

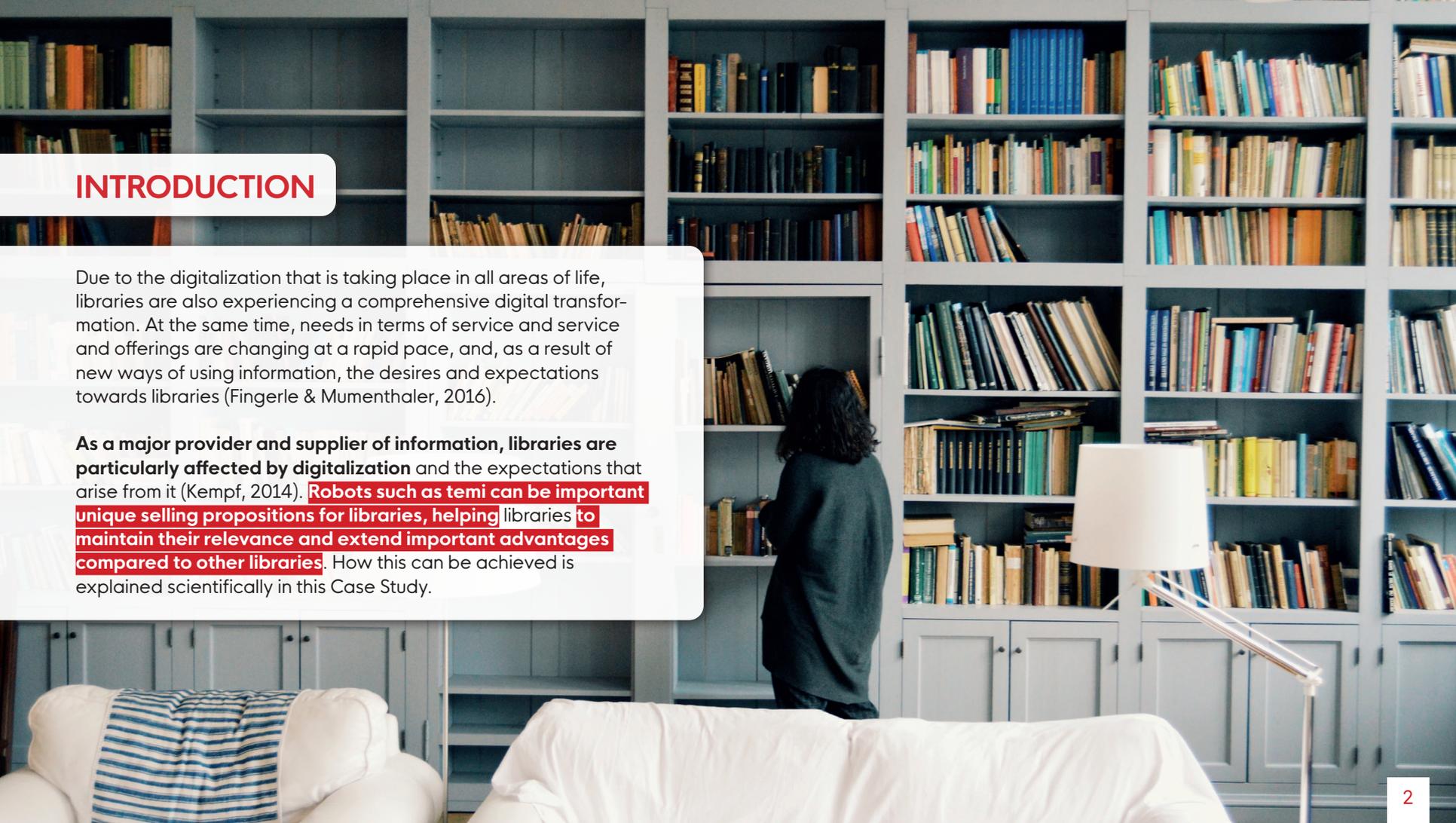
TEMI IN THE CENTRAL LIBRARY DÜSSELDORF

Scientific Case Study



Landeshauptstadt Düsseldorf
Stadtbüchereien





INTRODUCTION

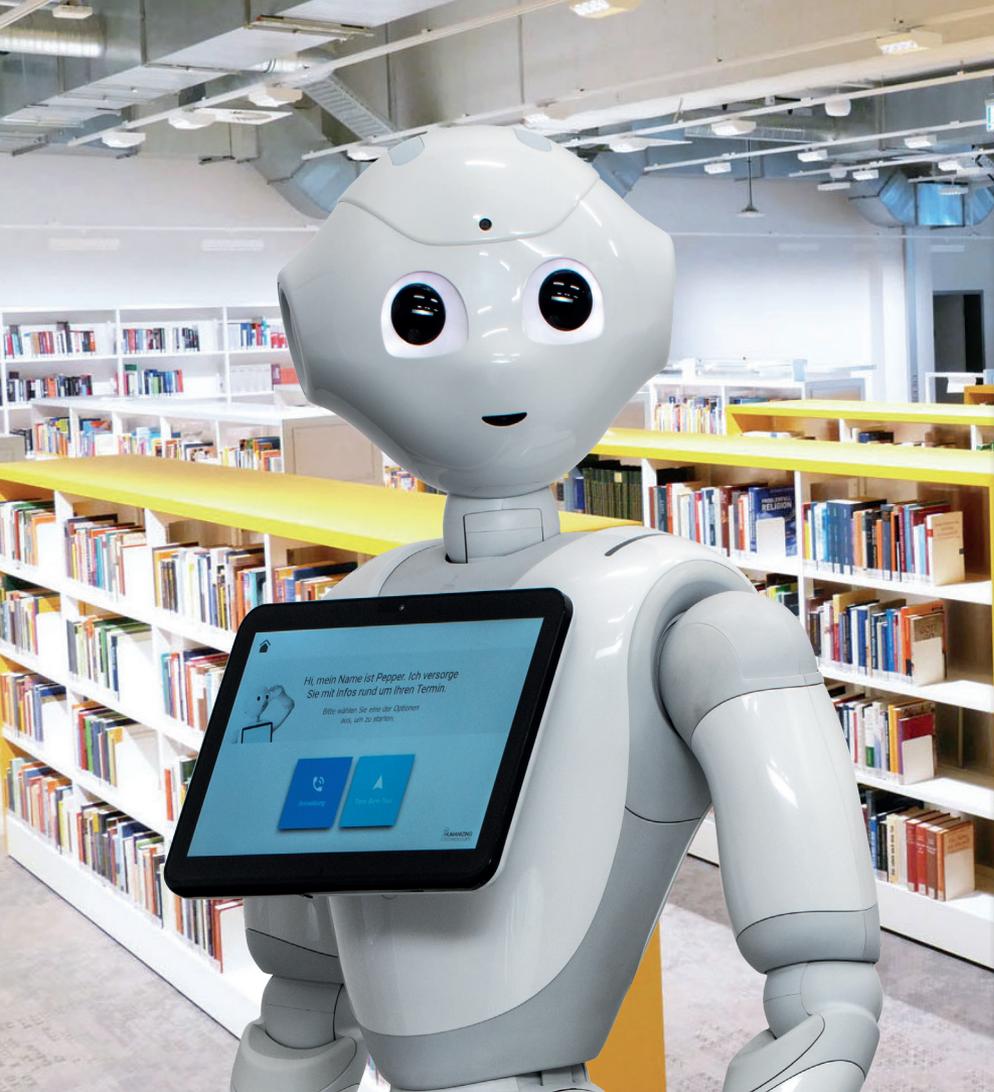
Due to the digitalization that is taking place in all areas of life, libraries are also experiencing a comprehensive digital transformation. At the same time, needs in terms of service and service and offerings are changing at a rapid pace, and, as a result of new ways of using information, the desires and expectations towards libraries (Fingerle & Mumenthaler, 2016).

As a major provider and supplier of information, libraries are particularly affected by digitalization and the expectations that arise from it (Kempf, 2014). Robots such as temi can be important unique selling propositions for libraries, helping libraries to maintain their relevance and extend important advantages compared to other libraries. How this can be achieved is explained scientifically in this Case Study.

ABOUT THE CENTRAL LIBRARY DÜSSELDORF

The Central Library Düsseldorf has been using innovative digital concepts for several years and has already successfully innovations such as VR, 3D printing and robotics. Due to the motto „Rethinking Libraries!“ **there is innovative technology and equipment to explore and try out** in the so-called LibraryLab (Landeshauptstadt Düsseldorf, 2021). **This way, the digital expectations and requirements towards libraries are met.**

The LibraryLab serves as a place of origin for ideas for the future and offers a space for experimentation and the testing of innovative concepts (Meissner, 2017). The Ministry for Culture and Science of the state of North Rhine-Westphalia promotes and supports the Düsseldorf approach financially (Landeshauptstadt Düsseldorf, 2021)



As part of the LibraryLab concept, the Central Library Düsseldorf acquired the humanoid robot Pepper in 2019, called Pixi in the library. Its main tasks there are to **greet customers, provide them with basic information and, above all, to provide enjoyment and entertainment** (Brembach, 2019).

In this way, the Central Library Düsseldorf is making a significant contribution to fundamentally turning the dusty image of libraries around and go together with the „customers the way into the future“ (Landeshauptstadt Düsseldorf, 2021).

Complementing the successful use of Pixi, another service robot should be implemented and tested in the context of the LibraryLab of the Central Library Düsseldorf. In the context temi was selected and implemented. **temi fulfilled the following tasks in the Central Library Düsseldorf:**

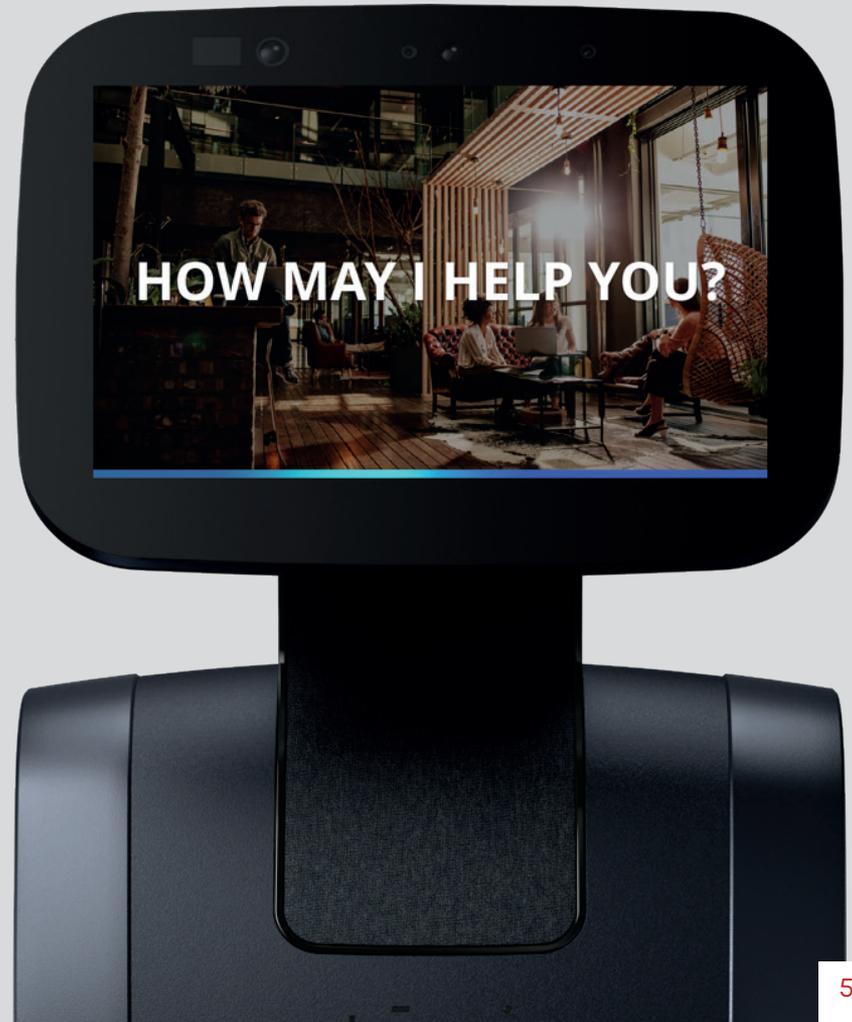
- **Welcome and greet library visitors**
- **provide orientation and navigate to desired locations in the library**
- **navigate to desired locations in the library**
- **Provide further information on locations and subject areas**
- **Promote content and activities**
- **Answer general questions**
- **Ask for feedback**

THE ROBOT TEMI

temi is a service robot developed by the company temi, which is used as a **navigation and orientation aid**. The robot is equipped with various sensors and cameras, which enable a **smooth and flawless navigation in buildings, rooms, and dynamic environments**. Visual and acoustic content can be displayed via the integrated screen (Humanizing Technologies, 2021).

CAPABILITIES

temi drives around at a moderate walking speed and detects both fixed and moving obstacles. For example, if a person crosses the robot's path just a few centimeters away, the robot recognizes this, stops immediately and takes evasive action. Even during navigation thanks to voice recognition and via the screen, it can respond to touch and voice commands (Humanizing Technologies, 2021). Thus, it can be sent to certain to specific locations in a room with a simple command. In addition, temi can be connected to smart home devices, can access online content, and has video communication capabilities. Via the temi app, the robot can be connected to a smartphone, enabling calls and video communication on temi. Other apps can also be loaded onto the robot such as interactive games, educational content, apps, and more (temi, 2021).

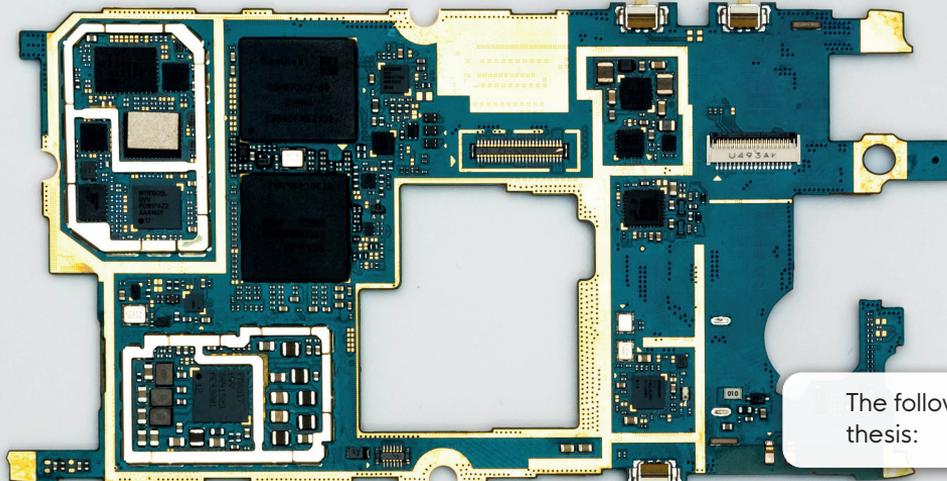


THE SOFTWARE

The **Robot Management System (RMS)** is a **customizable online software**, developed by Humanizing Technologies, which **can be used to manage various types of robots and to provide them with content. All software functions can be used purely intuitively, without any prior knowledge or programming knowledge.** It is possible to combine visual and linguistic contents to individual projects.

Like creating a PowerPoint presentation, so-called slideshows can be designed, containing text, images and videos. Furthermore, via the dialog function, sentences and and multilingual content can be created, which enables the robot to answer questions, give compliments and ask questions in turn. When the robot's Proactive Mode is activated, the robot proactively addresses the customer, initiates an interaction and actively offers its assistance (Humanizing Technologies GmbH, 2021).

The **RMS can be flexibly configured matching the respective Use Case** of the robot and **can be expanded by additional functions** such as the entertainment package, face and mask recognition and service call functions. The robot fleet management integrated in the software provides an overview and overview and management of all robots in use. In this way, a wide range of content, functions and projects can be spread to many different robots by just one click. For this it is not necessary to be near the robot. For example, the content can be adapted and uploaded to the robot remotely from the home office. (Humanizing Technologies, 2021).



RESEARCH QUESTION

The following research question formed the core of the bachelor thesis:

What benefits does the use of a service robot have for public institutions, such as the Central Library Düsseldorf, with special consideration of the factors acceptance and concerns?

In a practice-oriented empirical study, the question and use of the temi robot were evaluated. In addition, extensive knowledge of the current state of research and results of other studies were included.

DATA COLLECTION METHOD

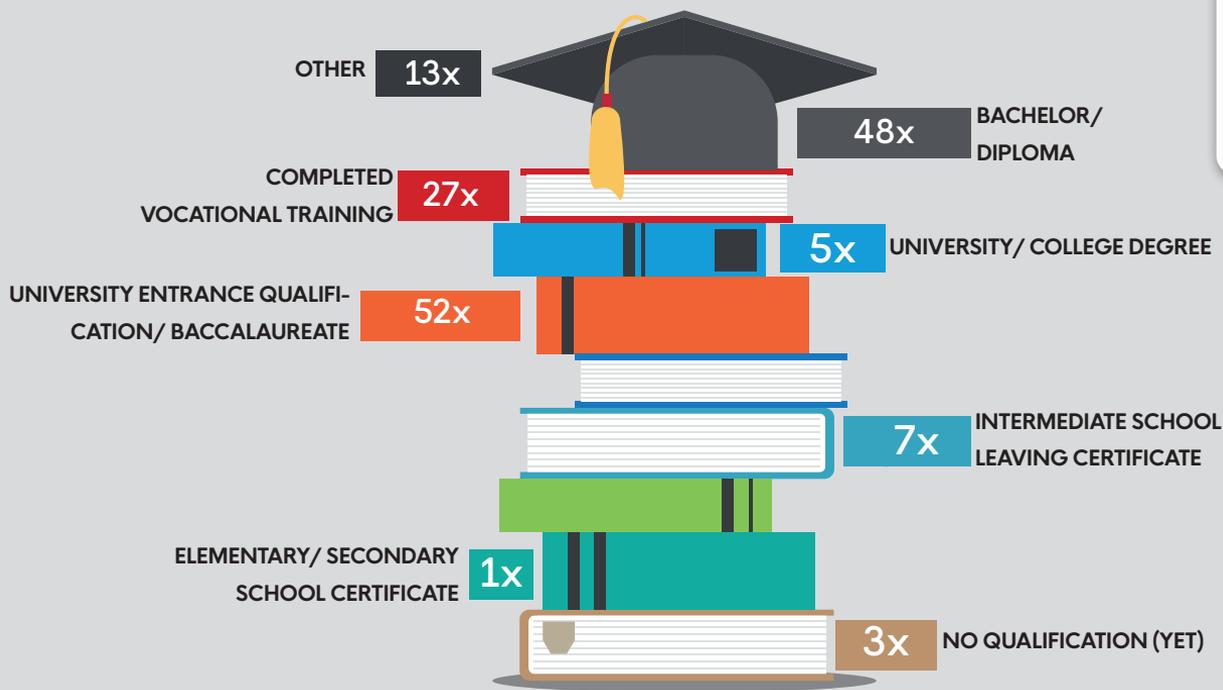
To investigate the research question and hypotheses, a questionnaire was created that consisted of two sub-questionnaires. One part was submitted to those participants who were able to test the robot and the application scenario on site at the Central Library Düsseldorf. The other part was given to the participants who took part in the survey online and were shown a video of the robot and the application scenario in the survey. No already existing questionnaires were included, all components of the questionnaire were non-validated parts based on own contribution.



THE PARTICIPANTS

Of the 158 total participants, 45 were men, 111 were women, and 2 indicated „diverse.“ The age range was from 16 to 84 years, with a mean of 30.52 years and a standard deviation of 12.493 years.

Information on the highest level of education attained:



There were two missing values.

Information on current employment:

- Pupil: 9
- Student: 73
- Employed or self-employed: 69
- Jobseeker or unemployed: 4
- Retired: 1

RESULTS

The participants were able to specify which functions and tasks temi should perform in a library. The following categories were named most frequently:

13x

provide orientation and navigation

12x

Transport media/ put away/ lending and return functions

3x

Database connection (e.g. online catalog)

8x

providing general information

33x

Speed, efficiency and reliability

4x

answer FAQs



CONCLUSION

The use of temi in the Central Library Düsseldorf showed important factors and results that contribute decisively to social acceptance. **By using robots like temi, libraries can maintain their relevance** and survive in the competitive situation of the information and media market (Kempf, 2014). **Service robots can be essential unique selling points** for service providers and **serve libraries to expand important advantages** (Schraft & Volz, 1996).

The underlying approach to the use of robots should always be that they are used **as assistance systems**. They cannot and will not replace people and accordingly do not take away jobs. As a supportive tool, robots offer **enormous potential to support and significantly relieve people**. If this symbiosis-like approach is pursued and communicated transparently, the emergence of robot acceptance can be nurtured and the use of robotics can be integrated into the society in the best possible way.



ABOUT HUMANIZING

Bringing ‚humanity into robotics‘ and ‚people into technologies‘ is the central focus of Humanizing Technologies. The company develops software for robot integrators of public life robots and is actively shaping the market of current and future technologies. Suitable for international partners sell the software and offer consulting services for the software and offer consulting services for the market development of and with robots.

Humanizing Technologies was founded in 2016 and is one of the world’s most valued providers of non-industrial robots and robot software. Distributed over 3 locations in Germany and Austria, it offers customer-oriented, sustainable and authentic, offering both ready-to-use and customized solutions (Humanizing Technologies GmbH, 2021).



NOTE

In case of existing interest in the entire bachelor thesis, you are welcome to send an inquiry to contact@humanizing.com. We will be happy to provide you with the original document.



CONTACT

Humanizing Technologies GmbH
Aachener Str. 23, 50674 Köln
Phone: +49 221 / 71 59 75 75
E-Mail: contact@humanizing.com
Website: www.humanizing.com

LITERATURE

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