ASSIST – assessment and evaluation tools for telemedicine

21 March 2013

ASSIST Final presentation,
ESA/ESTEC, Noordwijk

empirica Telbios IReR ISTITUTO REGIONALE DI RICERCA DELLA LOMBARDIA

Agenda

- Introduction and welcome (F. Feliciani /A. Runge, all, 5 min)
- ASSIST project overview (R. Hammerschmidt, 5 min)
- The starting point – a literature review (R. Hammerschmidt/ T. Jones, 10 min
- The ASSIST assessment framework (R. Hammerschmidt/ T. Jones, 45 min)
  - Using T4MOD as an example
- Validation of ASSIST (L. Colitta/ V. Natale, 10 min)
- Beyond ASSIST (R. Hammerschmidt, 5 min)
- Discussion (all, 30 min)

R. Hammerschmidt

ASSIST PROJECT OVERVIEW

Project funded by the ESA GSP programme

ASSIST team

- empirica
  - Consulting in eHealth for policy and industry
  - >50 Cost-benefit analysis in eHealth
  - For EC: eHealth Impact & EHR Impact
- Telbios
  - one of the first Italian Telemedicine services and solutions provider
  - Several projects on telemedicine
- IRER - Lombardy Regional Institute for Research
  - evidence-based analyses assisting implementation of policies,
  - support and advise strategic policy planning

Project funded by the ESA GSP programme

The ASSIST project

- Study Activity fully funded by ESA in the frame of the General Study Programme (GSP)
- A number of proposals were received in response to the ITT
- 250k Euro contract
- Kick-off Dec 2009

ASSIST – What for?

- Inform the improvement of telemedicine services
- Support migration from telemedicine projects into sustainable services
  - Focus on telemedicine service not project
- Evaluate outcomes and impacts of telemedicine service

Project funded by the ESA GSP programme

Output of ASSIST

- Assessment framework
  - Sound – literature review
  - Comprehensive - collection of methods for data collection, analysis and reporting
  - Validated – tested by 5 telemedicine projects
- Self-assessment tool-kit
  - Excel-based tool

Project funded by the ESA GSP programme

R. Hammerschmidt / T. Jones

THE STARTING POINT – A LITERATURE REVIEW

Project funded by the ESA GSP programme

The foundation

- ASSIST gathered existing experience of socio-economic evaluation of telemedicine and eHealth
  - in-depth analysis of 16 assessment frameworks
  - study team's own experience from evaluating more than 50 projects
- Grouping & ranking of evaluation frameworks against 17 criteria

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Method	(a) Ex-ante (b) ex-post	(a) Explorative, (b) Explanative, (c) Modelling	(a) Quantitative (b) Qualitative:	(a) Objective (b) Subjective,	(a) Reductionistic (b) holistic.	Major analytical principles	Cost and Benefits	Testing rigour	Objectivity and bias	Sustainability	Multi stakeholders	Environment	Time dimension	Comparability of measures	Conciseness	Multi-factor analysis	Applied to: eHealth / telemed / space technology	Score	Details in chapter
EHR Impact	b	c	a	a+b	a	CBA, monetarisation, Value added for stakeholder	x	x	x	0	x	x	x	x	o	x	x/x/-	**11**	5.1.11
ESA market study method	b	c	a	a+b	a	CBA, monetarisation, Value added for stakeholder	x	x	x	o	x	x	x	x	o	x	-/x/x	**11**	5.1.8
CITL method	a	c	a	a	a	CBA, Projection of value of IT	o	x	x	o	x	x	x	x	o	x	x/-/-	**9.5**	5.1.7
Green Book	a+b	a+b	a	a+b	a	CBA	x	x	x	x	x	x	x	x	-	x	?/?/?	**9**	5.1.5
HIS modelling and simulation based CBA	a	c	a	a	a	CBA, with strong modelling elements	o	x	-	o	x	x	x	x	o	x	-/x/-	**8.5**	5.1.15
Sociotechncial multimethod evaluation	b	b	b	b	b	Socio-technical theory, wicked problems	x	-	x	-	x	x	x	-	o	x	x/?/?	**7.5**	5.1.13
Guidelines for the economic evaluation of telemedicine	B	b+c	a	a	a	CBA	x	-	-	-	x	x	o	x	o	x	-/x/-	**7**	5.1.16
Brain	a+b	a+b+c	a+b	a+b	a+b	Method review	x	-	-	o	x	x	x	-	o	x	x/-/-	**7**	5.1.3
WiBe Framework	b	b	a+b	a+b	a	CBA	o	x	-	o	-	x	x	o	-	x	x/-/-	**6.5**	5.1.9
RCT	b	b	a	a	a	Randomisation, controlled, blinding	-	x	o	o	-	-	-	x	x	-	x/x/?	**6**	5.1.1
RAND Method	a	c	a	a	a	Econometric models	o	-	-	o	o	-	x	x	x	-	x/-/-	**5.5**	5.1.6
MethoTelemed	b	b	a	a	a	Several indicators, randomised clinical trial	o	-	o	-	-	0	-	-	-	x	x/x/-	**4.5**	5.1.2
NTOIP	b	b	a	a	a	Impact indicator framework	-	-	-	-	-	-	-	-	x	x	x/x/-	**4**	5.1.4
Scottish Telecare Development Programme	b	b	a	a	a	Impact indicator framework	o	-	-	-	x	-	o	-	o	o	-/x/-	**4**	5.1.14
Balanced score card	a	c	b	a+b	a	Combination of financials and non-financial	-	-	-	x	-	x	-	-	x	x	?/?/?	**3**	5.1.12
AHRQ	b	b	a	a	a	Impact indicator framework	-	-	-	-	-	-	-	-	-	x	x/-/-	**2**	5.1.10

ASSIST – Methodological founding

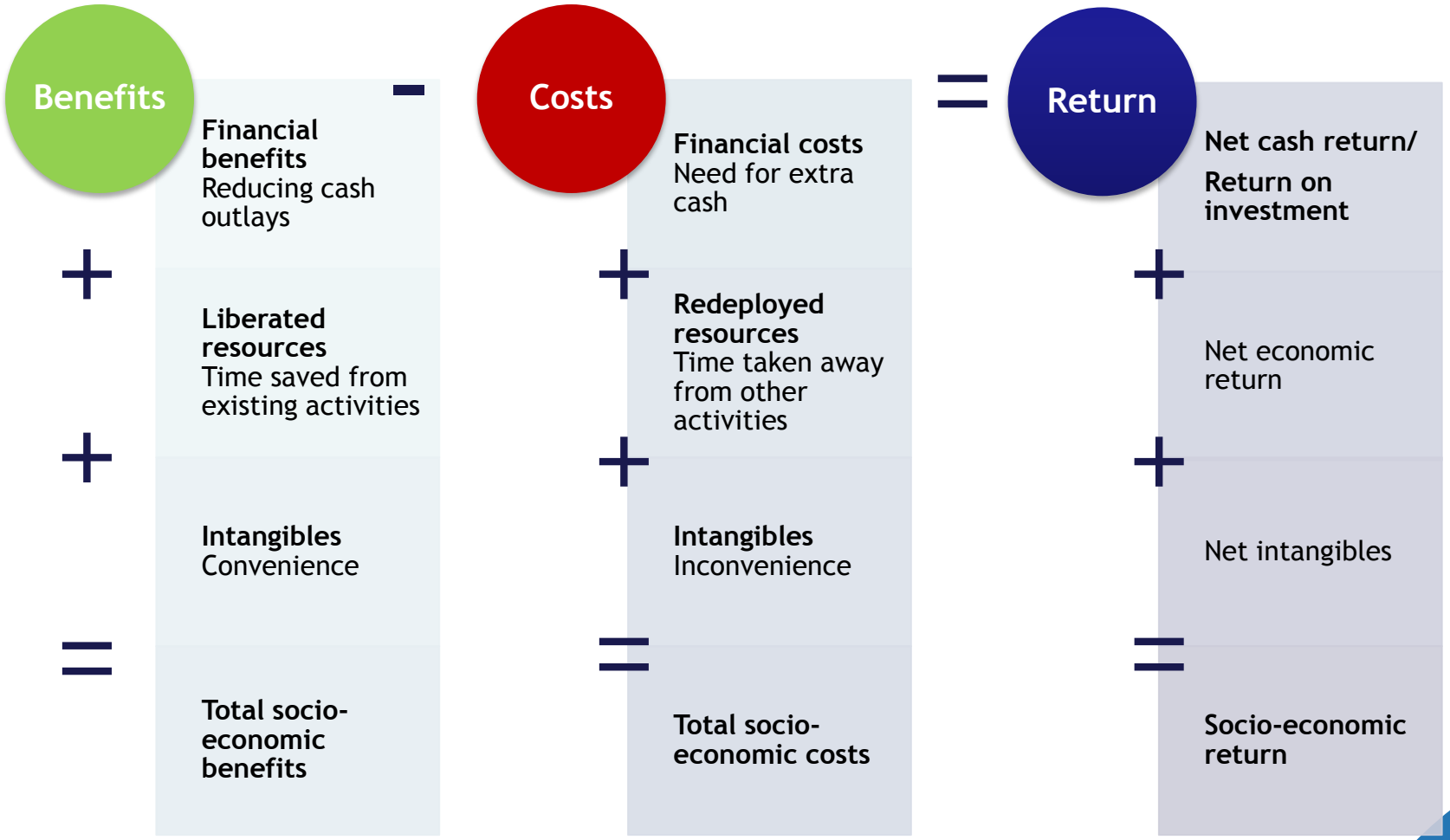
- ASSIST relies on Cost-Benefit Analysis (CBA)
  - A generic method applied to telemedicine
  - Recommended by
    - UK Green Book - Appraisal and Evaluation in Central Government
    - German WiBe – Konzept zur Wirtschaftlichkeitsberechnung
    - Hanover Health-economic consensus
    - White House Office of Management and Budget – Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs

Cost-benefit analysis

- Pro
  - Allows formative and summative evaluation
    - Summative: understand what happened
    - Formative: direct further investment decisions
  - Time series
    - Change over time
  - Stakeholders
    - Benefit shifts & veto players
  - Modeling
    - Simulation / what if
- Contra
  - Monetarisation of intangibles sometimes difficult

Project funded by the ESA GSP programme

Costs and benefits



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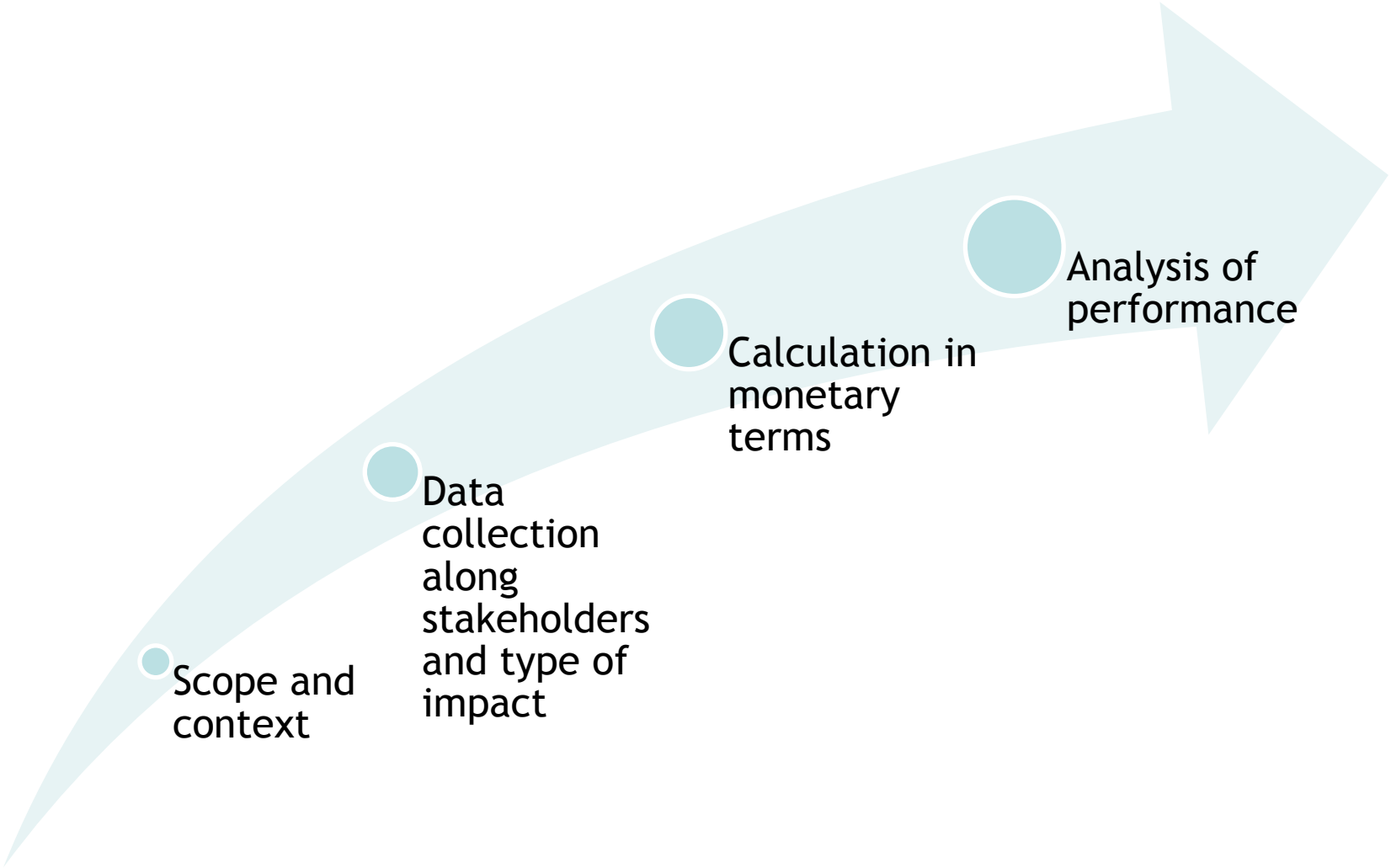
R. Hammerschmidt / T. Jones

THE ASSIST ASSESSMENT FRAMEWORK

Project funded by the ESA GSP programme

Getting started with ASSIST



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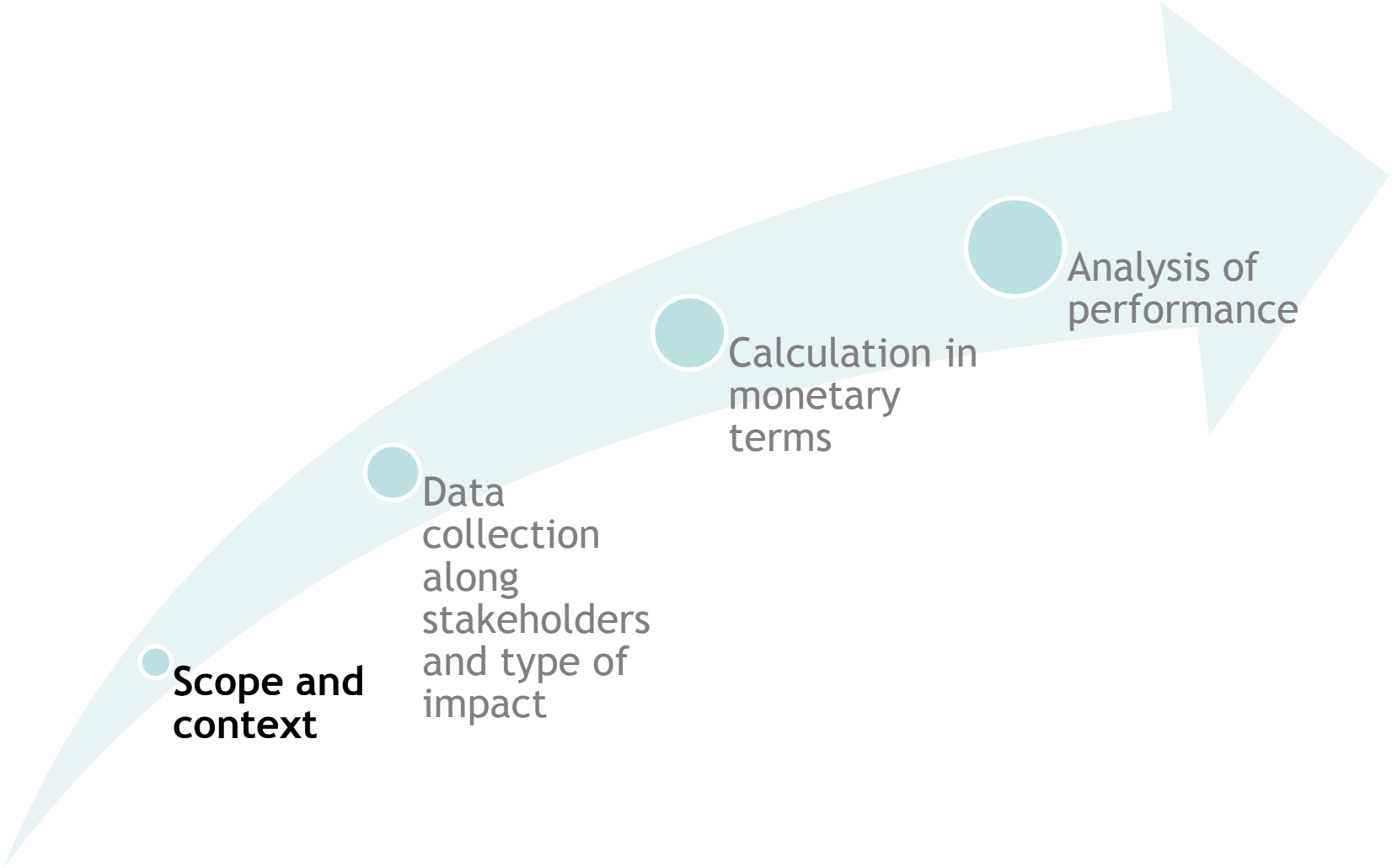
Getting started with ASSIST



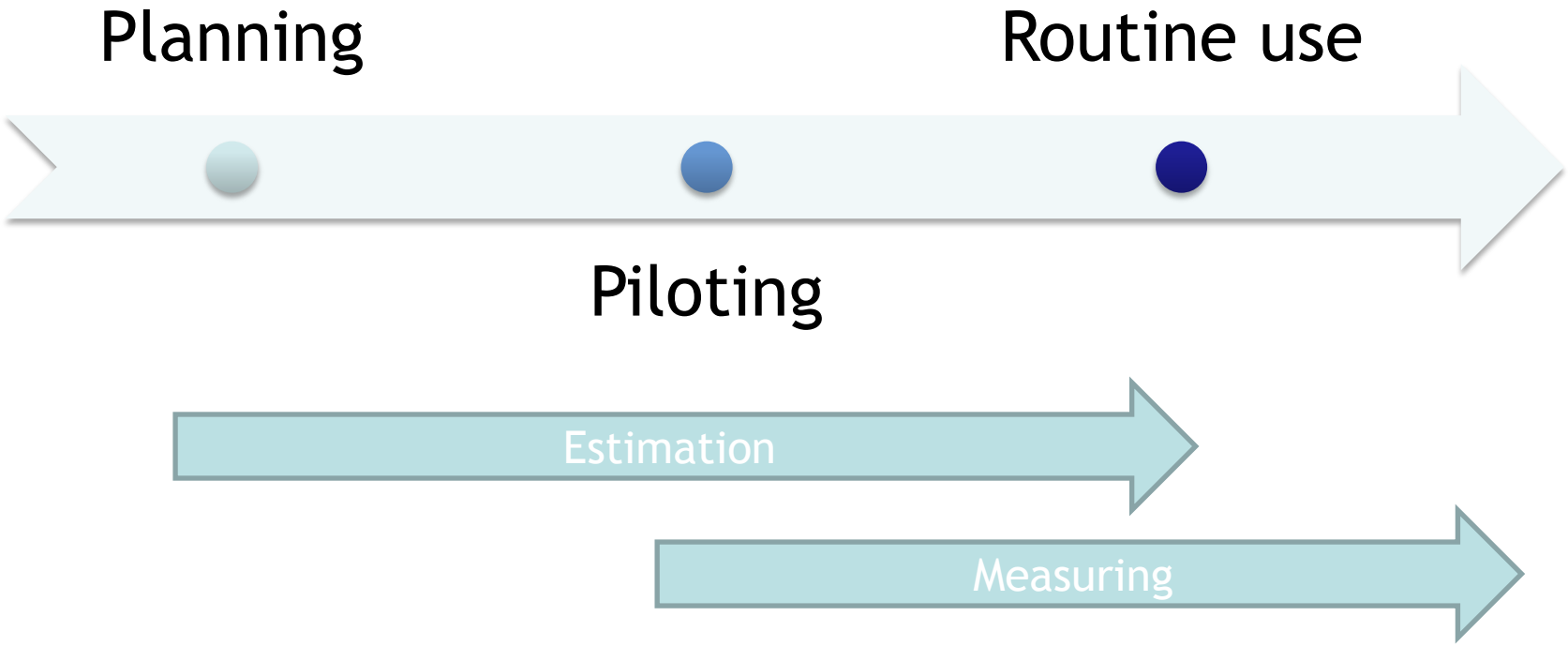
Project funded by the ESA GSP programme

What is the scope of an ASSIST assessment?

- Every ASSIST assessment is a comparison between a given status to which the evaluator wants to compare and an intervention:
  - DELTA (to be assessed with ASSIST) = Case (with TLM) – Case (without TLM)
- In the case of ASSIST, the intervention is not a single point in time but a process of changing from one status to another
  - It includes a time evolution through development, piloting and scale-up

ASSIST Assessing Telemedicine

Assessment along the development line

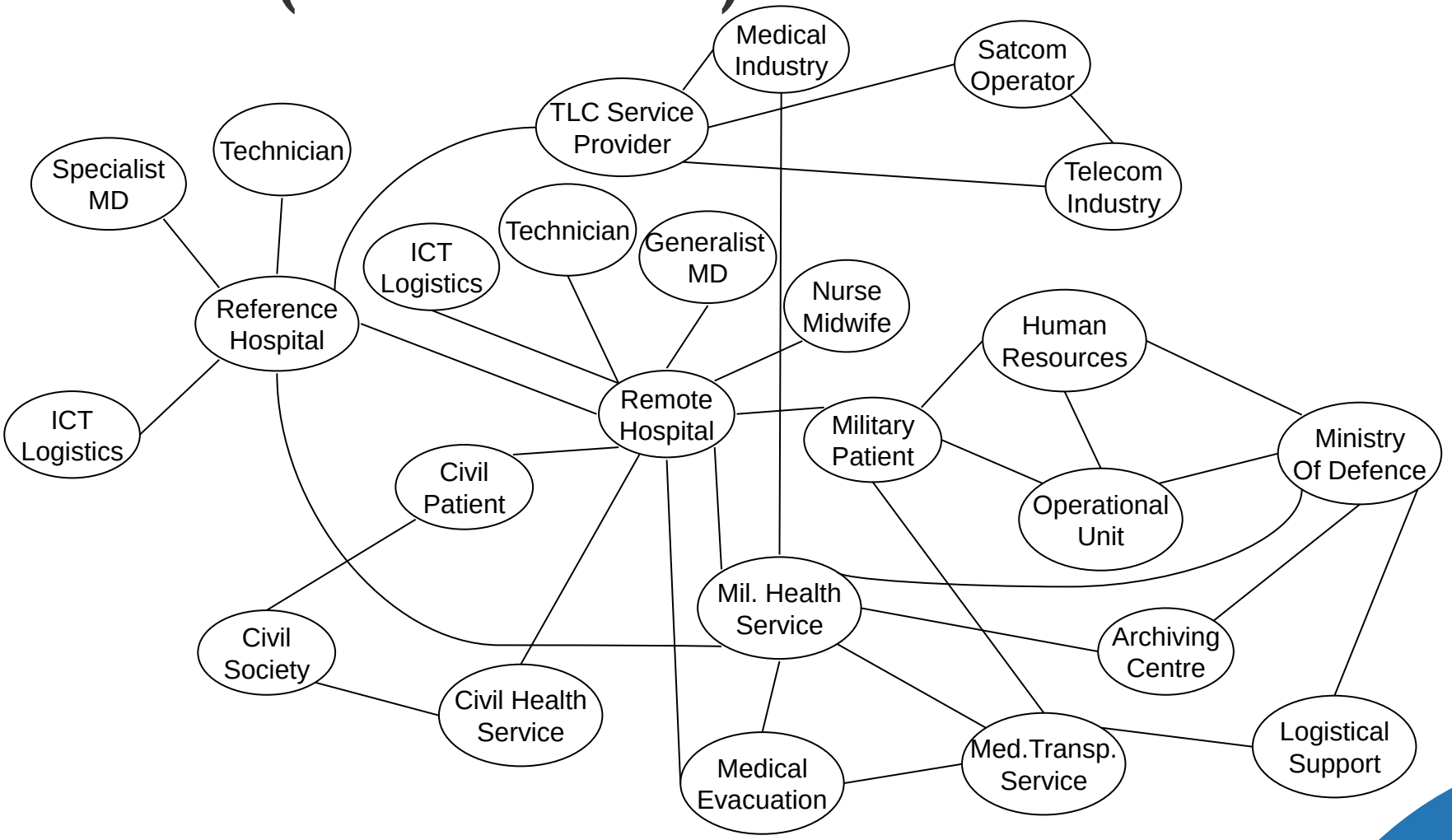


Project funded by the ESA GSP programme

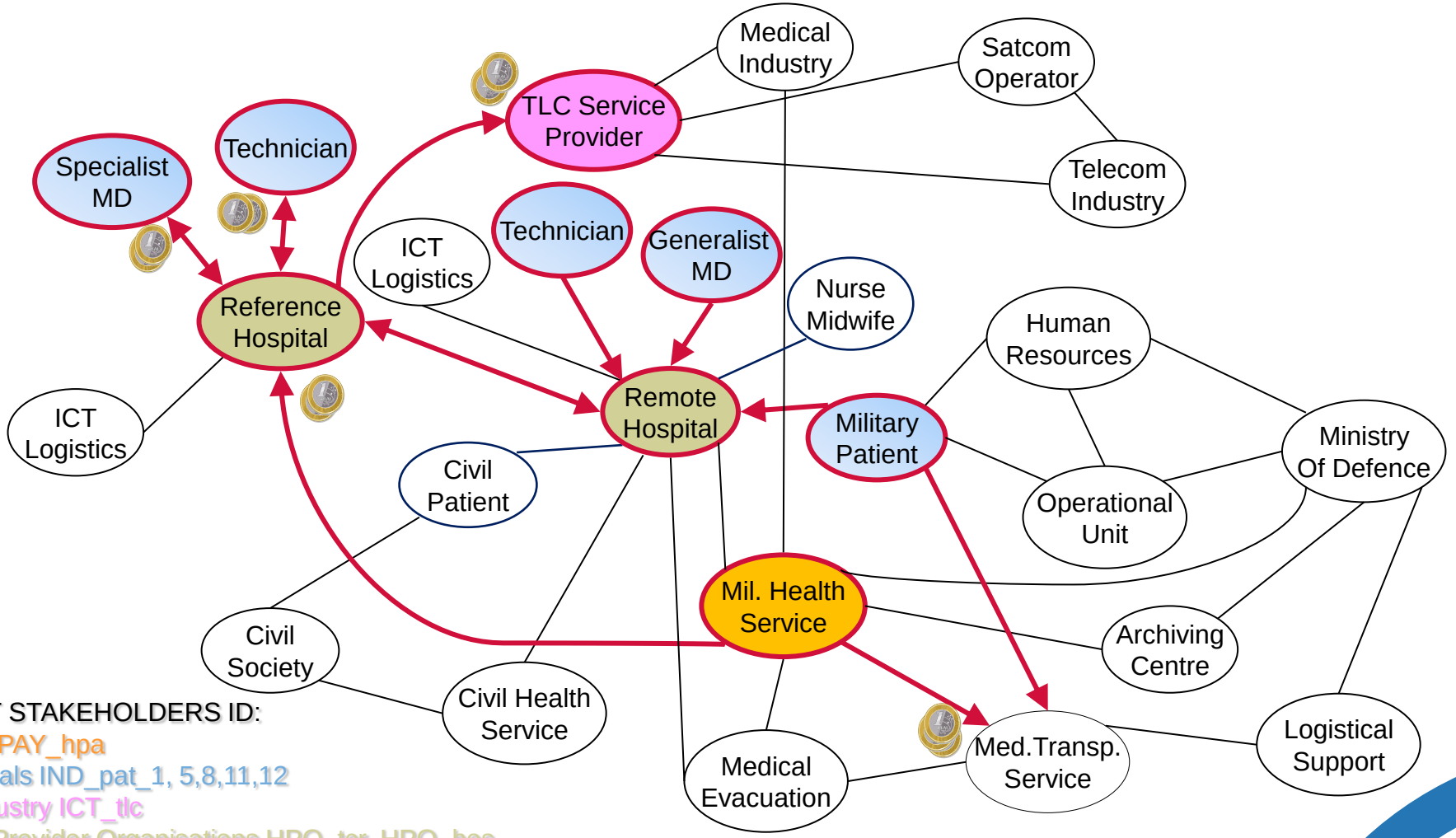
Use case T4MOD: tele-video assisted surgery between military remote and reference hospitals

- A military patient enters the remote hospital to undergo a surgery
- Through the T4MOD system, the Generalist MD in the Remote Hospital requests a tele-video assisted session, during which a Specialist MD in the Reference Hospital is requested to provide guidance
- Prior the tele-video consult, medical images of the patient are transferred from the Remote Hospital to the Reference Hospital
- The decision taken by the Generalist MD with the support of the Specialist MD is instrumental to take a decision to treat the patient locally, hence avoiding a MEDEVAC
- N.B. The above is just a simple example for ASSIST of the possible utilisation potentials of T4MOD. The T4MOD system and services can be used to support other cases (e.g. involving civil patients) in other scenarios (e.g. disaster relief)

T4MOD service models: actors (stakeholders) and interactions



The T4MOD service model used in the ASSIST instantiation



ASSIST STAKEHOLDERS ID:
Payers PAY_hpa
Individuals IND_pat_1, 5,8,11,12
ICT Industry ICT_tlc
Health Provider Organisations HPO_tcr, HPO_hos

ASSIST Assessing Telemedicine

Stakeholder mapping in ASSIST

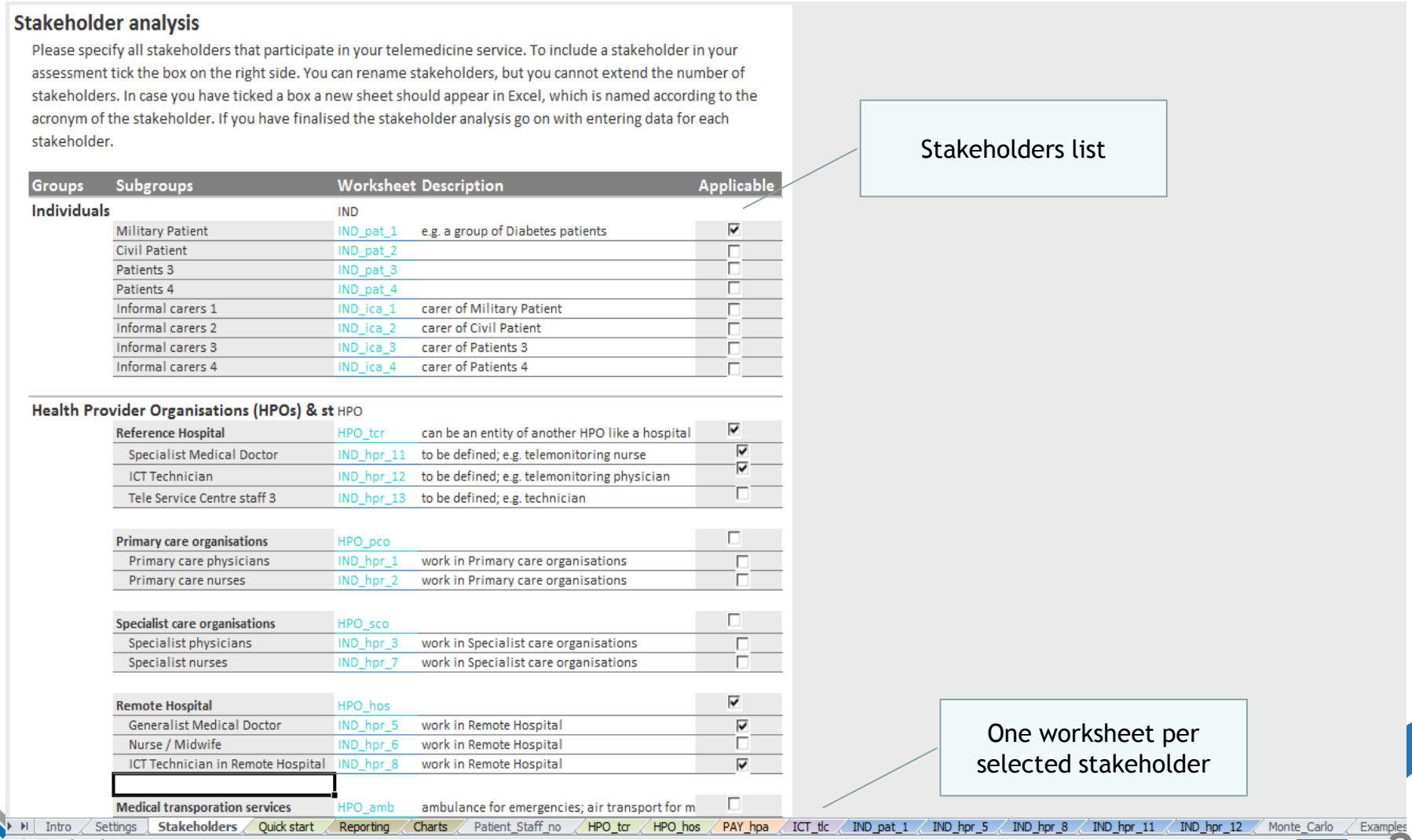
ASSIST

- Individuals
  - Patients 1 (IND_pat_1)
- Health Provider Organisations
  - Telemedicine service centre (HPO_tcr)
    - Tele Service Centre staff 1 (IND_hpr_11)
    - Tele Service Centre staff 2 (IND_hpr_12)
  - Hospitals (HPO_hos)
    - Hospital physician 1 (IND_hpr_5)
    - Hospital nurse (IND_hpr_8)
- Payers
  - Healthcare payers (PAY_hpa)
- ICT Industry
  - Telecom supplier (ICT_tlc)

Real world

- Individuals
  - Military Patients
- Health provider organisations
  - Reference Hospital
    - Specialist Medical Doctor
    - ICT Technician
  - Remote Hospital
    - Generalist Medical Doctor
    - ICT Technician in RH
- Payers
  - Military Health Service
- ICT Industry
  - Telecom supplier

Stakeholder in ASSIST



Stakeholder analysis

Please specify all stakeholders that participate in your telemedicine service. To include a stakeholder in your assessment tick the box on the right side. You can rename stakeholders, but you cannot extend the number of stakeholders. In case you have ticked a box a new sheet should appear in Excel, which is named according to the acronym of the stakeholder. If you have finalised the stakeholder analysis go on with entering data for each stakeholder.

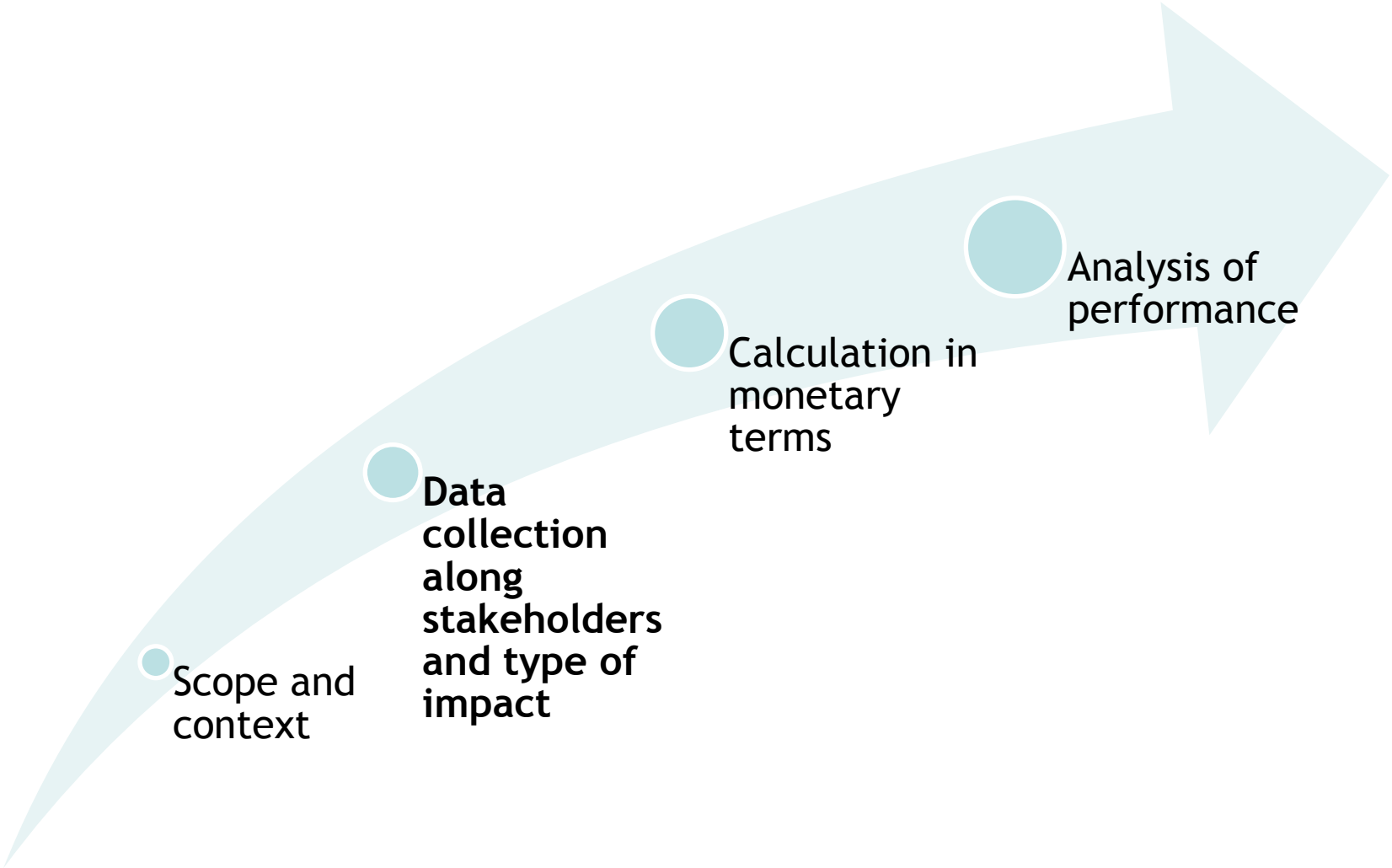
Groups	Subgroups	Worksheet	Description	Applicable
Individuals		IND		
	Military Patient	IND_pat_1	e.g. a group of Diabetes patients	☑
	Civil Patient	IND_pat_2		☐
	Patients 3	IND_pat_3		☐
	Patients 4	IND_pat_4		☐
	Informal carers 1	IND_ica_1	carer of Military Patient	☐
	Informal carers 2	IND_ica_2	carer of Civil Patient	☐
	Informal carers 3	IND_ica_3	carer of Patients 3	☐
	Informal carers 4	IND_ica_4	carer of Patients 4	☐
Health Provider Organisations (HPOs) & st		HPO		
	Reference Hospital	HPO_tcr	can be an entity of another HPO like a hospital	☑
	Specialist Medical Doctor	IND_hpr_11	to be defined; e.g. telemonitoring nurse	☑
	ICT Technician	IND_hpr_12	to be defined; e.g. telemonitoring physician	☑
	Tele Service Centre staff 3	IND_hpr_13	to be defined; e.g. technician	☐
	Primary care organisations	HPO_pco		☐
	Primary care physicians	IND_hpr_1	work in Primary care organisations	☐
	Primary care nurses	IND_hpr_2	work in Primary care organisations	☐
	Specialist care organisations	HPO_sco		☐
	Specialist physicians	IND_hpr_3	work in Specialist care organisations	☐
	Specialist nurses	IND_hpr_7	work in Specialist care organisations	☐
	Remote Hospital	HPO_hos		☑
	Generalist Medical Doctor	IND_hpr_5	work in Remote Hospital	☑
	Nurse / Midwife	IND_hpr_6	work in Remote Hospital	☐
	ICT Technician in Remote Hospital	IND_hpr_8	work in Remote Hospital	☑
	Medical transporation services	HPO_amb	ambulance for emergencies; air transport for m	☐

Intro | Settings | Stakeholders | Quick start | Reporting | Charts | Patient_Staff_no | HPO_tcr | HPO_hos | PAY_hpa | ICT_tlc | IND_pat_1 | IND_hpr_5 | IND_hpr_8 | IND_hpr_11 | IND_hpr_12 | Monte_Carlo | Examples

Stakeholders list

One worksheet per selected stakeholder

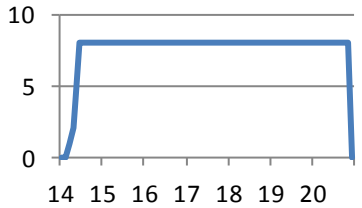
Getting started with ASSIST



Project funded by the ESA GSP programme

T4MOD Development over time

- Jan 2014 - Dec 2021 (7 years)
  - time step: month (m)
- Individuals: Military Patient (IND_pat_1)
  - First patient in m3, 2 in m4, 4 in m5, then 8 from m6 (two patients per week)



- Reference Hospital [TELEMEDICINE PROVIDER]
  - Specialist Medical Doctor (IND_hpr_11)
    0.5 day equivalent full staff per patient into the system. Therefore the fraction of manpower per month per patient is 0.5/30
  - ICT Technician(IND_hpr_12)
    1/3 equivalent full person starting at m1, replaced every 24m
- Remote Hospital [TELEMEDICINE RECEIVER]
  - Generalist Medical Doctor (IND_hpr_5)
    Starting at m1, then a new one is coming for replacement every 4m
  - ICT Technician in RH (IND_hpr_8)
    Starting at m1, then a new one is coming for replacement every 6m

Time entries - Patient_Staff_no

Patient and staff numbers

	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14
Wage plus employer contribution of staff	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Wage plus employer contribution of staff per minute	2.17	2.17						2.17	2.17	2.17	2.17	2.17
Wage plus employer contribution of new staff per minute	2.17	0.00						0.00	2.17	0.00	0.00	0.00
ICT Technician in Remote Hospital work in Remote Hospital												
New staff providing and supporting the service	1	0	0	0	0	0	1	0	0	0	0	0
Staff leaving service	0	0	0	0	0	0	1	0	0	0	0	0
Change in staff number	1	0	0	0	0	0	0	0	0	0	0	0
Staff in period	1	1	1	1	1	1	1	1	1	1	1	1
Income of all staff	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Income of all staff per minute	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Income of new staff per minute	0.29	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00
Wage plus employer contribution of staff	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Wage plus employer contribution of staff per minute	1.62	1.62					1.62	1.62	1.62	1.62	1.62	1.62
Wage plus employer contribution of new staff per minute	1.62	0.00					1.62	0.00	0.00	0.00	0.00	0.00
Specialist Medical Doctor Reference Hospital												
New staff providing and supporting the service	0			66667	0.0333333	0.0666667	0	0	0	0	0	0
Staff leaving service	0			0	0	0	0	0	0	0	0	0
Change in staff number	0			66667	0.0333333	0.0666667	0	0	0	0	0	0
Staff in period	0	0	0.0166667	0.0333333	0.0666667	0.1333333	0.1333333	0.1333333	0.1333333	0.1333333	0.1333333	0.1333333
Income of all staff	0	0	2,500	5,000	10,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Income of all staff per minute	0.00	0.00	0.00	0.01	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04

ICT Technician, changing every 6 months

Specialist MD depends on number of patients

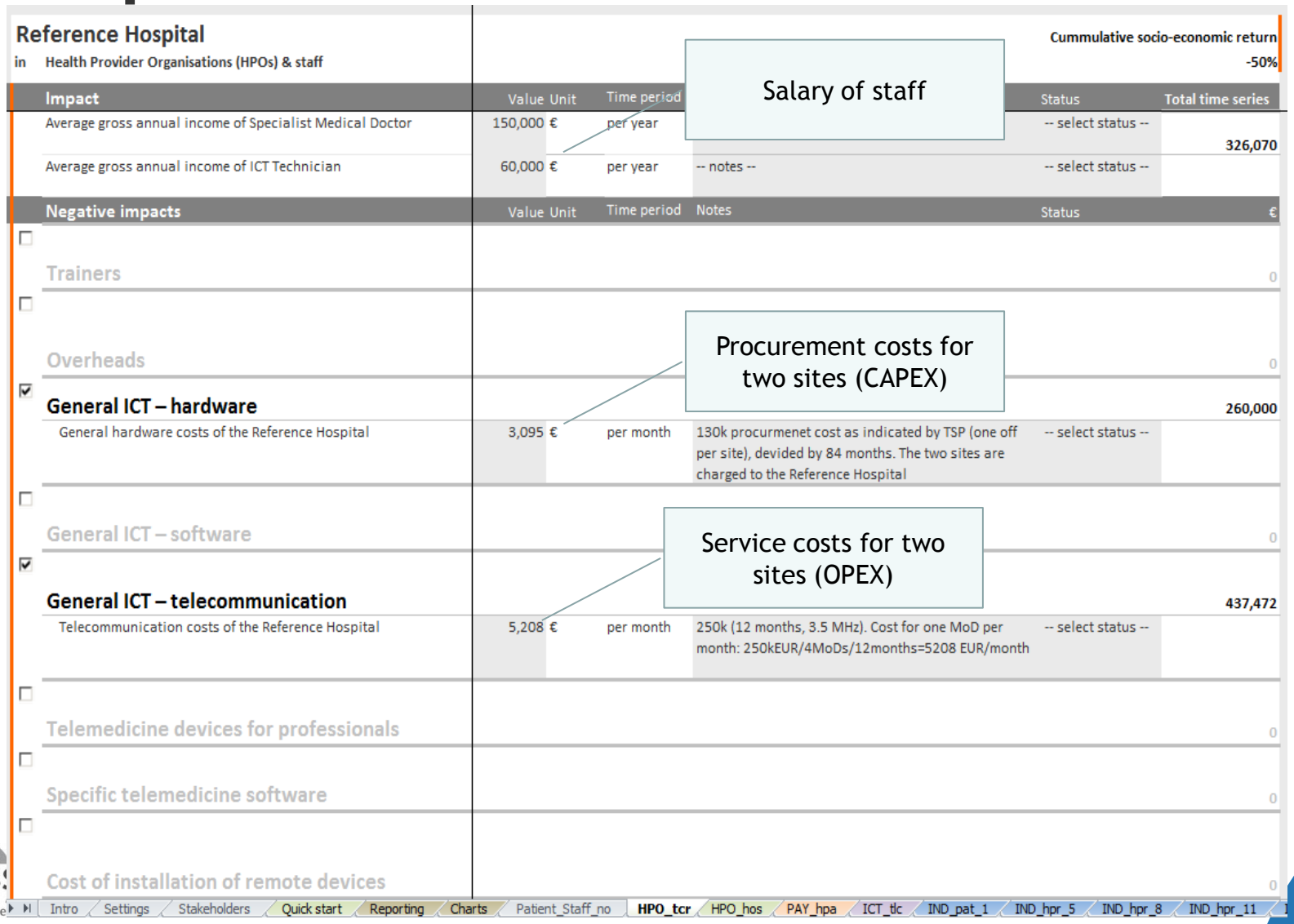
Francesco Feliciani:
0.5 day equivalent full staff per patient into the system. Therefore the fraction of manpower per month per patient is 0.5/30

ASSIST Assessing Telemedicine

Walkthrough for Reference Hospital

1) Individuals: Military Patient (IND_pat_1)
2) Health Provider Organisations
3) Reference Hospital (HPO_tcr)
4) Specialist Medical Doctor (IND_hpr_11)
5) ICT Technician(IND_hpr_12)
6) Remote Hospital (HPO_hos)
7) Generalist Medical Doctor (IND_hpr_5)
8) ICT Technician in RH (IND_hpr_8)
9) Payers: Military Health Service (PAY_hpa)
10) ICT Industry (ICT_tlc)

Reference Hospital – Negative impacts



Reference Hospital

in Health Provider Organisations (HPOs) & staff

Cummulative socio-economic return -50%

Impact	Value	Unit	Time period		Status	Total time series
Average gross annual income of Specialist Medical Doctor	150,000	€	per year		-- select status --	326,070
Average gross annual income of ICT Technician	60,000	€	per year	-- notes --	-- select status --	

Negative impacts	Value	Unit	Time period	Notes	Status	€
Trainers						0
Overheads						0
General ICT – hardware						260,000
General hardware costs of the Reference Hospital	3,095	€	per month	130k procurmenet cost as indicated by TSP (one off per site), devided by 84 months. The two sites are charged to the Reference Hospital	-- select status --	
General ICT – software						0
General ICT – telecommunication						437,472
Telecommunication costs of the Reference Hospital	5,208	€	per month	250k (12 months, 3.5 MHz). Cost for one MoD per month: 250kEUR/4MoDs/12months=5208 EUR/month	-- select status --	
Telemedicine devices for professionals						0
Specific telemedicine software						0
Cost of installation of remote devices						0

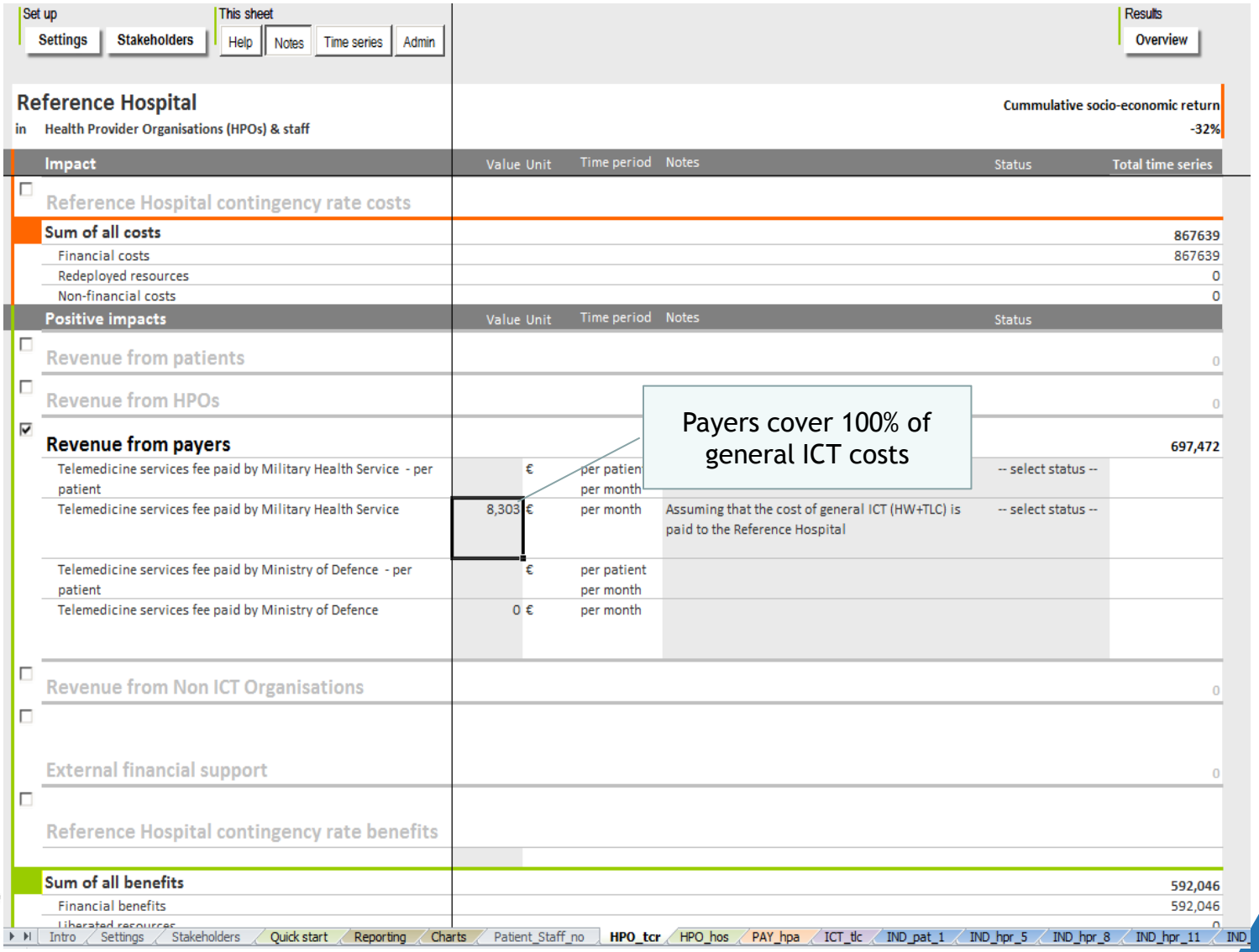
Salary of staff

Procurement costs for two sites (CAPEX)

Service costs for two sites (OPEX)

Intro | Settings | Stakeholders | Quick start | Reporting | Charts | Patient_Staff_no | HPO_tcr | HPO_hos | PAY_hpa | ICT_tlc | IND_pat_1 | IND_hpr_5 | IND_hpr_8 | IND_hpr_11

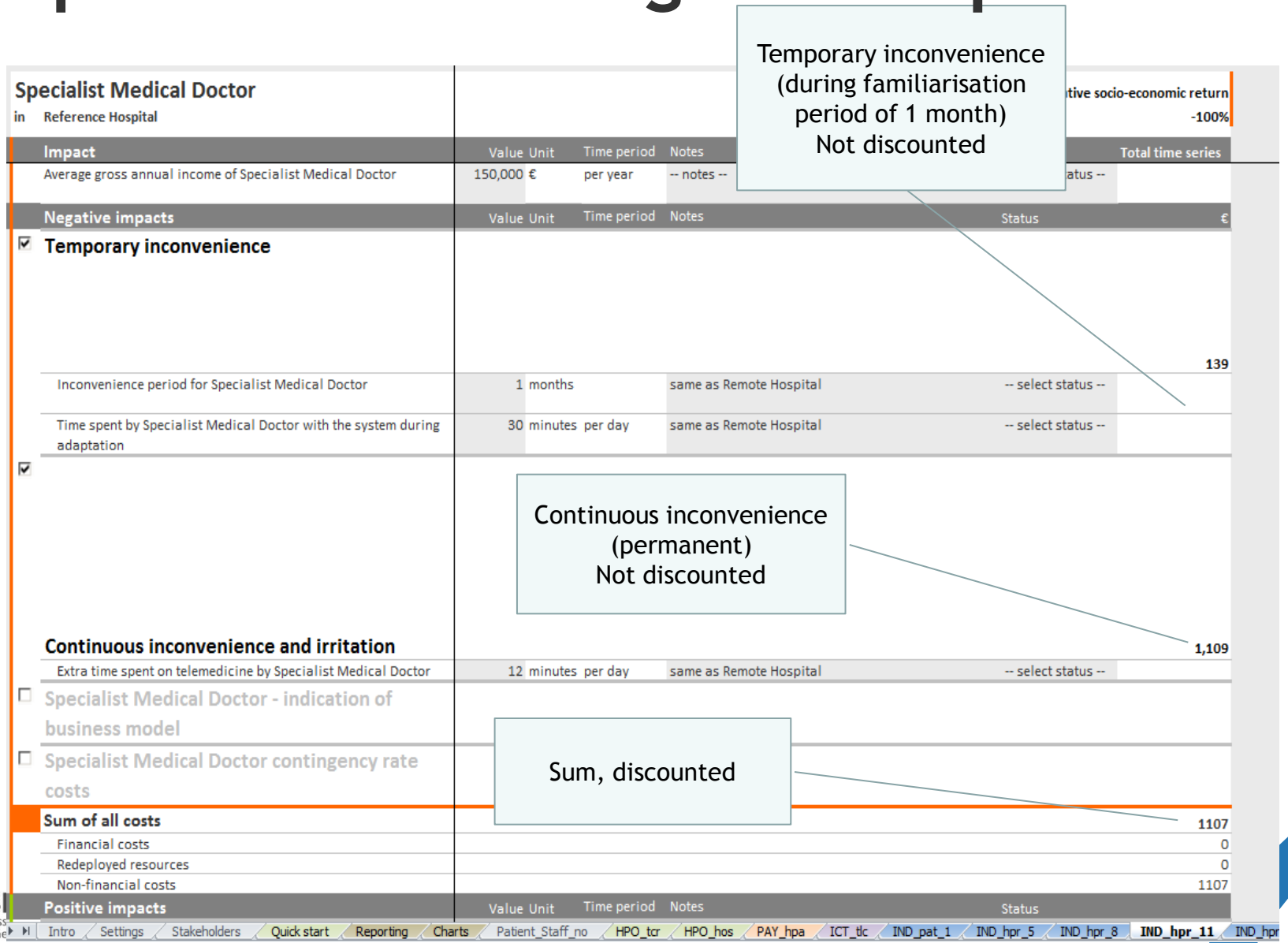
Reference Hospital - Positive impacts



Walkthrough for Specialist Medical Doctor

1) Individuals: Military Patient (IND_pat_1)
2) Health Provider Organisations
3) Reference Hospital (HPO_tcr)
4) Specialist Medical Doctor (IND_hpr_11)
5) ICT Technician(IND_hpr_12)
6) Remote Hospital (HPO_hos)
7) Generalist Medical Doctor (IND_hpr_5)
8) ICT Technician in RH (IND_hpr_8)
9) Payers: Military Health Service (PAY_hpa)
10) ICT Industry (ICT_tlc)

Specialist MD - Negative impacts



Temporary inconvenience (during familiarisation period of 1 month) Not discounted

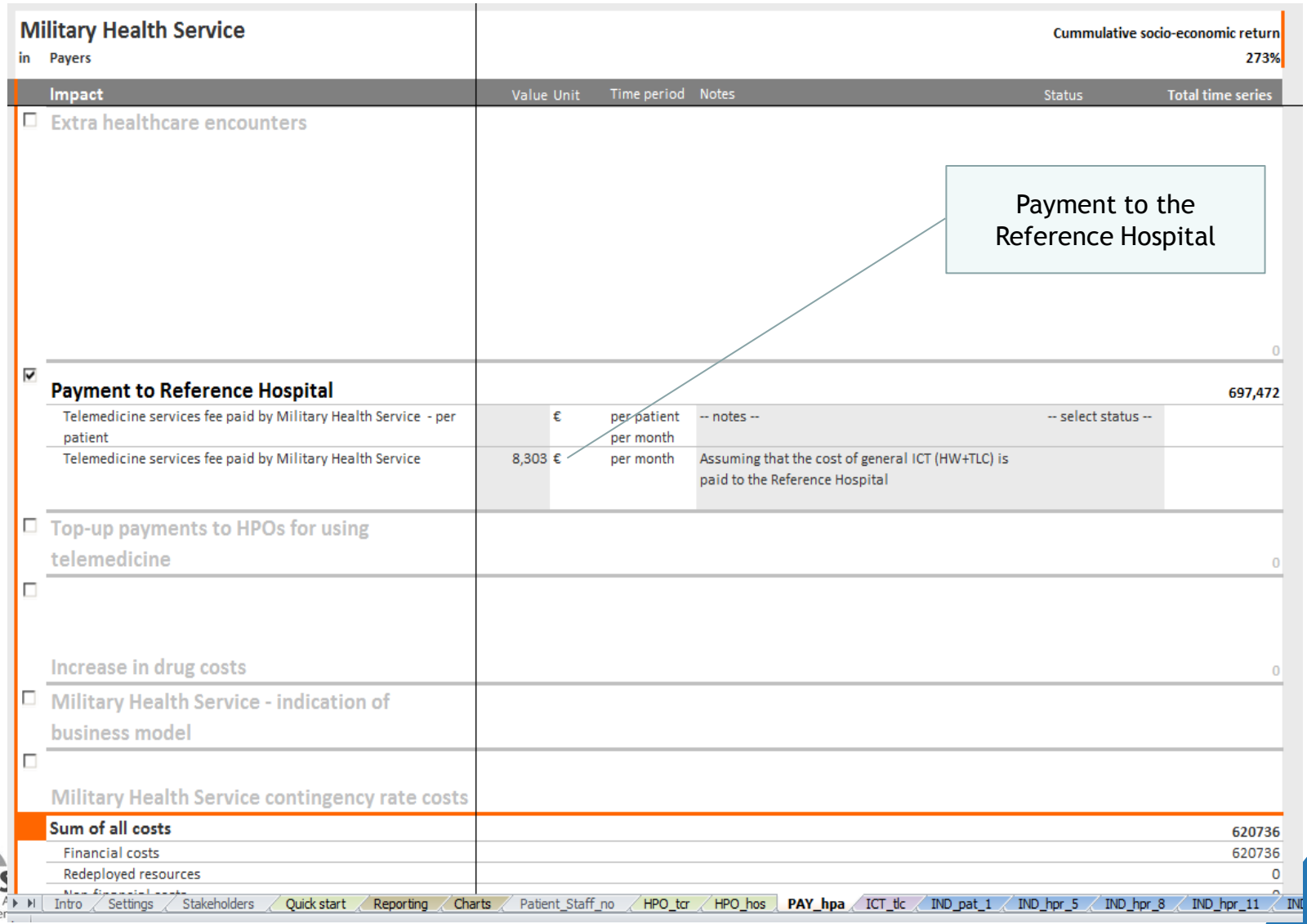
Continuous inconvenience (permanent) Not discounted

Sum, discounted

Walkthrough for Health Medical Service

1) Individuals: Military Patient (IND_pat_1)
2) Health Provider Organisations
3) Reference Hospital (HPO_tcr)
4) Specialist Medical Doctor (IND_hpr_11)
5) ICT Technician(IND_hpr_12)
6) Remote Hospital (HPO_hos)
7) Generalist Medical Doctor (IND_hpr_5)
8) ICT Technician in RH (IND_hpr_8)
9) Payers: Military Health Service (PAY_hpa)
10) ICT Industry (ICT_tlc)

Military Health Services - Impacts



Military Health Service

in Payers

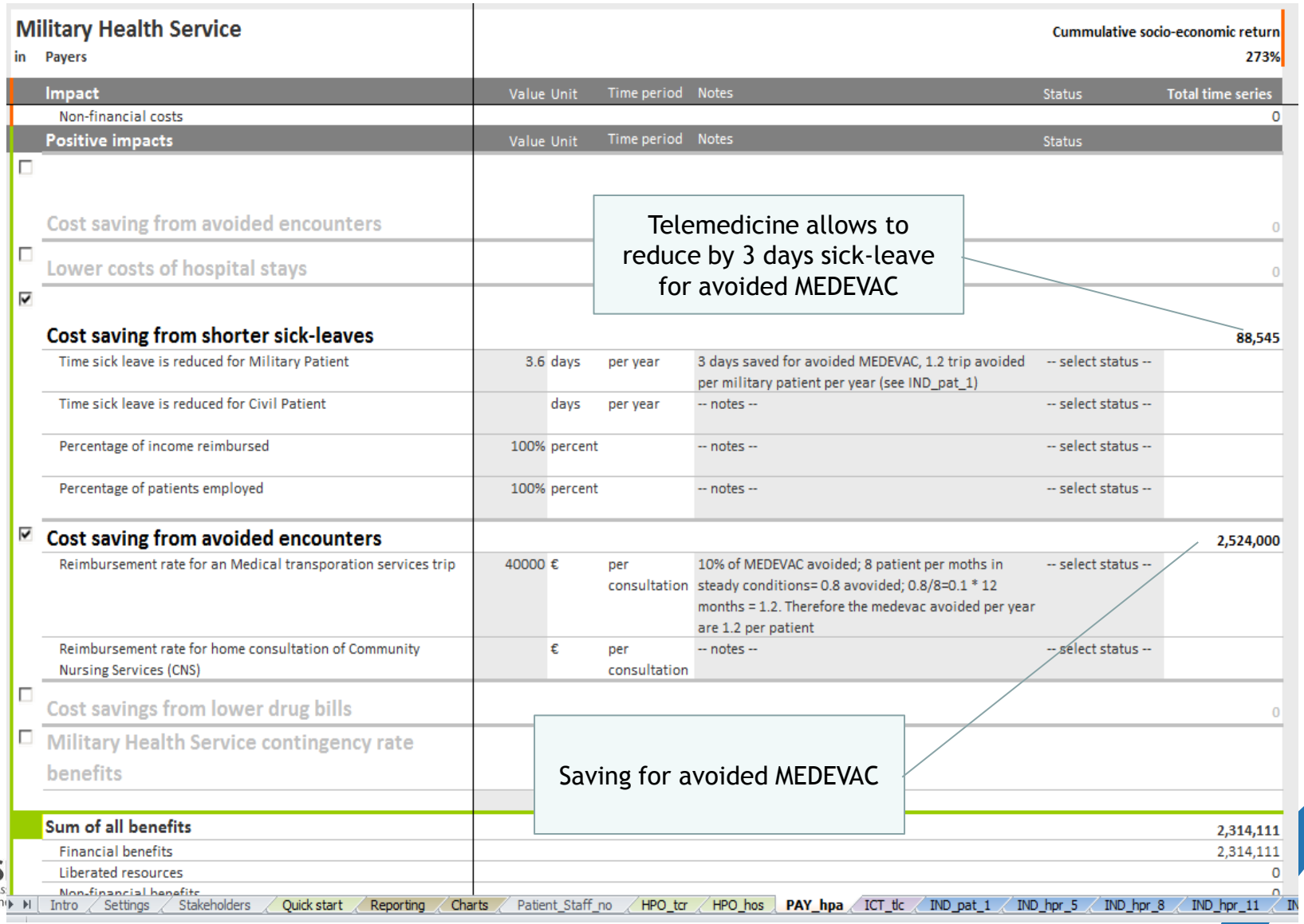
Cummulative socio-economic return: 273%

Impact	Value	Unit	Time period	Notes	Status	Total time series
☐ Extra healthcare encounters						0
☑ **Payment to Reference Hospital**						697,472
Telemedicine services fee paid by Military Health Service - per patient		€	per patient per month	-- notes --	-- select status --	
Telemedicine services fee paid by Military Health Service	8,303	€	per month	Assuming that the cost of general ICT (HW+TLC) is paid to the Reference Hospital		
☐ Top-up payments to HPOs for using telemedicine						0
☐ Increase in drug costs						0
☐ Military Health Service - indication of business model						
☐ Military Health Service contingency rate costs						
Sum of all costs						620736
Financial costs						620736
Redeployed resources						0

Payment to the Reference Hospital

Intro | Settings | Stakeholders | Quick start | Reporting | Charts | Patient_Staff_no | HPO_tcr | HPO_hos | PAY_hpa | ICT_tlc | IND_pat_1 | IND_hpr_5 | IND_hpr_8 | IND_hpr_11

Military Health Services - Impacts



Military Health Service

in Payers

Cummulative socio-economic return: 273%

Impact	Value	Unit	Time period	Notes	Status	Total time series
Non-financial costs						0

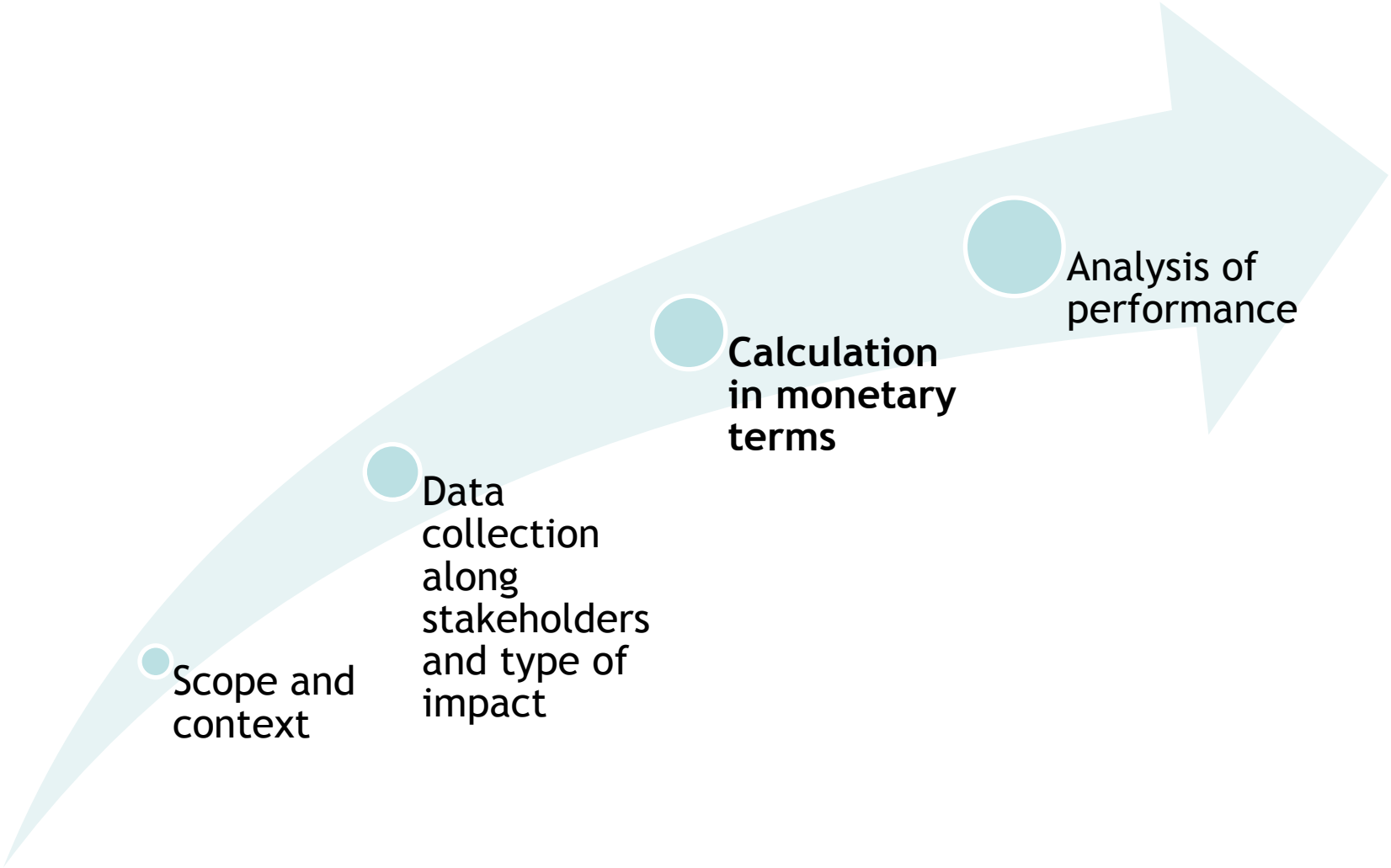
Positive impacts	Value	Unit	Time period	Notes	Status	
Cost saving from avoided encounters						0
Lower costs of hospital stays						0
Cost saving from shorter sick-leaves						**88,545**
Time sick leave is reduced for Military Patient	3.6	days	per year	3 days saved for avoided MEDEVAC, 1.2 trip avoided per military patient per year (see IND_pat_1)	-- select status --	
Time sick leave is reduced for Civil Patient		days	per year	-- notes --	-- select status --	
Percentage of income reimbursed	100%	percent		-- notes --	-- select status --	
Percentage of patients employed	100%	percent		-- notes --	-- select status --	
Cost saving from avoided encounters						**2,524,000**
Reimbursement rate for an Medical transporation services trip	40000	€	per consultation	10% of MEDEVAC avoided; 8 patient per moths in steady conditions= 0.8 avovided; 0.8/8=0.1 * 12 months = 1.2. Therefore the medevac avoided per year are 1.2 per patient	-- select status --	
Reimbursement rate for home consultation of Community Nursing Services (CNS)		€	per consultation	-- notes --	-- select status --	
Cost savings from lower drug bills						0
Military Health Service contingency rate benefits						
Sum of all benefits						**2,314,111**
Financial benefits						2,314,111
Liberated resources						0
Non-financial benefits						0

Telemedicine allows to reduce by 3 days sick-leave for avoided MEDEVAC

Saving for avoided MEDEVAC

Intro | Settings | Stakeholders | Quick start | Reporting | Charts | Patient_Staff_no | HPO_tcr | HPO_hos | PAY_hpa | ICT_tlc | IND_pat_1 | IND_hpr_5 | IND_hpr_8 | IND_hpr_11

Getting started with ASSIST



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Summing up & discounting

- Cost items → Cost indicator
  - Utilisation * unit costs
- Sum of all cost
  - Cost indicator + cost indicator
- Discounting to net present values
  - Economic concept
  - Adjust for time of investment

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Reference Hospital - Time series

Reference Hospital

in Health Provider Organisations (HPOs) & staff

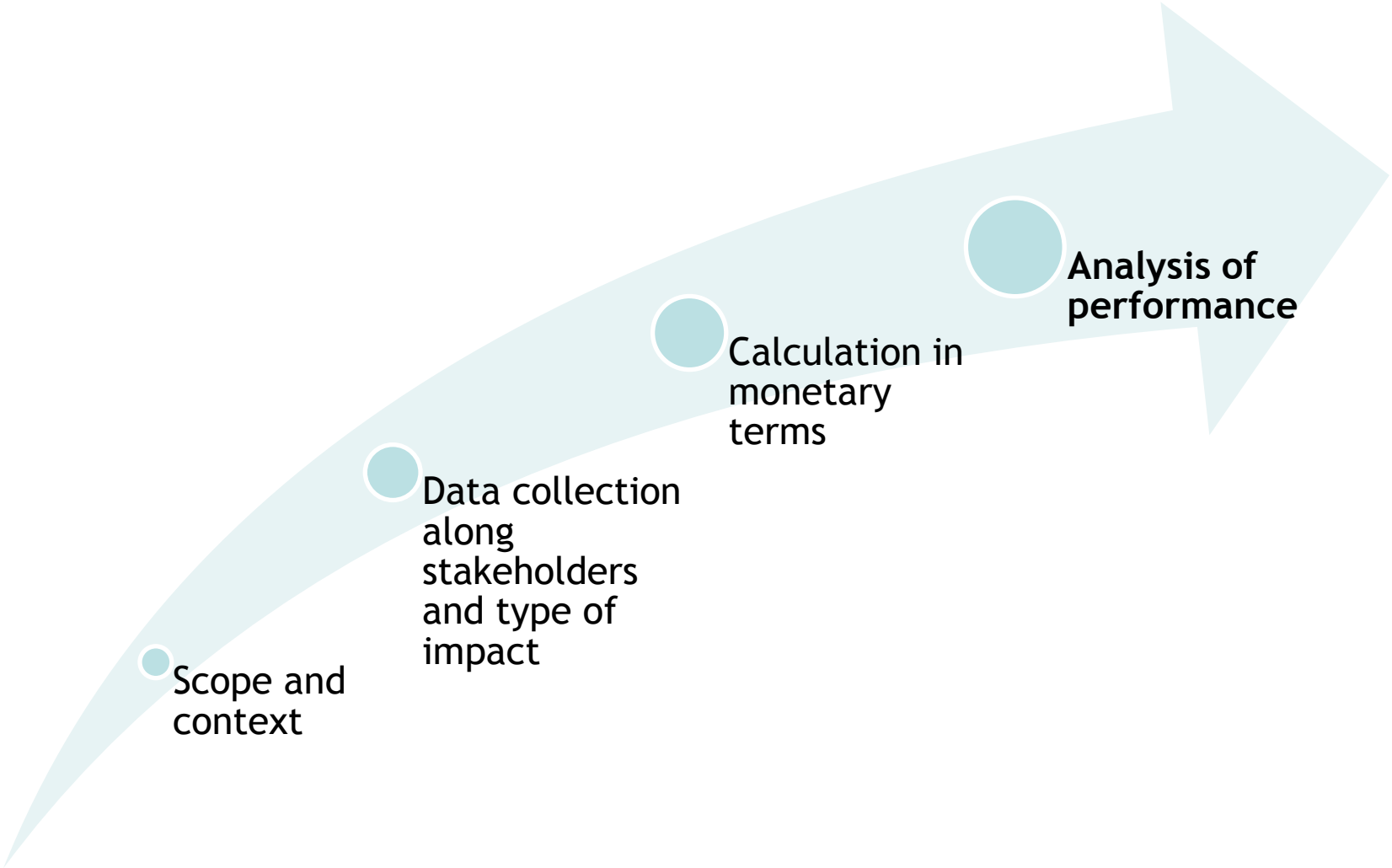
Impact	Time delay	End earlier	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-
Reference Hospital contingency rate costs		84																
Sum of all costs			10283	10242	10448	10653	11101	12036	11987	11939	11890	11842	11794	11746	11698	11651	11604	115
Financial costs			10283	10242	10448	10653	11101	12036	11987	11939	11890	11842	11794	11746	11698	11651	11604	115
Redeployed resources			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Non-financial costs			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Positive impacts																		
Revenue from patients		84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue from HPOs		84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue from payers			8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,303	8,3
Telemedicine services fee paid by Military Health Service - per patient																		
Telemedicine services fee paid by Military Health Service																		
Telemedicine services fee paid by Ministry of Defence - per patient																		
Telemedicine services fee paid by Ministry of Defence																		
Revenue from Non ICT Organisations		84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
External financial support		84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Reference Hospital contingency rate benefits		84																
Sum of all benefits			8,303	8,270	8,236	8,203	8,169	8,136	8,103	8,070	8,038	8,005	7,972	7,940	7,908	7,876	7,844	7,8
Financial benefits			8303	8270	8236	8203	8169	8136	8103	8070	8038	8005	7972	7940	7908	7876	7844	78
Liberated resources			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Discounted series (3.5% per year)

Intro | Settings | Stakeholders | Quick start | Reporting | Charts | Patient_Staff_no | HPO_tcr | HPO_hos | PAY_hpa | ICT_tlc | IND_pat_1 | IND_hpr_5 | IND_hpr_8 | IND_hpr_11 | IND_hpr_12 | Monte_Carlo | Examples

ASSIST Assessing Telemedicine

Getting started with ASSIST



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Summary

Socio Economic Return by Stakeholders

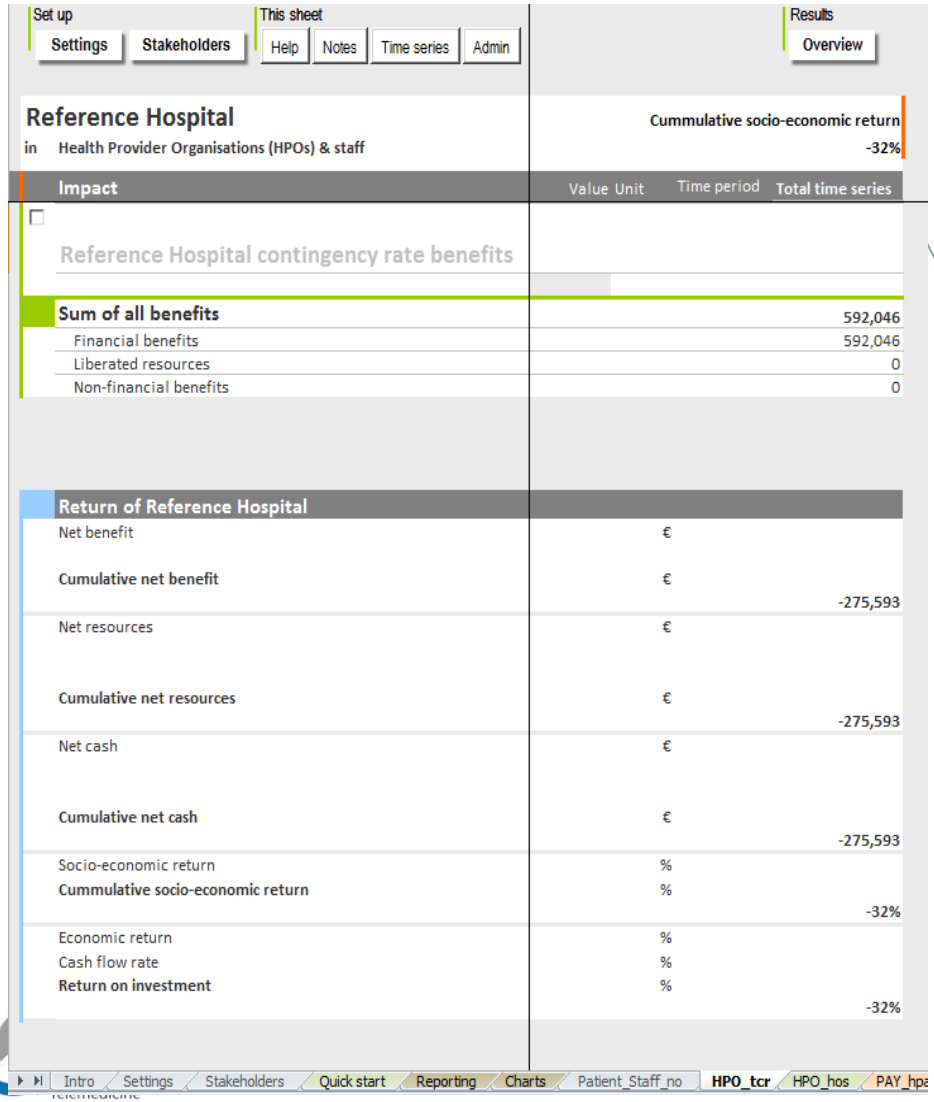
Core performance measure for your assessment is the socio-economic return. For a first rough analysis look at the coloured arrows. If they are green the stakeholder is likely to profit; yellow needs a closer look and red means that the stakeholder is negatively affected by the newly introduced telemedicine service. If veto players are red they might hinder you in putting the service in place.

Groups	Subgroups		Cumulative socio-economic return	Cummulative net-benefit
Overall socio economic return		↑	73%	
Individuals				
	Military Patient	↑	483%	
Health Provider Organisations (HPOs) & staff				
	* **Reference Hospital**	↓	-32%	-275,593 €
	Specialist Medical Doctor	↓	-100%	
	ICT Technician	↓	-100%	
	Remote Hospital	↓	-100%	-80,243 €
	Generalist Medical Doctor	↓	-85%	
	ICT Technician in Remote Hos	↓	-100%	
Payers				
	Military Health Service	↑	273%	1,693,375 €
Non ICT Organisations				
ICT industry				
	* TLC Service Provider	↑	11%	37,135 €

* Return on investment

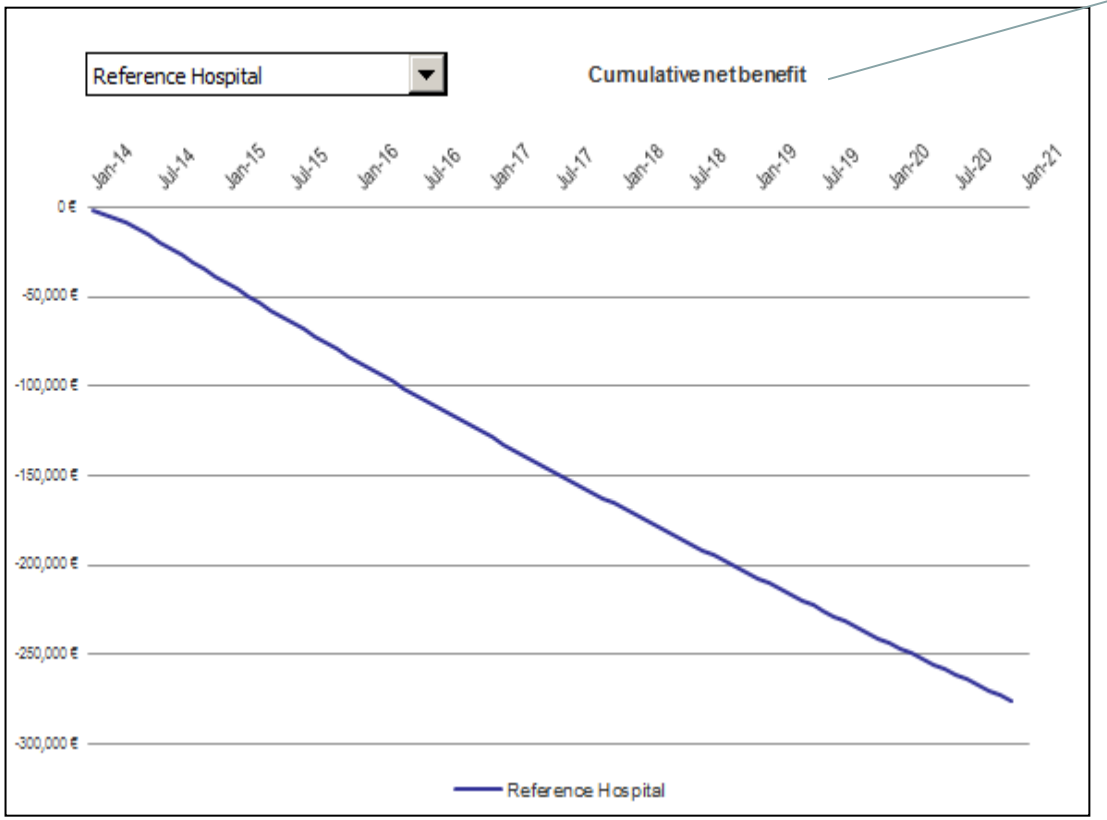
ASSIST Assessing Telemedicine

Reference Hospital – Impacts



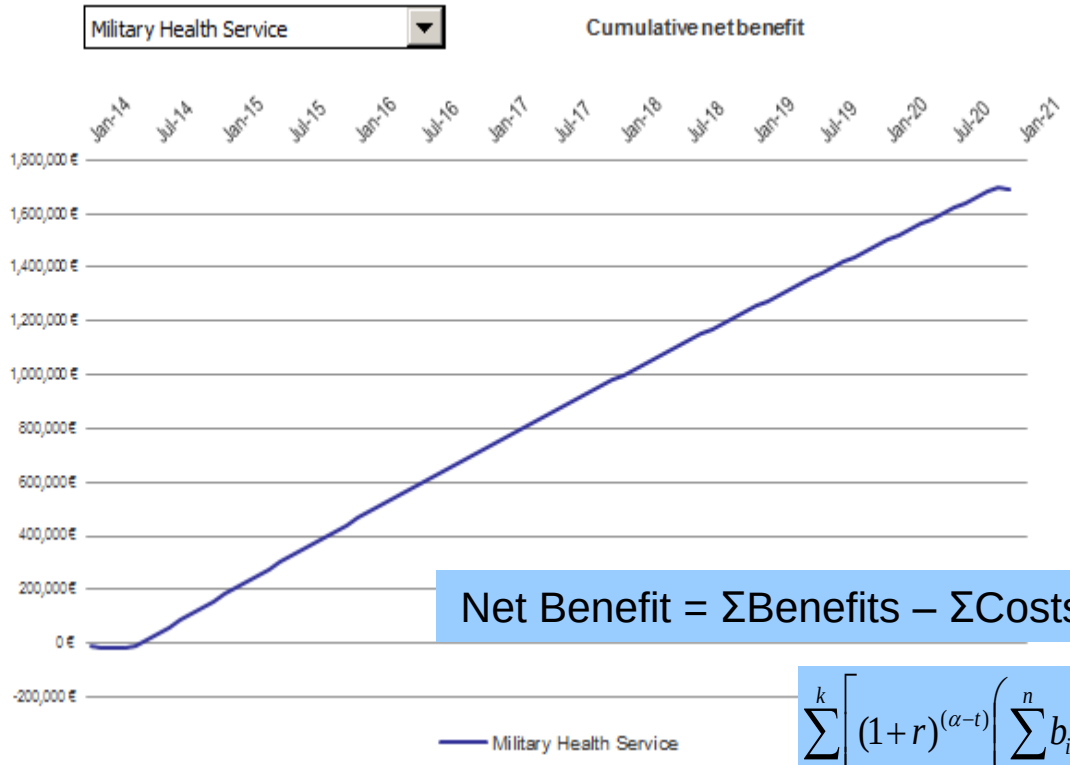
Even if ICT costs are covered by the payers, staff time used for T4MOD is a cost for the Reference Hospital

Reference Hospital – Cumulative net benefit



Cumulative net benefits decrease with time due to the progressive consumption of staff time

Military Health Services - Cumulative Net Benefit

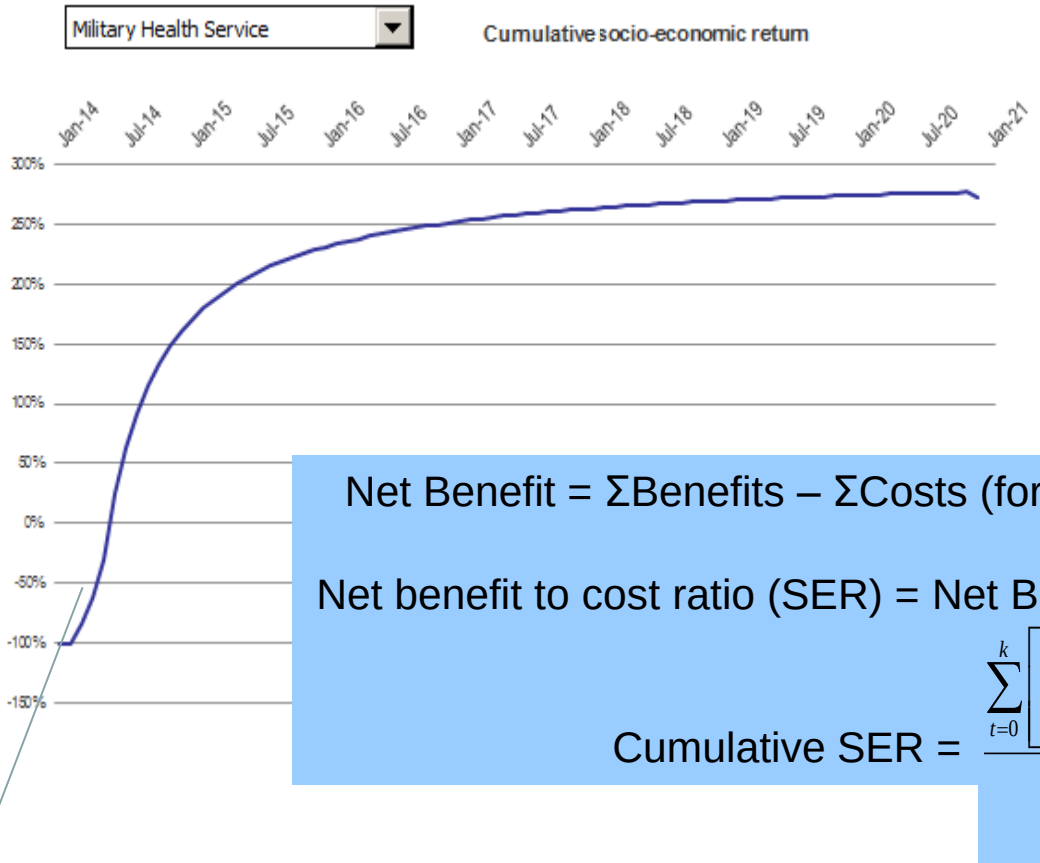


Net Benefit = ΣBenefits – ΣCosts (for given time)

$$\sum_{t=0}^{k}\left[(1+r)^{(\alpha-t)}\left(\sum_{i=1}^{n}b_i(t)-\sum_{j=1}^{m}c_j(t)\right)\right]$$

ASSIST Assessing Telemedicine

Military Health Services – Cumulative Socio-economic return



Low number of MEDEVAC avoided

Net Benefit = ΣBenefits – ΣCosts (for given time)

Net benefit to cost ratio (SER) = Net Benefit / ΣCost

$$\text{Cumulative SER} = \frac{\sum_{t=0}^{k}\left[(1+r)^{(\alpha-t)}\left(\sum_{i=1}^{n} b_i(t) - \sum_{j=1}^{m} c_j(t)\right)\right]}{\sum_{t=0}^{k}\left[(1+r)^{(\alpha-t)}\left(\sum_{j=1}^{m} c_j(t)\right)\right]}$$

Modelling

- During the planning phase you rely on assumptions
- Ask what-if question
  - What if the number of patients would be higher
  - What if MEDEVAC would be less

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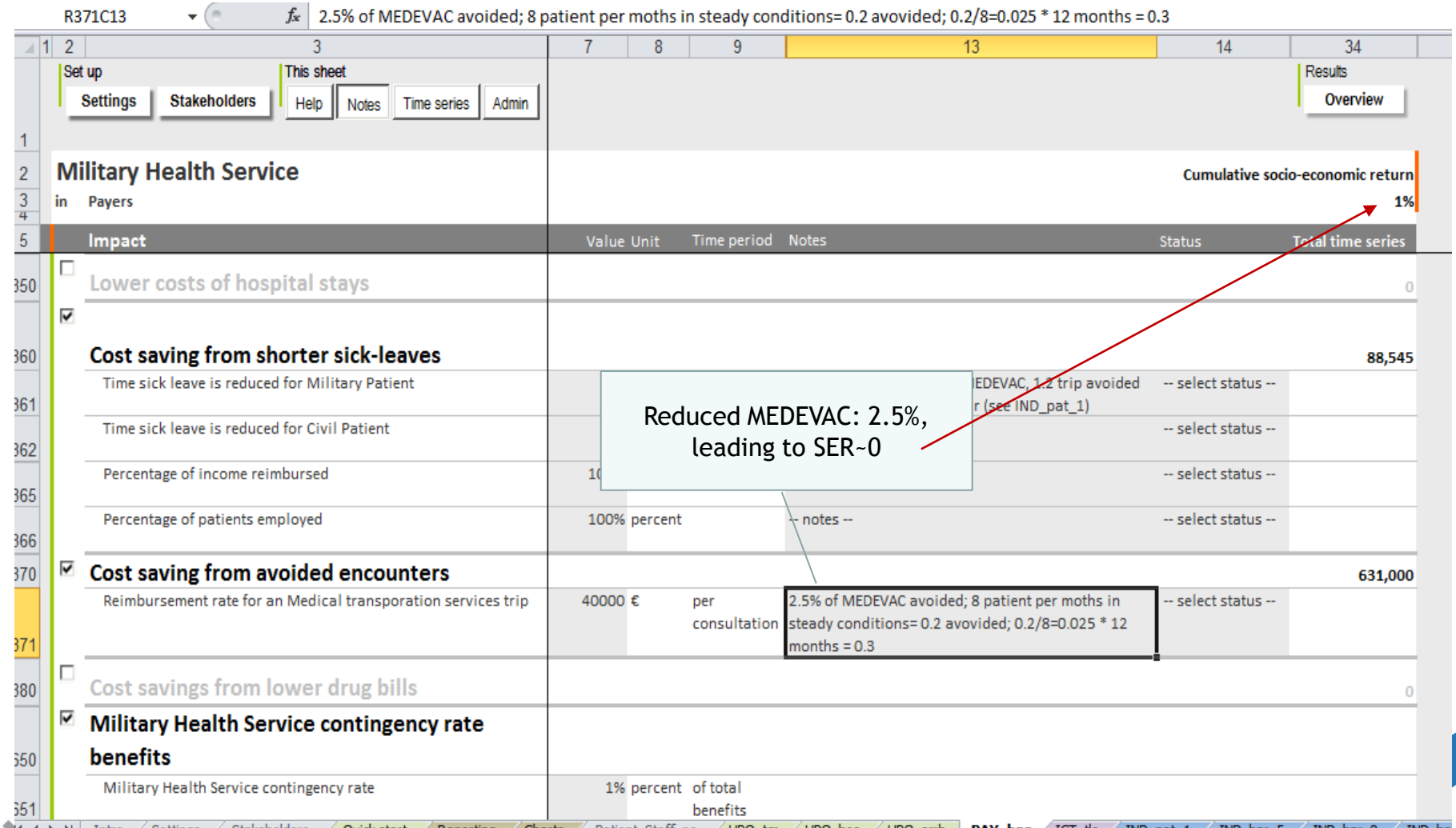
Military Health Services - Breakeven MEDEVAC

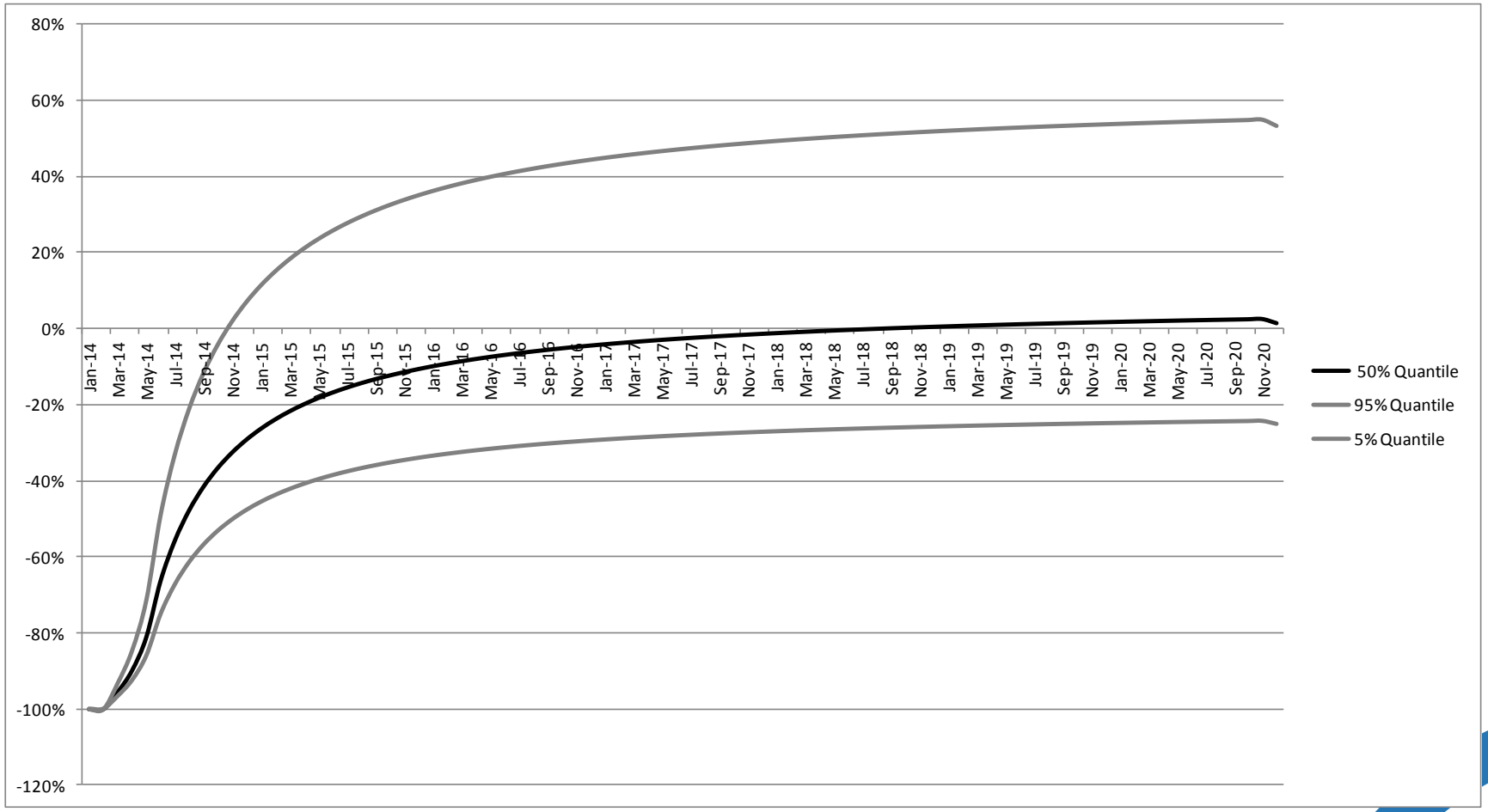


Sensitivity analysis

- Monte Carlo simulation
  - Asses how change of inputs affects the resulting distribution of Socio Economic Returns (SERs)
  - Underlying statistical distribution
  - 1.000 random drawings
- R^2 analysis
  - Identify which inputs are most important
  - Results interpretation only suitable for experts
  - R^2 neglects huge inputs with low variability

ASSIST Assessing Telemedicine

Military Health Service - Sensitivity



L. Colitta/ V. Natale

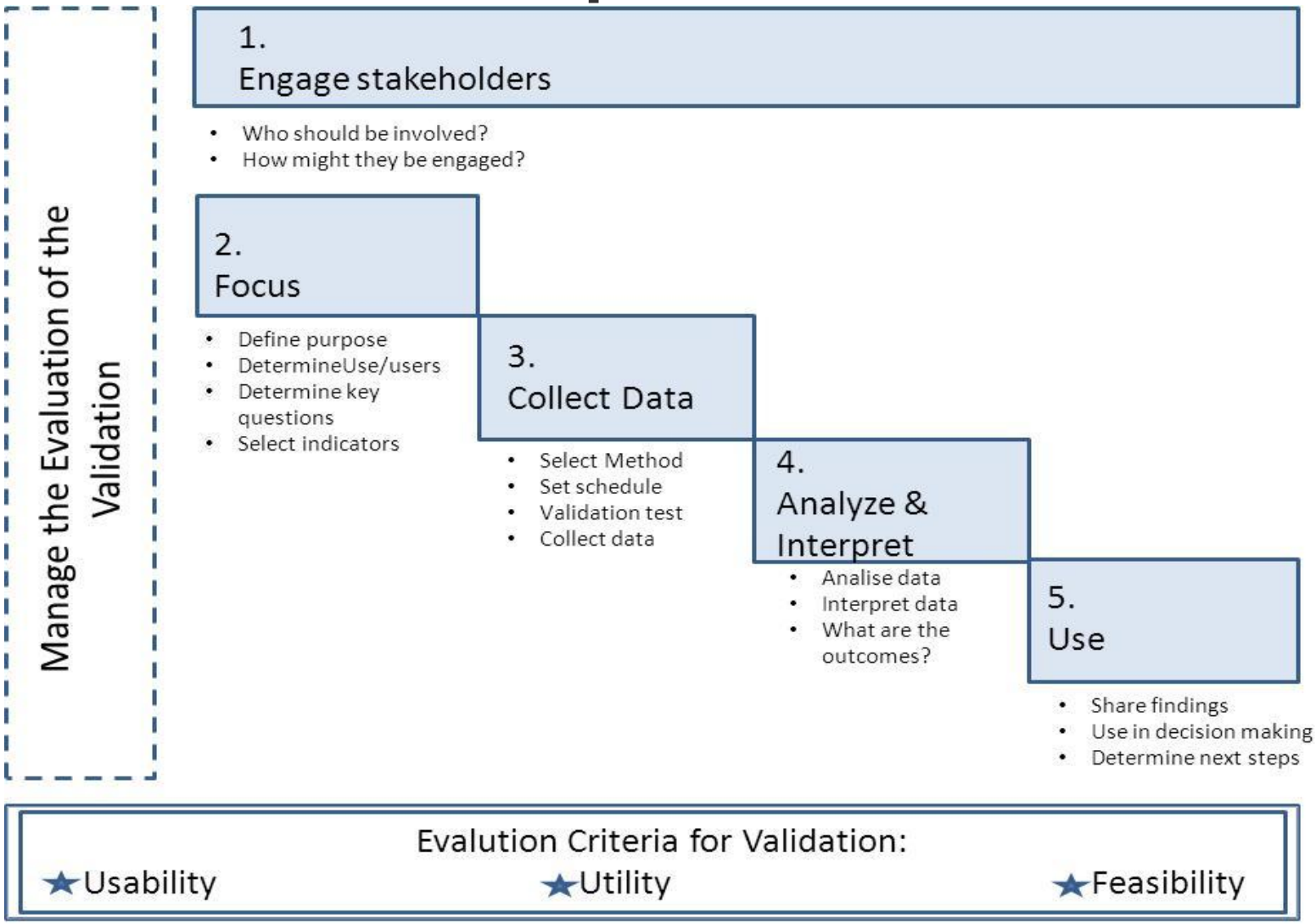
VALIDATION OF THE ASSIST TOOL

Validation campaign plan

- The validation campaign foreseen in the ASSIST project, aims to test the implemented assessment tool with real projects and real project data with the final objective to verify its adequacy with respect to the main project objectives and its acceptability by the end users.
- The ASSIST tool validation was planned according to the following five steps:

  - ✓ Engaging stakeholders
  - ✓ Focusing the evaluation
  - ✓ Collecting the information
  - ✓ Analysing the information
  - ✓ Using the information

Evaluation steps



Project funded by the ESA GSP programme

Selection of validation projects

- The tool developed by the ASSIST team was tested with 4 telemedicine projects and initiatives called “validation projects”.

- Selection criteria for these projects were:

  - ✓ Availability of basic economic and productivity data, or agreement to develop and estimate these together
  - ✓ Permission to work with people at the site to collect and develop the data required
  - ✓ Willingness to test the assessment tools and provide feedback to the ASSIST team
  - ✓ Commitment of top management to participate.

- The selection aimed at achieving a balance between different types of telemedicine services, as well as a balance between different pathologies and diagnoses targeted, to ensure that the models and tools would fit a wide range of telemedicine services.

Evaluation Criteria and Indicators

CRITERIA	NOTE ON THE CRITERIA	INDICATORS	REFERENCE VALUES AND EXPECTED RESULTS	MEASURING TOOLS	NOTE ON THE INDICATORS
			NOTE		
1 Usability and conciseness	This criterion evaluates the easyness in using the tool and the level of intuitiveness of the requested data and their format	1.1 Ease of use	Score: 1 = very difficult, 2 = somewhat difficult, 3 = easy (0% score 1; 50% score 3)	Questionnaire submitted at the end of the tests activity	This indicator evaluates the level of easyness of the used tool and the level of intuitiveness of the requested information. This indicator evaluates the overall impression of the user during the interaction with the system.
		1.2 User learning curve	< 4 hours - target reached at 75%	Questionnaire submitted at the end of the tests activity and Direct observation during the training	This indicator measures the affinity of the system with the users' background technical experience
		1.3 Clarification requests on the data meaning	Score: 1= very often, 2= sometimes, 3 = never (0% score1; 50% score 3)	Log of the received clarification requests and questionnaire submitted at the end of the tests activity	This indicator measures the number of received clarification requests on the data meaning . The request can be done by telephone and by e-mail.
2. Utility	This criterion evaluates the appropriateness of the analysis results with respect to the reports desired by the users	2.1 Satisfaction	Score: 1= not useful, 2 = Useful, 3 =Very Useful (75% of results scored 3)	Questionnaire submitted at the end of the tests activity	This indicator measures the level of user satisfaction on the working session using the tools provided by the system
3. Feasibility	This criterion evaluates the easyness to find out the data needed as input for the tool running.	3.1 Time needed to collect all input data	< 1 days by the 75% of the users completing the Program	Direct observation of the activity feedbacks	This indicator evaluates, indirectly, the easyness of the tool. This indicator should be analized and correlated with the indicator 1.1.1.
		3.2 % of valid data analysis reports	75% of the total users using the tool	Direct observation of the activity feedbacks	This indicator evaluates the appropriateness of the tool usage by the end users.

Data collection

- Data and estimates collected referred to:
  - ✓ development, implementation and running costs
  - ✓ estimated changes to costs of providing healthcare from productivity gains
  - ✓ costs of change, benefits for citizens and patients, informal carers, professionals, administration, research and/or the overall health system
  - ✓ utilisation of the application.

- The validation campaign was based on a two-step approach:
  - ✓ Application of the methodology and model to one project (IGEA SAT)
  - ✓ Application of a refined version to others four projects. Completion of the second step provided the necessary input for updating the methodology and method to its final version.

- This two-step approach has proven to be an excellent way of converting a theoretical evaluation methodology into a practical, user-friendly evaluation model and tool.

The projects involved in the assessment

- Telemaco (Lombardia Region, Italy: Telemedicine project focusing on small municipalities)

- ARTIS (Advanced Robotic Tele-echography Teleconsultation project in the Midi Pyrenees French region)

- AMAZON (on-going demonstration project within the tele-assistance service, co-founded by ESA)

- T4MOD: in depth analysis of a Teleconsultation project in the military field.

An example of *ASSIST* final report: *ARTIS*

Groups	Subgroups		Cumulative socio-economic return	Cummulative net-benefit
Overall socio economic return		↑	71%	
Individuals				
	Pregnant women patients	↑	689%	
Health Provider Organisations (HPOs) & staff				
	* **Tele Service Centre**	↑	10%	83.261 €
	Echocardiographist MD		hout inv ain without investment	
	Secondary Hospitals	↓	-100%	-300.687 €
	Secondary Hospital operators	↑	676%	
Payers				
	French Healthcare System	↑	233%	1.414.608 €
Non ICT Organisations				
ICT industry				

* Return on investment

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Positive stakeholders

- Most of the stakeholders resulted to have some benefits, in particular:

  - ✓ The **French Health System** (Payer): it saves the costs reimbursed to each pregnant woman for each single visit, for the travels to the Hub Centre (Reference Hospital) of excellence for the Echography exams. We removed the "transportation service" stakeholder since in this scenario we don't have such an actor which would naturally get an economic disadvantage from a "non traveling" based Telemedicine initiative, being the French Health System itself which gets the entire benefit and savings from the avoided transports

  - ✓ The **Tele Service Centre**, which receives an economic fee for the provided Telemedicine service, thanks to the remote Tele-consultation carried out by their Echographyst MDs

  - ✓ The **Individuals** (pregnant women) who do not need any more to travel dozens of kilometers each time they want to undergo an ultrasound exam and therefore their quality of life increases too.

Negative stakeholders (I/II)

- ✓ The **requesting spoke Hospitals** (remote Hospitals also known as "Secondary Hospitals"). In fact, although they do not need to employ an Echographyst (US MD specialist), who are very difficult to find at the present time in France, they sustain on one side the infrastructure cost and the indirect costs, disadvantages of the "temporary inconvenience" and costs for "adaptation" related to a very complex and advanced Telemedicine infrastructure, on the other side

- ✓ Furthermore, the **requesting spoke Hospitals** sustain costs related to the echographists that are external consultants (not direct personnel); this professional profile cannot be shown into the tool because a specific field related to an external consultant is missing. On the other hand for the secondary hospital the echographist profile is missing and this could impact on the calculation of the "liberated resources" that represent a positive impact for this stakeholder.

Negative stakeholders (II/II)

- ✓ Of course, if we look at the overall value that the remote Hospitals offer to their patients with the possibility to have an echography exam delivered on site, the increase of the quality of life for patients and the savings for the French Health System (**Payer**), it would have been fairer if they also received some sort of reimbursement in order to counter balance the negative effects (costs) of the Telemedicine infrastructure that they're facing all alone

- ✓ In that sense, it is interesting to see that if we for instance suppose that this Stakeholder received even a symbolic 38 EUR as "**Top-up payments**" from the French Healthcare System (cell C471 in HPO_pco), the Remote Hospital would reach a neutral Cumulative SER (Socio Economic Return). This extra payment would not jeopardize the SER of the Payer, but it would probably help to avoid a possible veto by the Remote Hospital with respect to the introduction of Telemedicine.

Results: PROs and CONs

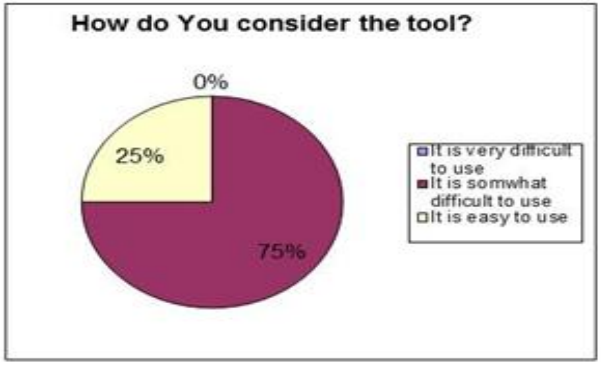
- **Positive aspects:**

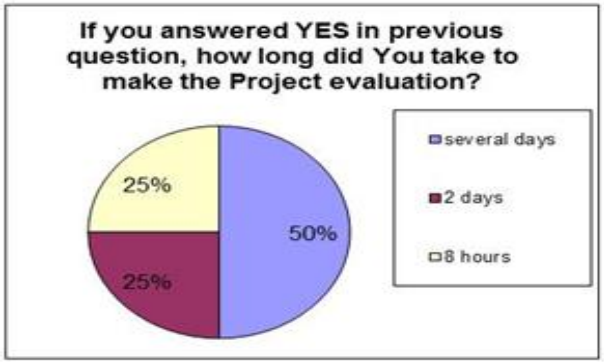
  - ✓ Tool is considered helpful because for the first time users have guidelines and a reasonable idea of how to judge the convenience of a Telemedicine/Telemonitoring project
  - ✓ The possibility of selecting the difficulty level has been judged extremely helpful, especially for the fact that it automatically enables/disables several stakeholders/fields
  - ✓ The presence of “indirect” costs/revenues (human, liberation, etc.) compared to the standard “tangible only” costs/savings is considered very innovatite.

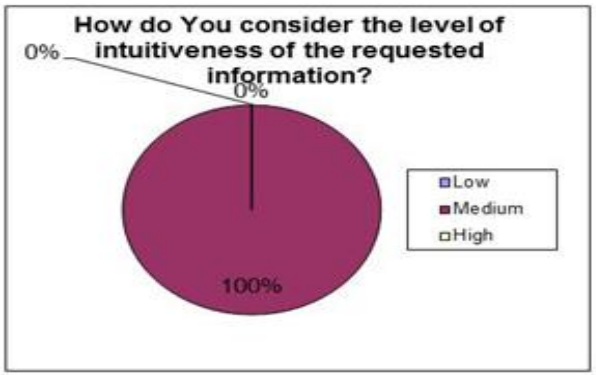
- **Negative aspects:**

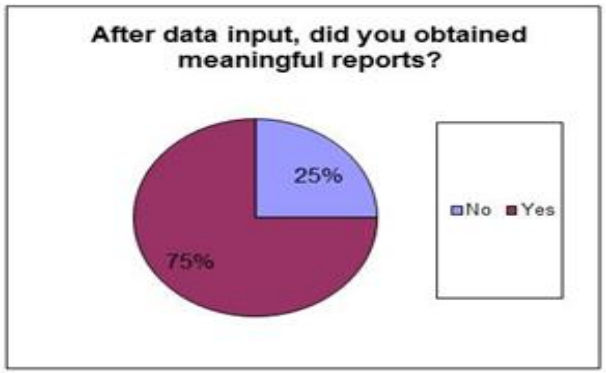
  - ✓ Given its complexity, the user needs some time to get into the tool, to be able to use it properly and to fill in all the fields correctly. In some scenarios, there might be too many fields to be filled/data not available and some assumptions need to be made.
  - ✓ It’s not always easy to associate real stakeholders with the stakeholder fields of the tool: sometimes the advantages/costs of some of them should be input in fields that are not foreseen into the tool, while for some other existing fields we do not have any data available (i.e. “transportation services”).

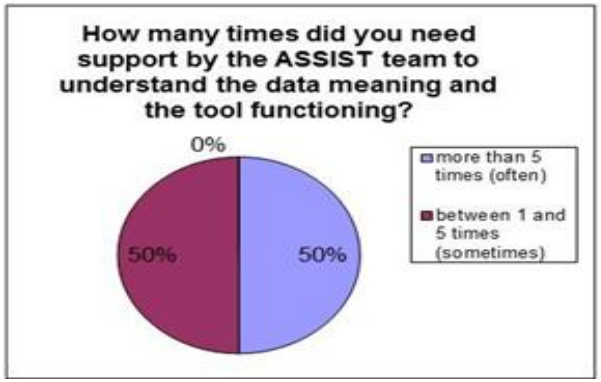
Evaluation Questionnaire Results (I/II)

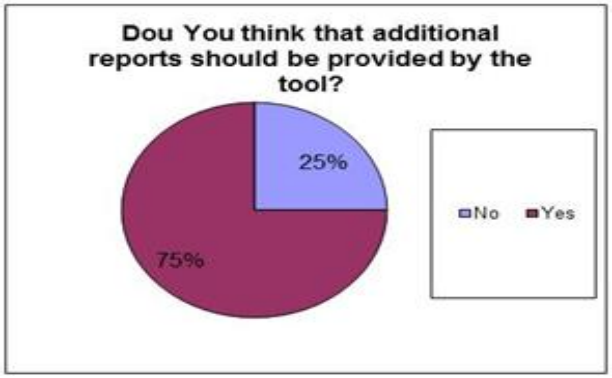












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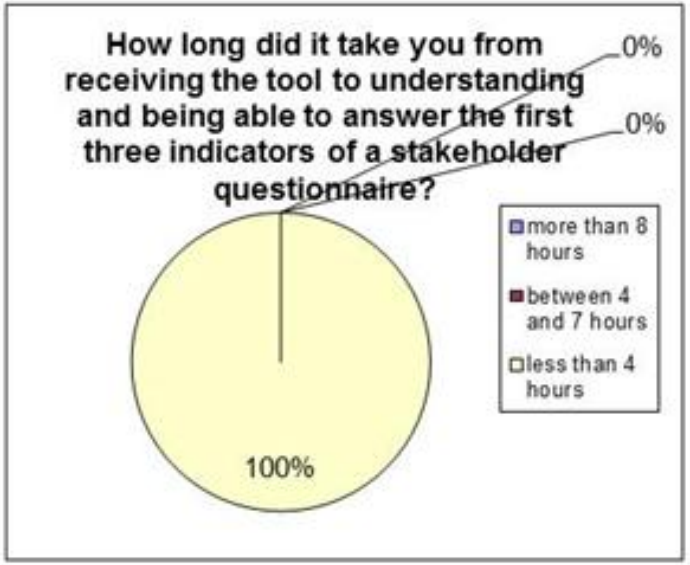
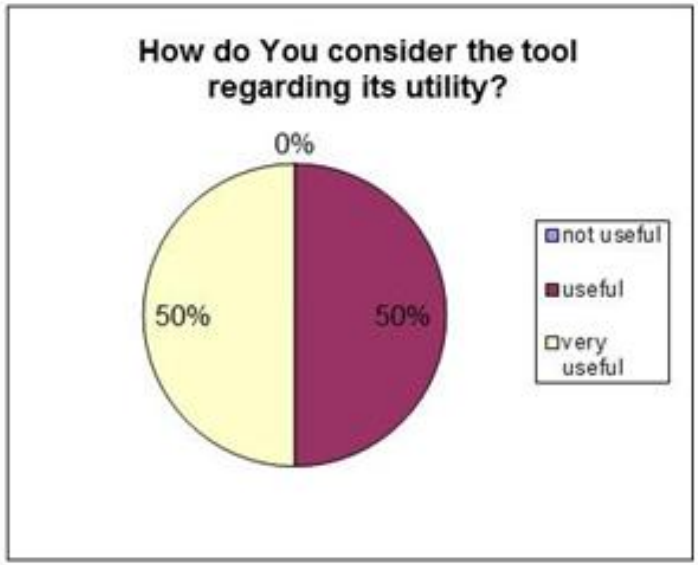
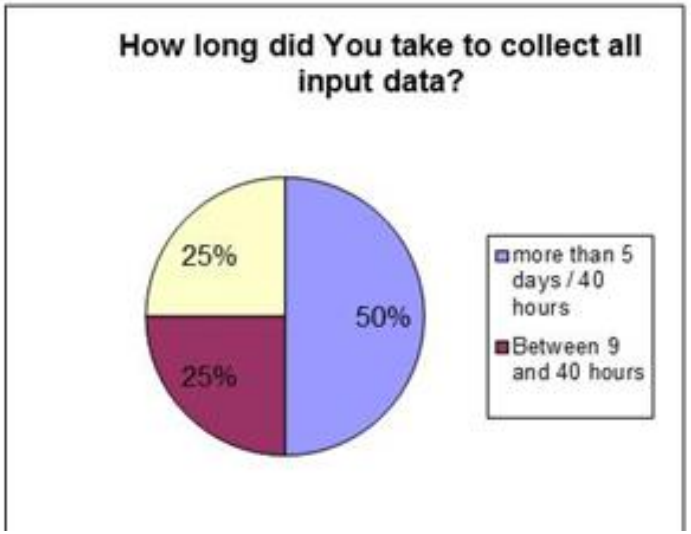
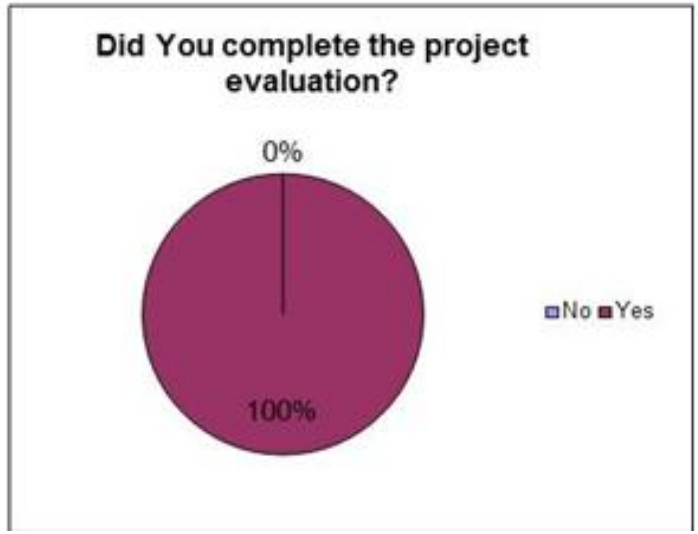
Final Conclusions (II/II)









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Final Conclusions (I/II)

- The users who performed the validation appreciated the tool scope and considered the tool useful but somewhat difficult to use (3/4 of the sample). 3/4 of users considered meaningful the obtained report
- The main problems encountered were related to the data gathering (too much data not always immediately and easily available), to the difficult interpretation of some fields and of the report generated by the tool
- 3/4 of the validator projects considered useful additional reports like those related to the automatic identification of indicators with high sensitivity and the automatic identification of values for the break even for selected indicator/stakeholder
- All this suggests that:
  - ✓ A more intensive training session is needed to the final users before starting the tool utilization in order to go deeply into the methodology and understand the value that each field/data has for the implemented algorithm

Final Conclusions (II/II)

- ✓ The experience done during the ASSIST validation demonstrated that the time planned and reserved for both the users training and for the completion of a project analysis were highly underestimated
- ✓ Some additional work could be done to optimize the number of requested data input and make more understandable the report results improving their presentation.

- ASSIST has demonstrated its utility when applied to completed projects as well as to running project or at concept level projects: the application of the ASSIST methodology to projects at the early stage of their development is useful to have a preliminary idea of the service model to be considered for the implementation of sustainable solutions
- It also provides hints on how to attenuate the loss for some of the stakeholders and maybe adapt the proposed service accordingly, taking into account criteria of efficiencies and productivity: in a “spending review” time a tool like ASSIST can be an interesting and extremely useful planning tool.

L. Colitta/ V. Natale

DISSEMINATION

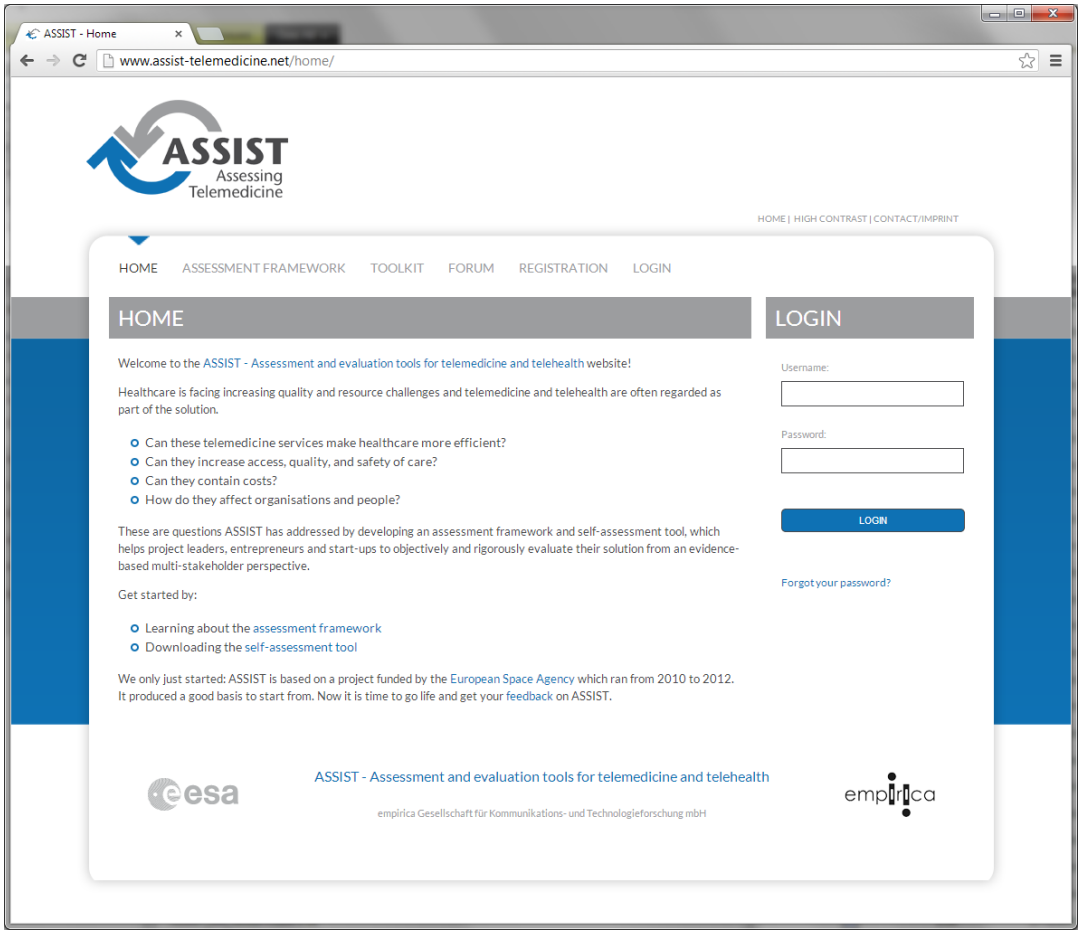
ASSIST Dissemination activity

- The following promotions activities have been conducted in order to optimize the methodology dissemination of ASSIST project:

  - ✓ Regione Lombardia, Milan, 23rd March 2010
  - ✓ Regione Lombardia, Milan, 12 November 2010
  - ✓ ARTES Applications Workshop, Noordwijk, 5th-6th April 2011
  - ✓ WORLD OF HEALTH IT, Budapest, 10-13 May 2011
  - ✓ T4MOD advisory committee, Rome, 11 May 2012
  - ✓ HeartCycle project
  - ✓ CommonWell project
  - ✓ BRAVEHALTH annual meeting, Brussels 3-4 May 2011
  - ✓ Independent project
  - ✓ European Commission meetings on evaluation
  - ✓ Short oral presentations to COCIR, WHO, IBM Germany and Slovakia, Philips Netherlands

ASSIST on the web

- Dedicated web site http://www.assist-telemedicine.net
- present the ASSIST methodology framework and
- download the ASSIST toolkit



R. Hammerschmidt

BEYOND ASSIST

Possible evolution

- Make ASSIST easier to use & more sophisticated
  - Lead user to full functionality step by step
    - Full blown tool is to overwhelming but when understood users want more functionality
    - Paedagogical approach needed
    - Video tutorials / results interpretation
  - Support more steps in the assessment process
    - Data gathering
    - Risks exposure
  - Service and business models vary considerably
    - Make value chain/ business model more flexible and visible
  - Commercial viability - Preparing for business
    - revenue and profitability model and business plans
    - needs analyses of capital and revenue, depreciation, and financing costs

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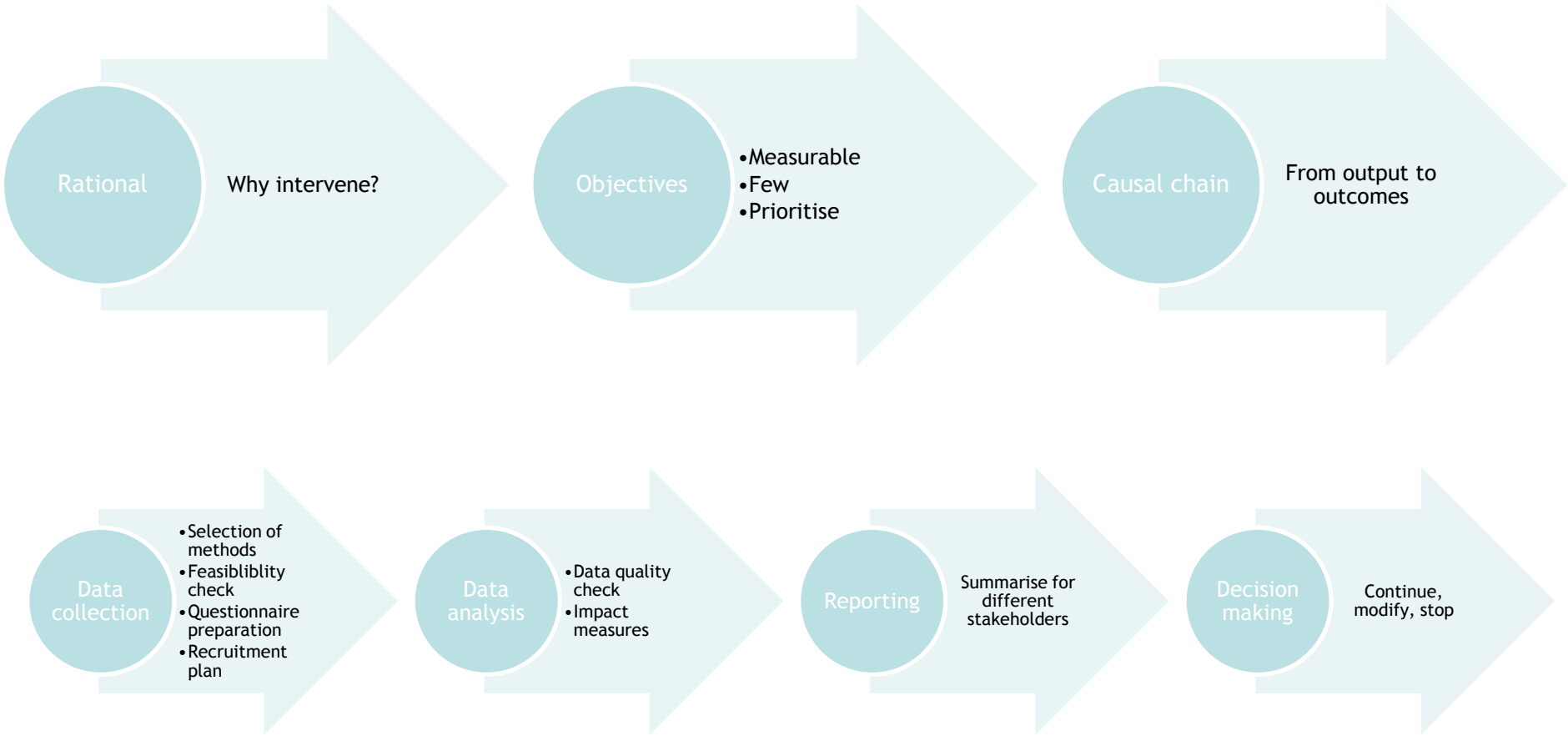
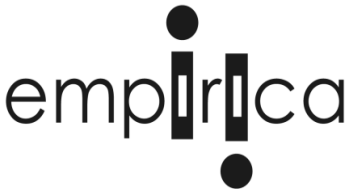
The future: support further tasks of assessment



Thank you

- For more information:
  - Contact us:



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