

Number

LANCS-D4.2-RN-ELSA-B

A-PI--

<b>Title</b>	Research Note (RN) for D4.2
<b>Subtitle</b>	ESLA aspects of <b>B</b> : <i>Convergence of Physical, Mental and Virtual</i>

PROBLEM	SOLUTION	Research Note	X	Selected Annotation
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Categories: | | |

Summary:

This note addresses an integrated ELSA assessment of the research area with particular emphasis on key considerations and further studies to support responsible future developments.

## CONTEXT

Convergence of physical, mental and virtual phenomena is met with high expectations, primarily manifested in the developments of assistive robotics, including advanced bionics and body/brain implant technology.

## FACTS

The real-life conditions for which assistive robotics, advanced bionics and implant technologies are being researched and developed within Europe include:

1. assistance to anyone under *normal* conditions -in the home, for entertainment, learning, for working, navigating, and so on.
2. specialised assistance under *disadvantaged* conditions -the elderly and disabled, and for therapy and rehabilitation
3. assistance managing *performance-critical* conditions -hospital functions, surgery, driving, flying, emergency, crises, etc.
4. assistance managing and controlling *infrastructural/societal* conditions -law enforcement, traffic management, dirt and rubbish management, managing water bodies, etc.

The convergence of physical, mental and virtual phenomena can be viewed as matter of degree or intensity. Latest development in robotics concern their assistive potential which relies on advanced mobility, sensor and monitoring capabilities. For example, *mobile manipulation* refers to the ability to recognise and respond to objects, people and changes in the environment which is essential if these assistive designs are going to be commonplace in the dynamic environments of the home, the street, in law enforcement, health, safety and military operations. Latest developments in implant technologies concern advanced therapies for brain-related disorders, implants for the monitoring of health-related conditions, for body / mind modification and for security purposes.

## COMMENTS

Key ESLA issues turn on matters of human dignity and rights, social-cultural chance, politics of innovation and adequate legal frameworks. Key problems concern data management which is engendered by the fact that assistive robots are designed with

advanced sensory and data management capabilities, operating in homes, workplaces and public spaces. The more intimate the human-device relationships become, physically and emotionally, other issues of ethical relevance begin to take priority.

1. Where does the value lie in using these advanced technologies?
2. To what extent will they actually save money, make work easier or relieve humans from dangerous, dirty, dull and boring tasks?
3. To what extent do assistive robots, designed with the aim to improve the autonomy of persons, make them dependent and, in fact, less autonomous?
4. To what extent are elderly and frail persons willing to give up some of their privacy for improved emotional and social engagement made possible with assistive robotics?
5. Do we want 'machine rights' rather than owner / user rights?
6. What are 'machine responsibilities' compared to the responsibilities of those who own the machines, configure them, operate them, discard of them, and so on.
7. What is the threshold for mistakes, accidents and conflicts, and to what extent should humans always be in the operational loop?

Using robotic assistance for companionship purposes has also raised a whole host of concerns about what precisely human-robot relations consist of and how to understand companionship in care, at home, in teaching, and other principally social and emotional scenarios. These developments involve:

8. changing perceptions of companionship (companion robotics)
9. changing perceptions of body, self and/or identity (advanced robotics and body/brain implants)
10. new tracking, monitoring and adjustment capabilities of bodies, behaviour and state of being
11. new experiential opportunities (how far can body modification be taken)
12. questions of access and distributive or commutative justice (health-related applications)

Data protection laws need constant revising with respect to advanced sensor technology and data management capabilities embedded in devices and systems that exemplify and support the convergence of physical, mental and virtual phenomena. In particular, an improved understanding is needed of the capabilities of on-the-fly data processing. Liability issues arise with respect to the safety, reliability and handling of devices and systems, in particular, their abilities to adequately support human-device interfaces as promised and expected. There are also property rights associated with embedding devices in public, occupational and private spaces and human rights issues relating to right of access, fair treatment and potential abuse.

Sorting out matters of social and cultural relevance needs to aim at clarifying the distinction between wishful enactment and scenarios in which devices and systems *can* operate among humans in unstructured and semi-structured private, occupational and public settings. They turn on the organisational challenges associated with a range of service provisions, for example, health monitoring, environmental monitoring, health and safety response or security operations, as well as the political issue of how to prioritise efforts and how we collectively conceive of the future of our societies and lives with the new technologies. Social issues further concern the study of attitudes, opinions and social-cultural behaviours in order to better understand behavioural changes associated with the deployment of particular applications and how such changes alter expectations, what counts as acceptable and a social value.

To approach this domain of development, the key task is to sort out the effects of the 'strategic turn' in recent innovation policies and strategic research agendas, to investigate the role of sociotechnical imaginaries, of promise and expectations, in order to better sort out credibility issues and develop an improved culture of governance and accountability.