

# Culturally Sensitive Social Robotics for Africa Check-In Meeting

15 December 2023



David Vernon  
**Carnegie Mellon University Africa**  
[www.vernon.eu](http://www.vernon.eu)

## Questions

1. What progress has been made so far by each partner?
2. What are the current challenges or obstacles you are facing?
3. What specific types of support or assistance are required to address these challenges and make further progress?
4. Any other business

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## The CSSR4Africa Consortium

**Carnegie Mellon University Africa**

Carnegie Mellon  
University Africa  
David Vernon



**University of the  
Witwatersrand**  
Benjamin Rosman  
Pravesh Ranchod





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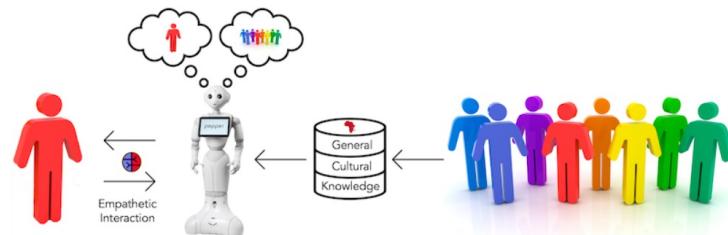
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[cssr4africa.org](http://cssr4africa.org)

## The CSSR4Africa Project

While technological invention creates new ways of doing things, it is *innovation* that produces social and economic benefits through widespread *adoption* and the consequent change in the people's practices. Adoption depends on physical infrastructure, but it also depends on social infrastructure: the conventions that govern people's behaviour, the practices they find acceptable and unacceptable, and their sense of what is trustworthy. Cultural competence, i.e., an awareness of social norms and cultural expectations, is a key element in fostering this acceptance.

The need for technology to be culturally competent is perhaps best exemplified by the field of social robotics, a field that is growing quickly.<sup>1</sup> Social robots serve people in a variety of ways: they operate in everyday environments, often in open spaces such as hospitals, exhibition centres, and airports, providing assistance to people, typically in the form of advice, guidance, or information.



Loosely based on ethnographic research to acquire cultural knowledge about acceptable modes of communication, the CSSR4Africa project will equip robots with the ability to interact sensitively and politely with people in Africa using spatial, non-verbal, and verbal modes of communication.

<sup>1</sup>The global social robotics market was valued at \$1.98 billion in 2020 and is expected to reach \$11.24 billion by 2026 ([Global Social Robots Market 2022 – 2027](#)).

Figure based on (Bruno et al., 2017); see [Overview](#).

CSSR4Africa

This project is funded by the African Engineering and Technology Network (Afratec) Inclusive Digital Transformation Research Grant Programme.

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## Work Plan

The project work plan is available [here](#).

The statement of work (SoW) is available [here](#).

The effort estimates by task are available [here](#).

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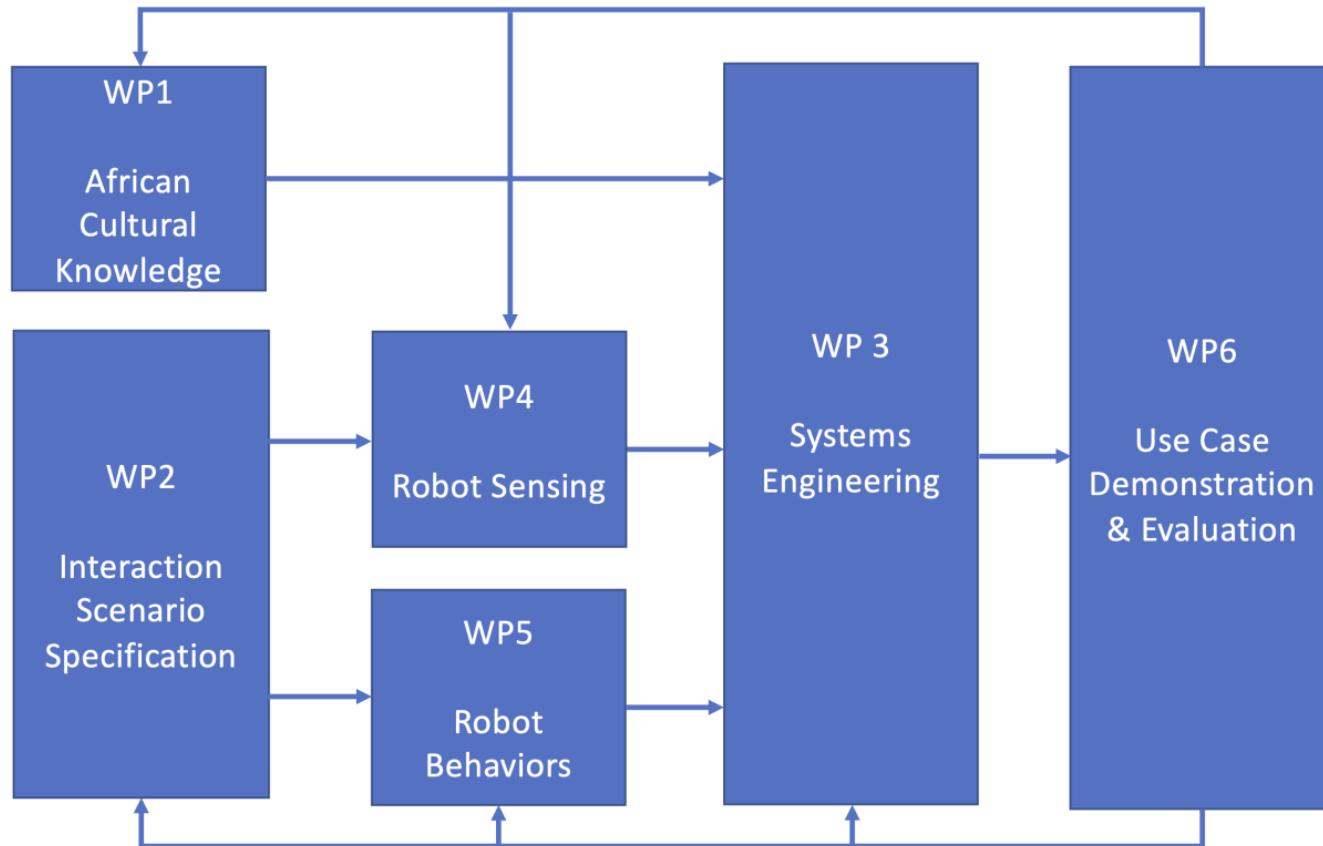
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## Work Plan

Version 2.11  
December 14, 2023

Start date of project: **01/07/2023**  
Duration: **36 months**  
Partner organisations: **Carnegie Mellon University Africa**  
**The University of the Witwatersrand**

**Project funded by the African Engineering and Technology Network (Afratec)**  
**Inclusive Digital Transformation Research Grant Programme**



## 2.4 Work Package Descriptions

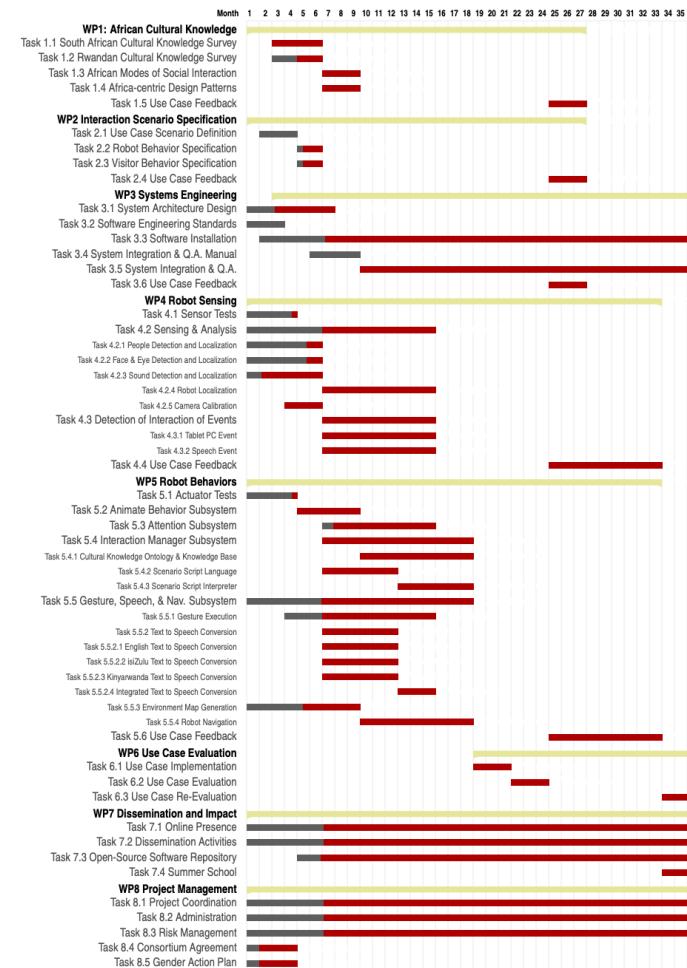


Figure 2: Gantt diagram showing the tasks in each work packages

## **WP1: African Cultural Knowledge**

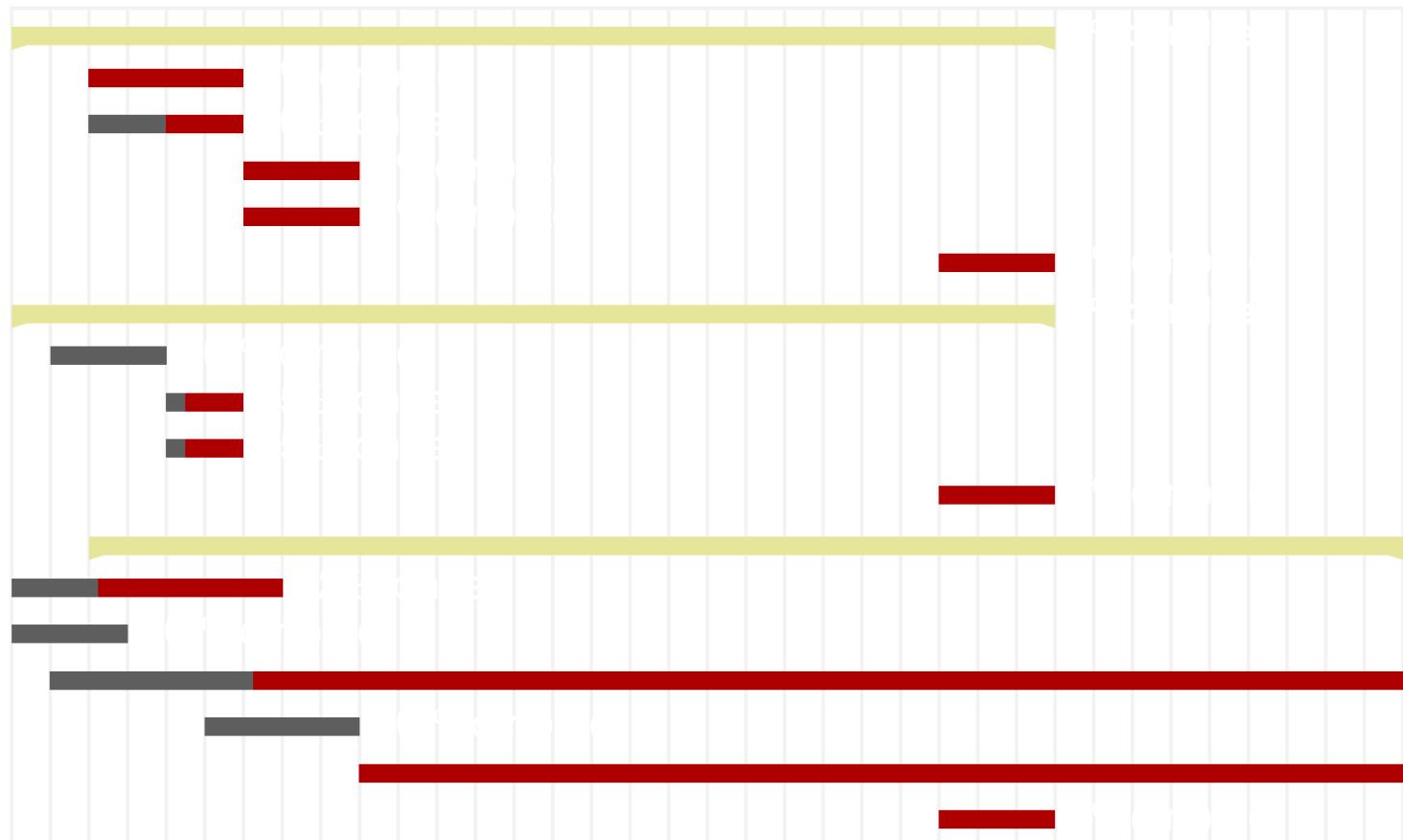
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- Task 1.2 Rwandan Cultural Knowledge Survey
- Task 1.3 African Modes of Social Interaction
- Task 1.4 Africa-centric Design Patterns
- Task 1.5 Use Case Feedback

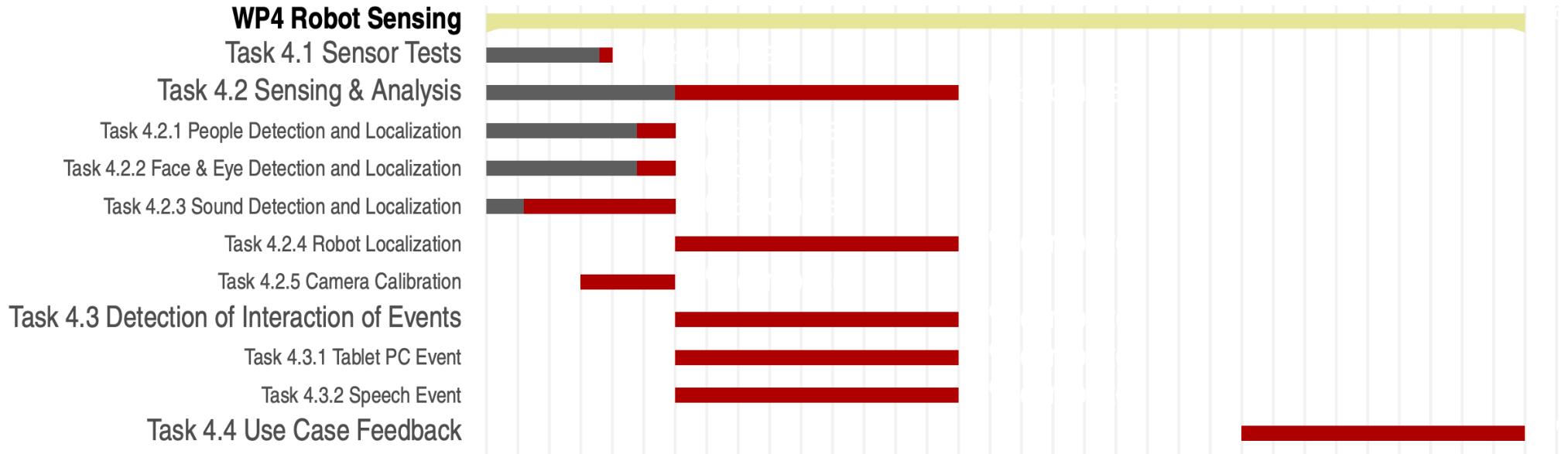
## **WP2 Interaction Scenario Specification**

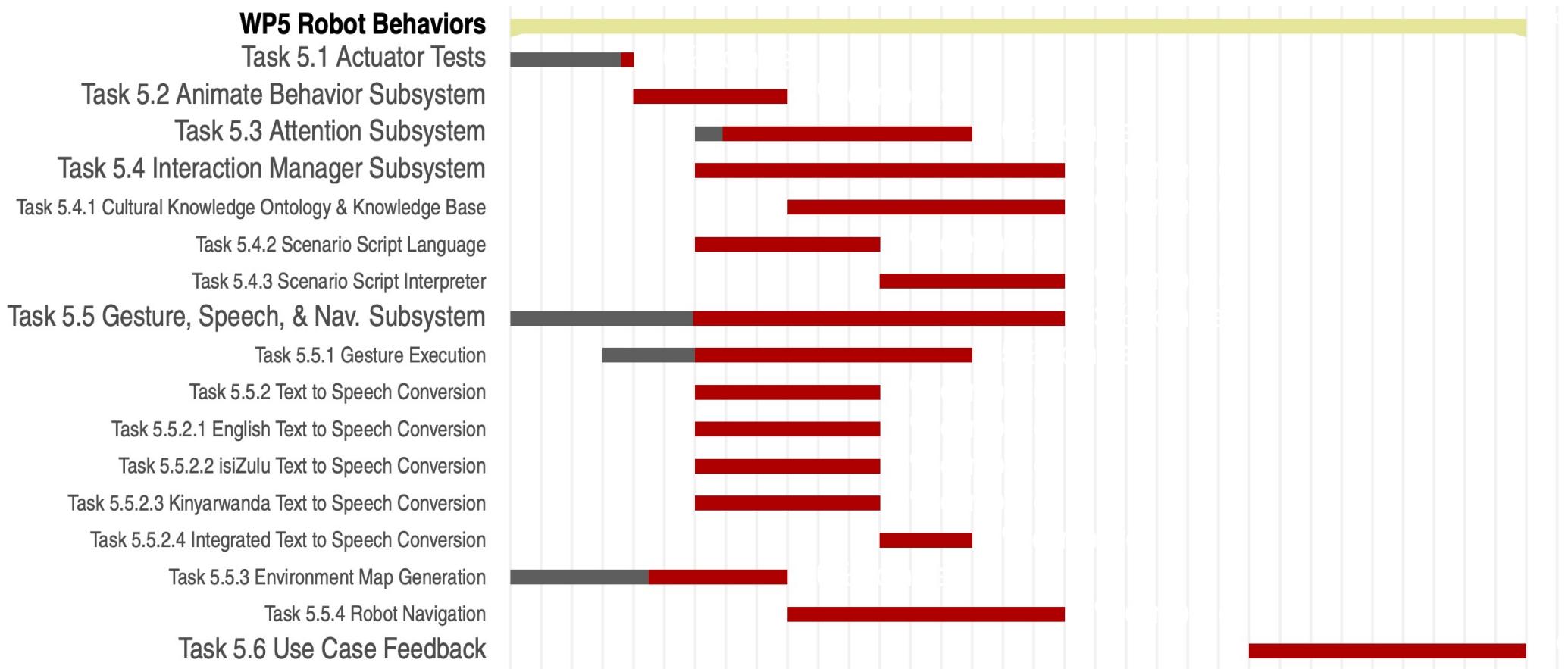
- Task 2.1 Use Case Scenario Definition
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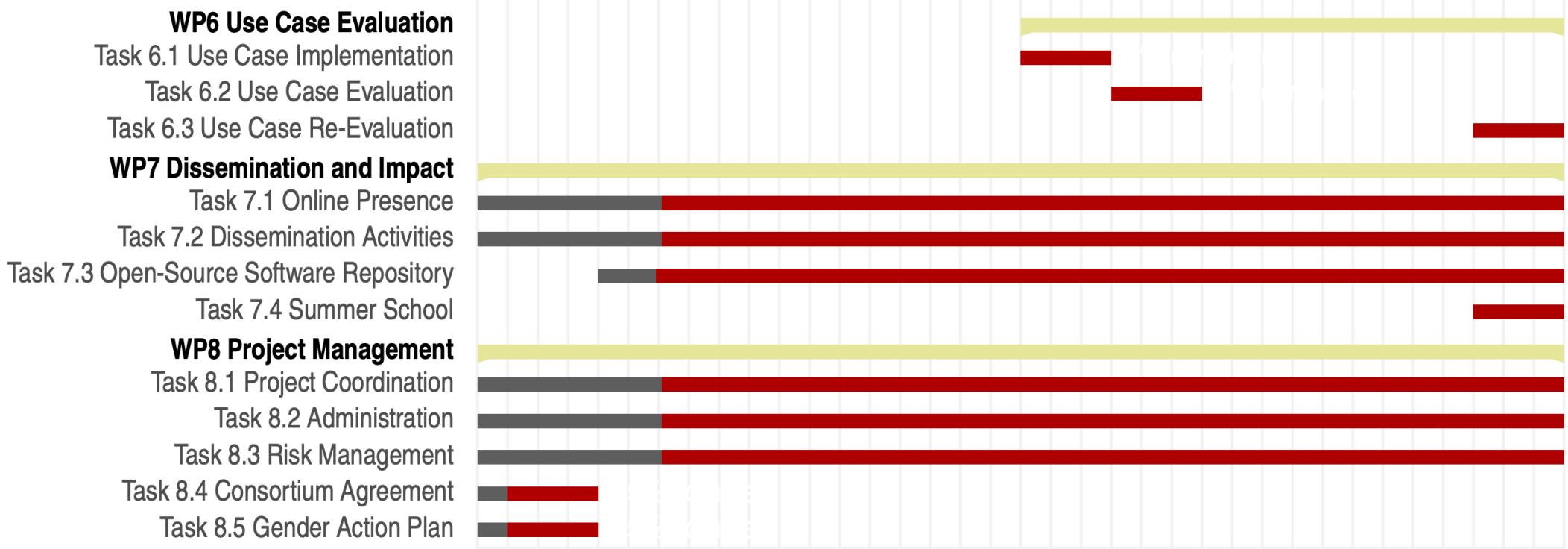
## **WP3 Systems Engineering**

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## Deliverables

No.	Title	Lead	Due Date (Period 1)	Submission Date
D1.1	South African Cultural Knowledge, version 1	Wits	31/12/2023	
D1.1	South African Cultural Knowledge, version 2	Wits	31/09/2025	
D1.2	<a href="#">Rwandan Cultural Knowledge, version 1</a>	CMU-Africa	31/12/2023	25/10/2023
D1.2	Rwandan Cultural Knowledge, version 2	CMU-Africa	30/09/2025	
D1.3	African Modes of Social Interaction, version 1	Wits	31/03/2024	
D1.3	African Modes of Social Interaction, version 2	Wits	30/09/2025	
D1.4	Africa-centric Design Patterns, version 1	Wits	31/03/2024	
D1.4	Africa-centric Design Patterns, version 2	Wits	30/09/2025	
D1.5	Updates to Deliverables D1.1, D1.2, and D1.3	Wits	30/09/2025	
D2.1	<a href="#">Use Case Scenario Definition, version 1</a>	CMU-Africa	31/10/2023	07/11/2023
D2.1	Use Case Scenario Definition, version 2	CMU-Africa	30/09/2025	
D2.2	Robot Behavior Specification, version 1	CMU-Africa	31/12/2023	
D2.2	Robot Behavior Specification version 2	CMU-Africa	30/09/2025	
D2.3	Visitor Behavior Specification, version 1	CMU-Africa	31/12/2023	
D2.3	Visitor Behavior Specification, version 2	CMU-Africa	30/09/2025	
D2.4	Use Case Updates	Wits	30/09/2025	
D3.1	System Architecture Design, version 1	CMU-Africa	31/01/2024	
D3.1	System Architecture Design, version 2	CMU-Africa	31/12/2025	
D3.2	<a href="#">Software Engineering Standards Manual</a>	CMU-Africa	30/09/2023	26/10/2023
D3.3	<a href="#">Software Installation Manual</a>	CMU-Africa	31/12/2023	07/09/2023
D3.4	<a href="#">System Integration and Quality Assurance Manual</a>	CMU-Africa	31/03/2024	01/11/2023
D3.5	System Integration and Quality Assurance	CMU-Africa	30/06/2024	
D3.5	Use Case Feedback	CMU-Africa	30/09/2025	
D4.1	Sensor Tests	CMU-Africa	31/10/2023	
D4.2.1	Person Detection and Localization	CMU-Africa	31/12/2023	
D4.2.2	Face and Eye Detection and Localization	CMU-Africa	31/12/2023	
D4.2.3	Sound Detection and Localization	CMU-Africa	31/12/2023	
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**D1.2 Rwandan Cultural Knowledge**

Due date: **31/12/2023**  
Submission Date: **1/12/2023**

Start date of project: **01/07/2023**

Duration: **36 months**

Lead organisation for this deliverable: **Carnegie Mellon University Africa**

Responsible Person: **D. Vernon**

Revision: **1.4**

<b>Project funded by the African Engineering and Technology Network (Afretec) Inclusive Digital Transformation Research Grant Programme</b>		
<b>Dissemination Level</b>		
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Date: 1/12/2023  
Version: No 1.4

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# Workshop on Culturally Sensitive Social Robotics for All

Abu Dhabi 2023  
**iCAR**

21st International Conference on Advanced Robotics

Abu Dhabi, UAE  
5th December  
2:00 pm - 6:00 pm

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[Motivation](#) | [Operation](#) | [Agenda](#) | [Dissemination](#) | [Organizer](#) |

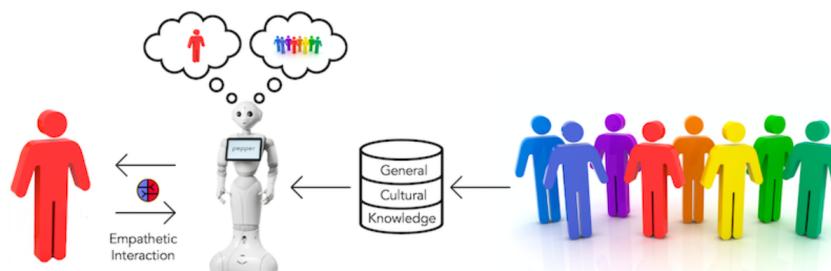
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## Motivation

Robotics has potential to drive economic growth, accelerate development, deliver education, support healthcare, and increase food production, among many other things. However, technological invention in robotics is not enough because it is innovation, not just invention, that produces social and economic benefits through widespread **adoption** and the consequent change in the people's practices. Adoption depends on the conventions that govern people's behaviour, the practices they find acceptable and unacceptable, and their sense of what is trustworthy. **Cultural competence**, i.e., an awareness of social norms and cultural expectations, is a key element in fostering this acceptance. This is especially important in the fast-growing field of social robotics.<sup>1</sup>

While there are studies on cultural differences in the acceptance of robots in the West and East, similar studies of the cultural factors that impact of acceptance in the Middle East and the Global South are few and far between. Of the fifty studies included in a survey by Lim et al. (2021),<sup>2</sup> only six focus on the MENA region and none target sub-Saharan Africa. Furthermore, only a very small fraction of the participants in these studies are from the MENA region and less than one percent are from sub-Saharan Africa.

**The goal of this workshop is to gather cultural knowledge of interaction in the Middle East and North Africa (MENA) and sub-Saharan Africa so that we can equip social robots with the ability to interact sensitively and politely<sup>3</sup> with people in those regions using spatial, non-verbal, and verbal modes of communication.<sup>4</sup>**



## Agenda

Time	Activity
2:00 pm - 2:10 pm	Welcome and introduction to the goals of the workshop
2:10 pm - 2:40 pm	Raquel Ros, PAL Robotics: <i>The challenges of social robotics and understanding user needs</i>
2:40 pm - 3:10 pm	Barbara Bruno, Karlsruhe Institute of Technology: <i>The nature of cultural competence in human-robot interaction</i>
3:10 pm - 3:30 pm	David Vernon, Carnegie Mellon University Africa: <i>The importance of cultural competence for diversity, equity, and inclusion</i>
3:30 pm - 4:00 pm	Coffee break
4:00 pm - 4:15 pm	The CSSR4All survey: walkthrough of the questionnaire
4:15 pm - 4:45 pm	Completing the CSSR4All online survey
4:45 pm - 5:15 pm	Review of the results of the survey
5:15 pm - 5:45 pm	Open discussion and consensus building
5:45 pm - 6:00 pm	Next steps
6:00 pm	Close and farewell

# Cultural Knowledge Survey

dvernon@andrew.cmu.edu [Switch accounts](#)



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## Workshop on Culturally Sensitive Social Robotics for All



21st International Conference on Advanced Robotics

Abu Dhabi, UAE  
5th December  
2:00 pm - 6:00 pm

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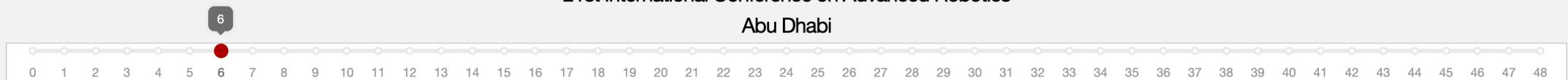
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## Workshop on Culturally Sensitive Social Robotics for All

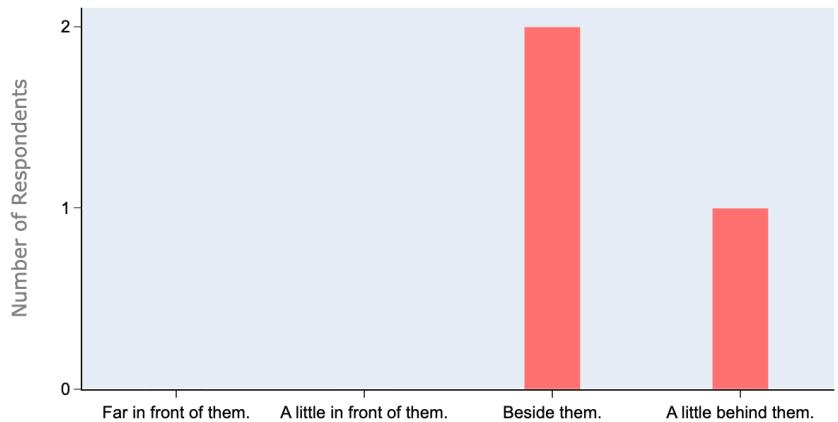
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When showing someone younger than you the way, where should you position yourself?



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## Culturally Sensitive Social Robotics for Africa



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### D2.1 Use Case Scenario Definition

Due date: **31/10/2023**  
Submission Date: **07/11/2023**

Start date of project: **01/07/2023**

Duration: **36 months**

Lead organisation for this deliverable: **Carnegie Mellon University Africa**

Responsible Person: **D. Vernon**

Revision: **1.1**

Project funded by the African Engineering and Technology Network (Afretec) Inclusive Digital Transformation Research Grant Programme		
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Date: 7/11/2023  
Version: No 1.1

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## D3.2 Software Engineering Standards Manual

Due date: **30/09/2023**  
Submission Date: **28/11/2023**

Start date of project: **01/07/2023**

Duration: **36 months**

Lead organisation for this deliverable: **Carnegie Mellon University Africa**

Responsible Person: **D. Vernon**

Revision: **1.4**

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## D3.3 Software Installation Manual

Due date: 1/10/2023  
Submission Date: 07/09/2023

Start date of project: 01/07/2023

Duration: 36 months

Lead organisation for this deliverable: Carnegie Mellon University Africa

Responsible Person: CSSR4Africa Team

Revision: 1.3

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Date: 07/09/2023  
Version: No 1.3

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**D3.4 System Integration and Quality Assurance Manual**

Due date: **31/03/2024**  
Submission Date: **01/11/2023**

Start date of project: **01/07/2023**

Duration: **36 months**

Lead organisation for this deliverable: **Carnegie Mellon University Africa**

Responsible Person: **D. Vernon**

Revision: **1.0**

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## Software

Software developed by the CSSR4Africa consortium for the Pepper robot can be accessed by cloning the [CSSR4Africa repository on GitHub](#).

Instructions on how to install the software can be found in [Deliverable D3.3](#).

Since the project has just begun, the software comprises only a few rudimentary diagnostic routines at present.

This project is funded by the [African Engineering and Technology Network \(Afretec\)](#) Inclusive Digital Transformation Research Grant Programme.

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## News

### 27 November 2023

Workshop update: There is a new format for the workshop on Culturally Sensitive Social Robotics for All ([CSSR4All](#)) at the 21st International Conference on Advanced Robotics, [ICAR 2023](#), Abu Dhabi, UAE, 5th December, 2 pm - 6 pm. We have two great invited speakers: [Barbara Bruno](#), Karlsruhe Institute of Technology, Germany, and [Raquel Ros](#), PAL Robotics, Spain.

### 20 November 2023

The second draft of Deliverable D1.2 Rwandan Cultural Knowledge is now available [here](#). Please refer to the document history for a list of the changes.

### 16 November 2023

A new version the CSSR4Africa work plan is available [here](#). This version, v. 2.8, updates Deliverable D4.1 Sensor Tests to remove the need for either a driver or a stub.

### 7 November 2023

The first draft of Deliverable D2.1 Use Case Scenario Definition (version 1.0) is now available [here](#).

### 1 November 2023

A new draft of Deliverable D3.2 Software Engineering Standards Manual (version 1.3) is now available [here](#). This version has some important changes to Appendices A and B which contain the mandatory standards (see Document History on p. 39).

Deliverable D3.4 System Integration and Quality Assurance Manual is now available [here](#).

### 27 October 2023

The [deliverables](#) page on the website now lists all deliverables due over the course of the project.

A new version the CSSR4Africa work plan is available [here](#). This version, v. 2.7, updates Deliverable D5.1 Actuator Tests to use an average angular

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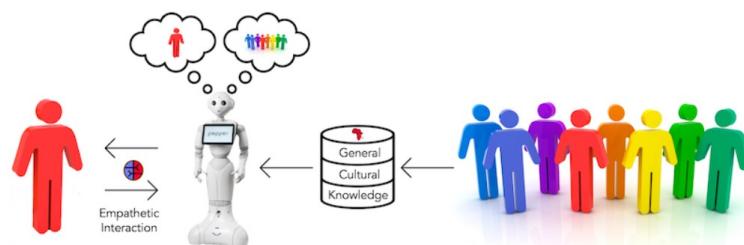
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## The CSSR4Africa Project

While technological invention creates new ways of doing things, it is *innovation* that produces social and economic benefits through widespread *adoption* and the consequent change in the people's practices. Adoption depends on physical infrastructure, but it also depends on social infrastructure: the conventions that govern people's behaviour, the practices they find acceptable and unacceptable, and their sense of what is trustworthy. Cultural competence, i.e., an awareness of social norms and cultural expectations, is a key element in fostering this acceptance.

The need for technology to be culturally competent is perhaps best exemplified by the field of social robotics, a field that is growing quickly.<sup>1</sup> Social robots serve people in a variety of ways: they operate in everyday environments, often in open spaces such as hospitals, exhibition centres, and airports, providing assistance to people, typically in the form of advice, guidance, or information.



Loosely based on ethnographic research to acquire cultural knowledge about acceptable modes of communication, the CSSR4Africa project will equip robots with the ability to interact sensitively and politely with people in Africa using spatial, non-verbal, and verbal modes of communication.

<sup>1</sup>The global social robotics market was valued at \$1.98 billion in 2020 and is expected to reach \$11.24 billion by 2026 ([Global Social Robots Market 2022 – 2027](#)).

This project is funded by the [African Engineering and Technology Network \(Afretec\)](#) Inclusive Digital Transformation Research Grant Programme.

Figure based on (Bruno et al., 2017); see [Overview](#).

# CSSR4Africa Wiki

cssr4africa edited this page on Oct 26 · 2 revisions

Welcome to the wiki for the Culturally Sensitive Social Robotics for Africa (CSSR4Africa) project, funded by the [African Engineering and Technology Network \(Afretec\)](#) Inclusive Digital Transformation Research Grant Programme.

The wiki is primarily a forum for exchanging information among the partners in the project consortium. The majority of the material available here is concerned with the effective operation of the project. Information of interest to others can be found on the [CSSR4Africa website](#).

Software developed by the CSSR4Africa consortium for the Pepper robot can be accessed by cloning the [CSSR4Africa repository on GitHub](#). Instructions on how to install the software can be found in [Deliverable D3.3](#). Since the project has just begun, the software comprises a suite of routines to verify the all of the actuators can be controlled using ROS and that all the sensor data can be accessed using ROS.

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# Project Meetings

cssr4africa edited this page on Aug 1 · 1 revision

**20 July 2023**

The CSSR4Africa presentation at the Afretec Inclusive Digital Transformation Research Grants kick-off meeting is available [here](#).

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# References

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# Resources

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## Graphics

Here are the various graphics used in documents, the wiki, and the website.

[CSSR4Africa logo red](#)

[CSSR4Africa logo grey](#)

[CSSR4Africa logo black](#)

[Wits Centenary logo](#)

[CMU-Africa logo](#)

[CSSR Scenario high resolution](#)

[CSSR Scenario low resolution](#)

[CSSR Scenario \(no map of Africa\) high resolution](#)

[CSSR Scenario \(no map of Africa\) low resolution](#)

[CSSR System Architecture](#)

[Pepper](#)

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# Templates

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## Templates

The template for deliverables (both LaTeX and Word) is available [here](#).

The template for periodic progress reports (in Word) is available [here](#).

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# CSSR for Africa

Culturally Sensitive Social Robotics for Africa

Overview

Consortium

Contact

Work Plan

Deliverables

Software

News

Wiki

Publications

## The CSSR4Africa Consortium

**Carnegie Mellon University Africa**

**Carnegie Mellon University Africa**  
David Vernon



**University of the Witwatersrand**  
Benjamin Rosman  
Pravesh Ranchod



- Weekly meetings
- Quality assurance of website and deliverables
- Liaison with sociologist regarding ethnographic survey
- Ordering Pepper robot
- No other direct contribution yet due to
  1. Late start
  2. Unavailability of students to work on tasks

## Questions

1. What progress has been made so far by each partner?
2. What are the current challenges or obstacles you are facing?
3. What specific types of support or assistance are required to address these challenges and make further progress?
4. Any other business

# Current Challenges or Obstacles

- RA Productivity
  - Difficult for students to be productive as RAs during the semester
  - Some graduate RAs not productive (health issues)
- CMU-Africa overspending on RAs
  - About to begin using start-up funds
- Pepper died in June
  - Major disruption
  - New Pepper arrived end of October
- Delays with ROS control of Pepper
  - Controller conflicts

Carnegie Mellon University Africa

## Questions

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# Culturally Sensitive Social Robotics for Africa Check-In Meeting

15 December 2023



David Vernon  
**Carnegie Mellon University Africa**  
[www.vernon.eu](http://www.vernon.eu)