

SYSTEMS REFERENCE DELIVERABLE



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

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

FOREWORD

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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- withdrawn,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
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INTRODUCTION

Under the "Triple Aim" [1]¹ 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.

¹ 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.

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2 Normative references

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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]

3.1.2

AAL user

person who uses or benefits from, or uses and benefits from, AAL devices, systems or services

[SOURCE: IEC 60050-871:2018, 871-02-05]

3.1.3

AAL care recipient

person who receives and consumes AAL care services

3.1.4

AAL informal carer

person who provides informal (or lay) services to the AAL care recipient

3.1.5

AAL formal carer

person who provides personal or homemaking services to the AAL care recipient

3.1.6

AAL system

<AAL services> set of interrelated elements in a defined context as a whole and separated from the environment

Note 1 to entry: A system is generally defined with the view of achieving a given objective, e.g. by performing a definite function.

Note 2 to entry: Elements of a system can be natural or man-made material objects, as well as modes of thinking and the results thereof (e.g. forms of organization, mathematical methods, programming languages).

Note 3 to entry: The system is considered to be separated from the environment and the other external systems by an imaginary surface, which cuts the links between them and the system.

Note 4 to entry: The term "system" should be qualified when it is not clear from the context to what it refers, e.g. control system, colorimetric system, system of units, transmission system.

[SOURCE: IEC 60050-151:2001, 151-11-27, modified – The domain "<AAL services>" has been added. In the definition, "in a defined context" has been deleted.]

3.1.7

remote monitoring

condition monitoring and monitoring of persons from a distance by using telecommunication

[SOURCE: IEC 60050-871:2018, 871-04-27]

3.2 Abbreviated terms

AAL	Active Assisted Living
ED	emergency department
CMC	centralized monitoring centre
CSF	critical success factors
NPV	Net Present Value
ROI	Return on Investment

4 General

4.1 Document objective

While this document is a theoretical example, this evaluation uses real data as input to the greatest extent possible. For example, costs of several technical components are based on those available to a health service provider organization in the Ottawa, ON, Canada area at the time of writing. Furthermore, examples of healthcare system benefits are taken from documented research studies and costs from Canadian measured averages; however, not all of these data elements came from a single study example.

All costs and benefits in this example are in Canadian dollars (C\$), but parallel examples using other currencies, and local costs and benefits may be created following this example.

4.2 Economic evaluation process overview

4.2.1 Alternate versus Reference Scenario

The economic evaluation process is a comparison of a Reference Scenario against an Alternate Scenario, the AAL service or technology intervention, using a cashflow analysis over an appropriate time period.

The Reference Scenario (also commonly referred to as a "base case" or "base scenario") is typically the current means of providing healthcare or health services, often known as "usual care", to the target patient population: members of the population living with one or more chronic diseases such as Chronic Obstructive Pulmonary Disorder (COPD) or Diabetes Mellitus ('diabetes') still living in their own homes.

The Alternate Scenario describes AAL service or technology, the specific intervention or benefits it hopes to achieve, and outlines the impacts on the delivery of healthcare. The Alternate Scenario proposed is to augment the traditional healthcare services with in-home monitoring of patient physiological signs (e.g. blood pressure, heart rate, blood oxygen levels, weight, etc.) as appropriate for the condition. The assumption, based on evidence from a number of smaller pilot projects, is that this AAL Service will prevent worsening of the conditions and reduce the number of hospital emergency department visits and in-patient admissions that would otherwise result, saving the overall health system costs.

4.2.2 Time period for analysis

This analysis uses a five-year time period. Major components of the equipment (hardware, software, etc.) requiring upfront investment have an expected lifecycle of at least five years and extending the study beyond this would require consideration of replacement costs which would generally replicate the analysis for an ensuing five years.

4.2.3 The cost of money

This cashflow analysis assumes the "cost of money" (or time value of money) is 4,25 % based on interest rates currently in place to large organizations (the US and Canadian 10 year government bond rates are roughly 2 % to 3,5 % at the time of writing).

4.2.4 The economic or financial indicators

The financial analysis will present the following indicators:

- Return on Investment (ROI) – the gain or loss generated by an investment relative to the amount of money invested (typically expressed as a percentage);
- Net Present Value (NPV) – the difference between the discounted future cash flows from an investment and the original investment amount;
- Payback Period – the length of time to recoup the initial investment in a project, product development or service implementation.