




SCRIPT

# SCRIPT PROJECT STROKE REHAB @HOME

Day 1- Track 2  
08:30-10:30

SCRIPT CONSORTIUM  
12 Mar, 2014

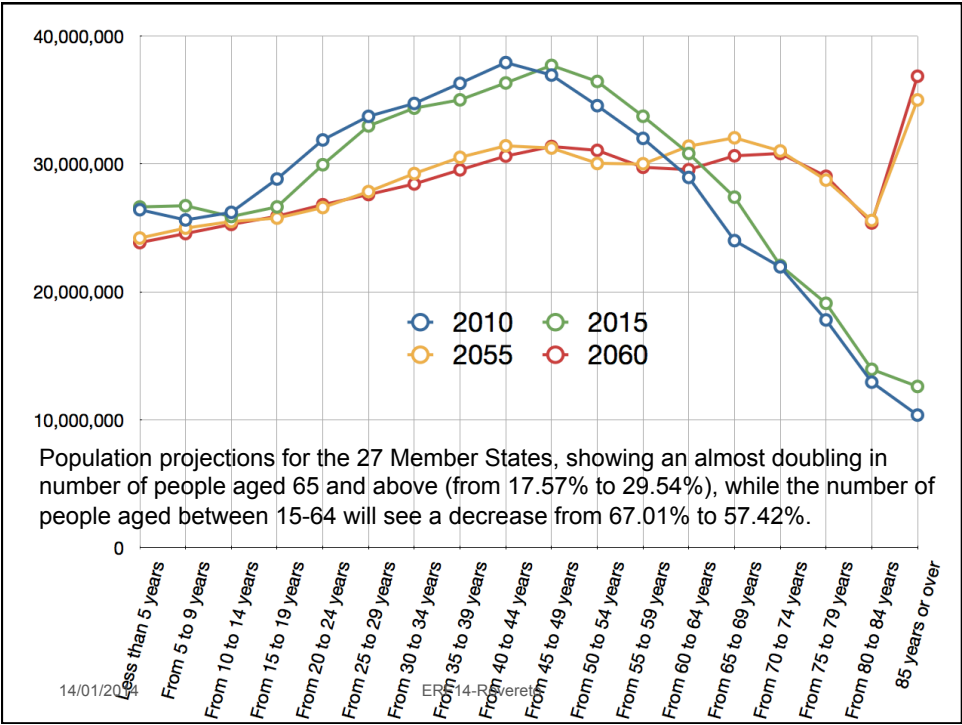
[www.scriptproject.eu](http://www.scriptproject.eu)

## Presentations at ERF14



- Wednesday 12<sup>th</sup>
  - SCRIPT Project and its user-centered development
- Thursday 13<sup>th</sup>, Track 3, 11:00
  - SCRIPT Project preliminary evaluation results
- Friday 14<sup>th</sup>, Track 4, 08:30
  - Project Accompany, companion in support of independence
- Friday 14<sup>th</sup>, Track 2, 11:00
  - Robots for the frail elderly



# SCRIPT

Supervised Care & Rehabilitation Involving Personal Tele-Robotics

Consortium

Budget: €4,643,983

EC funding: €3,331,961

## SCRIPT OVERVIEW

## WHAT IS THE PROJECT ABOUT?



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## OUR AIMS

Two prototype robotic devices, both of which can be used for hand & wrist rehabilitation



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- Use rehabilitative technologies at the **patient's home** to enable better management and delivery of therapies to stroke patients
- Focus on **hand and wrist** exercise; as this presents the **least researched area** with the **most functional relevance** and potential for contribution to **personal independence** for stroke patients.
- Look at differences between passive and active actuated devices.
- Using **interactive games**, provide an **educational, motivational and engaging** interaction, therefore making a therapy session more enjoyable for patients.
- Enable **remote management** and **support of the patient**.
- Deduce from **summative evaluation** in this project, **the impact on health and recovery** and its **potential cost** implications.

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## CHALLENGES

## Some of the questions

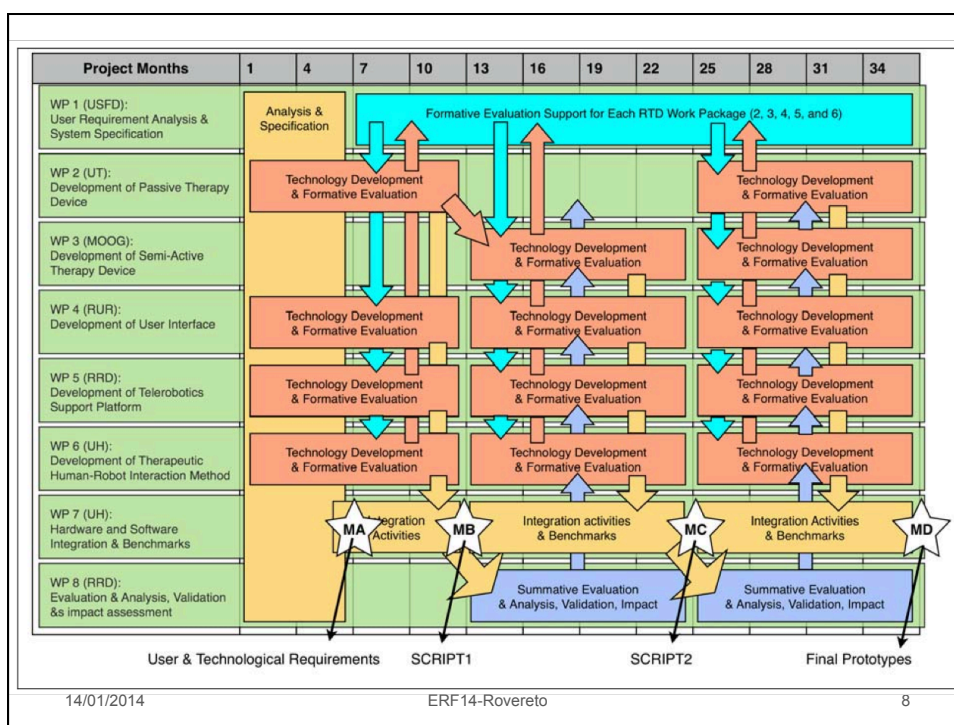


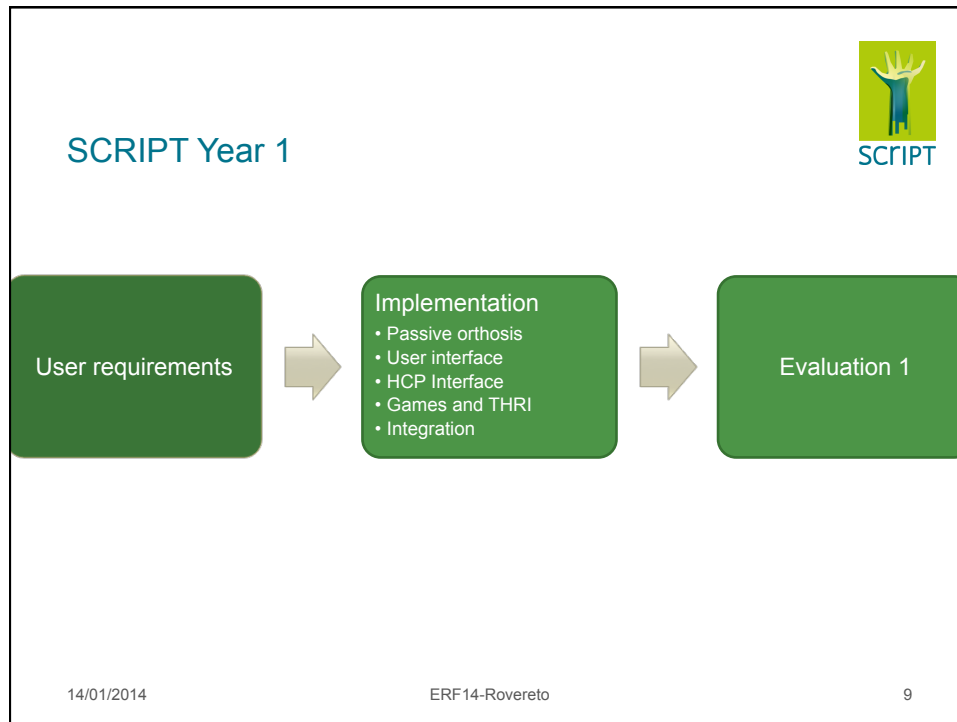
- Can we design our device in a way that patients will find it usable?
- Would patients actually use the device at home?
- Would it be effective in helping with the recovery?
- Can we manage with the remote supervision?
- Would we manage to make an affordable prototype?
- What market potentials are there?

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Video available on project YouTube channel:  
<http://www.youtube.com/channel/UCXad1tAgsxsJyLn533RGvqQ>

PROJECT OVERVIEW

Prototype 1 – progress to date



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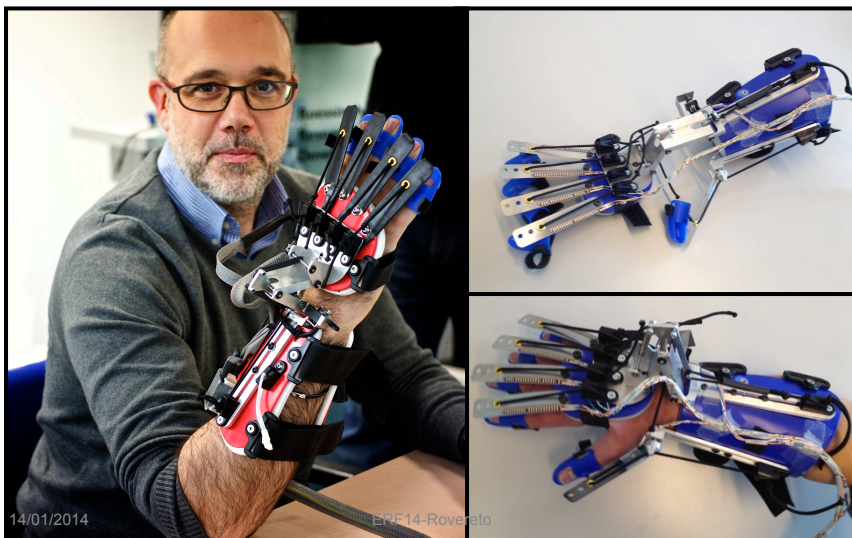
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## ORTHOSIS

## SCRIPT Prototype 1: Passive Orthosis



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## ORTHOSIS

## SCRIPT Prototype 1: Intended Use



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- SCRIPT Prototype 1 (SP1) is a **wrist, hand and finger orthosis** that assist individuals after stroke that suffer from impairments caused by spasticity and abnormal synergies.
- Stroke impairments are characterized in the wrist and hand by excessive involuntary flexion torques that hinder the hand in many to most activities in daily life. **SP1 can passively offsets the undesired torques.**
- SP1 cannot actively generate or control movements. **The patient needs to participate actively** to perform movements and thus needs to have some residual muscle control to successfully use the device.

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WP2

## SCRIPT Prototype 1: Mechanisms



- The SP1 **physically interacts** with the forearm, hand and fingers of the users.
- The SP1 offsets the excessive involuntary flexion by **applying external extension torques** to the joints of the wrist and fingers via passive leaf springs and elastic tension cords.
- The **amount of this support can be adjusted** to provide more or less offset force to wrist or finger extension.
- The SP1 is **equipped with sensors** to measure the joint rotations and estimate applied torques and provide limited information on the user's forearm posture.

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## SCRIPT Year 2



## User requirements

- Evaluation 1
- Formative results
- Technical tests & simulations



## Implementation

- Active orthosis
- User interface improvements
- HCP Interface improvements & DSS base
- Games & THRI progress
- Integration

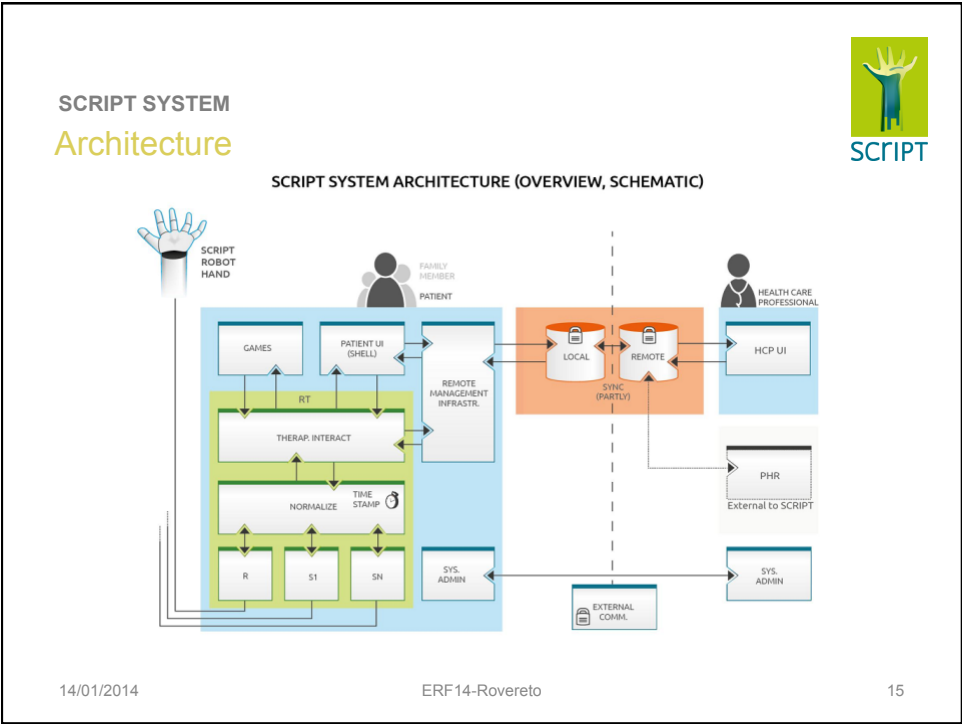


## Evaluation 2

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OVERVIEW PROGRESS

Progress in both years



WP	Year 1	Year 2
WP1	Requirement analysis	Formative evaluation
WP2	Device 1 design & development	Performance validation
WP3		Device 2 design & implementation
WP4	Interface design & development	Usability improvements
WP5	RMI design & HCP UI implementation	HCP improvements & DSS design
WP6	3 Games & lag/lead model	6 Game & energy flow model
WP7	Integration framework & Integration 1	Integration 2
WP8	Research protocol, ethics 1	SE1 (24 patients) & ethics 2
WP9	3 Posters, 3 Conf, 1 Journal	5 Posters, 5 confs, 6 journals, 3 large demos

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WP1

## Interdisciplinary mixed-methods research design



Phase 1: Pre-formative: Understanding users' experiences and identifying their requirements

Phase 2: Formative evaluation (FE1): Engaging users in design and system development

**Phase 3: Integrating Formative evaluation into Summative evaluation (FE2)**

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FORMATIVE FINDINGS

## Features of a home-based self-rehabilitation system



- Balance between independency and receiving supervision
- An interactive system
- Time
- Motivating system
- Fun system
- Inspiring system

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## FORMATIVE FINDINGS

**Conclusion from formative studies**

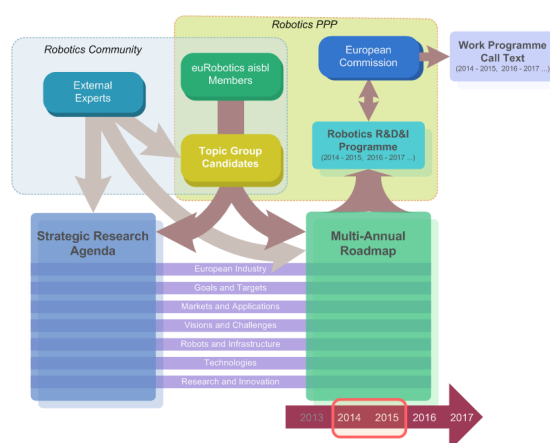
- The idea of the SCRIPT system well received by participants (FE 1&2)
- Usability, acceptance and adherence to training examined (FE 1&2)
- Participants' perception of home-based rehabilitation technology explored
- Stakeholders' views about the SCRIPT system and home-based technology examined
- Outcomes were used to inform the design of SCRIPT 2

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## SRA, MAR AND TOPIC GROUPS

**EU Robotics AISBL**

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SRA, MAR AND TOPIC GROUPS

## So where does a project like SCRIPT fits?



- Multi-annual roadmap includes healthcare as one of the application domains
- SRA includes healthcare it as one of the market domains
  - Inherently safe systems
  - Improved tele-operations
  - Monitoring patient conditions
  - Improved physical interaction
- Adaptability is one of the system abilities in the MAR
- Human-robot interaction is one of the technologies
- One of the main goals of the PPP is to position robotics to deal with the societal challenges.

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## Questions?

*The SCRIPT project is partially funded by the European Commission under the 7th Framework Programme.*

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