

# SYSTEMS REFERENCE DELIVERABLE



---

**Economic evaluation of active assisted living services –  
Part 2: Example of use – Monitoring patients with chronic diseases**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2020 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.



IEC SRD 63234-2

Edition 1.0 2020-02

# SYSTEMS REFERENCE DELIVERABLE



---

**Economic evaluation of active assisted living services –  
Part 2: Example of use – Monitoring patients with chronic diseases**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 03.080; 03.100.60

ISBN 978-2-8322-7834-5

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms, definitions and abbreviated terms .....	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	8
4 General .....	9
4.1 Document objective .....	9
4.2 Economic evaluation process overview .....	9
4.2.1 Alternate versus Reference Scenario.....	9
4.2.2 Time period for analysis .....	9
4.2.3 The cost of money .....	9
4.2.4 The economic or financial indicators.....	9
4.2.5 Multiple Alternate Scenarios .....	10
4.2.6 Risks and critical success factors .....	10
4.3 Document structure – the example.....	10
5 Overview of the analysis and results of a remote patient monitoring service .....	10
6 Description of the AAL Service or Intervention.....	12
7 The non-financial benefits of the AAL service .....	14
7.1 Overview .....	14
7.2 Improving the health of the population .....	14
7.3 Improving the patient experience with healthcare.....	15
7.4 Improving the work life of healthcare workers .....	15
8 The financial/sustainability analysis.....	15
8.1 The financial analysis cost data .....	15
8.2 Reference Scenario costs .....	16
8.3 Intervention/Alternate Scenario implementation costs .....	16
8.4 Intervention/Alternate Scenario health system costs .....	17
9 Cashflow analysis and calculating the financial indicators.....	18
9.1 Cash flow analysis: Alternate Scenario A - Ramp up to 10 000 patients.....	18
9.2 Financial indicators for Alternate Scenario A.....	19
9.3 Cash flow analysis: Alternate Scenario B - Ramp up to 100 000 patients.....	20
9.4 Financial indicators for Alternate Scenario B.....	21
10 Identifying risks and critical success factors .....	21
11 Conclusions and recommendations .....	22
11.1 Conclusions .....	22
11.2 Recommendations .....	22
Bibliography.....	23
Figure 1 – Cash flow analysis table Alternate Scenario A.....	19
Figure 2 – Cash flow analysis table Alternate Scenario B.....	20

Table 1 – Overview of the remote patient monitoring AAL Service ..... 10

Table 2 – Description of the AAL Service ..... 12

Table 3 – Reference Scenario healthcare costs ..... 16

Table 4 – Alternate Scenario AAL service implementation costs ..... 17

Table 5 – Alternate Scenario health system costs ..... 18

Table 6 – Financial indicators Alternate Scenario A ..... 20

Table 7 – Financial indicators Alternate Scenario B ..... 21

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ECONOMIC EVALUATION OF ACTIVE ASSISTED LIVING SERVICES –****Part 2: Example of use – Monitoring patients with chronic diseases**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC SRD 63234-2, which is a Systems Reference Deliverable, has been prepared by IEC systems committee Active Assisted Living.

The text of this Systems Reference Deliverable is based on the following documents:

Draft SRD	Report on voting
SyC AAL/154/DTS	SyC AAL/166/RVDTS

Full information on the voting for the approval of this Systems Reference Deliverable can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC SRD 63234 series, published under the general title *Economic evaluation of active assisted living services*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

Under the "Triple Aim" [1]<sup>1</sup> concept (now "Quadruple Aim"[2]), a well defined, inclusive set of objectives for new interventions leading to improvements in the local and national healthcare systems consists of the following:

- improving the health of the population;
- improving the patients' (e.g. AAL care recipients) experience of care,
- lowering (or holding constant) the per-capita cost of care to the healthcare system to ensure sustainability; and
- (the recently added fourth aim) improving the work life of healthcare providers (e.g. healthcare professionals and AAL formal carers), clinicians, and other staff.

Economic evaluations of proposed new healthcare services and technologies involve the assessment of the costs and effects of any interventions in the healthcare system and provide input into the economic sustainability objective above. Where there are important health outcomes that can be evaluated in monetary terms, a cost-benefit analysis can be undertaken as a 'non-reference case analysis' (Alternate Scenario analysis) with details provided on the derivation of the monetary value of the health outcomes. Appropriate economic evaluations will provide evidence to address the financial considerations of proposed new interventions along with the impact on health outcomes.

To achieve the Quadruple Aim objectives, all new technology-supported homecare or Active Assisted Living (AAL) services (such as remote monitoring of patient physiological measurements, in-home medication adherence monitoring and management, as well as mobility aids and emergency reporting services) should be evaluated to ensure they not only improve the quality of the patients' lives but also provide economic benefits greater than the cost of providing the service. Without financial benefits that exceed the cost of the service to the health system funder, or at the very least an economically neutral situation while improving patient outcomes over usual care pathways, the services will not be sustainable – or the healthcare services funder must be prepared to knowingly increase its cost per patient supported by the healthcare system to achieve the population health outcomes.

Furthermore, health system funders may be presented with a choice of options for investment in new or expanded services. In order to compare options from a financial costs and benefits perspective (as well as their health outcomes), economic evaluations of the options will provide an equal basis for comparison of the options.

The evaluation example has been structured to provide example data for a Reference Scenario (the current means of providing care to patients with chronic diseases, the target patient population) and compare this against an Alternate Scenario (the healthcare intervention using the AAL physiological measurement and monitoring service) for the economic comparison. Standard economic measures including Return on Investment, Net Present Value, and Payback Period of the investment are estimated.

---

<sup>1</sup> Numbers in square brackets refer to the Bibliography.

## **ECONOMIC EVALUATION OF ACTIVE ASSISTED LIVING SERVICES –**

### **Part 2: Example of use – Monitoring patients with chronic diseases**

#### **1 Scope**

IEC SRD 63234-1 provides a descriptive framework and template for the economic evaluation of the implementation of technology-supported home healthcare, wellness or AAL services. This part of IEC SRD 62234 provides an example of the use of the framework, specifically analysis and economic evaluation of the implementation of technology-supported, remote, in-home monitoring of patients (AAL care recipients) with chronic diseases.

This analysis is completed from the point of view of the healthcare system/services funder (e.g. the government in a state-sponsored healthcare system or possibly a health management/health insurance company in a privately funded system).

This document is structured like IEC SRD 63234-1, to provide a means of capturing data for the Reference Scenario (the current means of providing care, also known as 'usual care', to the target population of members of the population with one or more chronic diseases living at home), compared against an Alternate Scenario (the deployment of an AAL service which provides remote patient monitoring). Standard economic measures have been estimated (using an electronic spreadsheet) including Return on Investment (ROI), Net Present Value (NPV), and Payback Period of the investment.

#### **2 Normative references**

There are no normative references in this document.

#### **3 Terms, definitions and abbreviated terms**

##### **3.1 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

##### **3.1.1**

##### **AAL service**

action or function of an AAL system creating an added value for customers

EXAMPLE 1 Configuration and maintenance of AAL systems.

EXAMPLE 2 Assistant systems to support the home and living environment.

[SOURCE: IEC 60050-871:2018, 871-01-04]