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AAL 4 DS

(Can AAL Technology Help People with Down Syndrome to Live Better Lives?)

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Abstract. AAL has been extensively developed in the last few years, especially in relation to people with dementia and elderly people in general. However, there are segments of the population which are equally deserving of assistive technologies and yet have not attracted so much attention from our community. For example, there is very little research and focus on people with Down Syndrome, still they can benefit from AAL for similar reasons and yet they have their own specific needs and interaction capabilities which mean they may not necessarily benefit from current AAL systems without re-engineering. This paper discusses how AAL technology can be relevant to people with Down Syndrome at different stages of their lives.

Keywords. Ambient Assisted Living, Down Syndrome

Introduction

Various organizations from government, the private sector and academia are becoming more interested on the opportunities opened by technology to assist people in their daily lives. The area of Ambient Assisted Living [1] is emerging as a growing forum where people can share progress and problems on the use of technology to support people with some degree of special needs, usually related to health and social care areas. There is interesting research on supporting people with different conditioning profiles [2,3] still much more is still to be explored, in particular there is no much reported on the specific case of supporting people with Down Syndrome (DS), the focus of this article.

Support is useful for people with DS to strengthen their positive characteristics and help them develop healthier and happier as positive individuals immersed in society where they can realize their aspirations. Possible areas to look at how technology may help people with DS and their carers are listed in Figure 1 and can be briefly described as follows:

- **Cognitive Support:** can provide stimulus to learn and develop reasoning skills
- **Emotional Support:** can help to communicate their emotions, particularly in what it relates to their specific condition and how it affect them

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- **Physical Support:** can provide specific infrastructure and challenges to strengthen and develop their bodies
- **Health and Hygiene Support:** can help with monitoring conditions, preventing, and developing healthy habits
- **Social Support:** can help them communicate and stay in touch with the community at large
- **Security Support:** can protect them when they are vulnerable
- **Entertainment and Leisure Support:** can add options for their relaxation and enjoyment
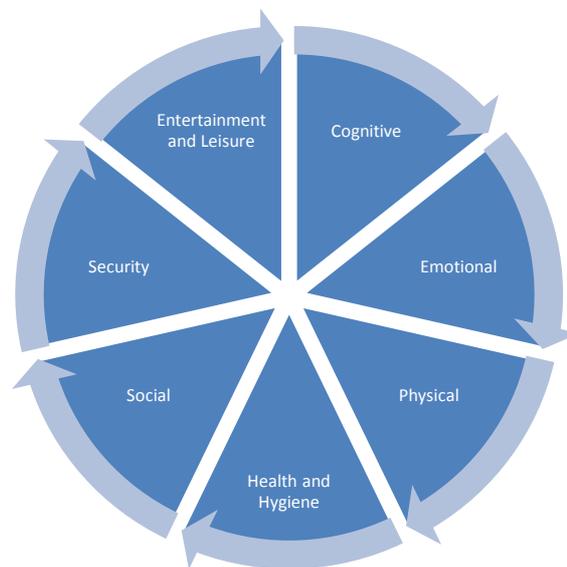
Figure 1. Potential Areas of Support

Each stage of life will require different levels of support. And this will impact in the type of technological solutions we can think off as well as the way they are developed. Table 1 provides a first attempt at linking these two dimensions together.

Table 1. areas of support according to stages of life

	Baby Toddler	Early stages of formal education (e.g. Primary school)	Middle stages of formal education (e.g. Secondary school)	Tertiary stages of formal education (Apprenticeships and University)	Adult life (supporting independent living)	Later Stages of Life
Cognitive	X	X	X	X	X	X
Emotional			X	X	X	X
Physical	X	X	X	X	X	X
Health and Hygiene			X	X	X	X
Social			X	X	X	X
Security					X	X
Entertainment and Leisure	X	X	X	X	X	X

Quantitative and Qualitative Assessments of Improvement

It is clear that living a fulfilling life is more complex than achieving a list of milestones but in some of the areas of support measuring the extent of achievement is sometimes done through a list of milestones. See for example in the Appendix, the one the UK health system will provide to parents with the Personal Child Health Record (informally, the 'red book'). Can something similar be done for the areas listed in Figure 1? Can these be used as generic requirements to guide, inspire and inform technicians on providing supporting technology for people with DS? Interacting with focus groups and organizations directly involved with DS can provide a scale to understand whether the new technology developed is meaningful and helpful for people with DS.

References

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Appendix

Gross Motor Skills Milestones

Milestone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Holds head steady	▓	▓	▓	▓	▓	▓	▓	▓	▓																								
Sits alone					▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓																	
Stands alone									▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Walks alone									▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Note: all those which can extend for a long period are only indicated until 33 months

Fine Motor Skills Milestones

Milestone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Follows object with eyes	▓	▓	▓	▓	▓	▓	▓	▓																									
Reaches out and grasps objects				▓	▓	▓	▓	▓	▓	▓	▓																						
Passes objects from hand to hand				▓	▓	▓	▓	▓	▓	▓	▓	▓																					
Builds a tower of two cubes										▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Copies a circle																		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Note: all those which can extend for a long period are only indicated until 33 months

Communication Skills Milestones

Milestone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Babbles dada and mama					▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓															
Responds to familiar words				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓																			
First words spoken with meaning										▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Shows needs by gesture											▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Two word phrases															▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Note: all those which can extend for a long period are only indicated until 33 months

Personal and Social Skills Milestones

Milestone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Smiles when talked to	▓	▓	▓																														
Feeds self with biscuit				▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓																			
Drinks from cup								▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓										
Dry by day														▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Bowel control																▓	▓	▓	▓	▓		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Note: all those which can extend for a long period are only indicated until 33 months