



# ASSEHS

ACTIVATION OF STRATIFICATION STRATEGIES AND RESULTS OF  
INTERVENTIONS ON FRAIL PATIENTS OF HEALTHCARE SERVICES

## PERFORMANCE MANAGEMENT FRAMEWORK



## DOCUMENT INFORMATION

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## DOCUMENT HISTORY

DOCUMENT VERSION	DATE	ACTION
V0.1	02.11.2014	Starting version, template
V0.2	03.11.2014	Definition of ToC
V0.3	18.11.2014	Draft version by WP6 authors
V0.4	28.11.2014	Incorporation of comments from Scientific Advisory Board

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### KEYWORDS

KEYWORDS: performance, management, framework, structure, process, results, outcomes, output, indicators

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# 1

## INTRODUCTION

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### RISK STRATIFICATION AND PREDICTION

Healthcare digitization started some decades ago recording electronically administrative data. This information was required to classify eligible patients, manage their resource utilization (booking, prescription of ancillary tests and activity recording). Paradoxically, clinical information digitization is a more recent phenomenon. Nowadays, we may find some healthcare organization in Europe that are currently in the process of moving from paper-based records to electronic clinical records. The early adopters of organization-wide electronic patient records adoption started at the end of the nineties.

Electronic health records have an operational principle that consist of allowing clinicians to record all necessary clinical data that may be useful for present and future patient encounters. This principle allows providing care continuity and longitudinality among healthcare providers. However, the existence of large data sets of clinical information opens different forms of analytics beyond transactional operations. A strategic healthcare planning might benefit from retrospective and prospective analysis of clinical and administrative data from different healthcare sources.

The advent of chronic care management due to ageing populations and the economic constraints that most European countries are facing nowadays have influenced health policy of each European Union member state towards a health system redesign. Among

the major components of this system shift, one may find the transition from acute to chronic care, the emphasis in a better care coordination and the reduction of avoidable hospital admissions and emergencies. In all three components, prospective analysis based in clinical data to identify patients who may be at high risk of emergency admissions is viewed as the best available technique.<sup>1</sup>

Risk stratification, risk prediction and risk simulations are three types of analytics that may fundamentally change healthcare delivery as prospective information enables organizations to be proactive. Risk stratification may be applied to population health management and profiling of patients whereas risk prediction may also be applied at population and patient level.

Most European health systems are able to use aggregated clinical data to prospect population and patient health. Some they have already deployed stratification and prediction tools that allow systems, organizations and health professionals to change the way they plan, finance, commission, manage and deliver healthcare.

The different connections of this sort of analytics and the potential transformation that may generate is within the scope of the ASSEHS project and this particular deliverable.

# 2

## GOALS OF THE DELIVERABLE

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### GOALS

The Performance Management Framework is the first deliverable of the work package 6 of ASSEHS. This work package is concerned with the impact of stratification tools on structure and processes of healthcare organizations. Specifically, its goal is to determine the effect of deploying stratification tools on the structure, process and outcome of healthcare organizations.

The aim of the Performance Management Framework is to develop a framework of key performance indicators that allows identifying any potential structure and process changes.

Consequently, the specific goals of this deliverable are twofold:

1. To identify the dimensions of impact of availability, deployment and use of stratification and prediction tools.
2. To measure the impact in health care provision models through a set of key performance indicators that illustrate potential and actual structural and process change.

# 3

## DEFINITION OF IMPACT

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The deployment, availability and use of stratification and prediction tools allow different health agents to modify the structures and processes of healthcare and therefore to influence healthcare outputs and in some extent health outcomes.

The connection between the intervention (which uses stratification and/or prediction tools) and health outcomes is difficult to analyze due to the multifactorial nature of health results and the difficulty of isolate cofounders and avoid biases. Moreover, the exploration of this causal link is out of the scope of ASSEHS.

We do start from the seminal work of Donabedian<sup>1</sup> on quality of care assessment. His framework is a classification based on three pillars that may help to seize the different dimensions of impact despite a few limitations. The furthest level of impact is on healthcare outcomes that contains the effect on the health status of patients and populations. According to Donabedian, this includes both improvements in patient's knowledge, behavior and satisfaction with care.

Although health outcomes are the holy grail of quality of care assessment, the dimensions of structure and process are easier to measure and therefore more suitable to analyze at the first instance.

Following the definitions provided by the author, structure depict the characteristics of the settings where health care is delivered. This encompasses from material resources (facilities, equipment and money), human resources (number and qualification of personnel) and organizational structure (medical staff organization, methods of peer review and methods of reimbursement). It is interesting to note that in the definition, there is no reference to health information systems, mainly because it was an uncommon structure at the time when it was developed. Perhaps, the concept of "methods of peer review" could be assimilated to health information infrastructures.

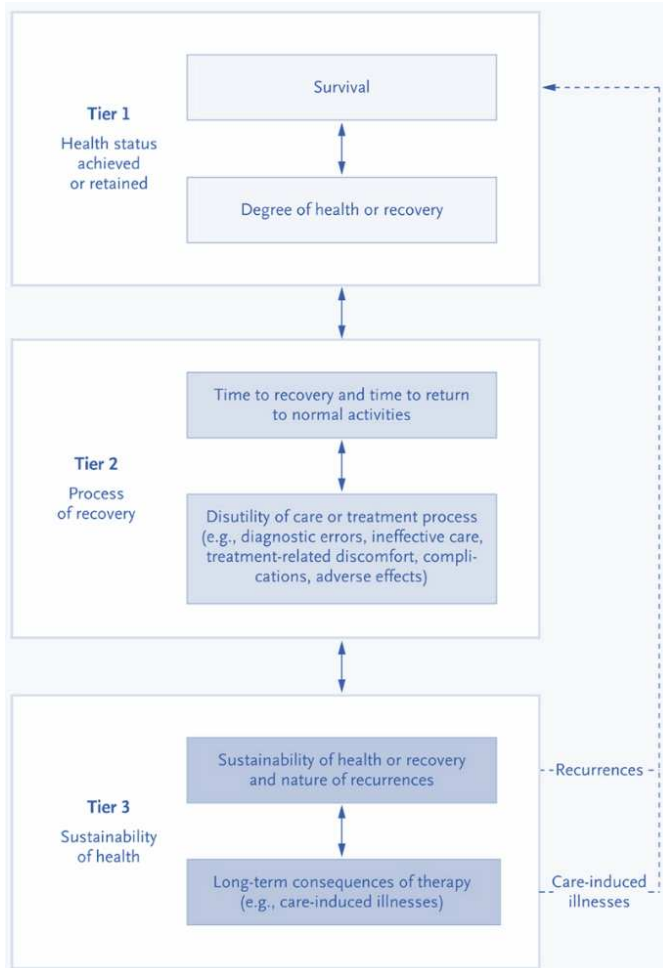
As for the process dimension, Donabedian straightly defines it as what is actually done in giving and receiving care. This includes the practitioner's activities in making a diagnosis and recommending an implementing treatment and so it is not including neither the preventive activities nor the care delivered by other health, social and informal care providers apart of doctors. Furthermore, the follow-up activity that chronic patients require is considered only implicitly under the implementation of treatment.

The results dimension can be complementary approached with two different frameworks: the Triple Aim and the Outcome Measures Hierarchy. The Triple Aim is an Institute for Healthcare Improvement framework that defines an approach to optimizing health system performance through the pursuance of three dimensions: the improvement of patient experience of care that includes quality and satisfaction, the

improvement of health of populations and the reduction of the per capita cost of health care. The Triple Aim has the goodness of combining the individual and the collective perspective in its approach to results.<sup>3</sup>

On the other hand, we have the Outcome Measures Hierarchy that currently develops Michael E. Porter and a panel of leading healthcare thinkers throughout the International Collaboration for Health Outcomes Measurement. As well, this framework presents three tiers illustrated in the following figure.<sup>4</sup>

**Figure 1. The Outcomes Measure Hierarchy**



Source: Porter ME (2010)

The Outcome Measures Hierarchy brings deepness and dimensionality to the results block from a patient perspective by means of three tiers: health status achieved and retained, process of recovery and sustainability of health.

A complementary framework to assess the impact of a stratification intervention is the RE-AIM evaluation framework. Although, RE-AIM has been designed to assess multifactorial public health intervention, it could enhance the performance framework due to the similarities with our information-based interventions.

RE-AIM is five-fold evaluation framework that measures reach, efficacy, adoption, implementation and maintenance. Except efficacy that has to be appraised at individual level, the remaining four factors applies to our framework at population level. All five are actually embedded in both the structure and process dimension.

To apply RE-AIM to our model we have to adapt the definition of each factor:



- Reach is the proportion of the target population that participate in the intervention. Here reach has to be understood both as professional reach or patient reach.
- Efficacy applies only at individual level when we measure the success rate (positive versus negative outcomes) for particular patient identification such as frail and complex chronic patients.
- Adoption is the proportion of setting that deploy the intervention.
- Implementation is the extent to which the intervention is implemented as intended in the real world.
- Maintenance is the extent to which a program is sustained over time.

## DIMENSIONS OF IMPACT

The following table summarizes the subdomains classified into the three dimensions of impact defined (structure, process and result). For each subdomain, we detail the different elements considered.

**Table I. Impact assessment dimensions, subdimensions and elements**

Dimensions	Subdomains and elements to assess
<b>Structure</b>	<ol style="list-style-type: none"> <li>1. Risk-adjusted resource allocation <ul style="list-style-type: none"> <li>- System-level: funding and reimbursement</li> <li>- Organization-level: budget allocation</li> <li>- Clinical-level: workload redistribution</li> </ul> </li> <li>2. Health information systems: <ul style="list-style-type: none"> <li>- Availability of stratification information (including health and social data sources)</li> <li>- Availability of prediction information</li> <li>- Information display in clinical workstations</li> <li>- Information filtering and query capability for end-users</li> <li>- Alerts and warnings of patients at risk</li> </ul> </li> <li>3. Health professional <ul style="list-style-type: none"> <li>- Reach of professionals (including social workers)</li> <li>- Shift in roles and emerging roles (case managers, care managers, liaison nurses, community matrons)</li> <li>- Activation of informal care-givers</li> </ul> </li> </ol>
<b>Process</b>	<ol style="list-style-type: none"> <li>4. Healthcare organizational strategies: <ul style="list-style-type: none"> <li>- System-level: healthcare planning, integrated care policies (including health and social integration)</li> <li>- Organization-level: integrated care programs</li> <li>- Clinical-level: integrated care interventions, identification of patients at risk, advance profiling</li> </ul> </li> <li>5. Quality of care process: <ul style="list-style-type: none"> <li>- Patient-provider communication</li> <li>- Appropriateness of referrals</li> <li>- Time of intervention (early diagnosis)</li> </ul> </li> <li>6. Delivery redesign (virtual wards, care pathways)</li> <li>7. Impactability models: refining, exclusions</li> </ol>
<b>Results</b>	<ol style="list-style-type: none"> <li>8. Satisfaction of principals: <ul style="list-style-type: none"> <li>- Patient satisfaction</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>- Professional satisfaction (clinical decision support system)</li> </ul>
	<p>9. Efficiency and resource utilization:</p> <ul style="list-style-type: none"> <li>- Reduction of avoidable activity: hospital admissions (ACSC), readmission, avoidable emergencies</li> <li>- Cost of healthcare services</li> </ul>
	<p>10. Quality of care and health outcomes</p> <ul style="list-style-type: none"> <li>- Patient quality of life</li> <li>- Mortality rates</li> <li>- Reversal of frailty</li> <li>- Increased autonomy (Barthel test)</li> </ul>

Before proceeding to the consolidated configuration of the performance management framework, it is worth to clarify some of the elements displayed in the table above and the rational of its classification. For instance, we do have placed new forms of care organization under the process block while one could consider them as new structures. The reason why we opted for such a classification criterion is that the organizational impact affects the processes in the short run and if the impact prevails over time may cause the emergence of new structures like integrated care organizations.

In spite of the flexibility of the framework, some aspects are difficult to be included in its categories because they are multidimensional and difficult to measure. This is the case of the impact of risk stratification tools on health equity. At first glance, equity understood as the fair access to healthcare should form a new subdomain belonging to the results block encompassing ethical issues such as patient autonomy, patient information and decision (opt-out) and burden of treatment.

# 4 MEASURING OF IMPACT

## SOURCES OF INFORMATION

The performance management framework aims to measure the impact of deployment, availability and use of stratification information in clinical settings along the domains identified and described in the preceding chapter. A requisite of this deliverable is to be easily actionable in order to be practical and useful for the job to be done by the following intervention work package (7) in combination with the activities deployed by work packages 4 and 5. With this in mind, we have shortlisted the subdomains and elements that are easier to measure. Therefore, a set of information sources to allow the assessment of stratification impact in any European region has been designed within the ASSEHS project scope.

A scoping review of the literature concerning impact was rolled out which results will guide the initial assessment for each site. Moreover, a couple of surveys have been performed aiming to make a qualitative analysis of stratification tools (Survey A) in use and a quantitative evaluation of the impact and satisfaction from a clinical perspective (Survey B).<sup>1</sup> All methodologies act as information sources to feed the performance management framework throughout the definition of key performance indicators (KPI).

The following table summarizes the information sources (Survey A or B) for the reporting of each element identified previously and their respective questions.

**Table 2. Sources to assess Impact dimensions and elements**

Dimensions	Elements	Source
Structure	1. System level resource allocation	A - Q33 & Q34
	2. Organizational-level budget allocation	A - Q35
	3. Caseload distribution	A - Q36
	4. Availability of stratification information	A - Q39
	5. Availability of prediction information (risk scores)	A - Q39
	6. Availability of query functions for clinicians	A - Q39
	7. Availability of alerts and warnings of patients at risk	A - Q39
	8. Availability of automatic patients follow-up	A - Q39
Process	9. Integrated care policies (system level)	A - Q32
	10. Integrated care programs/interventions (organization and clinical level)	B - Q2
	11. Impact in healthcare provision (organization level)	B - Q5
	12. Use of stratification information for clinical work	B - Q1

<sup>1</sup> Both surveys are available in the annex section

	13. Delivery redesign	A - Q38
	14. Use of stratification information for service redesign	B - Q4
	15. Use of stratification information for identification of patients (case management)	A - Q37
	16. Use of additional refinement of selected patients	A - Q41
<b>Results</b>	17. Satisfaction with communication	B - Q6a
	18. Satisfaction with training	B - Q6b
	19. Satisfaction with visualization	B - Q6c
	20. Satisfaction with sharing	B - Q6d
	21. Satisfaction with query functionalities	B - Q6e
	22. Satisfaction with frail elderly and complex patients identification	B - Q6f
	23. Usefulness of stratification information for clinicians	B - Q3

The compilation of both survey A and B guarantees a minimum set of data to inform the current situation of stratification deployment and impact in the regions to be assessed and where the intervention is taking or will take place.

# 5

## SELECTION OF KEY PERFORMANCE INDICATORS

### DEFINITION OF THE SELECTED INDICATORS

A performance management framework is composed by a set of key performance indicators that have to be defined before evaluating the sites. From the different information sources mentioned above and for each dimension and element, we have defined a set of KPI that covers all aspects of impact that are actually achievable.

In the following table 3, we do list each indicator with an initial arithmetic definition.

**Table 3. Set of Key Performance Indicators**

Dimensions	Elements	Indicator
<b>Structure</b>	1. System level resource allocation	Yes/No (integrated care commissioning or health level commissioning)
	2. Organizational-level budget allocation	Yes/No (% of organizations)
	3. Caseload distribution	Yes/No (% of organizations)
	4. Availability of stratification information	Yes/No (% of organizations)
	5. Availability of prediction information (risk scores)	Yes/No (% of organizations)
	6. Availability of query functions for clinicians	Yes/No (% of organizations)
	7. Availability of alerts and warnings of patients at risk	Yes/No (% of organizations)
	8. Availability of automatic patients follow-up	Yes/No (% of organizations)
<b>Process</b>	9. Integrated care policies (system level)	Degree of impact in health services
	10. Integrated care programs/interventions (organization and clinical level)	Degree of perceived coordination
	11. Impact in healthcare provision (organization level)	Degree of impact
	12. Use of stratification information for clinical work	Degree of use
	13. Delivery redesign	Yes/No
	14. Use of stratification information for service redesign	Degree of use
	15. Use of stratification information for identification of patients (case management)	Yes/No
	16. Use of additional refinement of selected patients	Yes/No

<b>Results</b>	17. Satisfaction with communication	Degree of satisfaction
	18. Satisfaction with training	Degree of satisfaction
	19. Satisfaction with visualization	Degree of satisfaction
	20. Satisfaction with sharing	Degree of satisfaction
	21. Satisfaction with query functionalities	Degree of satisfaction
	22. Satisfaction with frail elderly and complex patients identification	Degree of satisfaction
	23. Usefulness of stratification information for clinicians	Degree of usefulness

# 6 Design of a Performance Management Framework

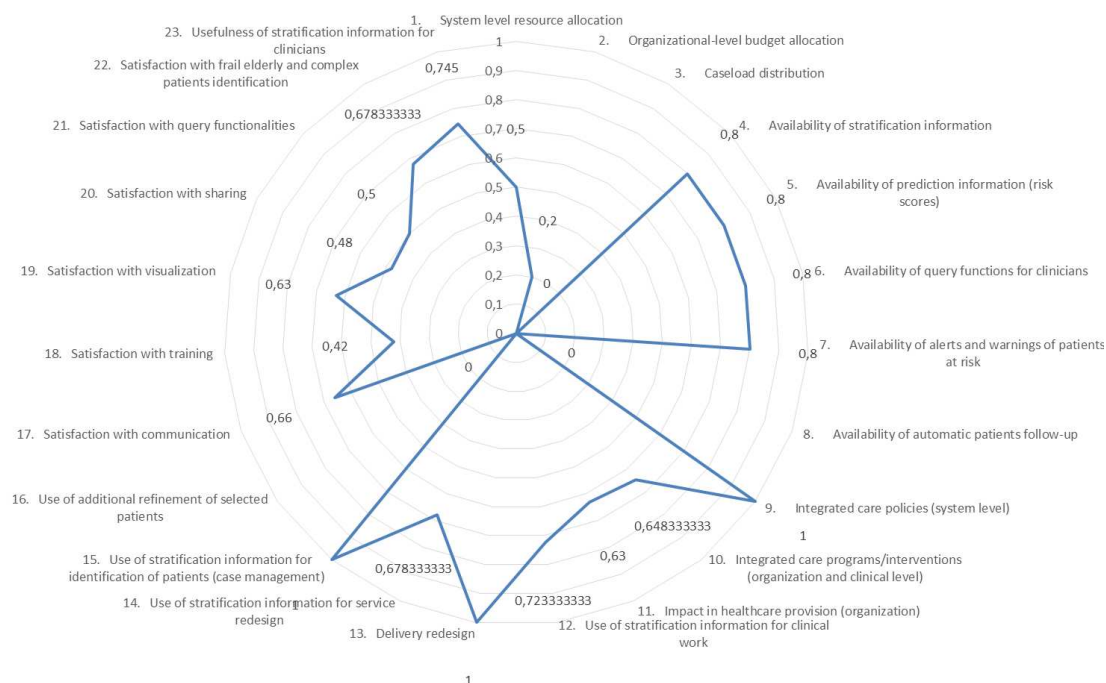
## VISUALIZATION

As a final stage of the development of the Performance Management Framework, we aim to design a visual outlet of how the framework would look like and how practical it could be to help evaluators to identify the potential areas of improvement both in individual analysis and in comparative analysis between European regions. In order to create this first visual approach we have gathered provisional data from the region of Catalonia.

In Catalonia, there is a system-wide implementation of a risk stratification tool based on the Clinical Risk Groups methodology. Its deployment ranges from primary to specialty care and both doctors, nurses and managers use it. Its applications are also of different kind covering initial experiences of risk adjustment capitation, identification of frail and complex chronic patients for integrated care interventions.

The following figures shows an initial visualization of the Performance Management Framework for the region of Catalonia.

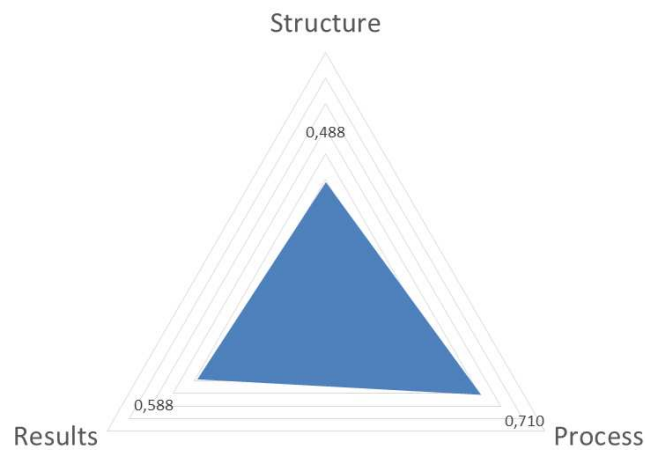
**Figure 2. Visualization of the Performance Management Framework for the region of Catalonia (Spain)**





This visualization may be synthesized at dimension level as it show in the figure 3, although an important degree of specificity is lost in this summarized illustration.

**Figure 3. Visualization of the Performance Management Framework at dimension level for the region of Catalonia (Spain)**



The addition of other regions data will make the tool useful for country/region comparison and detection of elements for improvement.

## 7 References

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1. Purdy S. Avoiding hospital admissions. What does the research evidence say? The Kings Fund. December 2010
2. Donabedian, A. The quality of care: How can it be assessed? JAMA (1988): 260(12), 1743-1748.
3. Berwick, Donald M., Thomas W. Nolan, and John Whittington. "The triple aim: care, health, and cost." Health Affairs 27.3 (2008): 759-769
4. Porter, Michael E. "What is value in health care?" New England Journal of Medicine 363.26 (2010): 2477-2481
5. Glasgow RE, Vogt TM, Boles SM. Evaluating the Public Health Impact of Health Promotion Interventions: the RE-AIM Framework. American Journal of Public Health 1999: 89(9)

# 8

## Annex

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**Annex I. Feasibility and Impact Survey (WP5)**

**Annex II. Impact and Satisfaction Survey (WP6)**

## Annex I. Feasibility and Impact Survey (WP5)

### Questions about Impact of the Introduction of the Risk Stratification Tool

**31. Do you consider that the stratification tool is useful for you at your daily practice?**

☒ Yes

☐ No

Why?

**32. Do you consider that the stratification tool has had an impact in your health service? (Being 1 very considerable impact and 5 not considerable impact) (*cambiar los likerts porn um*):**

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

Please explain your answer:

**33. How many people in your organization are actively using the stratification information in their daily practice? (Being 1 nobody and 5 almost everybody)**

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

**36. How many people in your organization are moving from a disease management approach of health delivery to a patient management approach? (Being 1 nobody and 5 almost everybody)**

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

**37. When a new intervention is defined, do you consider that the risk stratification information is taken into account in the definition process? (Being 1 Never and 5 Always)**

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

**38. Did stratification change the way health services are financed or reimbursed?**

- ☐ Yes
- ☐ No
- ☐ DK/NA

**39. Does the commissioner use stratification information to allocate resources geographically/between organizations?**

- ☐ Yes
- ☐ No
- ☐ DK/NA

**40. Do healthcare providers use stratification information to allocate resources within their organisation?**

- ☐ Yes
- ☐ No
- ☐ DK/NA

**41. Is stratification information used for workload distribution within healthcare teams?**

- ☐ Yes
- ☐ No
- ☐ DK/NA

## Annex II. Survey B: Impact and Satisfaction (WP6)

# Stratification Impact and Satisfaction Questionnaire for Clinicians and Health Service Managers

The objective of this questionnaire is to obtain information to address the impact that the introduction of risk stratification in a health system has in healthcare provision as well as to measure satisfaction amongst clinicians involved.

By collecting information from different regions and countries, from diverse types of organizations, from different healthcare levels and/or social care and finally, from many types of Risk Stratification tools and their implementation processes, we intend to generate knowledge on the drivers that make the implementation process successful.

## General Questions

### 1. About you:

Job title:

Setting:

☐ Primary Care

☐ Specialized Care

☐ Social Care

How long have you been involved in health service provision (years):

Region: \_\_\_\_\_

Country: \_\_\_\_\_

### 2. Which profile best fits you?

*Regarding your current occupation*

☐ Physician

☐ Nurse

☐ Other health professional. Please specify: \_\_\_\_\_

☐ Healthcare Manager

## Questions about Impact and Satisfaction amongst Professionals

### 1. Are you actively using the information produced by risk stratification in your daily practice? (Likert 6)

☐ Intensively

☐ Never

### 2. Do you consider that the stratification information provided to you has lead you to work in a more coordinated way with other levels of care (primary care, hospital care or social care,...)? (Likert 6)

- ☐ Always
- ☐ Never

**3. Do you consider that the stratification information provided to you is useful in your daily practice?**

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

Why?

**4. When you are involved in the design of a new intervention, do you take into account the information provided by risk stratification?**

- ☐ Never
- ☐ Rarely
- ☐ Occasionally
- ☐ Almost always
- ☐ Always

**5. Do you consider that the stratification tool has had an impact in healthcare provision in your organization?**

- ☐ Very considerable
- ☐ Considerable
- ☐ Neither considerable nor inconsiderable
- ☐ Slightly considerable
- ☐ Inconsiderable

Please explain your answer:

**6. Please click the option that best represents your view:**

**a. I am satisfied with the communication I have received about the stratification implementation**

- ☐ Strongly agree
- ☐ Agree

- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

**b. I am satisfied with the training I have received about the stratification implementation**

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

**c. I am satisfied by the way I visualize the stratification results in the ICTs**

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

**d. I am satisfied by the way I can share the stratification results using the ICTs**

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

**e. I am satisfied by the way I can manage the stratification results with the ICTs (create patients lists, follow up patients, monitor patients...)**

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree

**f. I am satisfied with the frail elderly patient identification and selection process established in the care programs of my region**

- ☐ Strongly agree
- ☐ Agree
- ☐ Neither agree nor disagree
- ☐ Disagree
- ☐ Strongly disagree



