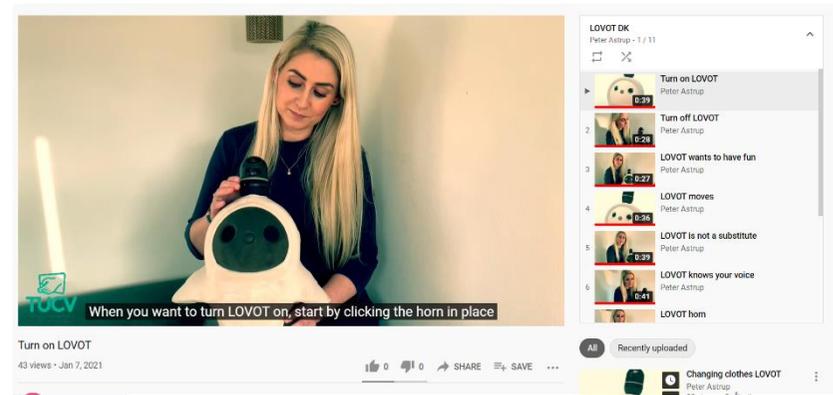
Cards

We developed a deck of cards (43 in all) which addresses aspects of the above-mentioned points:

- Convey small stories/tips and tricks based on stories from the project managers.
- Convey the basic functionalities of the LOVOT (simple manual)
- Provide ideas for implementation that project managers can use in their efforts.

The idea of a deck of cards – as opposed to a manual – is, that you will be able to flick through the deck at random and identify whatever tool, story or idea that speaks to you: Adaptability and Non-linearity.

An example of a tool: We learned, that at one nursing home the employees had set-up a closed group on at social media site where they

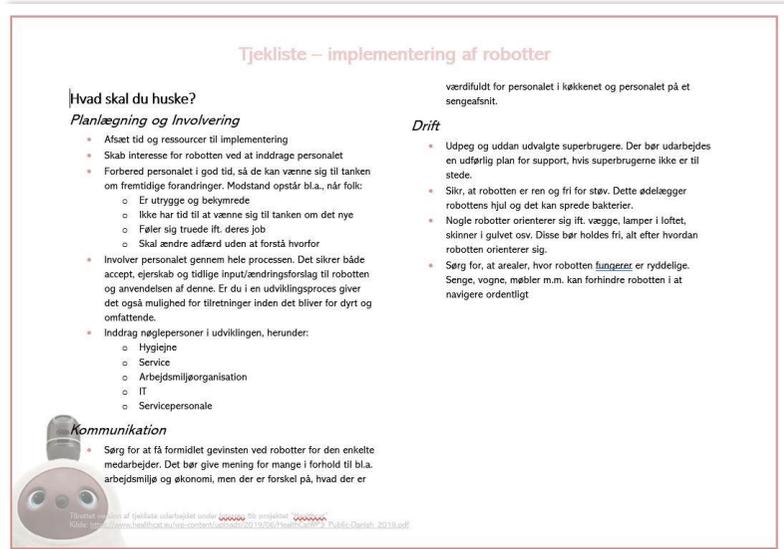


were able to upload small videos of how robots,

Figure 3: Cards

employees and seniors engage. Another nursing home used their existing documentation system and had created “LOVOTs journal” where ideas, tips and tricks etc. was disseminated. This way of disseminating, and spreading the word is included as a tool in the deck of cards.

In a very real way this way of working is “people moving people”



“infectious stories” and education being created in the moment and shared to peers and staff at the nursing home.

How-to videos

As visuals and video are important ways of communicating with audience at the nursing homes one of our key requirements to the toolbox was “Be visual”.

As stated, above videos had already become an integral part on how the project managers worked with implementation. We decided to develop videos where basic functions and reflections on the use of LOVOT was explored.

Figure 4: Youtube tutorials

The 11 videos are basic 1-minute videos with no citizen interaction due to GDPR regulations. The videos are intended for use during implementation and as a way of telling stories without comprising the individual citizens integrity.

The videos also function as a way of channeling the “cuteness” of the LOVOTS to the recipients (internally and externally) and an easy way of giving new employees a quick and easy understanding of the social robots (education/guidance). The videos are freely available on a dedicated Youtube channel: www.tinyurl.com/2ut77y fz.

Process

It is hard to remember and take care of all aspects in an implementation process. Especially when the technology at hand is novel – such as the social robots.

For this reason, we further developed a simple checklist from the Interreg 5b project “Healthcat” (Healthcat 2019). This project has been working with implementation of more functional robots (logistics etc.) in the healthcare sector. The checklist covers areas already covered by the toolbox:

- Communication
- Involvement
- Evaluation
- Basic care (also described in the cards and videos)

Some other areas, that we have not been able to “toolify” are also covered by the checklist. This involves remembering, that Social Robots are highly technical and complicated works of engineering. This will inevitably result in breakdowns and a need to make sure that the robot can function in the local environment.

Figure 5: Checklist

The list also covers what you as a project manager can expect from the reseller or producer of the robot:

- Usability

- Support/Service
- Safety

The check list can function as a way of ensuring that all areas are covered. The project manager will then be able to bring the needed tools into play when needed.

Conclusion

Implementation is a key point when new solutions are introduced. Aspects such as careful planning, engaging with the frontline staff, executing the implementation according to plan, evaluating and reflecting, are important aspects in all implementation processes.

Because of the individual traits and characteristics of the staff who will oversee implementation of Social Robots at nursing homes we did not develop and draw an exhaustive method for implementation. Such a model is very likely to never come into play.

Instead, we have provided the above-described tools, that will help the people on the ground to be able to execute and cover the most basic requirements of an implementation. This article spells out the model behind the tools.

The tools developed are:

- A physical “toolbox” containing all the below described tools. All tools are in physical form and on a USB drive. The physical toolbox can “move in” with the LOVOTs
- A digital version of the toolbox that can be accessed via a webpage. Here all tools are free to download (<https://lovottoolbox.mystrikingly.com/>)
- The tool developed are:
 - A *Quick evaluation guide*, which will help ensure, that the LOVOTs are put into use at the nursing homes where they create an impact in the specific local environment/culture.
 - A *folder*, that clearly communicates to new colleagues and relatives what the LOVOT is and what it does.

- *Posters*, that can be hung around the nursing homes. They will provide information about the LOVOT and clearly state, that “LOVOT works here”.
- A *Powerpoint* that can be used when project managers introduce the LOVOT to employees, peers and external partners. Links to videos and scientific results are integrated in this document.
- A *deck of cards* that can be used as; a mini manual, as a way to learn tips and tricks about the LOVOT and as an implementation tool for the project managers.
- *Videos* that provide information on the basic functionalities of the LOVOT and give food for thought in relation to daily use
- A *checklist* for project managers: What is important to remember when implementing Social Robots?
- An *article* that gives a meta-view of why the above-mentioned tools have been devised. The article also provides an overall framework for how Social Robots can be implemented at nursing homes.

Litterature

Bendix et. Al., 2015: "Spredning af Velfærdsløsninger = merværdi", Gyldendal

Blase, K. & Fixsen, D.: "Core intervention components: Identifying and operationalizing what makes programs work", ADPE Research Brief, February

Damschroder et. al., 2009: "Fostering implementation of health services research findings into practice: A Consolidated Framework for Advancing Implementation Science", Implementation Science, no. 4: s 50 ff.

Deming, W.E., 1986: "Out of the crisis", MIT Center for Advanced Engineering study

Duvald et. al., 2015: "Prøvehandling – en let innovationsmetode", Gyldendal

HealthCat: <https://www.healthcat.eu/da/>