Scuola di Ingegneria Industriale e dell'Informazione

Corso di Laurea Magistrale in
Ingegneria Gestionale

Business Model Definition for PEGASO, FIT FOR FUTURE PROJECT

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Anno Accademico 2014-2015

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ABSTRACT (Italian version)

Obesità e Sovrappeso sono malattie sempre più diffuse: 4 persone su 10 nel Mondo e 3 su 10 in Italia ne soffrono. PEGASO, FIT FOR FUTURE è un progetto integrato eseguito a livello internazionale nato per promuovere uno stile di vita sano tra i più giovani. Il Politecnico di Milano ne è il Project Coordinator. Il lavoro di tesi è la definizione di un Modello di Business di un ipotetico prodotto di prevenzione PEGASO output del progetto. In particolare lo stesso sarà composto di Wearable Device (un Braccialetto Intelligente e una Maglietta Intelligente), della loro App dedicata e di un Serious Game, che dovrebbe rappresentare la maggior fonte di motivazione per aumentare il livello di attività fisica e per seguire una dieta più sana. All'interno del Serious Game gli adolescenti, destinatari del programma PEGASO, devono decidere di cosa nutrirsi per sopravvivere e di quanto e come muoversi per guadagnare punti. Gli stessi sono convertiti in premi di cui si potrà godere nella vita reale: sconti su snack sani, menù sani, entrate in piscine e palestre e articoli sportivi. E' necessario stringere molti accordi commerciali per garantire una completa esecuzione di un così innovativo programma di prevenzione. Le Scuole Superiori devono essere coinvolte in quanto collettori di molti potenziali destinatari di PEGASO; Ristoranti, Bar sensibilizzati riguardo il tema e convinti nel proporre un'offerta più sana; accordi commerciali devono essere stretti con Centri Sportivi al fine di incoraggiare l'esecuzione di una maggiore attività fisica. La tesi analizza in primis il tema dell'obesità da punti di vista, spiega il progetto PEGASO, FIT FOR FUTURE in tutte le sue parti, studia i mercati dei Wearables e delle Health App versione Mobile. Quindi si focalizza sullo strumento gestionale del Canvas per definire il Modello di Business usato dai Vendor di Fitness Tracker. Infine arriva alla definizione teorica e poi applicata di un Modello di Business per PEGASO. L'iniziale intento di testare la sostenibilità economica di un così innovativo prodotto di prevenzione è infine comprovata da simulazioni numeriche.

ABSTRACT

Obesity and overweight are always more common diseases: 4 people out of 10 in the world and 3 people out of 10 in Italy suffer from them. PEGASO, FIT FOR FUTURE project is an integrated project performed at an international level wanting to promote a more healthy lifestyle among the youngest. Politecnico di Milano is the Project Coordinator. The thesis is about the definition of a Business Model for a potential PEGASO prevention product output of PEGASO, FIT FOR FUTURE project. Specifically this prevention product will be composed of Wearable Devises (a Smart Bracelet and a Smart T-Shirt), their dedicated Mobile Application and a Serious Game, which should act as the main motivation source for the prevention product recipients to carry out more physical activity and follow a more healthy diet. Within the Serious Game the teenagers, addressees of PEGASO programme, have to decide what to eat to survive and how much and how to move to gain points. These points are converted into rewards exploitable in the real world: promotional healthy snacks, promotional healthy menus, promotion on admission fees for Swimming-Pools and Sport Centres, discounts on sport tools. Many commercial partnerships are necessary to grant the proper execution of a such an innovative prevention programme. Secondary Schools have to be involved as collectors of many potential PEGASO recipients, Restaurants, Cafés have to be sensitised on the issue and convinced in providing a more healthy offer, commercial partnerships have to be created with Sport Centres in order to encourage teenagers in performing more physical activity. The thesis first analysis the obesity issue from many perspectives, explains PEGASO, FIT FOR FUTURE project in all its parts, studies the Wearables and the Mobile Health Application Industry. It then focalizes on the management tool of the Business Model Canvas trying to define the one used by the Fitness Tracker Vendors. It finally comes to the theoretical and then applied definition of PEGASO Business Model. The initial aim to test the economical feasibility of such an innovative prevention product is finally proved with numerical simulations.

Executive Summary (Italian version)

La seguente è una tesi molto poco convenzionale: è stata proposta da un Professore di Ingegneria Biomedica e da uno di Design of Systems for Healthcare ad una studentessa di Ingegneria Gestionale. Il lavoro di ricerca è consistito nella definizione di un Modello di Business per un programma di prevenzione chiamato PEGASO, *Personalised GuidAnce Service for Optimising lifestyle in teen-agers*: progetto Europeo gestito dal Politecnico di Milano e nella fattispecie dal professore di Design sopra citato. Il progetto si focalizza sulla prevenzione dell'obesità e del sovrappeso attraverso l'uso di strategie molto innovative quali l'uso di Wearable Device: questa è stata la ragione per cui un professore di Ingegneria Biomedica ha potuto proporre un così specifico lavoro di tesi ad una studentessa di Ingegneria Gestionale.

Dopo un rapido inquadramento su ciò che l'essere obesi comporta (dal punto di vista sanitario, economico e sociale) e sulle attuali strategie e modalità di gestione del problema, la tesi si addentra nella spiegazione approfondita di quello che è il progetto PEGASO, FIT FOR FUTURE. Nello specifico ne vengono illustrate le componenti e le innovative modalità per spronare i più giovani ad un più sano stile di vita. Quindi sono studiati i mercati in cui un futuro prodotto PEGASO sarà chiamato a operare: il mercato dei Wearable Devices e il mercato delle Health Mobile Application. Ci si addentra nello studio del Modello di Business degli operatori nel mercato dei Fitness Trackers, quali il popolare Fitbit, in modo da carpirne le best practice. La parte centrale del lavoro di ricerca condotto è costituito dalla proposta di un sostenibile Modello di Business per un prodotto caratterizzato da aspetti così innovativi e peculiari da renderlo per ora unico nel suo genere. Il coinvolgimento di molti Partner commerciali e sociali quali Istituti Superiori, Punti Ristoro, Centri Sportivi, Centri Commerciali ed in un secondo tempo anche Compagnie Assicurative e Sistemi Sanitari: tutti questi potenziali attori potrebbero avere un guadagno dalla partecipazione al sistema PEGASO. Questo è appunto uno degli aspetti che la tesi vuole dimostrare.

L'argomento è stato ritenuto doppiamente stimolante: da una parte i temi dell'obesità e del sovrappeso sono considerati come un profondo problema sociale a livello universale e di conseguenza l'idea di contribuire a risolverli è stato visto con grande interesse. Inoltre, la soluzione richiesta da questo problema sociale prevede l'ideazione di innovative partnership con tutti quelli attori che potrebbero avere un impatto sullo stile di vita degli adolescenti:

aspetto ritenuto particolarmente idoneo per essere analizzato e sviluppato da una studentessa di Ingegneria Gestionale.

L'obesità quale "epidemia globale silenziosa"

Nel mondo 4 persone su 10 sono obese.

In Italia 3 persone su 10 sono obese.

Essere obese significa avere un Indice di Massa Corporea (IMC) sopra la media: esso è un indicatore biometrico calcolato come il rapporto tra il peso del paziente espresso in Chilogrammi e il quadrato dell'altezza dello stesso espressa in Metri.

$$\text{IMC}= \frac{[peso]}{[altezza]^2} = \frac{[Kg]}{[m]^2}$$

Indice di Massa Corporea (IMC)	*Classe di Obesità/Sovrappeso*
25-29.9	SOVRAPPESO
30-34.9	OBESITA' di classe I
35-39.9	OBESITA' di classe II
>40	OBESITA' di classe III

Table 1: Categorie di Obesità, source Wikipedia

Il sovrappeso e l'obesità vanno ben oltre il mero problema estetico: malattie molto più gravi e complicazioni a livello medico hanno una maggiore probabilità di accadimento.

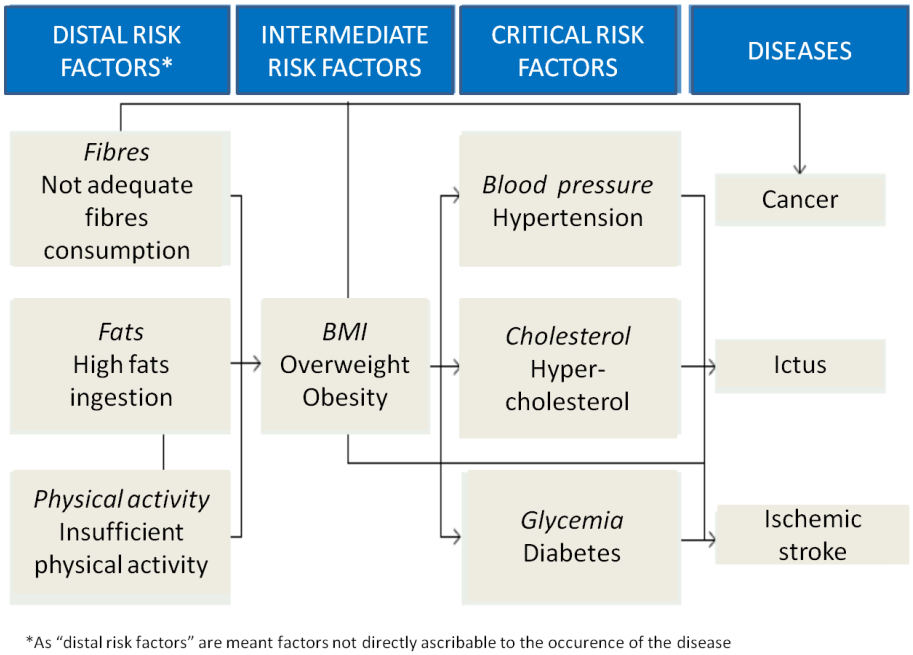
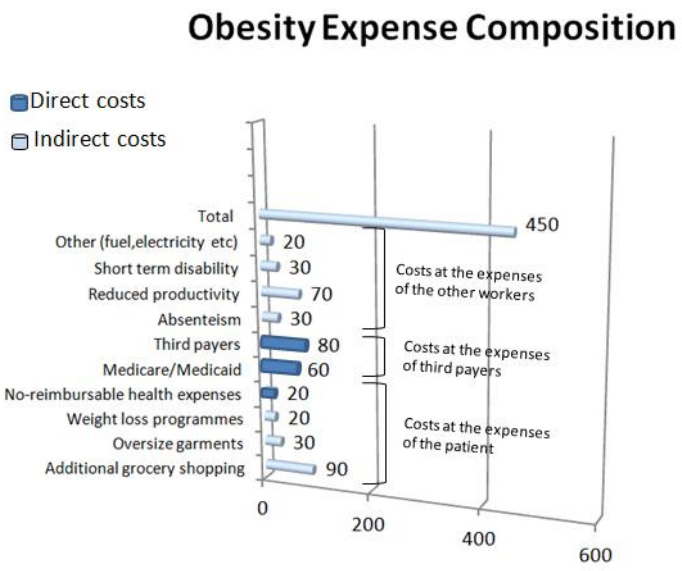


Figure 1: the Chronic Disease Prevention (CDP) model, source BCFN, re-elaborated version on OECD and WHO data

La qualità della vita delle persone in sovrappeso o obese diminuisce in maniera considerevole: esse si sentono spesso stanche e pesanti e hanno difficoltà respiratorie e di movimento.

In aggiunta questa categoria di pazienti comporta un importante costo per il Sistema Sanitario: è possibile fare un distinguo tra i costi "diretti" e "indiretti". I primi sono costituiti dalle cure personali, dalle cure ospedaliere, dai servizi sanitari cui si usufruisce e dai medicinali acquistati. Mentre i secondi sono legati alla minore produttività che caratterizza le persone obese e in sovrappeso. Esempi di questa seconda categoria di costo sono: assenteismo, ridotta efficienza, ridotta efficacia, morte prematura, incremento nei premi assicurativi.

Quello che segue è il risultato di un interessante studio condotto negli USA per quantificare e classificare le diverse spese supplementari che un paziente obeso è chiamato a sostenere.



Graph 1: Obesity Expense Composition, source Euromonitor

In Italia i costi diretti totali dell'obesità ammontano a €4,5 Miliardi e quelli indiretti ad altrettanti €4,5 Miliardi. Le proiezioni della Spesa Sanitaria del 2014 sono state di €111,5 Miliardi. Per tanto risulta che i costi diretti dell'obesità impattano per il 4% sulla Spesa Sanitaria Italiana.

I costi supplementari che un paziente obeso deve sostenere ogni anno vanno da un minimo di €38 ad un massimo di €550.

Le conseguenze sociali che l'essere obesi comporta devono altrettanto essere considerate: una scarsa autostima, dal momento in cui ci sente "diversi" dagli altri; una conseguente difficoltà nello stringere rapporti interpersonali e anche il fatto di essere discriminati sul posto di lavoro.

Infine l'ambiente socio-economico in cui viviamo è pure da considerare come una delle principali determinanti della crescita nel tasso di obesità e sovrappeso. Le abitudini alimentari e gli stili di vita sono cambiati in seguito a fenomeni quali la globalizzazione, l'urbanizzazione e il progresso tecnologico. L'offerta di "cibo spazzatura" si è espansa notevolmente: ovunque risulta più semplice e meno costoso acquistare cibi ad alto contenuto calorico e di grassi piuttosto che cibo sano. La moda dei fast food è diventata una globale. Persino nelle scuole i distributori automatici offrono bibite gassate e snack invece di frutta, jogurt o succhi freschi. La vita delle persone risulta sempre più frenetica e piena di impegni: di conseguenza la voglia di prepararsi cibi "da sé", con ingredienti naturali, risulta molto bassa.

Le città sono diventate sempre più affollate e trafficate: i figli sono sempre più spesso accompagnati a scuola dai genitori in macchina anziché usare mezzi di locomozione propria, quali le proprie gambe o la bicicletta, quale soleva essere la regola in passato. I genitori scelgono scuole molto lontane da casa per i propri figli, poiché considerate più prestigiose, e scoraggiano gli stessi ad uscire nel proprio tempo libero. A causa dell'iper-protezione dei genitori molti più ragazzi e ragazze passano i propri pomeriggi di fronte al televisore consumando nel mentre cibo poco salutare per combattere noia e solitudine. Risulta perciò evidente come per fronteggiare l'epidemia dell'obesità tra i più giovani sia necessario investire in una dieta più sana e in uno stile di vita più dinamico.

Il progetto PEGASO, FIT FOR FUTURE

Il progetto PEGASO, FIT FOR FUTURE nasce effettivamente con questi due intenti: educare i più giovani ad una dieta più sana e ad uno stile di vita più attivo. Gli aspetti innovativi del progetto sono le modalità usate per raggiungere tali obiettivi e le particolari caratteristiche del progetto stesso.

Caratteristiche di PEGASO

PEGASO, FIT FOR FUTURE è rappresentato da una task force internazionale e multidisciplinare composta da 17 partner provenienti da ben 6 diversi Paesi dell'Unione Europea.

Paese	*Partner*
Italia	POLITECNICO DI MILANO (POLIMI) CONSIGLIO NAZIONALE DELLE RICERCHE GRUPPO SIGLA SRL NEOSPERIENE SPA (NEOS) LIFEGATE SPA IMAGINARY SRL LOMBARDIA INFORMATICA (LISPA)
Svizzera	CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA – RECHERCHE ET DEVELOPPEMENT (CSEM) HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE
Spagna	UNIVERSIDAD DE LLEIDA FUNDACIO PRIVADA BARCELONA DIGITAL CENTRE TECNOLOGIC AGENCIA DE QUALITAT I AVALUACIO SANITARIES DE CATALUNYA (AQUAS)
Regno Unito	THE UNIVERSITY OF NOTTINGHAM COVENTRY UNIVERSITY THE UNIVERSITY OF EDIMBURGH
Romania	ROPARDO SRL
Germania	BILDUNGSBERATUNG TILL BECKER & CO GMBH

Table 2: PEGASO partners, fonte documento di progetto PEGASO

I project manager sono il POLITECNICO di MILANO e FONDAZIONE POLITECNICO. Al momento tre diversi programmi pilota di PEGASO sono in esecuzione in Italia, Spagna e Regno Unito e per gli stessi sono stati coinvolti più di 300 adolescenti.

Modalità di funzionamento di PEGASO

Il progetto vuole incoraggiare gli adolescenti dai 13 ai 17 anni a modificare il proprio stile di vita attraverso l'uso di Device "Intelligenti" quali "Braccialetti Intelligenti", come il famoso Fitness Tracker di Fitbit, e "Magliette Intelligenti", quale la Smart T-Shirt di Polo Ralph Lauren: essi tradurrebbero in valori significativi gli sforzi fisici dei ragazzi. Il Braccialetto Intelligente li informerebbe di quanti passi, quanti Chilometri, quante calorie avrebbero bruciato dopo una normale passeggiata o dopo una più specifica attività sportiva. La Maglietta Intelligente invece informerebbe circa la loro temperatura corporea, il loro battito cardiaco, la loro capacità respiratoria. Tutto questo set di informazioni potrà essere acquisito attraverso la dedicata App di PEGASO.

Figure 2: esempi di Braccialetti Smart, fonte sito di Fitbit

Figure 3: esempi di Smart T-Shirt, fonte sito di PEGASO

Tuttavia il semplice fatto di indossare tali Device Intelligenti non è stato ritenuto sufficientemente motivante per spronare i più giovani a modificare il proprio stile di vita. Di conseguenza i Dispositivi Indossabili (Wearables) di PEGASO sono stati associati ad un Serious Game versione Mobile: in un contesto catastrofico l'adolescente- giocatore deve compiere le giuste scelte in termini di cosa mangiare per sopravvivere e di quanto muoversi per guadagnare punti.

Il Serious Game di PEGASO dovrebbe a tutti gli effetti costituire la vera motivazione per un cambiamento del proprio stile di vita: l'idea di ottenere punti nel momento in cui un cibo salutare viene preferito ad uno "spazzatura" o quando un prefissato numero di passi viene raggiunto dovrebbe teoricamente avere una certa influenza su di loro. Inoltre tale Serious Game è stato concepito come un Gioco "Social" e "Multiplayer" in modo da fornire un ulteriore stimolo alla sua corretta esecuzione: ogni giocatore può vedere i risultati personali degli altri giocatori e può loro direttamente lanciare una sfida. Le performance personali e delle sfide di gruppo vengono quindi postate sul Social Network di PEGASO.

I punti guadagnati all'interno del Gioco sono tradotti in ricompense nel mondo reale: possono essere costituite da sconti sull'acquisto di snack" salutari", pasti "salutari", entrate a prezzo promozionali in Piscina e in Palestra, articoli sportivi scontati.

La complessità sottostante ad un tale sistema può essere intuita: risulta necessario coinvolgere molti partner commerciali al fine di garantire una completa esecuzione del programma di prevenzione PEGASO. Le scuole devono essere considerate come i centri di aggregazione da favorire per informare il maggior numero di possibili destinatari del programma; bisogna creare con i Centri Commerciali degli accordi commerciali che permettano di sfruttare sconti su particolari categorie merceologiche; i Bar, i Punti Ristoro, le Mense Scolastiche devono essere sensibilizzate riguardo il tema e spronate nell'offrire anche menu sani; le Piscine e le Palestre devono essere coinvolte per dare ai ragazzi la possibilità di allenarsi a dei prezzi agevolati.

Dal punto di vista sanitario la raccolta dei sopra citati dati biometrici potrà rappresentare un beneficio per i Medici di Base dei ragazzi: invece di avere un valore di pressione sanguigna misurato nel momento della visita, gli stessi potrebbero consultare un Data Base di valori di pressione sanguigna costantemente misurati attraverso l'uso delle Magliette Intelligenti.

Tali Dati potrebbe anche essere visti come un asset di valore, e quindi potenzialmente acquisibile, da parte di attori interessati: Ditte Farmaceutiche, Compagnie Assicurative, Sistemi Sanitari.

A seguire una rappresentazione dell'architettura del Sistema PEGASO.

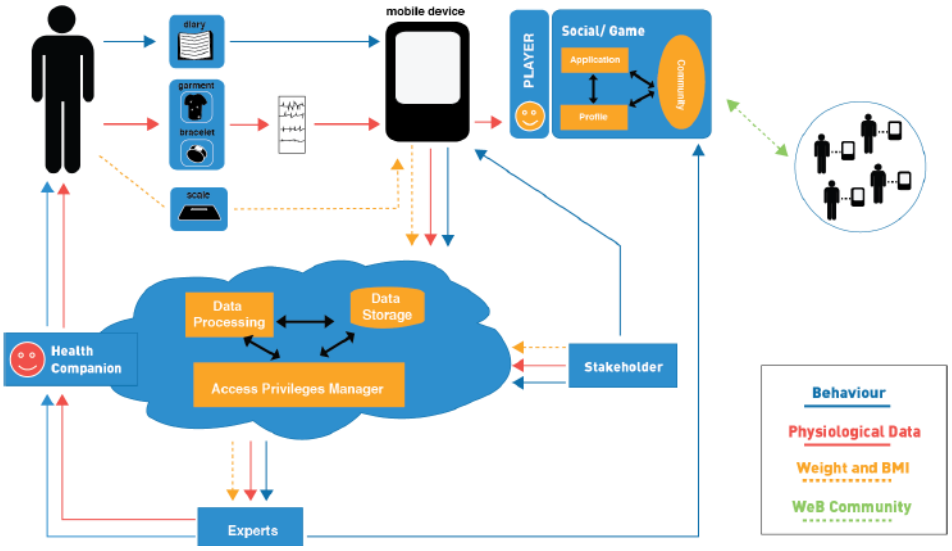


Figure 4: Architettura del sistema PEGASO, fonte documento di progetto PEGASO

Lo strumento gestionale del Canvas

Al fine di definire un' efficace strategia per il sistema PEGASO, lo strumento gestionale del Business Model Canvas è stato adottato. Lo si è usato due volte: in primo luogo per definire il Modello di Business dei competitor nel mercato dei Dispositivi Indossabili e in secondo luogo per definire un generale Modello di Business del sistema PEGASO.

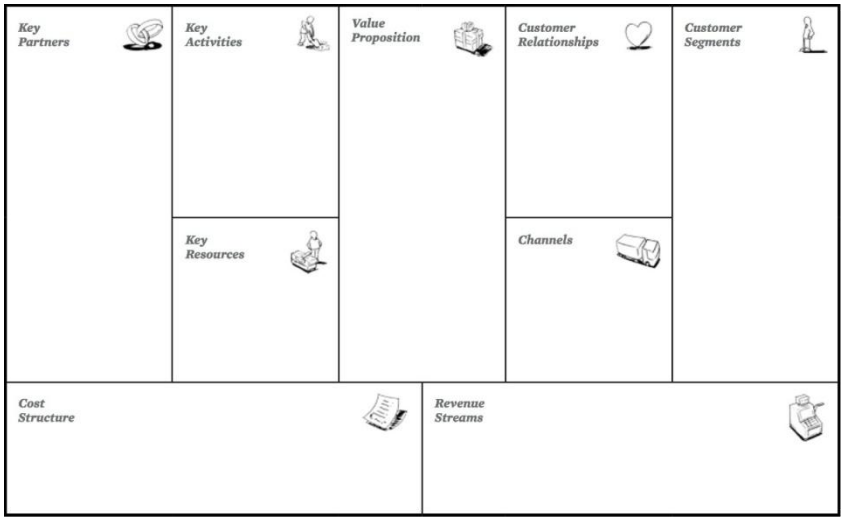


Figure 5: Strumento Gestionale del CANVAS, fonte Google Immagini

La metodologia

Per incominciare si è impiegato del tempo nell'approfondita comprensione di tutte le parti componenti il progetto PEGASO e delle dinamiche che ne stavano alla base. Svariati paper riguardanti Fitness Video Game, Video Game definiti " Active", poiché comportavano una

fase di gioco offline eseguita dal giocatore stesso, paper sulle Strategie, Teorie e Progetti Reali di Cambiamento Comportamentale sono stati letti. Il Serious Game di PEGASO vuole infatti essere una sorta di Fitness o Active Video Game e in generale tutto il sistema PEGASO vuole portare ad un cambiamento nei comportamenti degli adolescenti. A seguire sono state eseguite Analisi Esterne del Mercato dei Wearables e delle Health App versione Mobile: il programma PEGASO è composto infatti da un sistema fatto di Wearables e delle loro Mobile App.

E' stata poi eseguita un'Analisi Interna particolarmente approfondita del Mercato dei Fitness Trackers: svariate settimane sono state dedicate allo studio del Modello di Business di player quali Fitbit, Misfit, Jawbone, Fitbug soprattutto attraverso lo studio dei loro siti Web. Il risultato di tale lavoro di analisi è stato il riempimento delle categorie del Canvas con le informazioni raccolte adottando quindi una logica di puro Bench-mark. Al fine di definire un Modello di Business di successo per il sistema PEGASO le "good practices" già in uso nel settore dovrebbero essere imitate e adottate. Particolare attenzione è stata data al Modello di Business di Fitbit in quanto Market Leader.

Sono ora mostrati alcuni risultati dell'analisi condotta: la prima è una tabella riassuntiva che vuole distinguere i partner chiave da quelli "normali", la seconda è la rappresentazione del Piano di Marketing e Comunicazione principalmente adottato dai player operanti nel Mercato dei Wearables e la terza è una Mappa di Posizionamento dove i diversi Fitnes Trackers sono confrontati in base al livello di Tecnologia incorporata e in base al livello di cura prestato al Design e allo Stile, il prezzo è stato contestualmente indicato.

Key partner	***HW support***	***SW support***	***Partner***	***Partnership type***
Wearable Devices producer	✓			
App developers		✓		
			Endorsers	Product promotion
			Fashion brand	Product Co-creation
			Companies	*Corporate Wellness* support
			Insurance companies, Pharmaceutical industries,	Self-care model co-design

			Hospitals, Health Systems	
			Digital health platform	Health data integration
			Personal trainer bloggers	Product Promotion through the *Affiliate Programme*

Table 3: Partner Chiave e Partner normali

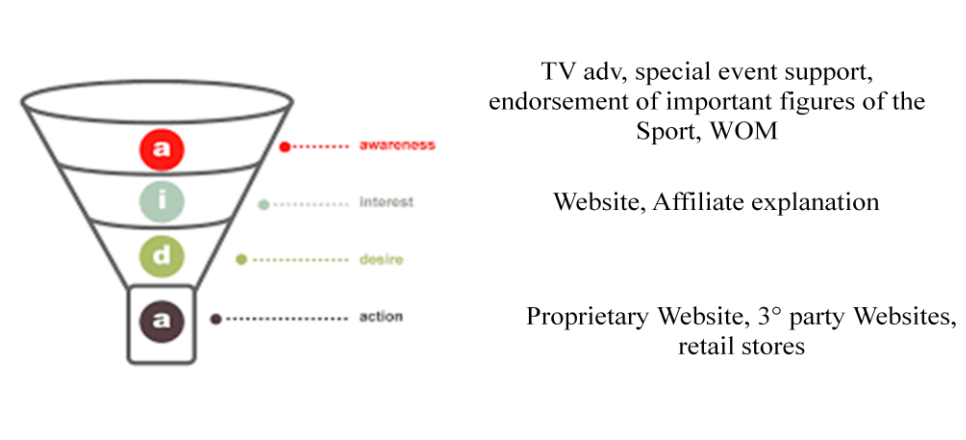


Figure 6: AIDA model

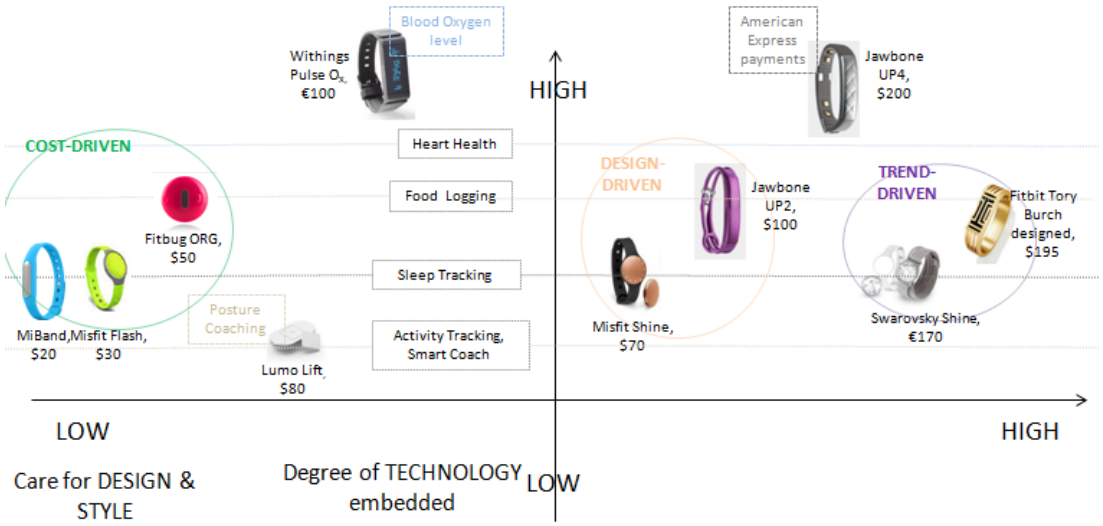


Figure 7: Mappa di Posizionamento dei Fitness Trackers

Infine è stata fatta una proposta di Modello di Business del programma PEGASO: lo stesso è stato valutato da diversi partner di progetto ed i feedback degli stessi sono stati tenuti in grande considerazione. Uno speciale supporto è stato offerto da alcuni di essi: NEOSperience è stato diverse volte consultato riguardo una possibile futura collaborazione con la start-up di

PEGASO; Lifegate si è rivelata di grande aiuto nel pensare ad un ingaggiante piano promozionale..

Grande attenzione è stata data alle modalità di finanziamento: si è pensato e di coinvolgere tradizionali Sponsor, e di fare uso di strumenti finanziari innovativi quali il Social Impact Bond (SIB) e infine di ricorrere a strumenti di credito agevolati. Il SIB rappresenta un esempio di Innovazione Sociale: Programmi di Prevenzione Sociale che prima solevano essere a carico delle sole Pubbliche Amministrazioni possono invece ora essere finanziate da Investitori Sociali più interessati all' Impatto Sociale dei loro investimenti piuttosto che al Ritorno Economico. L'idea sottostante è che i fondi, anticipati dagli Investitori Sociali, per eseguire i Programmi di utilità sociale, proposti alle Pubbliche Amministrazioni per risolvere problemi sociali (come quello dell'aumento del tasso di ragazzi obesi) da un Intermediario, siano poi loro restituiti solo nel caso in cui i Programmi Sociali avrebbero portato all'Impatto Sociale prefissato. Lo stesso necessita infatti di essere definito in una fase preliminare da PA, dall' Intermediario e dal Fornitore del Programma Sociale: l'Impatto Sociale deve essere un valore numerico, deve rappresentare un miglioramento nella qualità della vita dei destinatari del Programma Sociale e deve essere legato ad un risparmio monetario che le PA possono registrare in concreto. Questo risparmio, nel momento in cui si verificasse, servirà a ripagare quota capitale e quota interesse richiesto dagli Investitori Sociali. Un Valutatore Indipendente avrà il fondamentale compito di misurare tale Impatto Sociale.

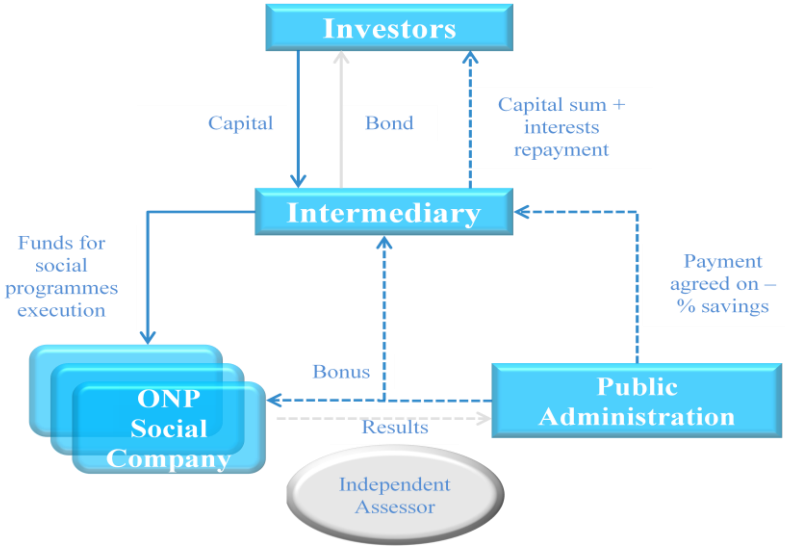


Figure 8: Attori e Funzionamento del SIB, fonte "Quaderni dell'Osservatorio" n. 11 Anno 2013

Nel caso del programma PEGASO i potenziali risparmi registrati dal Sistema Sanitario sarebbero quelli legati ad un minore costo diretto per la cura dei pazienti obesi, il cui numero dovrebbe diminuire grazie all'esecuzione del programma stesso

Applicazione ad un caso reale

Infine il Modello di Business definito in linea teorica è stato applicato ad una realtà di piccola scala alla cittadina di Merate, situata in provincia di Lecco, nel centro della Brianza.

Figure 9: Area di Merate, fonte Google Maps

Una tale scelta è stata fatta poiché le dinamiche di gioco e sociali alla base del programma PEGASO avrebbero potuto avere una maggiore presa in una realtà di modeste dimensione piuttosto che in una grande città, dal momento che per esempio la comunità di riferimento dei ragazzi coincide meno spesso con i propri compagni di classe in una grande città piuttosto che in un realtà di provincia. In aggiunta l'autrice della tesi ha frequentato una delle Scuole Secondarie coinvolte nella simulazione e per tanto sarebbe risultato più semplice mettersi in contatto con la suddetta Scuola e con i vicini Partner Sociali e Commerciali. Diversi colloqui con insegnanti e vicepreside del *Liceo Statale M. G. Agnesi,* uno degli Istituti Superiori coinvolti, hanno avuto luogo: il primo da considerarsi come intervista de-strutturata della durata di mezz'ora per avere dei generali feedback circa una futura e potenziale esecuzione del programma PEGASO, un secondo maggiormente strutturato per definire nel dettaglio aspetti più prettamente operativi (possibilità di far figurare PEGASO tra le attività extracurriculari di Salute e Benessere o di Educazione motoria, possibilità di legarne l'esecuzione al raggiungimento di un minimo numero di crediti scolastici) e infine un terzo dal carattere ancora più prettamente de-strutturato per avere delle riposte che ancora mancavano. Un Centro Commerciale e un Centro Sportivo sono stati visitati per proporre una

potenziale partnership per una futura reale esecuzione del programma PEGASO. Un evento lancio del sistema PEGASO è stato pianificato con il coinvolgimento di vari attori locali: un giornale e una Webradio locali.
Un sondaggio on-line rivolto agli studenti del *Liceo Statale M. G. Agnesi* è stato postato sulla pagina proprietaria di Facebook del Liceo stesso.
Infine sono stati definiti Conto Economico, Stato Patrimoniale e Rendiconto Finanziario che la start-up di PEGASO potrebbe potenzialmente registrare dopo un anno di esecuzione del programma stesso, corredati da un insieme di ipotesi applicative.

Conclusioni

E' stato deciso di applicare un mark-up del 40% al costo di produzione e si è ipotizzato di servire un mercato composto da 5450 unità: con questi valori l'Utile Netto risultante sarebbe di una modesta entità (ossia di €1200). Tuttavia l'obiettivo iniziale non era quello di una particolare remunerazione del Equity o del Capitale Investito, ma quello di comprovare la fattibilità economica di un Modello di Business molto innovativo e molto legato al territorio. Altre fonti di Ricavo sono attese per gli anni a venire: Compagnie Assicurative come GENERALI sono già state contattate ed hanno mostrato un certo interesse nei dati generati da PEGASO ovviamente nel momento in cui gli stessi riescano a raggiungere una massa critica. Allargando il numero dei Partner Commerciali potrebbe essere possibile che alcuni di essi dispongano di un Programma di Affiliate Marketing e pertanto la start-up di PEGASO potrebbe ricevere commissioni partecipando agli stessi.

Executive Summary

The following thesis has to be considered as a very unconventional one: a professor in Biomedical Engineering and a professor in Design of Systems for Healthcare proposed it to a Management Engineering students, that is, me. Indeed, the research work consisted in the definition of a Business Model for a prevention programme called PEGASO, *Personalised GuidAnce Service for Optimising lifestyle in teen-agers*: a European Project managed by Politecnico di Milano and especially by the Design professor over mentioned. The project is about the obesity and overweight prevention through the use of very innovative strategy as the use of Wearable Devices: this is the reason why a Biomedical professor was able to propose such a peculiar thesis to a Management Engineer student.

After a quick overview of the obesity issue and the actual ways to manage it, the thesis explains in depth PEGASO, FIT FOR FUTURE project: its different parts and innovative dynamics to face the obesity and overweight problem. Then an external analysis of the Wearables Industry and the Mobile Health App Industry are proposed. An Internal Analysis of the Fitness Trackers Vendors like the popular Fitbit is conducted in order to understand their effective Business Model. The core part of the research work is actually the proposal of a feasible Business Model for a prevention product characterized by peculiar and innovative features: the involvement of many Social and Commercial Partners like Secondary Schools, Cafès Courts, Sport Centres, Shopping Malls and in a second time Insurance Companies and Health System. All of these potential actors could have their gain if they take part in PEGASO prevention programme execution: this will be showed during the development of the thesis.

The topic was considered stimulating for two main reasons. On one hand the obesity and overweight problem is universally seen as a deep social issue, therefore, trying to solve it has been deeply inspiring. On the other hand, the solution to this social issue required the ideation of innovative partnerships with all the numerous actors that have an impact on teenagers' lifestyle, an aspect that is particularly adequate to be analyzed and developed by a Management Engineering student.

Obesity as a "silent global plague"

Worldwide 4 people out of 10 are obese.

In Italy 3 people out of 10 are obese.

Being obese means to have a too high Body Mass Index (BMI): a biometric indicator calculated as the ratio between one's weight expressed in Kilogram and the squared of one's height expressed in Meter.

$$\text{BMI}= \frac{[weight]}{[height]^2} = \frac{[Kg]}{[m]^2}$$

Body Mass Index (BMI)	*Obesity/Overweight Category*
25-29.9	OVERWEIGHT
30-34.9	OBESE class I
35-39.9	OBESE class II
>40	OBESE class III

Figure 10: Obesity Category, source Wikipedia

Overweight and obesity go far beyond the aesthetics problem: much more serious diseases and health complications have more probabilities to occur.

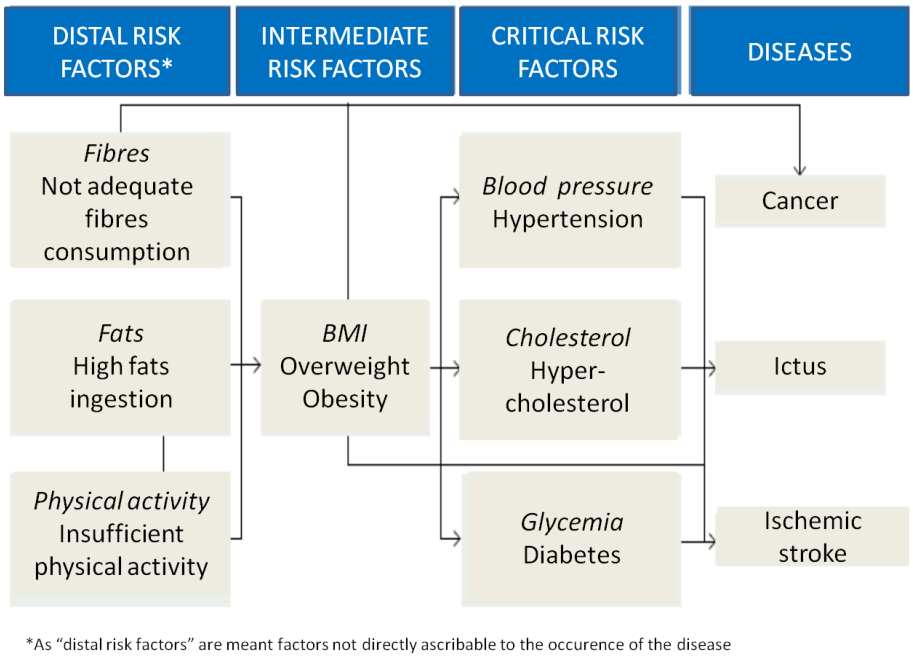
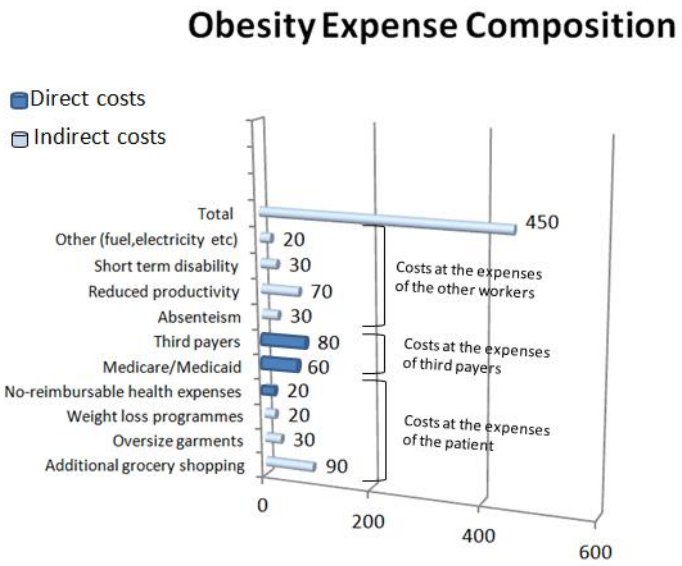


Figure 11: the Chronic Disease Prevention (CDP) model, source BCFN, re-elaborated version on OECD and WHO data

The quality of life of overweight and obese people considerably decreased: they feel often tired, heavy, they encounter difficulties in breathing and moving.

In addiction these patients categories imply a huge cost to the Health Systems: it is possible to distinguish between "direct" and "indirect" costs. The "direct" costs are represented by the personal health care, the hospital health care, the health services and the drugs acquisition. Whereas the "indirect" costs are more related to the minor productivity of obese and overweight people. Examples of this second cost category are: absenteeism, reduced efficiency, reduced efficacy, premature mortality, increase in the assurance premium.

The following is the output of an interesting US study for the quantification and classification of the different extra-expenses an obese patient has to faced.



Graph 2: Obesity Expense Composition, source Euromonitor

In Italy the obesity direct costs amount to €4,5 Billion and the indirect to €4.5 Billion as well. The projections of the Italian Healthcare Expense in 2014 were of €111,5 Billion. As a result the direct costs of obesity impacted for the 4% on the Italian Healthcare Expense.

The yearly extra costs to be sustained for an obese patient can vary from a minimum of €38 to a maximum of €550.

The social consequences such as low self-esteem, as obese people feel to be "different" from the others, their following difficulties in establishing close relationships and also the fact of being discriminated on the workplace have to be taken into account too.

Finally the social and economic environment in where we live has to be considered one of the main determinant of this growth in obesity and overweight rate. The eating and lifestyle

habits have changed due to mechanism like globalization, urbanization, technological development.

The junk food offer has widely spread: everywhere buying high-caloric and fatty foods is easier and cheaper than buying more healthy food. The fast foods trend has got a global trend. Even in the schools the vendor machines offers soft drinks and snacks instead of fruits, yogurts or fresh juices. People life got busier and more frenetic: as a consequence the will to prepare meals from raw ingredients results very low.

The cities have become crowded and more congested: as a consequence children are more often driven to schools or using means of public transport instead of going by feet or by bike as happened in the past. Their parents choose for them schools far from their home place as considered more prestigious and discourage them in going out on their own in their leisure time too. Thanks to the parents hyper-protection many more young girls and boys spend afternoons in front of the TV while maybe consuming junk food to beat their boredom and loneliness.

As a matter of fact to face the obesity plague among the youngest it has to be invested on healthy eating and on changing their too sedentary lifestyle.

PEGASO, FIT FOR FUTURE project

PEGASO, FIT FOR FUTURE project was actually conceived with these two purposes: educating the youngest towards a more healthy diet and a more dynamic lifestyle. The innovative aspects of the project are the modality used to reach these goals and the particular features of the project itself.

PEGASO features

PEGASO, FIT FOR FUTURE involves an international and multidisciplinary task force composed of 17 partners coming from 6 different European Countries.

Country	Partner
Italy	POLITECNICO DI MILANO (POLIMI)
	CONSIGLIO NAZIONALE DELLE RICERCHE
	GRUPPO SIGLA SRL
	NEOSPERIENE SPA (NEOS)
	LIFEGATE SPA
	IMAGINARY SRL
	LOMBARDIA INFORMATICA (LISPA)

Switzerland	CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA – RECHERCHE ET DEVELOPPEMENT (CSEM) HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE
Spain	UNIVERSIDAD DE LLEIDA FUNDACIO PRIVADA BARCELONA DIGITAL CENTRE TECNOLOGIC AGENCIA DE QUALITAT I AVALUACIO SANITARIES DE CATALUNYA (AQUAS)
United Kingdom	THE UNIVERSITY OF NOTTINGHAM COVENTRY UNIVERSITY THE UNIVERSITY OF EDIMBURGH
Romania	ROPARDO SRL
Germany	BILDUNGSBERATUNG TILL BECKER & CO GMBH

Table 4: PEGASO partners

The project managers are POLITECNICO DI MILANO and FONDAZIONE POLITECNICO.

At the moment three different PEGASO programme pilot are being executed in Italy, Spain and United Kingdom on more than 300 Secondary School Students.

PEGASO operations

The project aims at encouraging teenagers in a range between 13 and 17 years of age in modifying their lifestyle through the use of Smart Devices like Smart Bracelets, as Fitbit Fitness Tracker, and Smart Garments, as Smart T-Shirt of Polo Ralph Lauren, which will translate into numbers indicating the physical efforts of the teenagers. The Smart Bracelet will make them know how many steps, how many Kilometres, how many calories they have burned after a normal walking or after a more specific sport activity. The Smart T-Shirt instead will inform them of their temperature, heart rate, blood pressure, breathing capacity. All these information will be acquired from the dedicated PEGASO m-Health App.

Figure 12: Smart Bracelet example, source Fitbit Website

Figure 13: Smart T-Shirt example, source PEGASO Website

However the simple fact to wear this kind of Smart Devices was considered not motivating enough to make young people perform more physical activity. As a consequence PEGASO Wearables were associated to a Mobile Serious Game: in a catastrophic context the teenager-player has to make the right choice in term of what to eat to survive and in term of on how much to move to gain points. PEGASO Serious Game should actually be the motivation for the teenagers to operate a change in their lifestyle: the idea of obtaining points when choosing healthy food versus junk food or when a prefixed number of steps is reached should theoretically have some influence on them. Furthermore this Serious Game was thought as a Social and Multiplayer Game in order to provide an additional stimulus in performing well: every player has visibility on the other player personal results and can also decide to launch a group challenge. The results of the personal and group challenges have an echo in the PEGASO Social Network.

The points stored within the Game are translated into rewards in the real world: these could be represented by discounted health snacks, discounted health meals, promotion on admission fees for Swimming-Pools and Sport Centres, discounted sport tools.

The complexity behind such a system can be easily inferred: many commercial partners have to be involved to actually grant the proper execution of PEGASO prevention programme. The schools have to be seen as the best places where to inform the major number of possible programme recipients; the Shopping Malls have to be convinced in creating commercial

partnerships that allow the exploitation of discounts on particular goods categories; the Cafès, Food Courts, School Canteens have to be sensitized to the issue and encouraged in offering more healthy menus; the Swimming Pools and Sport Centres have to be involved too in order to offer the teenagers the chance to train at promotional prices.

From the health point of view the collection of all the over mentioned biometric data will represent a benefit for the General Practitioners of the teenagers: instead of having a spot blood pressure measure, the GP could count on a Data Base of blood pressure values constantly measured through the use of the Smart T-Shirt.

The collection of this data could also be seen as a valuable asset for many interested actors: Pharmaceutical Industries, Insurances Companies, Health Systems.

What follows is the representation of the architectural scheme of PEGASO system.

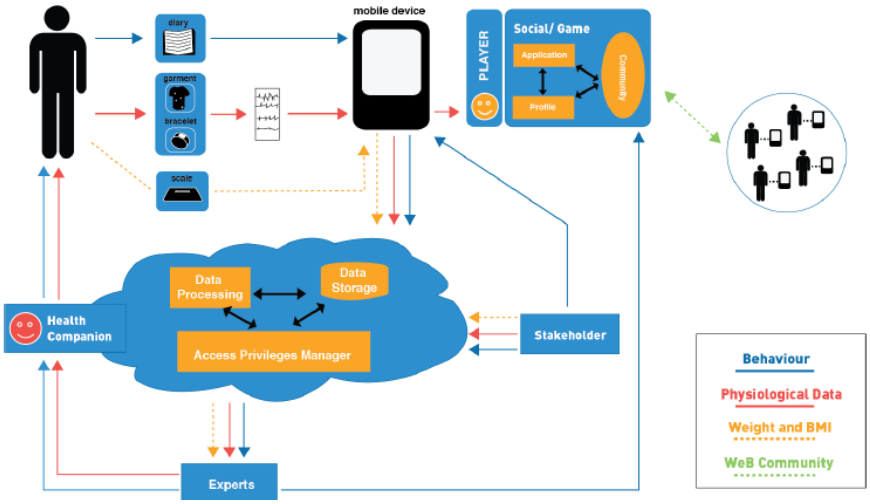


Figure 14: Pegaso System Architecture, source PEGASO project documentation

The Business Model Canvas

In order to design an effective strategy for PEGASO system the Business Model Canvas tool was adopted. It has been used twice: first to infer the Business Model of the players operating in the Wearables Industry and then to define a general Business Model for PEGASO system.

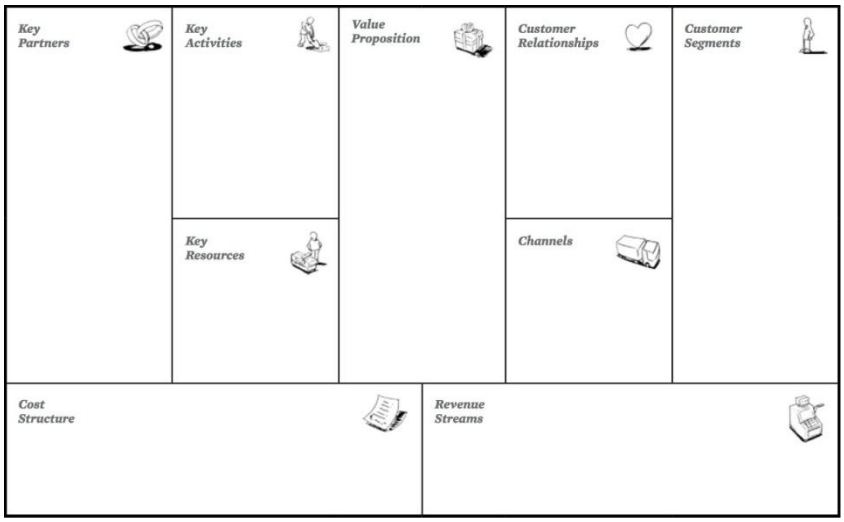


Figure 15: Management Tool of CANVAS, source Google Maps

The methodology

At the beginning some time was necessary to properly understand the project in all its parts and the dynamics on which it was built: many papers were read on Fitness Video Games, Active Video Games, Behaviour Change Strategies, Behaviour Change Theories, Behaviour Change Projects. Indeed, PEGASO, FIT FOR FUTURE project aims at changing teenagers behaviour through a source of motivation mainly represented by the PEGASO Serious Game, that could be seen as a sort of Fitness Video Game or Active Video Game. Then an External Analysis of the Mobile-App Market and the Wearable Devices Market was conducted: PEGASO programme is in fact a system represented by the coupling of Wearables with their Mobile App.

Especially an in depth Internal Analysis of the Fitness Trackers Industry was carried out: different weeks were spent studying the Business Model of players like Fitbit, Misfit, Jawbone, Fitbug especially surfing their Websites. The output of this analytical work was the fulfilment of the Canvas categories according to the information collected using a bench-mark logic. In order to define a successful Business Model for PEGASO system the good practices already experimented in the industry should have been adopted. Particular attention was given to the Fitbit Business Model as it was the Market leader.

The following are some of the results the analysis lead to: the first is the summarizing table of the key and normal partners; the second is the Communication and Marketing Plan mainly adopted and the third is a Positioning Map where the different Fitness Trackers are compared

on the degree of Technology embedded and on the degree of care for Design and Style, the price was also considered.

Key partner	*HW support*	*SW support*	*Partner*	*Partnership type*
Wearable Devices producer	✓			
App developers		✓		
			Endorsers	Product promotion
			Fashion brand	Product Co-creation
			Companies	*Corporate Wellness* support
			Insurance companies, Pharmaceutical industries, Hospitals, Health Systems	Self-care model co-design
			Digital health platform	Health data integration
			Personal trainer bloggers	Product Promotion through the *Affiliate Programme*

Table 5: Key Partners and Partners

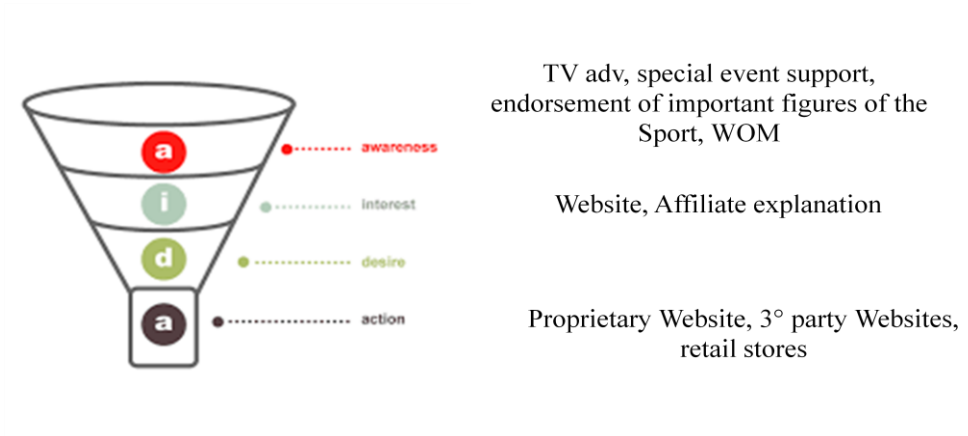


Figure 16: AIDA model

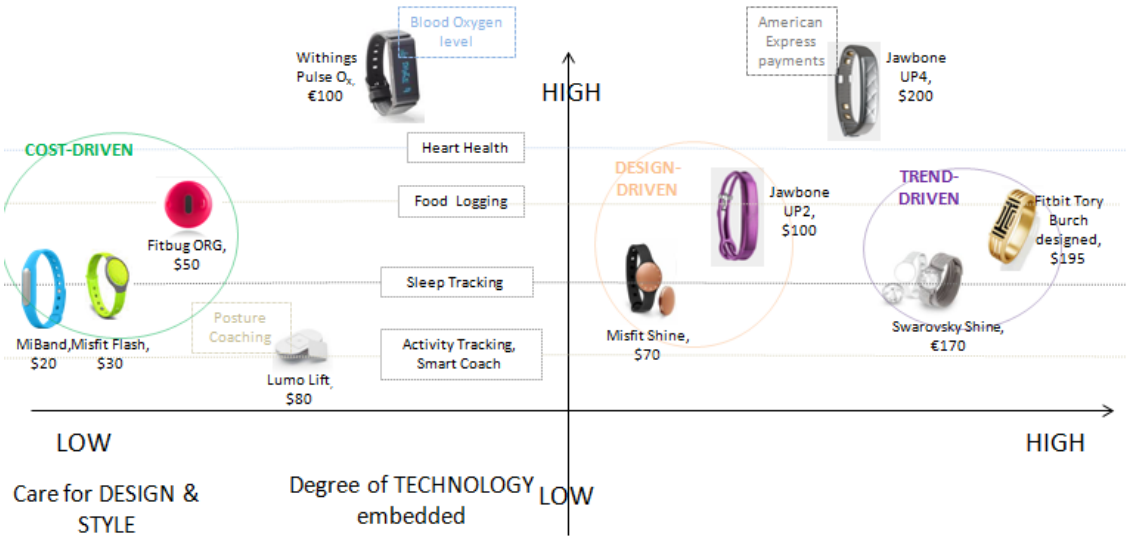


Figure 17: Fitness Trackers Positioning Map

Finally a PEGASO programme Business Model proposal was made: the same was evaluated by different PEGASO, FIT FOR FUTURE project partners and their feedbacks were taken into great consideration. Special support was received by some of them: NEOSperience was consulted about a possible future collaboration with PEGASO start-up; Lifegate was helpful in thinking at an engaging promotional plan.

Great attention was paid to the fund raising modalities: it was thought to involve as well traditional sponsors, as to make use of innovative financial tools like the Social Impact Bond and finally to apply for easy credit terms. SIB represents an example of Social Innovation: Social Prevention Programmes supposed to be in charge of Public Administrations can instead now be financed by Social Investors more interested in the Social Impact of their Investments than in the Economic Return. The underlying idea is the following: an Intermediary proposes to the Public Administrations a Social Prevention Programme to tackle a social issue. A Social Investor, more interested in the Social Impact of his investment than the Economic Return of it, will provide the funds necessary to perform the Social Programmes. The capital sum and the interest rate of the funds provided will be paid by the Public Administrations just in case a prefixed Social Impact will be reached. The same has to be discussed in a preliminary phase between the PA, the Intermediary and the Social Programme Provider: it has to be a numerical value, representing an improvement in the quality of life of the Social Programme recipients, and it has to be linked to a monetary saving the PA can actually

register. This saving, when it occurs, will be the way to pay back the capital sum and the interest rate required by the Social Investor. An Independent Assessor will have the crucial task to measure this Social Impact.

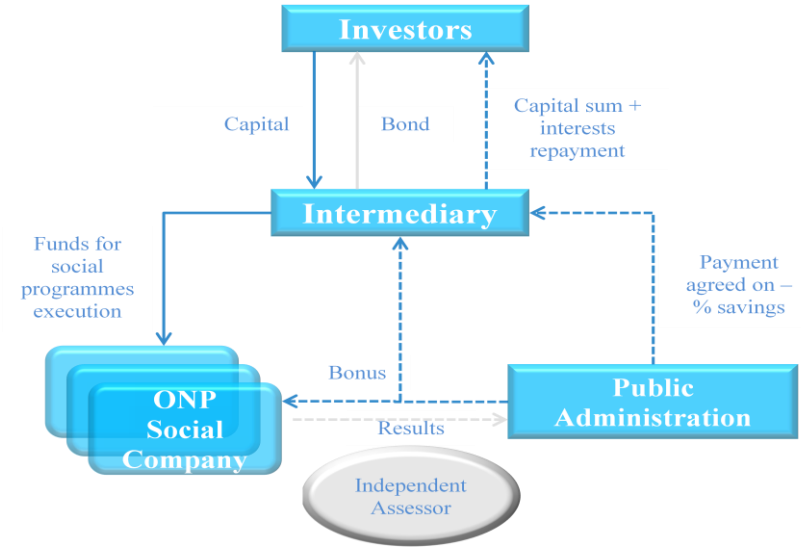


Figure 18: SIB actors and relations, source "Quaderni dell'Osservatorio" n. 11 Anno 2013

In PEGASO programme case the potential savings registered by the Health System would be the one on the direct cost to care the obese patients, supposed to be less thanks to the PEGASO programme execution.

Real case application

Finally the out-coming Business Model was applied to a small scale reality: Merate, in the province of Lecco, in the heart of Brianza.

Figure 19: Merate Area Map, source Google Maps

Such a choice was made for two reasons: the first was because the author of the thesis attended a Liceo involved in the simulation and lives close to that area so it proved to be

easier it would be easier to get in contact with the school and the nearby Social and Commercial Partners, the second was because the social and gaming dynamics characterizing PEGASO programme could have had more relevance there with respect to a bigger city where the students of the Secondary Schools are usually living not so close one to the other and so performing PEGASO programme in their leisure would have been harder. Three interviews were conducted with some teachers of *Liceo Statale M. G. Agnesi*, one of Merate Secondary Schools involved: two of them were semi-structured and one was instead structured. The first semi-structured one lasted half an hour and it was done to have a first general feedback on a potential execution of PEGASO programme. The second was the structured one: many details regarding the potential execution were analyzed; it was the longest one. The last was again a semi-structured interview executed in order to have some missing answer. A Shopping Mall and a Fitness Centre were visited for real to propose a potential commercial partnership for a future PEGASO programme execution. A PEGASO system launch event was planned with the engagement of many local actors: a local newspaper and a local Webradio.

A Web Survey addressed to *Liceo Statale M. G. Agnesi* students was posted in the Facebook proprietary page.

Finally a forecasted Profit and Loss Account, Assets and Equity & Liabilities, Cash Flow Statement with a set of operative assumptions were defined.

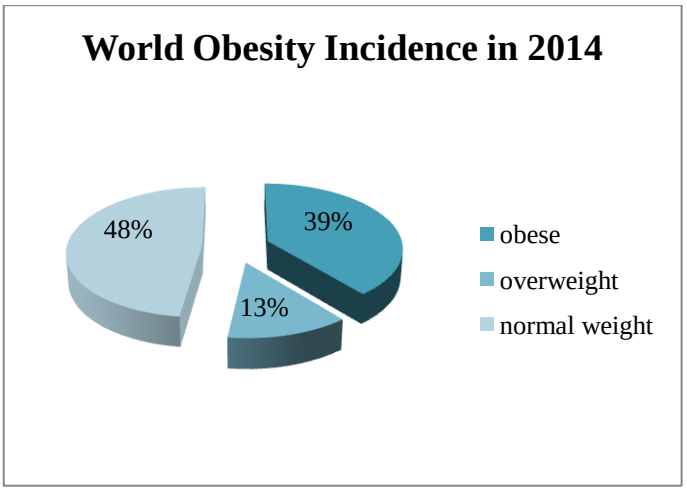
Conclusions

It was decided to apply a 40% mark-up to the production cost and it was supposed to serve a market composed of 5450 units: with these values the Final Earnings will be of a modest entity (€1200). However the aim was not to reach a predetermined ROE or ROI, but it was to prove the economical feasibility of an innovative and very much linked to local territory Business Model. Other revenue streams are expected to occur in the following years: Insurance Company like GENERALI has already been contacted and showed some interest in the PEGASO generated Data of once these reach a critical mass. Enlarging the Commercial Partners numbers it could be possible that some of them will have an Affiliate Marketing Programme, so PEGASO start-up could get commissions out of them.

1.THE PROBLEM: "the obese epidemic"

Obesity is one of the most serious health concerns in today's day and age. The number of obese human beings is seeing growing trends and this is not only alarming due to the harmful effect it can have on people's health, but also because of the threat it poses to the sustainability of healthcare systems. This problem is affecting not only the Western Nations, but also some Emerging Countries population segments.

39% of adults aged 18 years and over were overweight in 2014 and 13% were obese[1]. In almost half of OECD (Organisation for Economic Co-operation and Development) countries, 1 in 2 people are now overweight or obese.[2]



Graph 3: World Obesity Incidence in 2014, source WHO

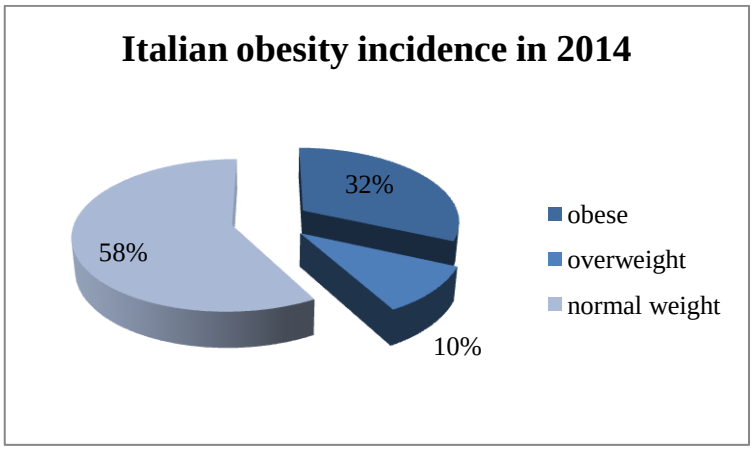
31,7% of Italian Population in 2014 was overweight and the 10,2% was obese.[3] The 26,9% of people in the range between 6 to 17 years of age in Italy was overweight in 2014. [4]

[1] Data collected by the World Health Organization (WHO) http://www.who.int/mediacentre/factsheets/fs311/en/

[2] Source: F. Sassi, *Obesity and the Economics of Prevention: Fit not Fat.* OECD, 2010

[3] Data collected by Passi http://www.epicentro.iss.it/passi/dati/sovrappeso.asp

[4] Data collected from Unicef and Istat http://www.panorama.it/scienza/dieta/obesita-adolescenti-non-si-piacciono/



Graph 4: Italian Obesity Incidence in 2014, source PASSI

The World Health Organization defined the obesity as a "silent global plague".

1.1_OBESITY: healthcare view

Being overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.

Body mass index (BMI) is a simple weight-for-height indicator that is commonly used to determine whether someone is overweight or obese in adults. The BMI of an individual is calculated by dividing a person's weight in kilograms by the square of his or her height in meters (kg/m^2).

$$BMI = \frac{[weight]}{[height]^2} = \frac{[Kg]}{[m]^2}$$

The World Health Organization (WHO) states that a person who's BMI is greater than or equal to 25 is considered "overweight" and a person with a BMI greater than or equal to 30 is "obese".

Body Mass Index (BMI)	*Obesity/Overweight Category*
25-29.9	OVERWEIGHT
30-34.9	OBESE class I
35-39.9	OBESE class II

>40	OBESE class III

Table 6: Obesity Categories, source Wikipedia

This illness usually arises when the calories introduced are constantly higher than the ones burned through the metabolic functions, the person's lifestyle and the physical activity performed. Less frequently, it is due to genetic reasons or psychiatric disease.

According to the Chronic Disease Prevention (CDP) Model, obesity directly causes chronic diseases such as hypertension, hyper-cholesterol and diabetes. It is also a strong determinant for illnesses like heart attacks and cancer. It can moreover indirectly contribute in the onset of Ictus (see figure below).

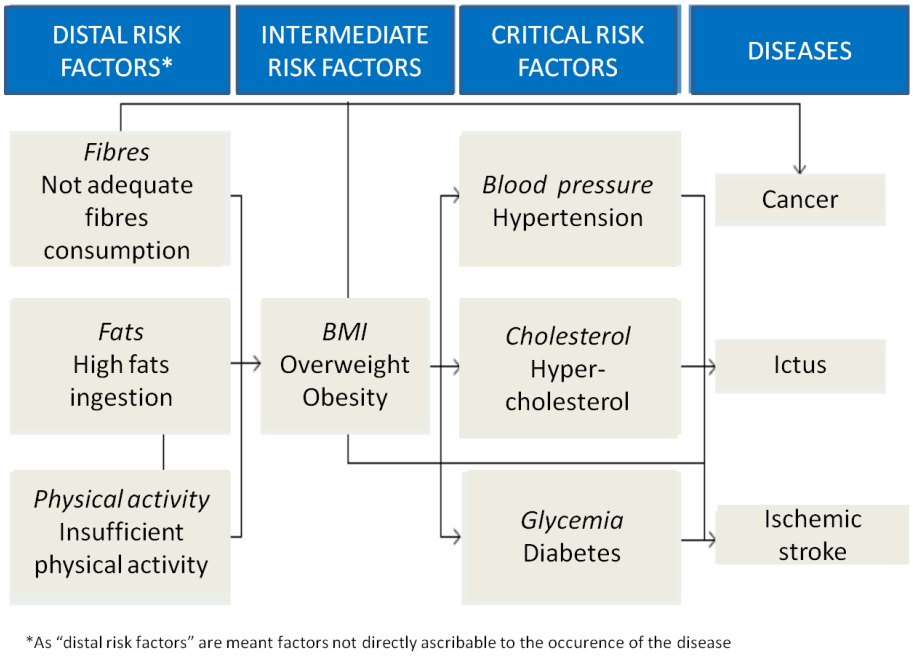


Figure 20: The Chronic Disease Prevention Model, source BCFN, re-elaborated version on OECD and WHO data

Obesity has also been shown to lead to asthma and arthritis problems. Overweight people often feel tired, weary, heavy, bloated, experience pain and have serious motor difficulties.

Life expectancy decreases for people with a higher BMI: People with a BMI between 30-35 kg/m^2 see their life expectancy decrease by 5 years and those with a BMI between 40-45 kg/m^2 see their life expectancy decrease by 10 years. It was

evaluated that with every 15 extra kilograms, the risk of early death increases by approximately 30%.[5]

However, the obesity paradox exists: life expectancy improved with a higher BMI as the patient gets old. In fact, elderly people have with higher probability illnesses that cause weight loss and so a sort of rebalancing effect takes place.

Finally, wealth and degree of education are factors, which discourage the outbreak of this disease when people are wealthier and have higher educational achievements.

Statistically, women are more often obese than men, but male obesity rates have been growing faster than female rates in most OECD countries.

1.2_OBESITY: economic view

Obesity and being overweight imply "direct" and "indirect" costs.

Obesity is connected with personal health care, hospital health care, health services and the acquisition of drugs whereas the second cost category is mainly related to a reduced productivity of the obese workers. It is possible to split this indicator in:

- Absenteeism: lost days of work caused by health reasons related to obesity.

- Reduced efficiency/productivity: caused by the not perfect physical condition of the obese and overweight people.

- Reduced efficacy: worsening of scholastic and working performance caused by the two illnesses.

- Premature mortality and number of lost QALY (Quality-Adjusted Life Years)[6].

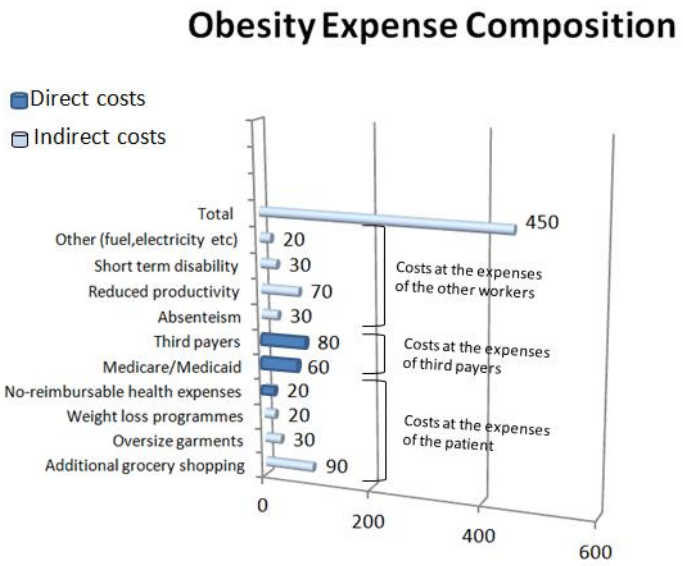
- Increase in the insurance premiums linked with disabilities caused by obesity.

To provide an example of the real direct and indirect cost categories, the results of an American study is shown in the graph below[7].

[5] Source: F. Sassi, *Obesity and the Economics of Prevention: Fit not Fat.* OECD, 2010

[6] This is an indicator for the life years spent in perfect health conditions.

[7] The yearly total expense to cure the obesity in the USA amounted to $450 Billion always according to the study.



Graph 5: Obesity Expense Composition, source Euromonitor

The annual cost sustained by the obese patients to privately cure their illness can range from a minimum of €120 to a maximum of €2892[8]. This private care is comprised of: consultation of nutritionists, dieticians, doctors, and psychotherapists. The high cost is associated with drug prescriptions (such as amphetamines, injections to reduce the muscle volume, diuretics, dietary supplements) and surgical operation (such as the sleeve gastrectomy).

In Italy, obesity leads to €4,5 Billion in "direct" costs every year, and this due to the hospital recoveries mainly, while the other €4,5 Billion[9] are the "indirect" costs. The projections of the total amount of healthcare expenses in Italy in 2014 were of €111,5 Billion[10]. As a result, the direct costs of obesity alone accounts for 4% of the Italian Healthcare Expense.

[8] Data collected from O.N.I.C.E. study in 2012.
[9] Data collected from the Italian Barometer Diabetes Observatory (IBDO).
[10] Data reported by Francesco Cancellato in http://www.linkiesta.it/it/article/2014/11/01/tutti-i-costi-e-gli-sprechi-della-sanita-italiana/23359/

In Italy, the extra direct health care costs [11] (with the exclusion of Hospital recoveries) are for:

- An overweight patient the +4% with respect to a normal weight health care direct cost.

- A class I obese patient the +18%.

- A class II obese patient the +40%.

- A class III obese patient the +51%.

On average, an obese person costs 25% more to the healthcare system (always considering only the "direct" costs) than a person of normal weight.

€100.000 is supposed to be the extra expense an 18 year old obese person will entail to the Italian Healthcare Service during all of his or her lifespan, supposed to be of 75 years.[12]

1.3_OBESITY: social view

The social, psychological and emotional consequences of being obese are very different from a "normal" person and cannot be overlooked. An obese person is more often depressed, has very low self-esteem, and tends to isolate himself/herself when compared to a "normal" person: these individuals are most of the time mocked by surrounding peers. As a result, overweight people tend to have more relationship problems, such as facing more difficulties in starting a family. They are inclined to assume insane behaviours to compensate for these pains. For example, they begin to smoke and to consume alcohol very early in life.

In the job market, they deal with other types of problems. The selection process turns out to be harder. They cannot complete specific tasks (e.g. representation jobs) and

[11] According to a recent study carried out by Centre for Economic and International Study (CEIS) of Tor Vergata http://www.linkiesta.it/costi-obesita

[12] This data was evaluated by Scuola Superiore Sant'Anna in 2009.

are going to be paid less for their reduced productivity and performance. Obese people earn up to 18% less than people of normal weight[13].

1.4_OBESITY: environmental view

Junk food is readily found in our society. It is possible to buy soft drinks and snacks everywhere at a very low price. Fast-food chains conquered the most crowded places, such as in schools where these high-calorie foods are pushed for their economic convenience. At the same time, changing working and living conditions mean that fewer people prepare traditional meals from raw ingredients.

Many factors contribute in the sedentary lifestyle of young people and adults.

Many moments of spontaneous physical activities, especially in the regular day of the youngest, were cut off. Choosing a school far from the home forces children to take different means of transportation instead of walking or cycling to get to school. The urbanization trend, the rise in the number of vehicles and the lack of cycle paths or fast tracks discourage parents to let their children walk or cycle to school. Once home, kids spend most of their time alone, mainly in front of the television set, consuming junk food (crisps, snacks and candies). This is in part caused by the busy lifestyle of their parents, who come back home very late in the evening, and also by their hyper-protection, which prevents children to participate in physical activities in their leisure time.

Children who have at least one obese parent are three to four times more likely to be obese themselves. This is partly due to genetic reasons, as children generally share their parent's unhealthy diets and sedentary lifestyles. This is an influence that has played an important role in the spread of obesity.

The technological development made the task content always more brain-intensive rather than labour-intensive. As a consequence, adults spent most of their working day sitting in front of a computer.

[13] Source: F. Sassi, *Obesity and the Economics of Prevention: Fit not Fat.* OECD, 2010

Obesity is an illness that must be identified as early as possible to prevent the outbreak of more serious diseases. This sickness is very costly and severely damages the quality of life of the people affected. Sadly, this is more and more due to the environment in which people live. The over-eating caused by the obese people was considered as “food waste”. This situation is no more sustainable and it is urgent to begin using a more preventive than curative approach.

The prevention of obesity will lessen the tremendous pressure imposed on the healthcare system, since it will reduce the number of chronic diseases that are caused by the onset of obesity. Therefore, prevention should be considered as a social investment for the health and sustainability of many nations.

2.ONE SOLUTION: Obesity Prevention Programmes

Three actions can basically be adopted and combined by governments to tackle the obesity problem: health education and promotion, regulation and fiscal measure and lifestyle counselling by family doctors.

A culture of healthy eating and active living has been promoting for some years especially in schools: "Frutta Snack" project within the *Guadagnare salute* programme represents a practical example. It was tested in 80 Secondary Schools in three Italian cities (Bologna, Roma and Bari) in 2007 and aimed at prompting and increasing the fruit consumption: fresh fruit vendor machines replaced the traditional snacks vendor machines, the teachers held informative and educational lessons on the topic and communication actions were directed to students and to their parents. One involving initiative was a radio message realized by the students themselves on the importance of eating fruits.

Figure 21: Frutta Snack project logo, source Google Image

To raise all the population awareness towards the too limited physical activity issue many initiatives were experimented: walking group for elderly people, guided walking path for children going to school- the project, called "Piedibus", reached a reasonable diffusion in the Italian reality-, sport activities enhancement and disabled people physical activity support.

Figure 22: Piedibus project logo, source Google Image

Governments are generally reluctant to use regulation and fiscal levers -that means increasing the prices of determined food category, imposing taxes on them or even not allowing their consumption- because of the complex regulatory process, the enforcement costs and the likelihood of confrontation with key industries. These measure would be more transparent and cost efficient, but they would indiscriminately hit all the population causing regressive reactions.

The last counteracting obesity action, the lifestyle counselling through family doctors, is the more effective, but the more expensive to be executed.

Combining these three interventions in a comprehensive prevention strategy, targeting different age groups and determinants of obesity, provides an affordable and cost-effective solution and significantly enhancing overall health gains.

It is also fundamental not to stop these obesity counteracting actions for i.e. political priorities, but to conceive them as a medium- or long-term projects. The definition of European or even Global plans should facilitate a continuous commitment of the different Governments and Countries towards these delicate questions.

The *Action Plan on Childhood Obesity 2014-2020* is one of the latest obesity prevention programme where the EU Member States committed to contribute to halt the rise in overweight and obesity among children and young people (0-18 years) by 2020. The plan suggests to act on 8 areas:

-sustaining an health begin of life,

-promoting health environments (especially in schools and kindergartens),

-making the health choice the most easy one,

-limiting the promotion and commercialization of junk-food and unhealthy habits to kids,

- informing and empowering the families,

-encouraging the physical activity,

-monitoring and evaluating the phenomenon,

-enhancing the research.

The Action Plan identifies three main types of stakeholder who will play an important role in achieving its overreaching goal: the 28 EU Member States, the European Commission and international organisations such as the WHO and civil society (for example, Non-governmental organisations (NGOs), industry and research institutes).

Figure 23: WHO logo, source Google Image

The *Global Action Plan for the prevention and control of non communicable diseases 2013-2020* is another prevention programme that has among its objectives to reduce of 10%

the prevalence of insufficient physical activity, of 30% the mean population intake of salt/sodium and to halt the rise of the obese epidemic by 2020. Especially this prevention programme wants to free the world from the avoidable burden of non communicable diseases in order to maximize the health condition and the productivity at every age.

The *European Charter on Counteracting Obesity* was constituted in Istanbul in November 2006. This charter underlines as well the huge health costs as the social and economical consequences the obese epidemic lead to and identifies in the incorrect diet and in the sedentary lifestyle the risk factors connected with the obesity onset. The main counteracting actions to beat the determiners of these wrong and risky behaviours were finally outlined.

Gaining in health is a European strategy for the prevention and control of chronic diseases approved in September 2006. It can be described as an integrated approach which aims at intervening on the main risk factors (sedentary lifestyle, wrong nutrition, smoking, alcohol abuse) and to enhance the prevention and control through an adequate healthcare systems.

Figure 24: Guadagnare Salute project logo, source Google Image

Passi (Progressi delle Aziende Sanitarie per la Salute in Italia) is a 360° health monitoring programme on the Italian adult population that began in 2006. This kind of monitoring system works constantly through sample surveys and information regarding Italians (18-69 years old), their lifestyle, the behavioural risk factors connected with the outbreak of non communicable chronic diseases and the degree of awareness and adoption of prevention programmes.

Figure 25: PASSI project logo, source Google Image

The *Obesity Day Project* is the national Italian day dedicated to the raising of awareness on obesity. It has taken place every 10th October since 2001 and it is promoted by ADI (Associazione Dietetica Italiana). The goal of this action is to attract and guide the attention of the Mass Media, the public opinion, the healthcare operators on obesity as a serious health issue rather than just an aesthetic problem.

2.1_PEGASO, FIT FOR FUTURE project

What is PEGASO, FIT FOR FUTURE project?

PEGASO, FIT FOR FUTURE is a European integrated project co-managed by the Design Department of Politecnico di Milano and Fondazione Politecnico di Milano. Its aim is to develop a multi-dimensional cross-disciplinary ICT system that exploits sophisticated game mechanics to motivate behavioural changes towards healthier lifestyles and prevent overweight and obesity in the younger population. The project relies on a mobile- and cloud-based ICT platform to set up a system of new healthcare services targeted to teens (13-17 years) for obesity prevention.

PEGASO system is designed around a social platform that integrates various gaming strategies to involve teens to prevent and engage with their health in a long-term period. The serious gaming broadens into a social dimension, where the game takes place in real-world situations, aims to solve real problems and come across real challenges of teens' life.

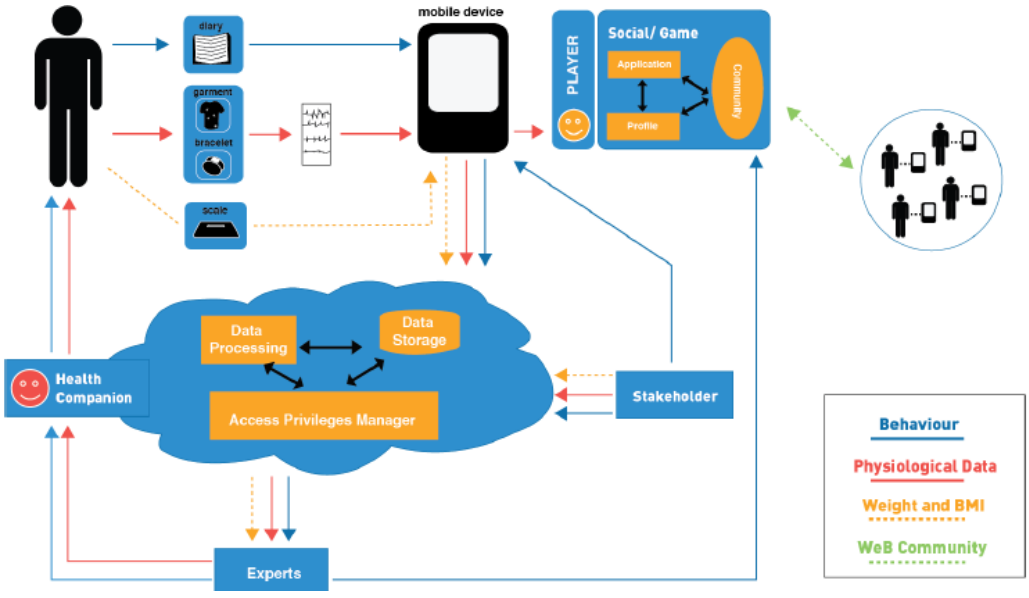


Figure 26: Architectural Scheme of PEGASO system, source PEGASO project documentation

These are the physical components of PEGASO system:

-**Mobile Device**: PEGASO has a mobile-centred architecture system. Mobile phone is the primary "sensor" and interface for the users.

The system is meant to be modular, so additional sensors that add additional HW can be considered:

-**Smart Bracelet**: it monitors the physical activity. It gives more accurate measurements than the mobile device thanks to the embedded sensors and should be worn 24/7. It can measure steps, calories, distances made.

-**Smart Garment**: this is provided of specific sensors to monitor fitness activity. The more sophisticated biometrics parameters are heart-rate, respiratory capacity.

-**Scale**: it provides information about weight and body composition.

These are instead the digital components of PEGASO system:

-**Social platform**: this represents gamification of teens' life. The platform parts are Game, Player, Multimedia Diary, Daily challenges, Group challenges and health-related educative applications.

-**Game**: this is a Serious-Game where the user is guided in doing healthy actions (a minimum number of steps every day, healthy foods choice) in order to get points and rewards, which can also be exploited in the real world.

-**Player**: this is the teen, PEGASO user, who should execute in the most proper way PEGASO programme, so he should play the Game, wear PEGASO Wearables 24/7, write the Multimedia Diary, be engaged in the personal and group challenges.

-**Multimedia Diary**: the users are here asked to insert their food intake in a not to demanding way, e.g. pointing at food pictures.

-**Daily Challenges**: these are the personal goals that should be reached by the users every day (e.g. a minimum amount of physical activity represented by a determined number of steps or minutes of walking) and are customized according to the user's health condition.

-**Group Challenges**: these represent instead a kind of competitions between at least 2 PEGASO users. The winners can celebrate their successful performance on PEGASO Social Network.

-**Health related educative Applications**: these are e.g. the Health Companion, the Interactive Chat where to speak with Experts, the Data Visualization tools.

-**Health Companion**: this is where the recorded data, collected through PEGASO Application and processed by an automated algorithm, are sent and transformed into feedbacks for the users.

-**the Cloud**: this is where the data, collected through PEGASO Application, are sent to be processed in a more structured way. They are in fact accessible by experts and stakeholders who want to get knowledge out of them.

-**Social Network**: this is a social community formed by peers that should share the same objective, i.e. healthy lifestyle habits.

These are the different kind of data managed by PEGASO platform:

-the behavioural and nutritional data flow (blue lines) represents the information that the users provide about their nutritional habits (food intake) together with specific information about their fitness activity (time spent for fitness activities during the day, not related to physical measurement). These data are collected through the Apps user interface directly from the users (e.g. pictures, questionnaires, diaries, vocal annotations, etc.).

-the red line represents physiological data that can be acquired in continuous (this means, accelerometers for the bracelet and, when used, the bio signals from the garment). Specific algorithms integrated in the Apps and based on interpretative models process these data.

-the yellow line represents data coming from the scale/balance board. This is a non-continuous measure used as a complementary data for the physiological status of the subject.

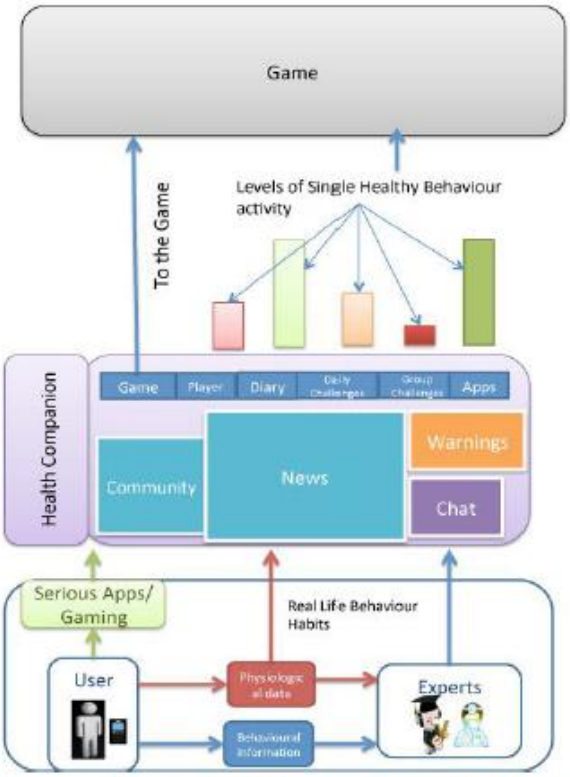


Figure 27: Architecture of PEGASO Social Network, source PEGASO project documentation

Who is it addressed to?

As already said, PEGASO, FIT FOR FUTURE is an obesity and overweight prevention programme addressed to 13-17 years old teenagers. The reason to choose this population target lies on the assumption that around the age of 14 years old the teenagers acquire more independency and have increasingly the opportunity to select by their own what to eat and the extra-school activities are influenced by what their friends do. Therefore it is important that at this stage they become aware of the consequences of an incorrect behaviour and that they perform a sufficient physical activity. So teens turn to be the primary users of PEGASO system.

PEGASO is being tested with over 300 adolescents in three EU member states (Spain, Italy, UK).

It should be underlined that PEGASO, as tool for prevention, is addressed also to healthy people. Recruitment of teenagers was done through schools, focusing on fostering communities of interest (i.e. all students in a class), rather than students with identified risk factors.

The ecosystem of stakeholders and enablers is composed of three main parts that are integrated in the user centred PEGASO system: **technological frame** (composed by multimedia diaries, embedded sensors systems, mobile & web platform), **services frame** (stakeholders services to provide answers to users' needs and desires in real time/not real time, from the health companion to the serious gaming and social experiences) and **experts layer** (which are knowledgeable groups of people from different disciplines - medical/psychological/educational – able to interact with the system, who provide first users with filtered accurate and needed information to reach their PEGASO objective). As a matter of fact people assigned to create, manage and maintain the HW (the sensors embedded in the Wearables, the Mobile and Web-platform, the Game), as well as the SW (the contents of the feedbacks provided to users through the Health Companion, the Game, the Social Network) are in need. A pool of experts able to re-elaborate the behavioural and physiological users data and to support them with their expertise and competence is necessary too.

The development of PEGASO project mobilized a wide stakeholders' ecosystem contributed by National Health Authorities and Research Institutions, Industries and Academia from the ICT and healthcare sectors, as well as food companies and SMEs.

PEGASO is a cross-disciplinary ICT system: the number and kind of partners who are collaborating towards its development is a proof of it. Go to **Attachment 1** to see the whole list.

Where is it executed?

PEGASO framework is being validated by secondary school students with the support of their school and families. The four validation studies are being carried out in Italy (Lombardy), especially at the Liceo Vittorini of Milan, in Spain (Catalonia) and United Kingdom (England/Scotland).

When did it start? How many months will it last?

It started in December 2013 and it will last 42 months. The project has already passed the half of its lifespan-it is now at its 24th month of execution.

Which are the dynamics of PEGASO system?

The following are the key assumptions behind PEGASO approach:

1. **an "active monitoring system"** based on an advanced sensor systems and on both exergames and social/networked games allows to discover at an early stage potential risks of developing obesity and related co-morbidities and encouraging lifestyle changes;

2. **serious games** are a key tool to support the education of teenagers towards healthier lifestyles;

3. physical seminars to teachers and parents by means of **online educational modules** engaging the educational environment (families and schools) reinforce the delivered messages;

4. **information accessibility and sharing** supports improvement of stakeholders decisions and provision of specific services.

The project relies on ICT technologies to implement a framework for the promotion of an health service based on three main features: **individual & environmental monitoring**, including wearable sensors, mobile phone and multimedia diaries for the acquisition of physical, physiological and behavioural attributes of participants; **feedback to the user**, presenting personalised healthy options for alternative lifestyles; **social connectivity**, encouraging involvement in social network experience sharing and social engagement. For

the system development, a user centred approach, social and networked games and online education are used.

All the information from the users must be “handled” and processed and the corresponding feedback provided. This means building an expert layer that is able to analyze all the data and deliver the resulting answers to the teenagers. A part of this layer is composed by automatic algorithm (for real-time processing and feedbacks provision when applicable); a second building block is the experts’ team who integrate the previous assessment to better stimulate the teenagers’ consciousness about obesity and their motivation to adopt a healthy lifestyle.

Moreover PEGASO considers the various levels towards persuasion for healthcare. Various types of experts and technologies feed these levels of persuasion towards healthier decisions. There are four different persuasion strategies: awareness of obesity risks, motivation, affective learning and behaviour change.

Experts evaluate the user’s nutritional habits and provide specific information directly to the Social/Game level. This information modifies the Player's characteristics and produce benefits/penalties at the community level. Experts must filter this information to avoid false information. Another data flow is sent to the Health Companion directly from experts to provide habit suggestions and evaluation of the user’s lifestyle and results. From the cloud originates another data flow concerning behavioural and nutritional information directed to the stakeholder, in order to make specific evaluation or send specific suggestions (i.e., information for insurance companies, location based suggestion for food industries or fitness industries etc.).

In addition to providing individual and social dimension, and to address prevention, input also for the “healthcare” system are expected to be provided. Privacy and security aspects have to be considered so that a cloud paradigm can be adopted for the storage of data and information. Some data can become part of the personal health record to which the patients can have (mobile) access and that can be available for paediatrician or the family doctor as appropriate.

Which are the aims of PEGASO system dynamics?

Knowing how to stay healthy is not enough to motivate individuals to adopt healthy lifestyles, but relevant progress can be achieved through the use of incentives delivered through a combination of processes and mobile technologies.

Effective management of the obese epidemic should thus be directed to the **environment where the youngsters live** taking into account family income, ethical and cultural background, and lifestyle patterns. Finally, such a behavioural management should be also sensitive to **social factors** as **relations with peers** through **social network media** and personal opportunities focused on increasing awareness and personal involvement in the issues of healthy lifestyles to contrast body mass excess.

The capabilities of ICT technologies (i.e. mobile phones, digital tablets) offer the possibility to integrate this system with additional technologies for data acquisition (like accelerometers and wearable sensors for physical activity). Mobile phones, compatible with open-source resources, can interface various technologies to create a social and global network for a real time monitoring of the entire patients-healthcare system, for data exchange and access to on-line services.

The impact expected by taking such approach concerns wide users' acceptance and use of the PEGASO system with consequent increase of quality of life through healthier behaviours stimulated by social "rewarding" Apps such as gaming applications (including serious games with educational objectives). This will ultimately lead to **reducing costs and time of healthcare services** and will drive *education towards self-care organizational model*.

PEGASO, FIT FOR FUTURE project was designed in accordance with the strategic directions given at the Copenhagen Research Forum hold in 2011.

"Poor dietary habits and a lack of physical activity also mean coping with associated serious public health issues such as obesity. With about half of the population in Europe now considered overweight or obese, the occurrence of diabetes and metabolic syndrome is on the rise."

(Copenhagen Research Forum - Visions for Horizon 2020)

"One specific goal involves dealing with the huge health problems related to ***overweight and obesity****.* ***Prevention*** *is of obvious importance and there is an urgent need for further research into how physical activity and training, in addition to nutrition, can prevent the steadily increasing average body mass index of Europeans. This proposal includes a vision that integrates a* ***lifestyle of healthy habits*** *with an environment that promotes healthy living by* ***encouraging exercise and making healthy food affordable****."*

(Copenhagen Research Forum - Visions for Horizon 2020)

PEGASO Game as a Serious Game

Definition:

Serious Games (SG) are simulations of real-world events or processes designed to solve a problem, in the case of PEGASO: teenagers incorrect lifestyles that lead to obesity and overweight. Although SG can be entertaining, their main purpose is to train or educate users, though they may have other purposes, such as marketing or advertisement.

Serious Games are primarily focused on an audience outside of primary or secondary education, in PEGASO case the first.

These games are made to provide an engaging, self-reinforcing context in which to motivate, educate and train the players.

Categories:

These are the SG categories relevant for PEGASO Game:

Advergames

The use of games for advertising. The approach can include numerous different ways of advertising more or less well-known from other media. Product placement, banners in-game or just traffic triggers are examples.

Edutainment

A combination of education and entertainment.

Games for Health

Such as games for psychological therapy, cognitive training, emotional training or physical rehabilitation uses. Technology and mental health issues can use Serious Games to make therapy accessible to adolescents who would otherwise not find an approachable psychotherapist.

Exergaming

Games that are used as a form of exercise.

To see all the other SG categories with their definition see **Attachment 2**.

PEGASO Serious Game can be considered as: an Advergame since in the commercialization phase it will suggest users in which associated shops to exploit the rewards won within the Game, an Edutainment since it is actually a mix of health education and entertainment, a Games for Health since its primary aim is to reduce the obesity rate among teenagers and an Exergame since it will be used as sort of physical exercise.

Serious Games Examples*:*

-*Biohazard*, an Epidemic Management Serious Game

This was a multiplayer RPG designed for the PC/Xbox in which sources of epidemic outbreaks were investigated to determine how to control crowds and deliver decontamination treatments and manage resources efficiently.

Figure 28: Full Spectrum WARRIOR logo, source Google Image

-*Army Battlezone*, *America's Army* (2002), *Full Spectrum Warrior* (2004) US military training Serious Games

The primary consumer and producer of Serious Games is the United States Military, which needs to prepare their personnel for enter a variety of environments, cultures, and situations. The above mentioned Serious Games were designed exactly on these purposes.

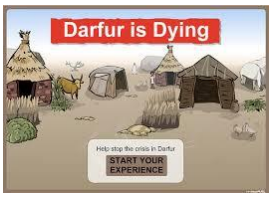


Figure 29: Darfur is Dying logo, source Google Image

-*Darfur is Dying*, a provocative Serious Game

An online game by mtvU that simulates life in a Darfur refugee camp.

-*FloodSim*, a flood management and educative Serious Game

A flood prevention simulation/strategy game designed to inform the people of the United Kingdom about the dangers of flooding as well as to help gather public opinion on the

problem that flooding presents to the UK. The player takes control of the UK's flood policies for three years and attempts to protect the people and the economy of the United Kingdom from damage due to floods.

Figure 30: Moonbase Alpha logo, source Google Image

-*Moonbase Alpha*, an astronaut training Serious Game. Developed as a multiplayer simulation of astronaut training for a catastrophic event on a hypothetical lunar outpost.

-*X-plane*, a civil aviation simulator Serious Game.

The reason why to use a Serious Game to change the teens lifestyle

Health education is a particular area where results have been observed by the use of Serious Games "*Video games, enhanced by behaviour-change technology and motivating story lines, offer promise for promoting diet and physical activity change for diabetes and obesity prevention in youth.*" (Thompson). The features required to a Serious Game to be effective are "challenge, curiosity, control and imagination". In PEGASO Serious Game many challenges are proposed: Individual, as well Collective. The Game design should be catchy enough to stimulate the user's curiosity and imagination. The users should feel to have more control over their health status thanks to the health condition improvements hopefully monitored (such as weight losses, increased respiratory capacity). In addition a well-designed Serious Game should engage and make the player active participate. The use of rewards in a behavioural sense is also a powerful tool in this kind of games "*the video game will ask a question and the player will answer. When students link the question and the answer enough times, reinforced by a reward, learning will occur*" (Egenfeldt-Nielsen).

PEGASO Game as an Active Video Game

PEGASO Game is an example of exergames, also known as "active video-games" (AVG). These are video-games categories which comprehend a set of actions to be carried out in the real life through real movements. An AVG to be successful should be designed according to the "self-determination theory", which says that a person to be satisfied should feel autonomous, competent and in relationships with other people. In an Active Fantasy Sport taken as example in the paper written by Arlen C Moller, Sara Majewski, Melanie Standish,

Pooja Agarwal, Aleksandra Podowski, Rebecca Carson, Biruk Eyesus, Aakash Shah, Kristin L Schneider the coach of the fake football team can choose on his own which football players to acquire and in which tournament to play satisfying in this way the need of *autonomy*. The other teams capabilities assessment and the following matches results represents the coach *competence*. Finally the chance to play against teams of known coaches granted the satisfaction of the *relationship* need.

PEGASO Game was designed keeping in mind these guidelines: the users can choose every day what to eat and which physical activity to perform to reach their daily fitness goal, their competences are represented by their capabilities to reach these goals or by winning the competitions with other users. The existence of other users to be faced and to be informed of the users performance fulfils the relationship need. In addition an AVG to really increase the physical activity performed by its users has to be built on an engaging story and to be integrated with extra tools to effectively monitor the users' physical activity. In the above mentioned Active Fantasy Sport the coach had to walk a minimum number of steps in order to maintain all his players. Otherwise at random any of his players could be lost being acquired by the other coaches, who had instead properly carried out their physical activity daily goal. In PEGASO Game the engagement stays in the possibility to win concrete rewards or to win against other known players and be celebrated in the Social Network. To count the steps and the amount of movements required the users have to be equipped with smart devices provided of specific tools, like accelerometer, GPS. These are the functions fulfilled by PEGASO Smart Bracelet and Garment.

PEGASO Game as a Fitness Video Game

PEGASO Game shows also many similarities to a Fitness Video Game: a digital way to motivate Sport activities. A successful Fitness Video Game should provide, as reported in the paper *Prevalence of Behaviour Changing Strategies in Fitness Video Games: Theory-Based Content Analysis* written by Elizabeth Jane Lyons and Claire Hatkevich: feedbacks to users, rewards for virtual behaviours, information regarding the calories expenditures, exercise scheduling and social interaction. It should be based on a self-monitoring system, a goal setting approach, an action planning section and a self/social comparison opportunity. It results quite evident to what extent PEGASO Game was conceived looking at this model.

Using the Smartphone to prompt Behavioural Change

The Smartphone seems to be a suitable tool to support a healthier lifestyle for different reasons: sensors useful to track one's physical activity are usually built into it, the connection to the different Social Networks allows to share one's physical activity performances with friends with ease and finally its feature of "portability" has a huge potential. The Smartphone can in fact be used in every moment and enables the communication and the data exchange between the peer-patient and the peer-doctor: these are the reasons why it can represent an helper in modifying incorrect behaviours and in adopting new ones. As a consequence the Smartphones and the Apps market are in a growing phase: App to quit smoking, App to self-cure chronic diseases, App to follow a diet, App to do physical activity, App to reduce stress and App to feel in a good mood.

The emerging results from a study did at Southampton University and reported in *Opportunities and Challenges for Smartphone Applications in Supporting Health Behaviour Change: Qualitative Study* by Laura Dennison, Leanne Morrison, Gemma Conway, Lucy Yardley are the following:

-the Smartphone is considered a precious informative source regarding disease symptoms, healthy recipes and physical exercises;

-the Smartphone tracks the physical results obtained and allows to set physical goals: it plays the role of a personal trainer, it can be used 24/7 and it represents a source of motivation. However the manual inserting of all the data necessary to the monitoring activity is considered as a tedious job, the outcoming measurements could result not so accurate and this fact represents a source of demotivation;

-the Smartphone enables to share in real-time own lifestyle data: it has to be decided which data to publish and the group of people who can have visibility on them;

-the Smartphone can easily pass from being considered a Motivator (sending notifications, suggestions, alerts) to a Disturber: the App dropout rate is quite high.

These kind of Apps aim at conditioning the user's lifestyle and are particularly recommended to who is really motivated in changing a life habit, for who is sick of food-borne diseases, for the elderly people and for who requires to follow a particular diet.

Crush the Crave App case

Figure 31: Crush the Crave App logo, source Google Image

Crush the Crave is an App to quit smoking. It was developed by the University of Waterloo, financed by Health Canada and promotionally supported by Canadian Cancer Society. Its peculiarity is the craving moment management: many distractions are suggested and provided to the ex-smokers who are living this annoying condition. For example old videos of Cigarettes advertisements lasting the time needed to smoke a cigarette are launched through YouTube channel in order to be provocative. See **Attachment 3** to read the complete list. There is also a dedicated section called Quit Buddy where it is possible to get customized support through a digital interaction.

The App even calculates the amount of money saved counting the not smoked cigarettes and shows the health improvement as the users go on in their quitting smoking programmes. Interesting and pertinent information are provided too, e.g. discovering the real contents of a cigarette.

Figure 32: Crush the Crave App screenshots, source Crush the Crave Website

Some data regarding the smoking condition (time, place, social context) are collected and then statistics about the most common smoking habits are made in order to offer a whole and most adequate support.

3.PEGASO, FIT FOR FUTURE product

The aim of the Work Package 10 of PEGASO project and also of this thesis is to study the economical sustainability of a possible PEGASO product once PEGASO project financed by the EU funds ends. If PEGASO product is meant as mobile- and cloud-based ICT platform combined with its Wearable Devices (the bracelet and the garment) an external analysis of the Wearable Device Market and of the Health-Mobile Application is necessary.

3.1.1_WEARABLES ESTERNAL ANALYSIS

What are the "Wearables"?

Wearables are small electronic devices, often consisting of one or more sensors and having computational capability. They are embedded into items that attach to the body, such as a user's head, feet, arms, wrists and waist. They can resemble a watch, eyeglasses, clothing, contact lenses, shoes or even jewellery. Wearables either capture data or present data. The types of data collected could be as simple as the number of steps made in a day or as complex as ECG or brainwave measurements. For output, Wearables can convey information to the user through a variety of means, from the blinking of a LED light to a complex display of data.

Wearables market categories and segments

Health and fitness, and other medical applications, are areas where Wearables are expected to play a transformative role. However, the application of Wearable Devices has potential in any industry where hands-free data collection is highly valued. Wearables can be generally divided based on consumer or non-consumer applications. These two categories can be further segmented based on the particular sector the product targets.

The consumer market segments for wearable include:

-General consumer
-Fitness and sports
-Fashion and apparel
-Home automation and remote identification
-Gaming and recreation

The non-consumer market segments include:

-Defence and security
-Enterprise and industrial
-Healthcare

Wearables for health (including fitness, wellness and medical applications) are some of the early applications that have already gained traction. Their success so far is not a surprise, as they have already shown clear benefits to the user in a number of ways.

PEGASO Wearables in according to the previous description can be considered both belonging to the *fitness and sports*, *gaming and recreation* consumer market segment and to the *healthcare* non-consumer market segment.

Drivers of Wearables diffusion

As noted, the Wearable Devices market has grown dramatically over the past few years as advancements in electronics, material sciences and sensor technologies have allowed innovative start-ups to create relatively inexpensive devices. Other drivers, such as consumer interest in personal health and fitness, have helped to propel this market forward.

Wearables track-records

Consumers have responded with their wallets. For example, Pebble has sold about 190,000 units, Samsung sold over 800,000 units of their Smart-Watch in just two months, and Nike has sold between one to two million FuelBands. In the second quarter of this year Fitbit sold 4,4 Billion fitness trackers, followed by Apple, who succeeded in selling 3,6 Billion Watch during their first quarter of existence on the market.

Vendor	2Q15 Shipment Volume	2Q15 Market Share	2Q14 Shipment Volume	2Q14 Market Share	2Q15/2Q14 Growth
1. Fitbit	4.4	24.3%	1.7	30.4%	158.8%
2. Apple	3.6	19.9%	0	0.0%	%
3. Xiaomi	3.1	17.1%	0	0.0%	%
4. Garmin	0.7	3.9%	0.5	8.9%	40.0%
5. Samsung	0.6	3.3%	0.8	14.3%	-25.0%
Others	5.7	31.5%	2.6	46.4%	119.2%
Total	**18.1**	**100.0%**	**5.6**	**100.0%**	**223.2%**

Table 7: Fitness Tracker Vendors Ranking, source IDC

Wearable Devices categories

The market for Wearable Devices is both broad and varied. These devices range from simple wristwatches that count calories (like the Nike Fuelband) to continuous glucose monitors (like the MiniMed Paradigm® from Medtronic) to heads up display, or HUD, monitors (like SNOW2 from Recon Instruments). Manufacturers are developing creative ways to fit these devices on and with the human body. This market is poised to accelerate over the next few years as innovative ideas come to market and consumer interest and knowledge grows.

Wearables market forecasts

Initial estimates by market research firms confirm the growing interest in this field. However, the numbers vary as analysts work to grasp this evolving market. International Data Corporation (IDC) recorded total sales for 28,9 million units for 2014. Looking ahead to 2018, ABI forecasts that annual shipments will increase to 485 million units. In contrast, MarketsandMarkets, another research firm, predicts that by 2018 the total shipment of wearable electronic products will expand to 134 million units. IDC forecasts annual shipment of 173,4 million units for 2019, with a five year compound annual growth rate (CAGR) of 22,9%.

In terms of global revenue, market research estimates range from $4.65 billion to $9.17 billion for the 2014 revenues. Firms varied greatly in their projections for 2018, ranging from a

conservative $6 billion to an optimistic $30.2 billion. Statista expects these to get to $120 billion by 2023.

Annual shipment (units)			*Global annual revenue (dollars)*		
2014	2018	growth	2014	2018	Growth
28,9 million (IDC)	485 million (ABI) 134 million (Markets&Markets)	+1578 % +364 %	$9,17 billion	$30,2 billion	+229% Optimistic scenario
			$4,65 billion	$6 billion	+29% Pessimistic scenario

Table 8: Wearables Sales forecasts

The hype bubble of the Wearables

The wide disparity in market numbers shows that industry experts are still uncertain about the wearable technology market. Some analysts believe that consumer interest in this market is overinflated and that it will take some time for interest to grow. JP Gownder, Vice President and Principal Analyst at Forrester Research, believes that "...the Wearables market is, in fact, suffering from a bit of a hype bubble." In his blog, Gownder draws a comparison to the early days of the internet, when there was a lot of early hype although most of the expectations were only realized after a decade or so of growth. In order for manufacturers to translate "hype" into sales, they must focus heavily on educating their consumer base on the true benefit of a wearable device. A recent survey conducted by IDC affirms a similar message that consumers are still unsure about the true value proposition of Wearable Devices.

Wearable market composition

Consumer applications are the largest component of the overall market. BCC Research published the most comprehensive study on the topic, projecting the market to grow from $6 billion in 2014 to $22.1 billion in 2018. The non-consumer market accounts for the rest: $3.2 billion in 2014 and $8.1 billion in 2018.

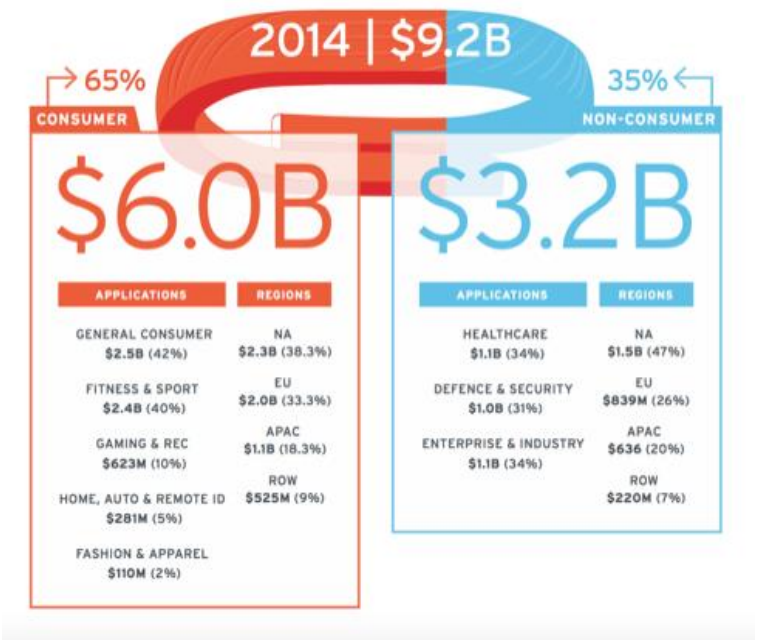


Figure 33: Market Size for Consumer and Non-Consumer Applications by application and region, 2014, source BCC

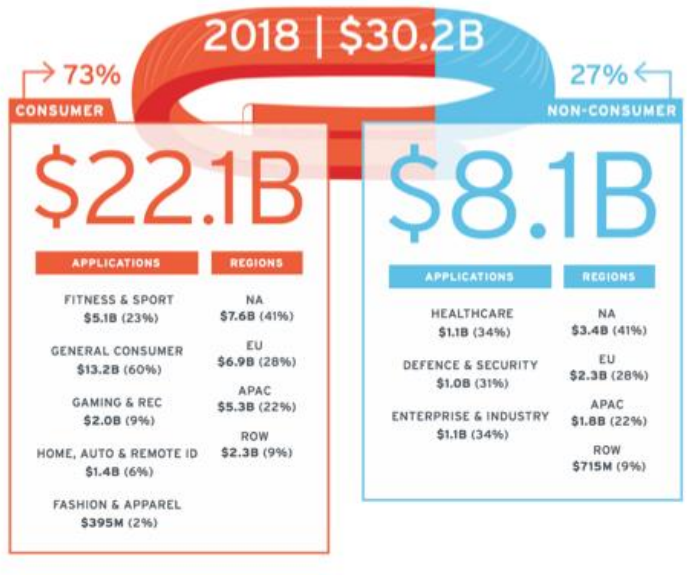


Figure 34: Market Size for Consumer and Non-Consumer Applications by application and region, 2018, source BCC

Wearables for fitness and sports

Fueled by the Quantified Self movement, Wearables for fitness and sports have captured the attention of enthusiasts and consumers alike. Wearables for this market sector measure data such as heart rate, steps count, calories burned, breathing rate, balance, explosive strength, and much more. These devices are generally simple in form and function and are marketed towards professional and amateur athletes, coaches, parents of athletes, and health-conscious consumers. Customers are interested in fitness devices like the Fitbit Flex and the Jawbone UP because these tools help motivate users to realize personal goals such as maintaining a healthy weight and getting the proper amount of sleep. These devices help consumers gain a deeper understanding of their own body and, in the process, recognize the necessary next steps to improve their overall health.

The fitness and sports segment is currently experiencing fierce competition as companies like Fitbit, Apple, Xiaomi, Garmin and Samsung are in battle for space.

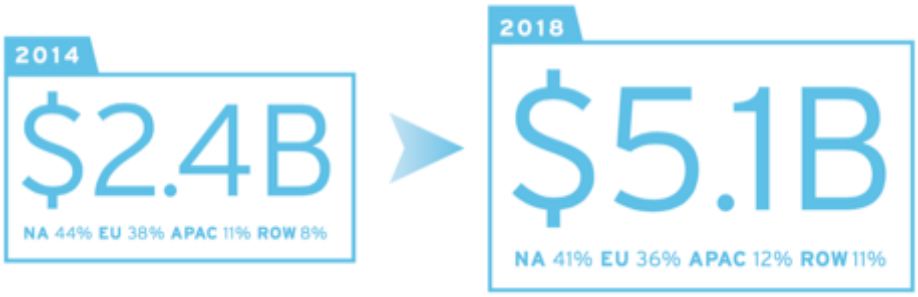


Figure 35: Market Size for Sports and Fitness Wearables, 2014-2018, source BCC

3.1.2_ M-HEALTH APP MARKET EXTERNAL ANALYSIS

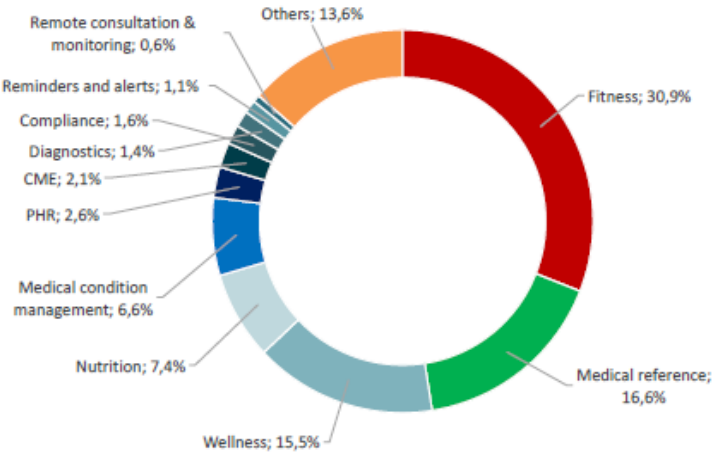
PEGASO App will represent a mobile-health App example, so studying the features of this specific business could be useful in order to be guided in the development of a successful Mobile Health Service.

m-Health App Market Phase

The m-Health App enters its **commercialization phase** when e-market places like Apple App Store and Google Play Store began to be used. These mobile platforms allow final users to easily download and use the medical App and constitute an efficient development and distributing channel for the m-Health App Editors.

m-Health App Market Categories

The different m-Health App categories are shown according to their reach in the following chart.



Graph 6: mHealth App category share, source IDC

PEGASO m-Health App will fall into the four most downloaded categories: PEGASO App will grant user physical activities tracking (Fitness), will provide feedbacks regarding health condition through a constant monitoring (Medical Reference), will in general try to improve final users lifestyle (Wellness) and through the Multimedia Diary will also give nutritional suggestions (Nutrition).

m-Health App Market dimensions and revenue sources

m-Health App size (numbers)	*m-Health App value (worldwide value)*
100.000+ released in the past 2,5 years	2,4 Billion (registered in 2013)
	26 Billion (expected in 2017)

Table 9: m-Health App size and value forecasts, source IDC

At the moment the m-Health App market is still to be considered as a niche market: it represents just the 0,5% of the whole Health Market, whose value will reach $6 Trillion in 2016.

The revenues increase will begin in 2016 due to the design and proposal of integrated medical solutions, constituted by traditional health care services enriched by the use of m-Health Apps.

The major revenues drivers are represented by the complementary services provided: back end services granted by automated algorithms, customized services executed by a medical staff who will be monitoring the users health status and will be in contact with their general practitioners. Examples of these value added medical services are: *Diseases Diagnosis* from the sharing of pictures showing the disease symptoms, *Medical Examination Data Share*, i.e. fetus pictures between the gynaecologist and the future mother, *Monitoring Services* required by sport associations. An enrolment fee when downloading the App or a pay-per-use are the two most used paying modalities.

The additional valuable services PEGASO App will offer are the chance to get online feedbacks from free lance general practitioners and medical specialists and then a direct channel to arrange private physical visits with them.

m-Health App Market Target Customers

The m-Health Apps are mainly developed for chronic diseases patients (31%), people interested in their health and fitness condition (28%) and the doctors (14%), who will have the opportunity to use them as a complementary care tool.

PEGASO App will be developed for teenagers in order to avoid them to be considered future chronic diseases patients.

m-Health App Market Operative System

The choice of the OS depends on the its reach on the target groups and on the number of devices and sensors compatible with the same OS that can work with the Health App. At the moment the most chosen OS is Android, followed by iOS, WindowsPhone and HTML5.

PEGASO App will initially be developed for Android and if it turns to be successful also for iOS.

m-Health App Publishers

Several actors play the Publisher role in this new business: the Traditional Health Care System Players (doctors, hospitals, pharmaceutical industries, nurses associations, health assurances), the 'Helpers' who want to increase the others wellbeing, the Mobile App Specialists, the 'Connectors' who usually enable connections and finally the Medical Specialists and the Fitness Specialists.

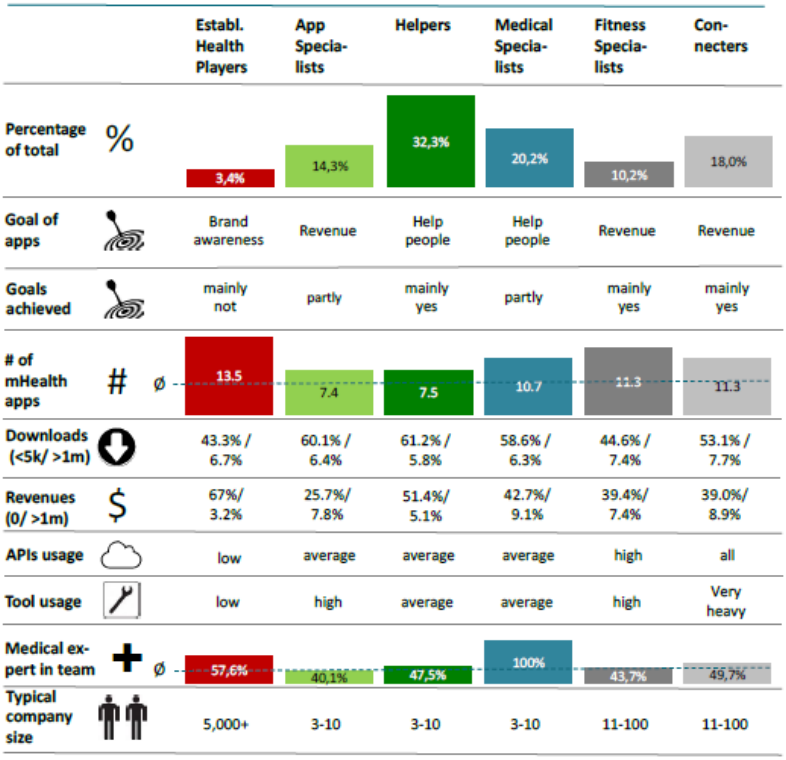


Figure 36: Different Publishers Business Model comparison, source IDC

The first reason to release an Health App is to make profits out of it, the second is surprisingly to help the others, the third a way to enhance brand awareness and the last a possibility to cross-sell through the App other more lucrative products.

PEGASO publisher belongs to the "helpers" category as the main goal to be pursued is the halting of the obesity trend among the youngest.

m-Health App Market Best Practice

This is a list of practices that can be considered successful:

-offering specialized medical services increased the perceived quality of the m-Health App user;

-using an open API systems assures moderate development and further monitoring App systems costs;

-owning a portfolio of App allows to diminish the failure risk specifically linked to the release of one Health App and can be used as a cross-selling channel, since users of the m-Health App can be encouraged in buying another App always belonging the same portfolio;

-being connected to a medical Database gives robustness to the Health contents provided;

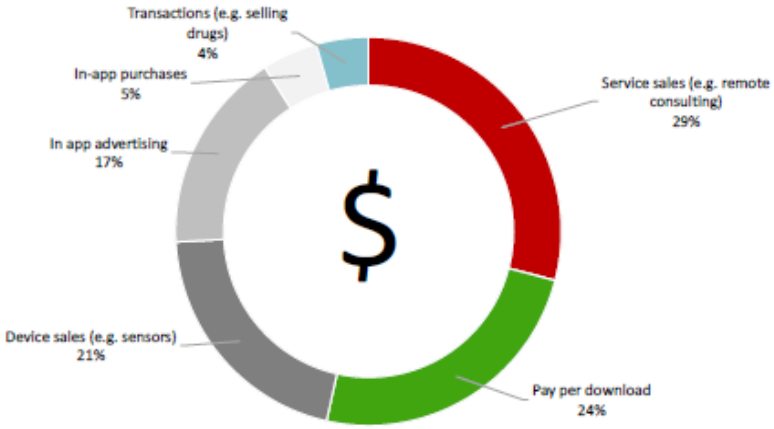
-sensors and specific devices (like Wearables) association enrich the value proposition.

PEGASO App should provide a service of medical consultation and should count on open API systems.

m-Health App Revenues Stream

As already said the most lucrative activity of the m-Health App Business Model is the sale of additional services, followed by the pay per download, the associated device sale and in App advertising.

PEGASO revenues stream will actually be based on the sale of PEGASO Wearables, of Advertising spaces on PEGASO Social Network, of the data generated and finally on the commissions obtained thanks to the participation to all the existing PEGASO commercial partners' Affiliate Programmes.



Graph 7: top ranked Revenue Source by m-Health App Publishers, source IDC

The Connected Elite and the Open API strategy

The "connected elite" is a group of App Developers and Sensors Developers who decided to collaborate: they allow other App Developers to have access to the data generated from their own App and associated Sensors. The Application Programming Interface (API) existing in this field are of 4 types, in connection with the different kind of data they give access to: general Health information API (giving access to data related to drugs, food, diseases), Personal Health Information API (allowing access to calories burnt, steps made, blood pressure), Medical Tools purchased in the App API (with data regarding glucometers, blood pressure measurement devices), Health Monitoring Tools purchased in the App API (with data on heart-rate measurement belt, step-counting bracelets, scales). The added value for the App users whose data are accessible by other App Developers are additional services offered by these last actors: acting like this every actor concentrate just on his core business and the out coming value proposition for the final user results enriched and more complete. The use of this open API system helps the App developers in building a competitive advantage with respect to the other players operating in their same business.

The amount of data generated by the m-Health App users thanks also to the associated sensors is important: a sort of Health Social Network is assumed to be created and managed exactly by these data integrators, the Connected Elite.

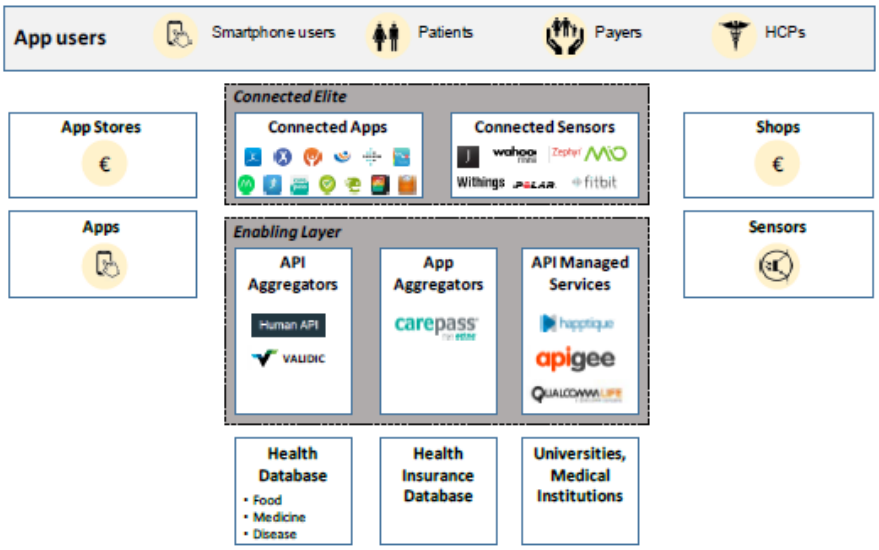


Figure 37: Connected Elite System, source IDC

PEGASO App will have to draw upon a similar data integration system in order to exploit all the subsequent advantages.

Kind of data collected

Three kind of data have been by now collected: the Health &Fitness Tracking Data (steps, kilograms, calories), the Patient Monitoring Data acquired i.e. during a chronic disease therapy (blood pressure, blood oxygen level, blood glucose level, brain waves) and Medical Examination Data after using of specific medical devices (respiratory rate, lung air capacity, ECG, blood analysis, urine test).

PEGASO Bracelet will allow the measurement of Health & Fitness Tracking Data and PEGASO Garment the collection of some Medical Examination Data.

m-Health App Benefits

Different are the benefits expected by the use of this new and innovative care system:

-Combining the traditional health care model with the use of m-Health App should improve the results of the care provided;

-the m-Health Apps are a self-care model, when they effectively help in the care of an existing disease, or a prevention model, as in the case of PEGASO;

-they help in the Health Care Systems Expense optimization;

-they make closer and sometimes more effective the doctor-patient relationship and the patients more active and responsible for their health monitoring and care.

m-Health App External Analysis: Drivers, Neutral Factors and Stoppers

The encouraging factors in the m-Health App development are the **diffusion** of **devices able** to **support** them, the fact that the **patients** who will be their future users **show** a **desire** to **have** these kind of health supporting tools and the fact that through m-Health App **involving** the **patient** in his/her **disease care** will result easier.

The **regulatory aspect**, the need to have **more clinical evidence** and the **development costs** are factors which stay between the drivers and the stoppers of m-Health App market diffusion. Health Institutions like FDA will not accept every new m-Health App release as this process implies a considerable time-consuming analysis deeming that a new App release occurs every 4 months. More structured clinical tests, which means executed on bigger samples, for a longer time and with the inclusion of economic parameters, are in need. The development cost which can go from a minimum of $20.000 to a maximum of $50.000 are supposed to increase when the App is make compatible for more OS platforms.

PEGASO App is being tested on a sample of 400 teenagers of three different EU countries: 100 in Italy, 100 in Spain and 200 in UK. This test phase is supposed to last 9 months.

The **data security issue** and the **lack** of a **standard data format** have to be seen instead as some of the most critical aspects to be solved. In addition the **scarce m-Health App availability** and the **resistance to change** displayed by the traditional players operating in the Health Industry have to be taken into consideration as well.

PEGASO App will have to tackle carefully the data security question as one possible PEGASO Business Model revenue stream is actually the data generated sale to third interested actors, i.e. Assurance Companies.

m-Health App Market Forecasts and future Trends

The m-Health App categories supposed to become the Stars in the next years are the *Remote Monitoring App* and *Medical Consultation App*.

PEGASO App will grant both the functionalities.

The m-Health App have to be included in the health care model defined for the patient.

The m-Health App use will reduce the Health Care Costs as less mismatching between the patient symptoms and the cares provided will occur and less additional Hospital recoveries will be necessaries.

The glucose level and insulin level monitoring is the basic principle on which App dedicated to Diabetes self-care are designed on, however the tools necessary to make such measurements are much more expensive than the traditional ones: that is the reason why m-Health App to self-care the Diabetes turned to be scarcely successful.

The most important distributive channels for the m-Health Apps will be the traditional players operating in the Health System: doctors, hospitals, nurses, health assurers.

PEGASO system has in fact to involve free lance general practitioners and health specialists.

The App stores remains still a relevant distributive channel, there are even very specific App stores that act as a sort of m-Health App pre-selection channels.

The reason why this kind of market will have a bigger diffusion in Overdeveloped countries is linked with the need of their Health Systems to cut the huge expenses related, with the higher penetration of m-Health App supporting devices and with the bigger purchasing power of the patients who will turn to be the real buyers and drivers of this new market. By the way in the Developing Countries the data safety issue would be easier to be faced.

3.2_ WEARABLES INTERNAL ANALYSIS

To deeply understand the competences required to play in the Wearables business, the strengths and weaknesses of the actual players were studied using the CANVAS model.

Firstly these are some of the competitors of PEGASO, when conceived as a behavioural change platform combined with its Wearables, whose Business Model was analysed:

-Orbit-Runtastic, Fitbit, Misfit, Lumo, iHealth, MiBand, Withings, Fitbug, Jawbone as Activity and Sleep Trackers

-Pebble, Basis Peak, Apple Watch, Android Wear as Smart Watches.

The tool used to reason over their Business Model was the CANVAS.

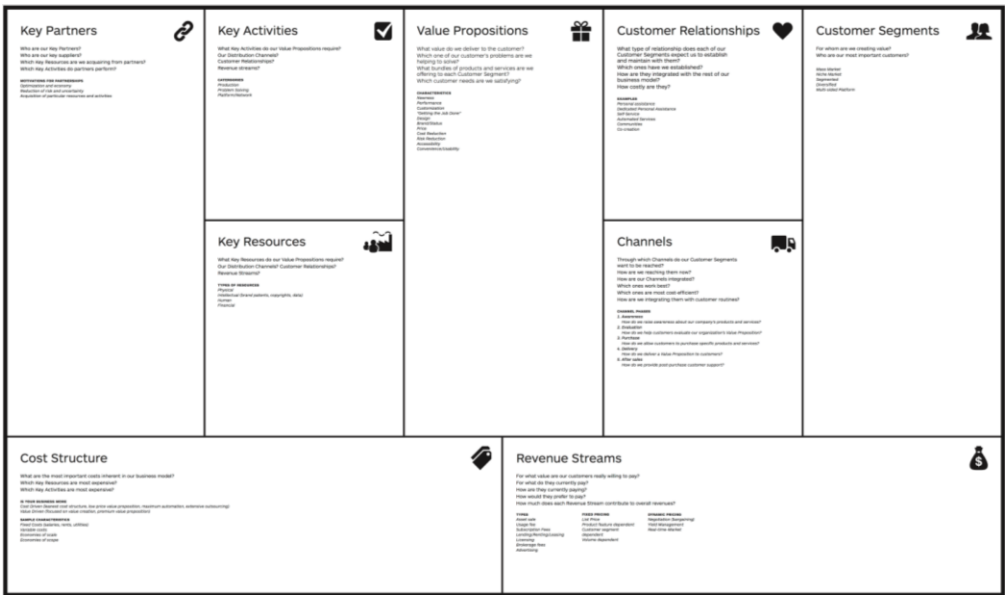


Figure 38: CANVAS tool, source Google Image

The relevant results of each categories are going to be shown.

Key partners

Starting from the basic idea that the product offered is a Wearable Device, especially an Activity and Sleep Tracker or a Smart Watch, combined with its associated App, the "key partners" can be divided in the ones supporting the HW part of the offer and the ones supporting instead the SW part.

In the first category the Wearable Devices producers are basic as the devices are the most tangible and gainful part of the commercial proposal.

In the second category stand the App developers for the different OS (Android, iOS, WindowsPhone and HTML5): offering a wearable compatible with the highest number of mobile phones models represents a competitive advantage and this is possible when the App associated to the wearable is developed for the highest number of versions of the different OS. The leader in this is Fitbit, that is compatible with more than 150 mobile devices. In most of the cases a system of accessible API allows the Wearables ICT platform to be synchronized with the most popular fitness App- like SparkPeople, EndoMondo, MyFitnessPal- and also musical Apps- like Spotify. In this way it is possible to import the data collected through the Wearable Device in all the compatible App and exploit of the different visualizations and reworked versions of the same data.

Then also the endorsers like famous marathon runners, cyclists, coaches are fundamental in promoting the products as a whole. Depending on the value proposition of the different vendors also the partnerships with fashion brands are of primary importance: this is the case of Misfit with Swarovsky.

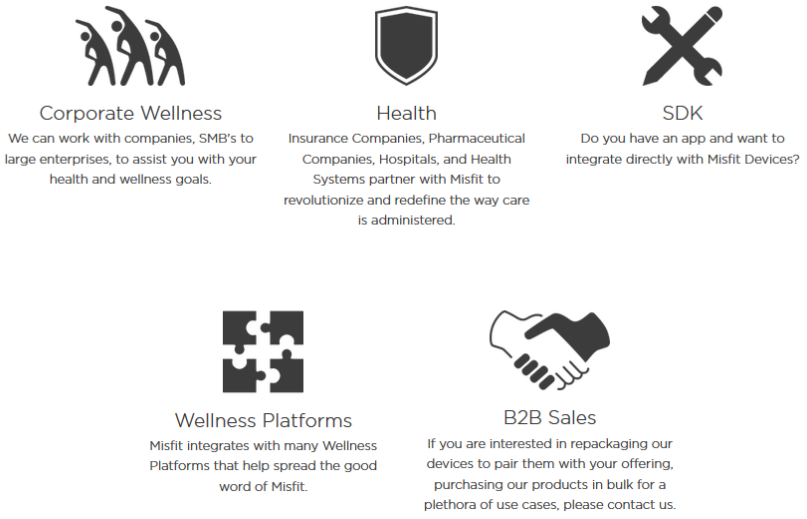


Figure 39: "Enterprise" section of Misfit Website, source Misfit Website

The Companies which are proposed the *Corporate Wellness Programmes*, i.e. a promotional offer of Wearable Devices for all the employees in order to engage them with

health programmes, are assuming more and more relevance as partners. By the way these still cannot be considered "key partners".

Insurance Companies, Pharmaceutical Industries, Hospitals, and Health Systems are also given the chance to partner with the Wearable Device vendors in order to redefine the way the health care is now managed. This is a challenge for the future: the idea is to prompt the self-care model, without always physically visiting the practitioners, but just giving them the access to the personal health database made up through to the constant use of the Wearables and the following storage of the collected data in the Wearables associated App. However the data accuracy, the privacy issue, the fact that now the practitioners are not so used to deal with high amount of data (potentially instead of measuring the heart rate of their patient, they could have access to a DB of heart rate data measurements of their patients) are tangles to be still untied.

Finally the dedicated App synchronization with other digital health platforms enriches the SW part of the commercial offer and helps the patients in their health data integration process.

Applications of many vendors like Garmin, Fitbit, Jawbone, Withings, Bodymedia are synchronized with Validic platform.

"Validic is the healthcare industry's premier technology platform for convenient, easy access to digital health data from best-in-class clinical and remote-monitoring devices, sensors, fitness equipment, Wearables and patient wellness applications. Validic's mission continues to be helping our healthcare clients and integrations thrive in this transformational industry"

Figure 40: Validic Health Platform representation, source Validic Website

Finally with the *Affiliate Programme* personal trainers, bloggers and all people interested in the activity could be potentially engaged in promoting the products: thanks to the fact that

they will speak about the product to their friends, customers, followers they will get some commissions.

Key partner	*HW support*	*SW support*	*Partner*	*Partnership type*
Wearable Devices producer	✓			
App developers		✓		
			Endorsers	Product promotion
			Fashion brand	Product Co-creation
			Companies	*Corporate Wellness* support
			Insurance companies, Pharmaceutical industries, Hospitals, Health Systems	Self-care model co-design
			Digital health platform	Health data integration
			Personal trainer bloggers	Product Promotion through the *Affiliate Programme*

Table 10: Key Partners and Partners

Key activities

The "key activities" that must be outperformed to succeed in this business keeping in mind that the product offered is constituted by the Wearable Device and its dedicated application are going to be now analyzed.

The Wearables Production is usually outsourced: granting a sure supply is of primary importance to deliver the promised products on time and follow the technological innovation wave. Jawbone launched its UP3 with 4 months of delay. Fitbit expressed its will to pass from a single sourcing model- at the moment its main provider is Flextronics - to a dual sourcing model in order to diversify its procurement risk. The Development and the Updating of an Application that plays the role of a "Personal Coach" is another crucial activity. The resulting App should allow the setting of personal physical activity goal (corresponding to a given number of steps, minutes of walking or minutes of running) that is supposed to be reached every day. During the day the App registers the distance covered, the steps done, the

corresponding calories burned thanks to the daily normal activities and specific physical activities performed. The App can encourage in completing the daily goal showing the percentage already done. Wearing the device also at night gives the chance to monitor the quality and quantity of sleeping and also to be woken by the App/Device itself. Some App allow also to insert the food intake and suggest what and how much to eat to stay fit.

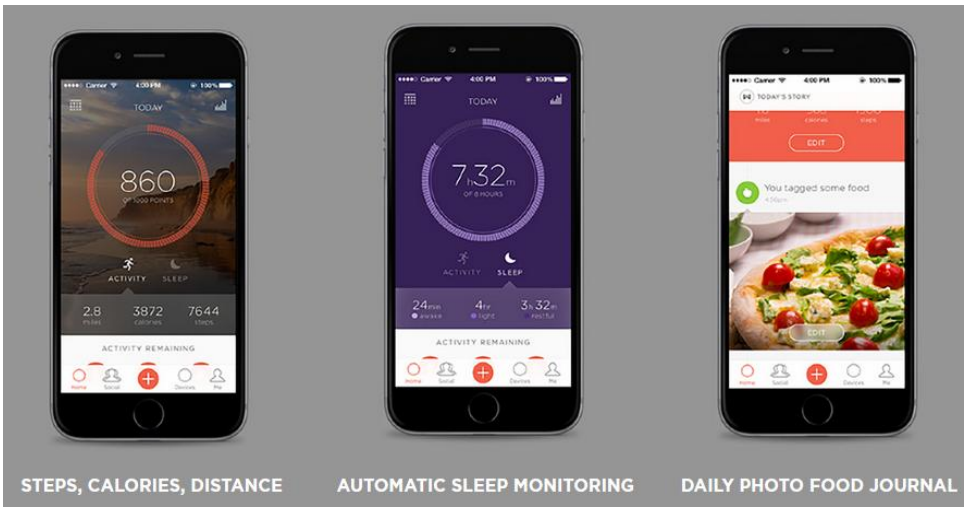


Figure 41: "Track it all" Webpage of Misfit, source Misfit Website

The App has also the Social section where the performances of the different users are displayed and where is also possible to face each others in customized challenges. The App should result intuitive and user-friendly.

In order to continue offering innovative products the Research and Development (R&D) activity must always be supported and maybe enhanced. Fitbit recently announced that the budget allocated to R&D activities is going to be tripled.

The Use of different Distributive Channels is another key activity: considering that the average price of a basic Activity and Sleep Tracker is $80 the shipping expenses do represent an important part of the final price. Fitbit is again the leading vendor in this sense: it sells its products in 50 countries through 45.000 retail stores in addition to the online channel.

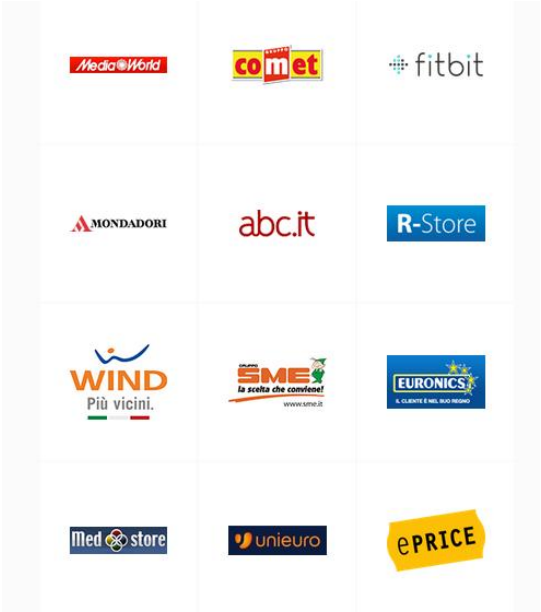


Figure 42: "Where to buy?" Italian Webpage of Fitbit, source Fitbit Website

However also other players are committing with internalization projects: Xiaomi wants to bring its MiBand also in the Western Markets after its commercialization in China, Taiwan, Hong Kong, Singapore, Malaysia, Philippines, India and Indonesia. Jawbone, US native, is going instead to India to support the Health National Plan.

The adoption of a not-proprietary approach (granting a high compatibility with the different OS and mobile devices models, the synchronization with health digital platforms, the use of an open API system) allows to build a good customer base in a short time.

$R\&D_{in}$> Device $Production_{out}$ +App $Development_{in}$>Diversified Distributive $Channels_{in/out}$

Key Resources

From the previous analysis defining the "key resources" results quite easy. First the suite of all the Activity and Sleep Trackers offered: released at different times with a growing number of features. This is a strategy followed by different vendors: Fitbit, Jawbone, Misfit.

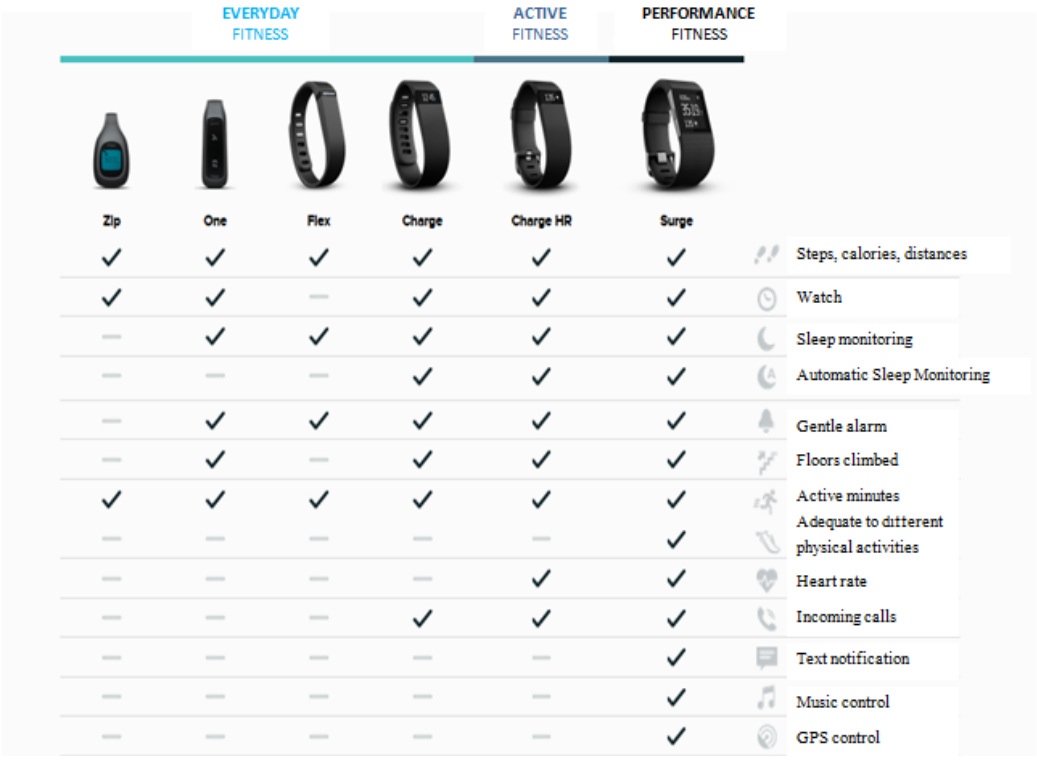


Figure 43: "Compare Products" Webpage of Fitbit, source Fitbit website

In this way different customer targets are being served.

Misfit offers 3 products with the same features (activity and sleep tracking, 1 year of battery, water-resistant) but one, the Shine, is the classic version with a fine design, the second, the Swarovsky Shine, is a sort of "jewel" and the third, the Flash, is the cheapest among all.

Figure45:Misfit Shine, source Misfit website

Figure 44: Misfit Swarovsky Shine, source Misfit website

Figure 46: Misfit Flash, source Misfit website

The suite of products offered can also be formed by devices complementary to the fitness tracker: scales, battery rechargers, headlamps in a logic of "product bundle". Let's take the case of Runtastic: its core offer consists in Runtastic Orbit, the activity, fitness and sleep

tracker, but it is also possible to integrate it with Runtastic Libra, a smart scale, Runtastic Heart Rate Combo Monitor, a specific waistband to measure the heart rate, Runtastic Headlamp, to go running when it is dark, Runtastic USB Power Bank, to recharge the smartphone/tablet/MP3 reader in every moment and every place.

Figure 47: Orbit Runtastic Complementary Products Suite, source Orbit website

Another choice is to include the Activity and Sleep Tracker into a Health Care Products offer: it is the case of iHealth which sells blood pressure monitors, wireless scales, glucometers and in addition Fitness Devices. In this way they look more like Healthcare than Fitness & Sport Wearables.

The Application/Application Ecosystem associated with the Wearable Device, the proprietary and additional third party Health Platforms, the Website are all SW key resources necessary to accomplish with the value proposition to guide the users towards a healthier and more dynamic lifestyle.

Some Wearables vendors decided to develop a own Apps Ecosystem, as Runstastic did, others instead developed just the App naturally associated with their Wearables and then enable the exchange of the data generated through the use of their Wearables also with other popular Apps. Fitbit made these deal with SparkPeople, Lose It!, MyFitnessPal, MapMyFITNESS and EndoMondo. It acquired FitStar, an App where specific Joga and Training videos are provided, and made a partnership with the popular Strava App,

specifically suggested for runners and cyclists wanting to always change the locations of their physical activity.

Another key resources to be mentioned are the data generated through the use of the Wearables and their following storage in a Database that does represent a precious asset.

Last but not least the human capital meant as the quantity and quality of HW and SW developers or as the expertise of working with the E-Commerce and the Cloud has to be considered too. The case of Xiaomi, the Asiatic vendor founded in 2010 by different Chinese entrepreneurs, has to be quoted: they said "At Xiaomi, we've brought together smart people from Google, Kingsoft, Microsoft, Motorola, Yahoo, and other Internet and tech companies..." and as a result they were able to offer competitive devices at a considerable lower price, entering the Wearables business just this year and resulting now the third best performers. Pebble instead can count on 18.000 SW developers.

Finally the financial resources are as a matter of fact a key resource especially in business so innovative and most of the time based on a freemium strategy like the Wearables. Different ways of financing were employed: Fitbit, the market leader, resorted several times to Venture Capital and decide to quote the company at the NY Stock Exchange the 16th June 2015 collecting $732 Million from the IPO. Pebble was able to collect $20 Million in 104 minutes posting its latest product as a project on Kickstarter.

Value Proposition

The "value proposition" applicable to all the Fitness Trackers and their Associated App analyzed is to act as a sort of "personal coach". Below are some of the declared value propositions.

The market leader said that "*there is a Fitbit product for every need*" emphasizing its rich product width.

Misfit was defined as "*the world's most elegant activity tracker*" and as *"a balance between fashion and functionality"*.

One basic value of Xiaomi is that "*high-quality technology doesn't need to cost a fortune*" stressing the convenience of its products.

Withings, the producer of Pulse O_x, an activity tracker that measures also the heart rate and the blood level of Oxygen, said that its motto is to be "*inspired by health*".

Jawbone cares very much about the "*wearability*" of its products and its driving value is "*Beauty plus Engineering in service of a better life*".

Customer Relationship

A close relationship between the customer/user and the Wearable-App system (so the Application backend services) is supposed to exist when the product delivered turns to be successful and so used for real every day.

In addition the co-creation of some features, the engagement in health blogs and the involvement in special prevention events are the moments of closest relationships between the vendors and the customer/user. Basis Peak asked its clients to be the testers of a couple of new features using the beta version of them. This is the typical process of *co-creation* made in order to deliver to the customers exactly what they prefer. Most of the vendors websites have an health blog where news regarding their latest devices or health issues are published: these act as stimulus to interact with the costumers/users.

Channels

A focus on the "channels" used to reach the customers in the different phases of their purchasing process (with reference to the AIDA- Awareness, Interest, Desire, Action- model) is now going to be done. For the "awareness" phase the market leader has been using for some times the TV advertising channels (at least in the Italian market). Fitbit increased also its visibility supporting many events related to health prevention releasing every time a special version of his model Flex. On the occasion of the day against the Cancer the Flex Pink was produced devolving $10 of the final price to the research. The past 3rd of February Fitbit launched the US FitForFood campaign increasing once again the level of awareness towards its products: 1 Billion calories had to be burned, and their tracking would be granted by the use of the Fitbit devices, to give 1,5 Millions meals to poor families in the US. The endorsement of many important fitness and sport figures enhances the popularity of the Fitness Trackers as well.

For the “interest” phase the Website plays a relevant role providing many and detailed information: e.g. the ones regarding the compatibility of the tracker with the different mobile devices models and the duration of the battery. Always more often explicative videos are used to quickly show all the Smart Tracker functionalities.

For these first two phases thanks to the *Affiliate Programme* also personal trainers, bloggers, third people involved act an important part presenting the products and talking about them to their friends and clients: this action is called Word of Mouth (WOM).

Finally for the “action” phase the most used channels to become owner of the Smart Devices are the proprietary Website or third party Websites (Amazon, BestBuy). The possibility to physically buy them in retail stores (MediaWorld, Mondadori, Euronics with reference to the Italian market) is as well contemplated.

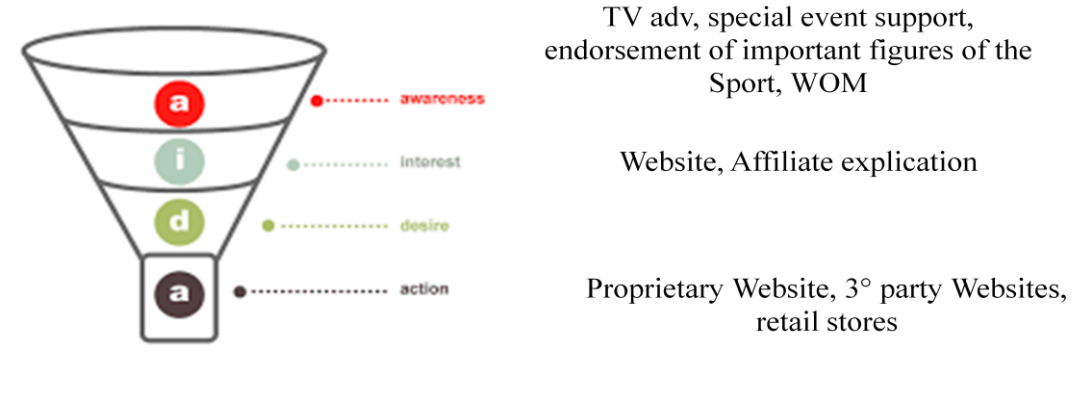


Figure 48: AIDA Model Application

Customer segments

The “Customer Segments” served can already be deducted from the previous analysis. These are formed by people who want to be healthy and fit. The Activity and Sleep Tracker or the Smart Watch should act the part of a personal coach: either to support a change for a more dynamic lifestyle or simply to track and monitor the physical activity the user usually does. The basic functions (steps, calories, distances, elevation counting) are for a normally active person, instead the special functions like the GPS activation, the heart rate monitor, the blood oxygen level measurement, the smart alerts are for a more advanced athlete.

Four different customer segments can be identified: the "cost-driven", people interested in having a smart device with the basic functionalities at the lowest price possible, trackers like MiBand, FitBug, Misfit Flash can be found in this cluster. Then the "design-driven", customers interested in having a smart device with the basic functionalities but who care also about the design of the wearable, their motto is "beauty and engineering": here Misfit Shine, Jawbone UP2 and UP3 find their place. The "trend-driven" want to wear a sort of jewel: this is the case of Misfit Swarovsky Shine and of the Fitbit designed by Tory Burch. Finally the "special-function", users interested in trackers with specific functions like the blood oxygen level measurement, granted by Withings Pulse O_x, the poor posture monitoring, offered by Lumo Lift and the contactless payment, enabled by the embedding of the American Express chip into the Jawbone UP4.

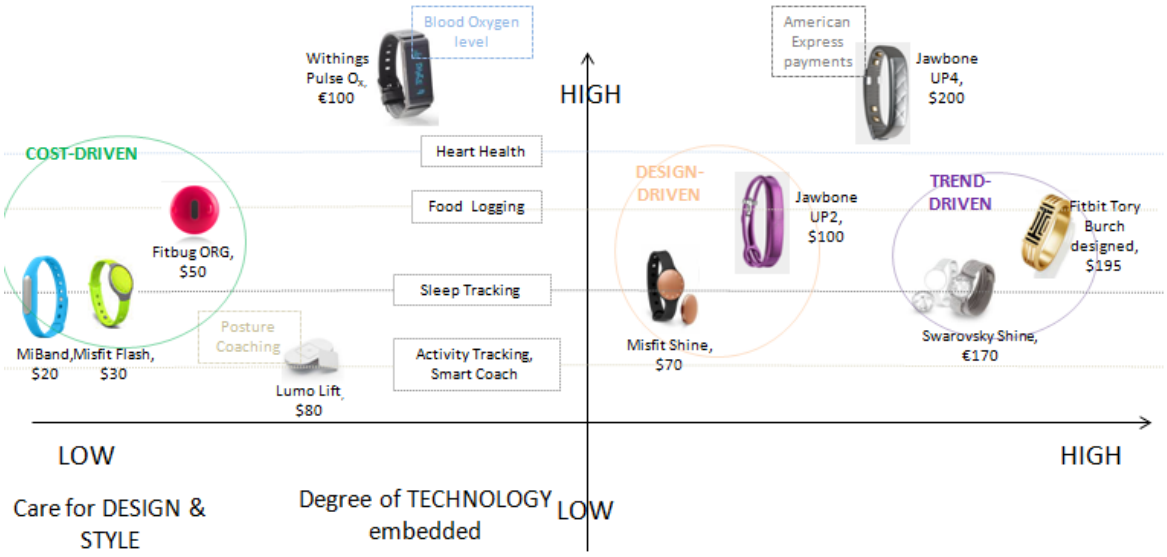


Figure 49: Fitness Trackers Positioning Map

With most of Fitness Trackers now in commerce is not possible to specify all the kind of physical activities performed, however the vendors are specializing also in this sense creating dedicated products for the different sport categories. Misfit Speedo Shine was specifically designed for swimmers with the partnership of one of the most famous swimming apparel producer company. Runstastic released special App either for who rides a mountain-bike or a road-bike.

All the companies analyzed born firstly as Business to Consumer (B2C), although thanks to the *Corporate Wellness Programme* they begin to be also seen as Business to Business (B2B).

Cost Structure

Although finding costs information was not easy, the category costs to be sustained can be inferred and a comparison with the real expenses the market leader registered can be made. Fitbit is in fact the only vendor to be quoted and as a matter of fact its balance sheets are public.

The following is a view of Fitbit most relevant for this analysis quarterly costs categories.

quarter	Q12013	Q22013	Q32013	Q42013	Q12014	Q22014	Q32014	Q42014	Q12015	Q22015
Revenues (thousand $)	33,121	47,169	83,667	107,13	108,815	113,572	152,862	370,184	336,754	400,412
Cost of revenues	18,132	25,947	42,412	124,345	64,046	55,183	69,257	199,29	167,545	212,87
% Cost of revenues on revenues	55%	55%	51%	116%	59%	49%	45%	54%	50%	53%
R&D	5,346	6,507	7,766	8,254	9,088	11,809	14,945	18,325	22,426	30,492
%R&D on revenues (Q-1)		20%	16%	10%	8%	11%	13%	12%	6%	9%
Sales and Marketing	4,217	5,433	6,159	11,038	11,273	13,311	17,539	69,882	43,867	69,69
% Sales and Marketing on revenues (n)	13%	12%	7%	10%	10%	12%	11%	19%	13%	17%
General & Administrative	1,338	2,154	2,853	8,14	8,617	7,443	7,849	9,647	12,981	14,648
% General & Administartive on revenues	4%	5%	3%	8%	8%	7%	5%	3%	4%	4%
Interest (thousand $)	0,41	0,92	1,50	1,91	1,63	4,14	3,50	8,89	13,54	45,69

Table 11: Fitbit most relevant for the analysis cost categories, source Google Finance

What follows is instead an hypothetical Wearables vendor cost structure:

- **R&D expenses** to develop the Wearable Device prototype and to develop, manage and update the SW contents of the App and the Platform;

R&D	5,346	6,507	7,766	8,254	9,088	11,809	14,945	18,325	22,426	30,492
%R&D on revenues (Q-1)		20%	16%	10%	8%	11%	13%	12%	6%	9%

Table 12: Fitbit R&D expenses, source Google Finance

- the **production costs** to be usually recognized to a third actor- one of the most important Activity and Sleep Trackers providers is Flextronics;

- the **marketing expenses**, the **distributive costs**- these are higher for vendors owning a proprietary distributive network like Fitbit;

Sales and Marketing	4,217	5,433	6,159	11,038	11,273	13,311	17,539	69,882	43,867	69,69
% Sales and Marketing on revenues (n)	13%	12%	7%	10%	10%	12%	11%	19%	13%	17%

Table 13: Fitbit Marketing and Sales expenses, source Google Finance

-the **personnel cost**, the **management costs**, which are supposed to be moderate as most of the companies are very young and as a consequence with a limited number of executives;

General & Administrative	1,338	2,154	2,853	8,14	8,617	7,443	7,849	9,647	12,981	14,648
% General & Administartive on revenues	4%	5%	3%	8%	8%	7%	5%	3%	4%	4%

Table 14: Fitbit Administrative costs, source Google Finance

-the **financial costs**, that instead are supposed to be quite high being this an innovative and so risky business.

Interest (thousand $)	0,41	0,92	1,50	1,91	1,63	4,14	3,50	8,89	13,54	45,69

Table 15: Fitbit Financial costs, source Google Finance

The cost leader is by now Xiaomi.

To define a possible cost structure for PEGASO product the above cost categories will be taken as example, especially to check PEGASO cost categories relative incidence on forecasted revenues.

Revenue Streams

In this business the Wearables design is a driver that leads to recognize a premium price: many customers are convinced that they will properly use (and so wear) an Activity and Sleep Tracker only if this is cool, stylish as it will become a part of them. The quality of the technologies embedded, the advanced specific features, the accuracy of the data collected are other drivers to justify a premium price. The degree of innovation, of uniqueness of the product are other factors that allow to ask for a premium price: this the case of the limited edition of Withings Activitè Pop in pink colour or the smart shorts recently made by LUMO.

The main revenue streams come from the selling of the Wearables.

The additional streams are due to the downloading of the premium version of the App and the consequential subscription plan: this is the so called "freemium" strategy, used by many App vendors, e.g. Spotify. Becoming a PREMIUM member implies having access to more contents (training plan, story run) and extra-functionalities (statistics, records, customized incitements, reports).

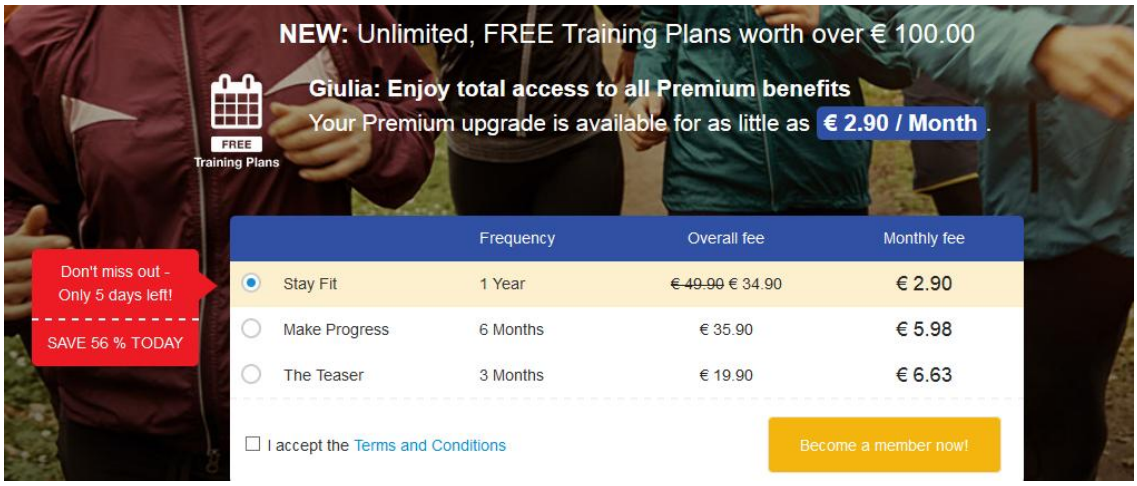


Figure 50: Subscription Promotional Plan of Runtastic, source Orbit website

The possible sale of the data generated through the use of the Wearables and the App and stored in the proprietary Database to interested third parties can be lucrative too. This is what can be read in the General Terms and Conditions on Runtastic Website:

"*The user grants Runtastic the irrevocable, free, non-exclusive and unlimited right to use all content generated, transmitted, saved and published by such user. Accordingly,* ***Runtastic shall have the right to use, irrespective of the type of usage, all content both as part of the Runtastic platform and any other activity of Runtastic or any company affiliated with Runtastic***."

The sale of advertisement spaces to companies interested in gaining visibility among the Platform and App users, once their number reach the critical mass, has to be mentioned too as a possible voice of incomes.

The pricing strategies applied are different: the price can be made according to the number of features of the Wearables, more the features higher the price (figure 34); the product-bundle logic is sometimes used (figure 35); the "quantity discount" is employed when buying several items of the same kind (figure 36 and 37); shipping expenses can be paid by the vendors for already important prices (as in the case of Basis Peak a Smart Watch already costing €200).

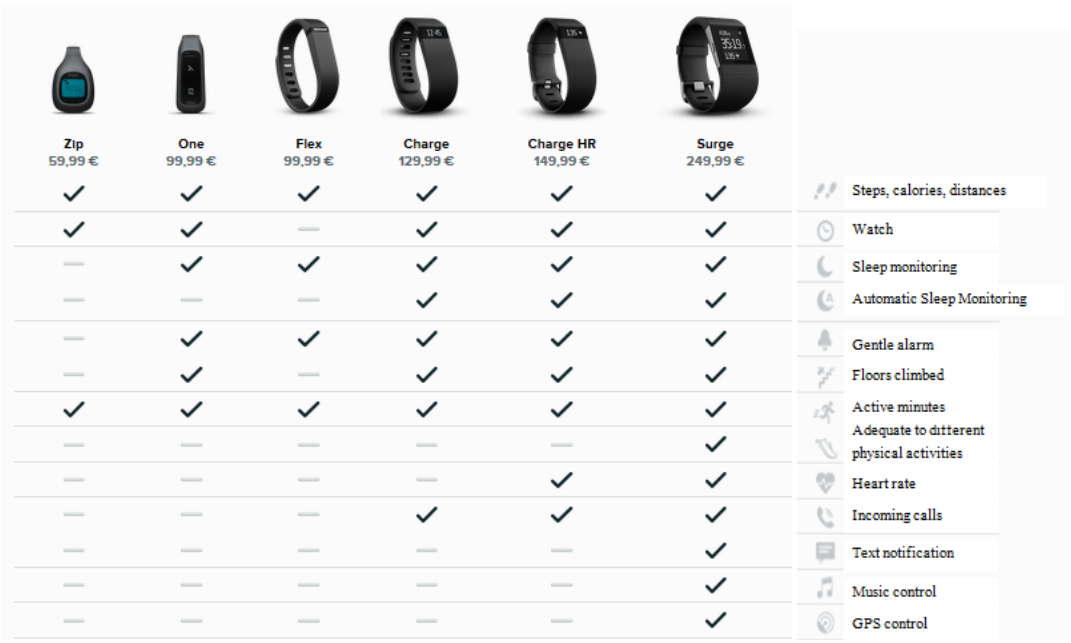


Figure 51: Fitbit Features-Based Pricing Strategy, source Fitbit website

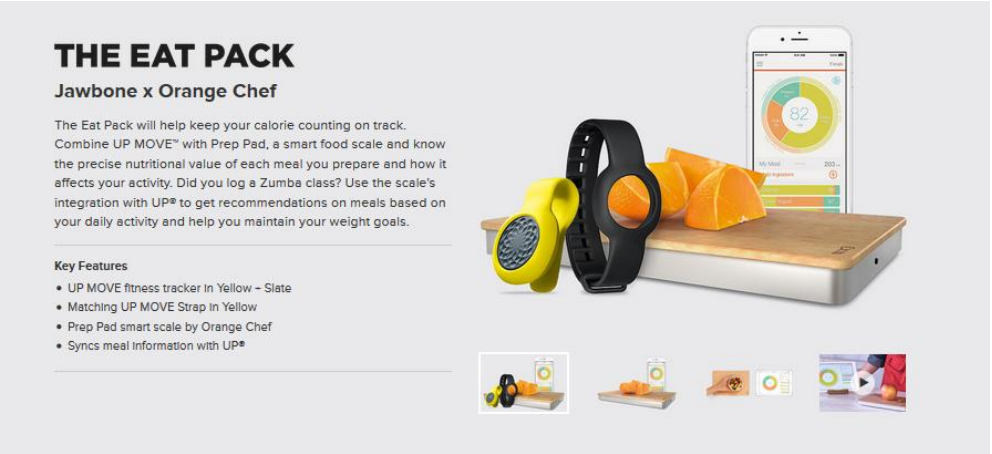


Figure 52: Jawbone "eat pack"- Product Bundle Strategy, source Jawbone website

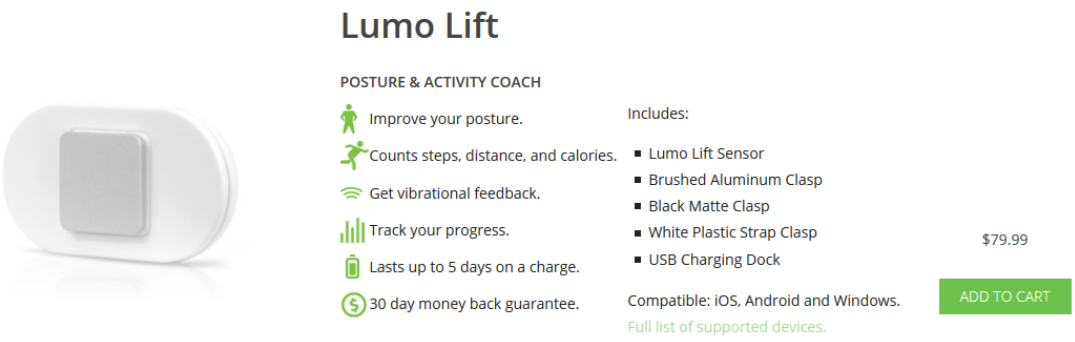


Figure 53: Lumo Lift normal price, source Lumo website

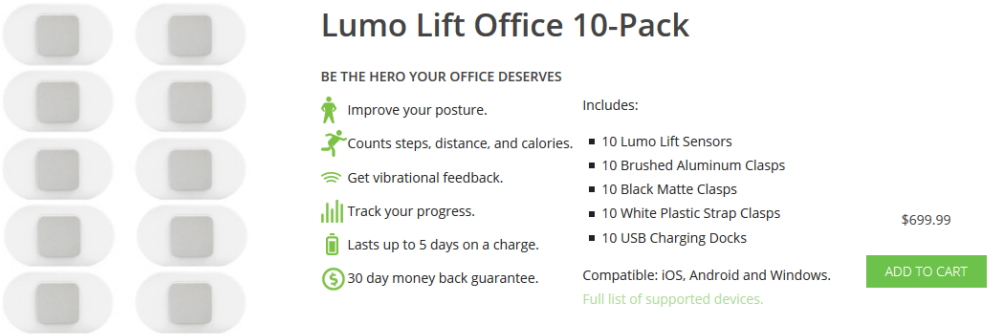


Figure 54: Lumo Lift Office discounted price, source Lumo website

4.PEGASO, FIT FOR FUTURE Business Model proposal

After having studied the Business Models of the actual players in the Wearables business, a first theoretical Business Model for the PEGASO, FIT FOR FUTURE product will be presented. The same CANVAS categories are going to be used.

Key partners

Keeping in mind that PEGASO, FIT FOR FUTURE project was born with a health preventive mission, for consistency the same will be the mission of PEGASO, FIT FOR FUTURE product. Since PEGASO was conceived as an obesity and overweight prevention programme addressed to the teenagers who are 13-17 years old **the Secondary Schools** do play a crucial role in its diffusion. The teens spend in them till one third of their normal day and so if the teachers and headmasters are convinced of the huge benefits PEGASO programme can lead to, they will promote it enhancing its diffusion and execution. It results also aligned with the school educative role: if PEGASO programme is properly executed, this means with efforts, engagement and consciousness, the students cultural baggage will be enriched of precious knowledge. It would be a very optimistic scenario if the schools decided to include PEGASO programme into their educational CV: the students would get credits if they do well with PEGASO programme, i.e. walking the suggested daily number of steps. This would represent a strong extrinsic motivation source. In addition in order to explain the programme and to grant a higher adoption rate the elder students can be involved and taken as models by their younger companions as they represent a more believable example than other institutional figures.

However the effort and commitment of the schools alone are not enough to maximize the result of PEGASO programme: the teenagers socio-economic system has to be involved and commit too in enhancing PEGASO efficacy. The **School Canteens, Snack-Bars, Vendor Machines,** as well as the **Restaurants, Cafés** in the nearby or in any case highly frequented by the teens have to be engaged by PEGASO with this kind of deal: if they agree on preparing and offering at promotional prices healthy plates and snacks to PEGASO players, they become PEGASO-approved snack bars or restaurants, gaining in visibility among PEGASO users. “Healthy plates” stand for plates with few fats and dressings, with instead the right amount of essential nutriments. The digital rewards gained in the PEGASO Game could be converted in real discounts to be used in the PEGASO-approved locals net. In the same

schools it would be coherent to place healthy vendor machines offering yogurts, fruits, sugar-free drinks instead of chips, overly sweet snacks and soft drinks.

The teenagers have also to be encouraged in doing more physical activity. As a consequence **Fitness Centres, Swimming Pools, Sports Associations** accessible and more frequented by the target population should become PEGASO partners too: the deal would be again the offering of special subscriptions for PEGASO players in exchange of visibility among PEGASO users. An experimental project[14] done in a UK Secondary School with the aim of increasing the degree of physical activity performed by the 9th year students found out that a strategy to capture all the teens' willingness to move is to always propose them a renovated sport courses offer. It would be coherent that the involved gyms gave PEGASO players the chance to always try new courses: the subscription plans should result flexible and with a high courses variety.

The ASL (Local Health Associations) should also be involved as they are stakeholder "by definition" of preventive programmes like PEGASO: helping in decreasing the obesity and overweight rate and so the direct costs for their cares should be within their interests. In an optimistic scenario the Health Minister should promote and finance prevention programmes like PEGASO, in the actual scenario the Italian Health Minister is in a spending review phase where is trying to reduce the health expenses instead of investing in new projects. As a consequence the **Health Institutions** should be just involved to promote PEGASO programme in term of reliability, accuracy and quality.

The **Sensors Developers** have to be considered as key partners as well: the higher data accuracy characterizing PEGASO Wearables granted by the cutting-edge technologies embedded in the Wearables themselves represents a differential competitive factor. Choosing every time the most innovative and up-to-date technological partners turns to be of key importance.

Free-lance General Practitioners and **Specialists** could be involved in a partnership with PEGASO programme too: they would act a similar part of the former experts intervening

[14] Kirsten Corder, Annie Schiff, Joanna M Kesten, Esther M F van Sluijs , *Development of a universal approach to increase physical activity among adolescents: the GoActive intervention*, BMJ open, 8/7/2015

when a risky health situation is pointed out by the system. They would give the interested users a first on-line consultation for free and schedule the followings off-line real examinations, which will instead be on payment. This additional service is supposed to be of great value as results from the m-Health App market analysis.

Key Partners Name	Key Partners Function	Key Partners Gain
Secondary Schools	Programme promotion and diffusion	Students' cultural baggage enrichment
RECA: Restaurants and Cafés	Programme properly execution	Visibility enhancement
Sport Associations	Programme properly execution	Visibility enhancement
ASL	Programme promotion	Obesity care cost savings
Sensors Developers	Competitive advantage source	New and growing customers acquisition
Free-lance Practitioners and Specialists	Value added activities execution	New customers acquisition

Table 16: Key partners, Key Functions, Key Gains

The key partners just described are specific for PEGASO as a prevention programme. Furthermore once PEGASO programme is launched as a change behavioural platform with its associated Wearables to be successful it has to rely on the same key partners of the wearable market players previously analyzed.

Key Activities

It has to be first said who is going to execute the so called "key activities".

A first hypothesis is that a start-up will be founded and will exploit when possible the competences developed by the most relevant partners during the project:

Figure 56: CSEM logo, source Google Image

Figure 55: Neosperience logo, source Google Image

-CSEM, specialized in sensor technologies, could carry out the R&D activities in order to always propose a cutting-edge technological product;

-NEOS, expert in designing and maintaining innovative applications and Web services, could bother about the App and Platform upgrade;

-POLIMI and FONDAZIONE POLITECNICO could represent an important support for the development of the start-up itself: thanks to their previous role of project coordinators and to their closeness to the Incubator PoliHub;

-LifeGate, expert in media communication, now assigned of PEGASO project promotion, could be consulted to define a successful Marketing Plan.

Figure 59: POLITECNICO DI MILANO logo, source Google Image

Figure 58: Fondazione Politecnico and Polihub logo, source Google Image

Figure 57: LifeGate logo, source Google Image

Although the followings could appear more like project key activities than product key activities it has to be remembered that what would distinguish PEGASO product from the other present on the Wearables market is the **target population** chosen and its **gaming and social dynamics**. To grant the sustainability of these competitive differentials is necessary to continue spreading PEGASO product in schools and contexts familiar to the young. This is the reason why the marketing and promotion activities and the commercial deals with RECA and Sport Associations are of primary importance.

So **PEGASO Programme Communication** has to be considered a continuous key activity, not just in the product launch phase. As disclosed in the previous section the teachers, headmasters have to be convinced of the huge benefits the whole execution of

PEGASO programme can lead to. PEGASO could also be included in the extra-curricular "Motion" or "Health and Well-being" activities. PEGASO programme could be presented to students on dedicated conferences. In every school a 'PEGASO-ambassador' figure could be identified: a 18 or 19 years old student with the task to explain to the others the dynamics and the features of PEGASO system. It should be considered as a referential figure. The programme communication should also be directed towards the parents of the teens, as they will be the real product purchaser, and so be promoted at an institutional level: on the Health Minister website, on the ASL website and offices, in the General Practitioners office. The marketing activity could be also partially outsourced to LifeGate, the actual project partner in charge of the project communication and consequent exploitation. This would make use of press releases, media campaigns and endorsement of famous rock-stars and sport stars willing to use their image for social issues. Furthermore it has to be disclosed that PEGASO programme counts different customer categories: the main one is constituted by the teenagers, so by their parents as they have the real purchasing power, then the Insurances Companies, the Pharmaceutical Industries, the Hospitals and the Health Systems do represent another customer category. They could possibly be interested in the health data generation and following exploitation: the Insurances could create customized life policy according to the peculiar health condition of the users and their good/bad execution of preventive programmes, the Pharmaceutical Industries could use these slot of data to create new adequate drugs to beat the chronic diseases, the Hospitals and the Health Systems could use these additional patients information to prompt the self-care model avoiding visits, day-beds and consultations. As a consequence specific marketing actions directed to these second customer categories have to be realized.

The second key and specific activity of PEGASO system as a special prevention product for teens is the involvement of the teens' social system operators to grant a successful programme execution. The already explained **commercial deals with Restaurants and Cafés and Sport Associations** (could be considered as a special "procurement" activity performed by the start-up supported by the expertise and by the reputation of the Politecnico di Milano) results essential for a whole and coherent execution of PEGASO programme. For the school canteens, snack-bars and vendor machines if the product promotion towards the schools is effectively done the school headmasters, secretaries could insert in the requirements of the school food provider also the offering of health menus. As far as regards the

Restaurants and Cafés outside the school as well as the Sport Associations a system of Affiliate Marketing could be implemented. PEGASO App, Game and Platform would be the advisors of RECA and Sport Facilities belonging to the PEGASO-approved net through a referral digital system: the users would be guided in doing actions on the PEGASO Game, App, Social Network in order to get rewards to be later spent in the PEGASO-approved food and sport net.

The RECA and Sport Facilities gain would be additional advertisement, increased demand and if they well performed, offering health menus and flexible promotional plans, better reputation among PEGASO users. A monetary premium could also be granted, once a threshold of health menus served or of promotional plans sold is reach.

Finally it is also fundamental to **find Free-lance General Practitioners and Specialists** who agree to work with PEGASO product giving a first consultation for free and then arranging normal paid visits. It could be possible to take part in their Marketing Affiliate Programmes, when they own it: a database of PEGASO-associated practitioners and specialists would be so created.

The previous have to be considered as key activities to build an enabling environment for the PEGASO programme execution. The next instead are meant as key activities for the realization of the PEGASO product.

Another competitive advantage of PEGASO system is the higher accuracy of the data collected granted by the embedding of high-quality technologies sensors. To sustain this strength is necessary that CSEM will continue with his **R&D activities**: this represents a binding condition of the procurement contract defined with them.

The start-up itself would be appointed of the **App, Platform and Data collected management**: this will become one of its core business.

The **exchange of the Data collected** with third interested actors is another key and hopefully lucrative activity. Going beyond the privacy issues, the data generated could be sold to Insurances and Pharmaceutical Industries and shared with Hospitals and Health Systems. In this sense Lombardia Informatica (LISPA) is already in charge of including the data produced by PEGASO system in the personal health record of the Lombard teens. The new born start-up can go on working with LISPA in this sense.

Conceiving PEGASO product especially as a change behavioural ICT platform the **use of an open API system** with the possibility for third party App (sport App like MyFitnessPAL, MapMyFitness, EndoMondo) to be synchronized with PEGASO platform and to use PEGASO data visualization, data processing tools would increase PEGASO customer base and amount of data collected. Once the customer base reaches a critical mass, it will be possible to **sell Advertisement spaces** and these will result one of the most lucrative activities of the whole Business Model.

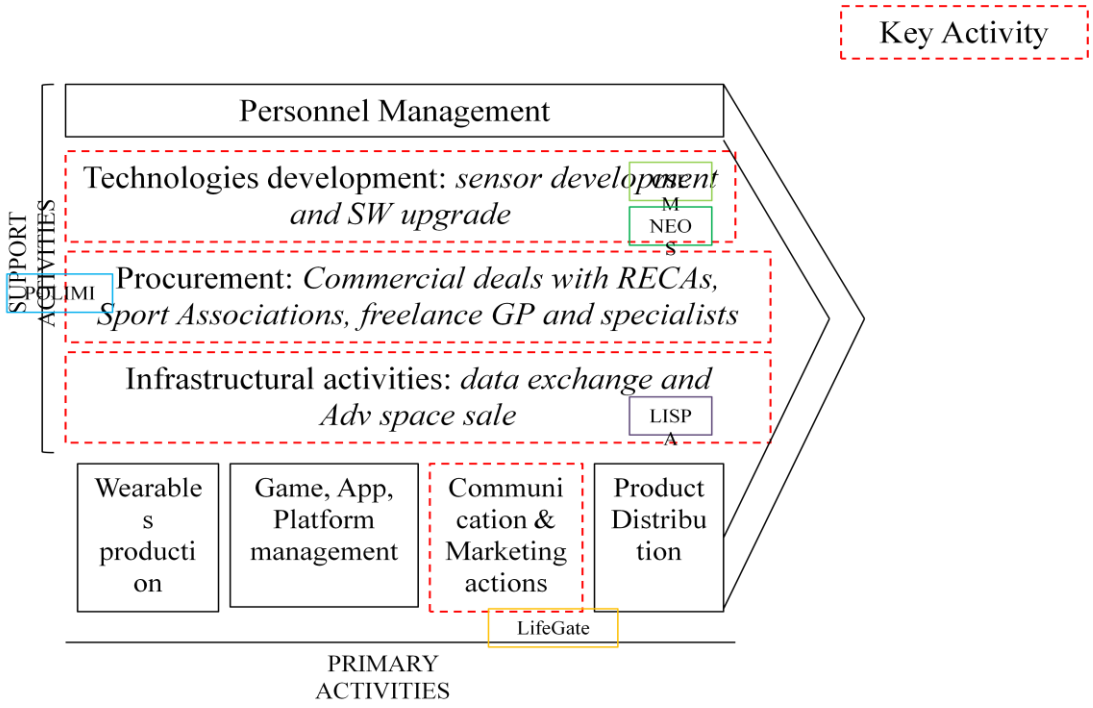


Figure 60: PEGASO product Value Chain Model

Affiliate Marketing

The RECA, the Sport Associations and the Free-lance Practitioners and Specialists could decide to use the Web marketing channel called *Affiliate Marketing*. In this system two main actors are found: the *Merchant*, who wants to promote its business and launches its Affiliate Marketing Programme and the *Publishers*, who have a proprietary Website and decide to take part in the Affiliate Marketing Programme of others, and these second actors are also called *Affiliates* for this reason. The latter have to provide the JavaScript code corresponding to the Web address of the part of their Website where the Merchant's advertisement will be visualized. The Affiliates will get a commission for every new customer the Merchant will acquire or for every new order the Merchant will receive thanks to the ad placed in their site. This is the reason why the Affiliates have to communicate their JavaScript code: in order to

understand the successful clicks path that brought the users to the Merchant landing page. As a matter of fact the Merchant business and the Affiliates business have to be complementary: the Product Bundle strategy is another time here applied.
An Affiliate Platform to rule the payments and the contents to be promoted exists too.
PEGASO start-up could sign in to all the Affiliate Marketing Programmes of all the adequate Restaurants, Cafés, Sport Centres, Medical Offices which make use of this Web promotional channel.

Vitality partnership with GENERALI

GENERALI, one of the major insurance company worldwide, could decide to partner with PEGASO prevention programme as did almost a year ago with Vitality.
Vitality is an insurance model designed by Discovery, a South Africa insurance company, based on behaviours whose aim is to support healthy living habits through a customized and constant interaction with the customer in order to motivate and reward virtuous behaviours. Many similarities can be found with PEGASO product, when conceived as a change behaviour platform.
Specifically Vitality is an incentive-based wellness programme directed to Enterprises in order to have more healthy and more engaged employees.
Vitality Members start with an online Health Risk Assessment that identifies relative risk factors for each member and provides them with their Vitality Age. This is a scientifically calculated representation of their risk-adjusted or "true" age, allowing each member to easily understand how their current behaviours are impacting their health.
Each member is then presented with a Personal Pathway, a recommended set of activities and goals to assist them in improving their health. Members can select from more than 30 health-related activities including exercising, achieving health goals such as losing weight or stopping smoking, receiving routine preventive care, such as a prostate exam or mammogram and participating in a health education program. Members are incentivized for their participation throughout the program and earn rewards.

Key Resources

The Key Resources are the tangible and intangible assets that grant the competitive differentials sustainability. The target population chosen, the social dimension of the product offered reinforced by the gaming and rewards dynamics and the top quality sensors embedded in the Wearables have to be considered as PEGASO competitive differentials. Consequently the **Secondary Schools Supportive Net formed** which promote PEGASO product among the teenagers, the **PEGASO-approved Food and Sport Net** that allows the social realization of the preventive programme, the **CSEM Expertise in the Sensor Realization** turn to be crucial material and immaterial assets. The **Game** and its social competitions, social rewards, social networks dynamics has to be considered a key resource too as it should represent one of the teens' reason why to have PEGASO product. As a consequence it should be as attractive, user-friendly and engaging as possible. PEGASO product could also just be conceived as a **Behavioural Change ICT- and Mobile-based Platform**, which has to be consequently considered as well a key resource. In this case not because it directly sustains a unique and successful proposal feature but in a storage and exchange of data enabling logic. The **Data Collected** are instead a precious asset: as they could be sold and become a source of revenues or they could be shared with the Health Services and improved the accuracy and the costs of the future cares directed to the target population.

Value Proposition

PEGASO product acquisition, that consists in a behavioural change ICT- and Mobile-based Platform with its associated Wearable Devises- a Smart Garment and a Fitness Tracker, offers the teenagers who are 13-17 years old a fun, social and satisfying way to adopt a more healthy life-style. "Fun" because of the Game and its individual and social challenges, "social" because of the associated social network, where the results of the challenges performed can be published and where PEGASO users stay all connected and "satisfying" because of the many encouraging rewards as discounts in Restaurants and Snack-bars or in the Gyms and Swimming-pools belonging to PEGASO network.

This is the motto of PEGASO, FIT FOR FUTURE project:
"*Personalised Guidance Services for Optimising lifestyle in teen-agers through awareness, motivation and engagement*".

Customer Segments

They have already been presented: the primary and declared one is constituted by the teenagers who are 13-17 years old. This target population was chosen as the addressee of a prevention product like PEGASO since making prevention against obesity and the associated chronic diseases at this age was in need and because no other products of PEGASO kind have never been developed for this target, so this represents an interesting business opportunity to be exploited.

Insurance Company, Pharmaceutical Industries, Hospitals, Health Systems are instead a secondary customer. If PEGASO product spreads according to the expectations the data generated will represent an interesting asset to be acquired by these actors (see Key Activities section for the different exploitations and uses of the acquired data).

Finally a third implicit customer will be constituted by the Advertisement Spaces Buyers as far as a critical mass of PEGASO users will be reached.

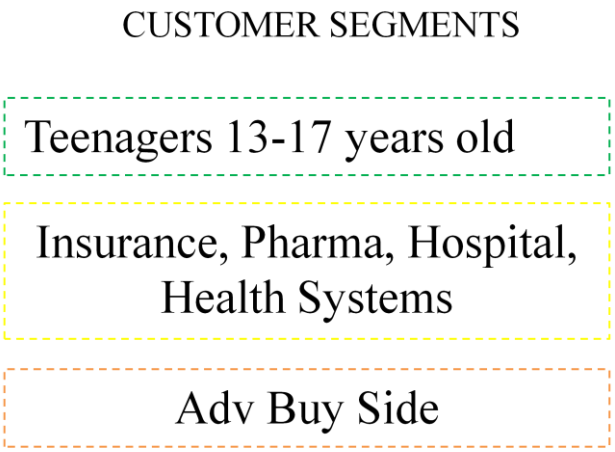


Figure 61: Customer Segments representation

Customer Relationships

The relationship between PEGASO and its main customers, i.e. its users, should be as interactive as possible to grant PEGASO programme goal satisfaction. The feedbacks system, the health-companion nutritional suggestions, the personal physical activity results presentation, the engagement in personal and collective challenges, the rebound of the personal success in the Social Network, the rewards systems, the chance to schedule appointments with doctors are all examples of this digital relationship.

With the Insurance Companies and Pharmaceutical Industries the relationship is more traditional: these business customers have to be convinced of the potential gains PEGASO data purchase could lead to. The bargaining phase will consequently play a relevant role.

As far as regards the Hospitals and Health Systems, PEGASO data sharing represents the main relationship with them working in a logic of self-care system. In this case the relationship is more collaborative than commercial.

The actual relationship between LISPA and PEGASO can be taken as example: the sharing of clinical relevant information between the teenager and his general practitioner is made possible through the usage of a special tool of the Electronics Health Record. This tool is called "Notebook" and here all health information generated through PEGASO usage will be collected and accessible by the teenagers' GP.

Finally with the implicit customer, i.e. the companies interested in being advertised on PEGASO Game, App and Platform through banners and the Affiliate Marketing Programme the relationship is a pure commercial one.

Channels

The teens are supposed to be reached through promotional events organized in the Secondary Schools, the endorsement of sport stars or rock-stars wanting to promote a prevention programme like PEGASO, media campaign (TV advertising realized by the Health Minister, Web adv, radio adv managed by LifeGate) in the Awareness Phase. Then they are informed about PEGASO product features thanks to the actions of the PEGASO-ambassadors in the schools and on PEGASO Website. They could finally buy the product on-line or by authorized vendors, where other Wearables are sold (Mediaworld, Mondadori, Euronics). It is important to think of communication actions also directed to the real purchaser of PEGASO product: the teens' parents. These could be informed about the existence of this innovative preventive product through the same TV advertisement made by the Health Minister, from fliers hanged in the general practitioners offices, in the ASL, in the hospitals. To give more detailed information PEGASO, the Health Minister, the ASL and the Schools website should dedicate a special section to this innovative prevention programme.

The food and sport PEGASO-associated net does constitute another tool to capture teens' and parents' attention towards this programme: on their windows special marks could show their belonging to PEGASO network and so intrigue about PEGASO itself.

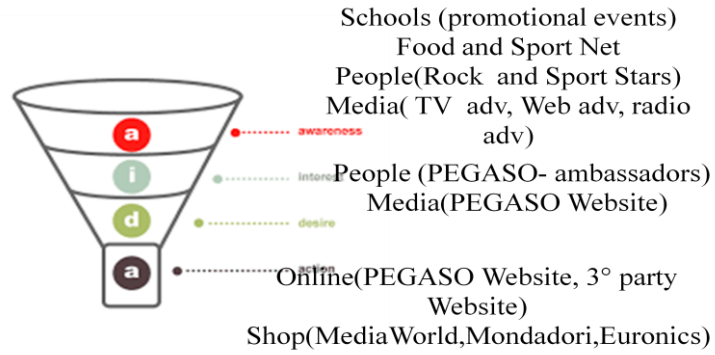


Figure 62: teenagers' AIDA model

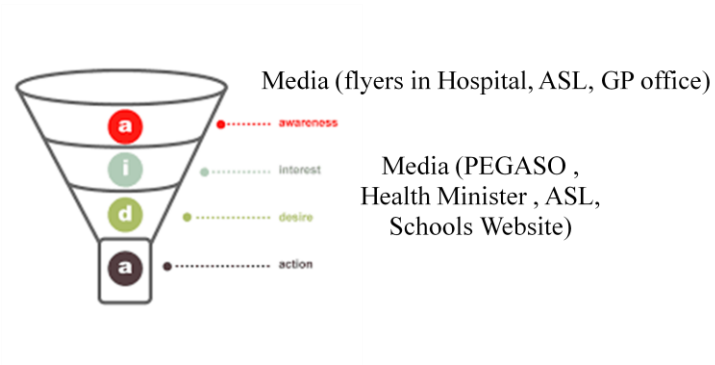


Figure 63: teenagers parents' AIDA model

The secondary customers will be individually contacted and invited to special informative events: as this second customer is a B2B (Business to Business), different communication strategies have to be used.

The implicit customers will be met at the Adv Stock Exchange.

Cost Structure

To outline an hypothetical cost structure all the activities, either supposed to be inside or outside performed, will be listed and a cost appraisal will be done under specific conditions.

PRIMARY ACTIVITIES:

R&D: activity assigned to CSEM. For the project phase development the cost of 400 Wearables systems (smart garment and smart bracelet) was of €100.000. So **€250 of R&D expenses for every PEGASO system**. It could seem a very high value, however if the learning economies are considered the increased expertise of the sensors providers will lead to diminish their development cost.

Wearable production: activity assigned to an external provider. The logistics costs have also to be considered. Average price for a fitness tracker: $73 (source: Statista). Average mark-up in the Wearables: 40-60%. Average production price: $43,8.

Game, App, Platform contents generation, updating and management: activities assigned to internal and external actors. PEGASO Platform composed of PEGASO App, PEGASO Social Network and especially PEGASO Serious Game has to be considered as the main output of PEGASO, FIT FOR FUTURE project. The same could be acquired and used at a zero cost by a start-up whose vision is aligned to PEGASO, FIT FOR FUTURE values. This will be one of the operating condition characterizing the real case application which will be studied in the next chapters. So the **acquisition costs** could be assumed to be of **€0**.

The system updating activity will be outsourced and provided by NEOS. Specifically this will be appointed of: system administration and system maintenance activity; App maintenance and App upgrading. The costs to be sustained will be: the infrastructural, administrative and maintenance ones, to be quantified as 10 working days of a System Administrator and of a Client Developer. The infrastructural costs amount to €5000 per month, the administrative and maintenance appraised through the working days of the two human resources involved count for €2500 per month.

Communication and marketing actions: activities performed by a variety of actors. Marketing one to one meant as physical meeting with schools, restaurants and snack-bars and sport associations. This activity could be done by internal resources. A couple of days to reach the previously contacted actors, to explain them the programme and the social and economical gains have to be counted for every school. **2 working days *1 internal resource * every School**. (It is an internal cost-so not be considered).

The cost of printing a stock of **1000 fliers** amounts to **€15.** They can be posted by the internal Human Resources during their meeting round with the RECA and Sport Facilities close to the Secondary Schools involved.

Special promotional events will take place in every new Secondary School involved. Their organization and cost structure will be better detailed when applied to a real case study. Anyway the cost categories which will be considered are the ones related to the radio advertising, press advertising.

PEGASO ambassador can be rewarded with promotions on health menus, health snack, gym and swimming pool membership.

To appraise the cost of realizing an Health Advertisement on TV the target market which is wanting to be reached and the duration of the TV advertisement campaign on the chosen channel have to be considered. Recurring to this very expensive kind of promotion is correct when the target market is considerable and matches with the chosen channel audience in order to have a reasonable cost per contact. More specific evaluations of this cost category will be later done when reasoning on the real case study.

Marketing one to one actions will be directed to secondary customers.

Distributive Costs: activities assigned to authorized sellers. The fixed fee to be monthly recognized to Amazon to sell through its channel amounts to €40/month. In addiction the commissions on each sale have to be considered as well: the minimum commission applied to the price of the good belonging to "Elettronica" category is of 7%, the minimum 'commissione per segnalazione' amounts to €0,50.

Finally the margin kept by the shop-vendor has to be taken into account: this is usually around the 15-20%[15] of the price of the good sold.

SECONDARY ACTIVITIES:

Infrastructure cost: servers costs, data centres costs, connection cost, offices cost, general expenses.

Personnel cost: it has still to be defined the number of the start-up founders.

Revenue Streams

As three customer categories were previously defined, so three revenues streams have at least to be taken into account: **PEGASO Wearables purchase**, **PEGASO generated data acquisition** by the Insurances Companies and the Pharmaceutical industries and **advertisement spaces** on PEGASO Game, App and Platform purchase. In addition thanks to the **Affiliate Marketing Programme** PEGASO system should get **commissions** for every successful advice given. It could be also thought at a **PREMIUM version of the PEGASO App**: an additional income could come from the subscriptions plans.

[15] Data collected from a Mondadori salesman.

Financial strategies

Traditional Sponsorship

A classical way to raise funds is the search of commercial sponsors whose mission is aligned with PEGASO values: healthy eating; active living; prevention and care against obesity, overweight and chronic diseases. Financing a prevention product would be seen as a way to care about the society and as a consequence the institutional image of the companies acting like this will improve. In addition as all these three business are linked with the proper execution of PEGASO programme, if this turns to be successful and begins to spread, the health food industry, the sport industry and the prevention and care industry themselves will get benefits too.

In the health food industry the companies to be involved could be: Melinda, Chiquita, Santhal, Parmalat, Danone, Yomo, Eridania.

In the sport industry: CONI, Virgin Active, FIPAV, FIGC, FIDAL LaFabbricaDelloSport, Nike, Adidas.

In the prevention and care fields: Associazione Obesi Italiani, Fondazione Cariplo,

Furthermore any company willing to be 'socially responsible' could potentially become a PEGASO sponsor: sustaining a prevention programme like this would enhance its Corporate Social Responsibility.

Social Impact Bond

An innovative and social way to be financed could consist instead in the issuing of a Social Impact Bond. This fund-raising modality comes from UK where it was first employed to reduce the recurrence rate of Peterborough prisoners.

Definition: The Social Impact Bond (SIB) is a financial tool born to support innovative welfare policies. The innovation stays as in its form as well in its contents. Traditionally the Public Administrations (PA) have always been the payers for care programmes carried out to solve social issues, assigned to a private actor. Instead the SIB is based on a thick network of actors and on an innovative way of financing. The SIB grounding belief is the following: instead of caring problems ex-post, i.e. sustaining extra-costs to accept again the just released captives, is better and more convenient to prevent them, i.e. implementing educational paths, helping the just released prisoners in finding a job or a house. The prevention topic is once again a basic value of all this system.

SIB actors and their functions

These are the actors necessary to realize a SIB:

-Public Administrations (PA),

-an Intermediary,

-a Social Investor,

-a Prevention Programme Provider,

-an Independent Assessor.

The **Public Administrations** are informed by an **Intermediary** of the existence of social prevention programmes to solve specific social issues, i.e. the recurrence rate of prisoners just come out and so the reduction of the readmission costs into the prison. The PA is responsible with the Intermediary for **Prevention Programmes Provider**'s choice, who is usually a non-profit organization. The novelty of this programme is its way of being financed: **Social Private Investors** will pay for it granting a loan, whose capital sum and interests will be redeemed just in case the Social Prevention Programme leads to determined results. This system is also known as "pay for performances" programme.

These Social Investors have to be searched among the Bank Foundations, Institutional Investors, Highly Net Worth Individuals (HNWI) as the placement costs to be sustained in case this financial instrument would be offered to the Retail Customers would increase too much the already high transaction costs. These are higher with respect to the traditional case in which the Prevention Programme was assigned to one private actor. The investment results quite risky and the yields the investors required higher. That is the reason why the investors involved have to be mainly "impact first".

An "impact-first" investor is not betting on the aleatory trend of a certain value (stock, currency), but on the capabilities of an activity to create social and economic value, which is represented by the positive and sure impact for the interested community, the PA and the direct recipients of the social service.

Figure 64: The Impact Investments Value Chain in Italy, source POLITECNICO slides

SIB operation

As the financial risk is not upon the PA, these can try innovative prevention programmes without decreasing their reputation in case of failures, that would mean inadequate use of public resources.

Since funds are risen as the first step of this process, the Prevention Programme Provider (PEGASO start-up) is chosen not depending on his fund-raising capability, but just on the quality of his service. To avoid opportunistic behaviours the funds are given to them in "tranches" and a continuous monitoring of their activity is imagined too.

The social impact possibly reached through the Social Prevention Programmes execution is a key point to be discussed: it has to be translated into a measurable indicator and in a cost savings for the PA. The Social Prevention Programmes performed will have to cost less than the PA cost savings: i.e. the educational paths programmes proposed to former detained will have to be less expensive than the money saved by the jails to hypothetically accept them again. These extra-savings will be used to remunerate the Investors, the Intermediary and the Prevention Programme Provider: the PA cash will remain the same, but prevention programme will be carried out.

The social outcome, i.e. the percentage of reduced recurrence rate, has to be properly measured by an Independent Assessor: the fact that this is another actor, specialized in measurement activity, grants the accuracy and the transparency of the obtained results. Once the social outcome is higher than the fixed threshold the PA will redeem their debt, be able to pay interests on it, be able to recognize a commission to the Intermediary and the Social Programme Provider.

SIB specific features: Social Innovation and Trust-based system

The SIB is a sophisticated financial tool, similar to a derivative, but differently from this it is not conceived to speculate but to promote Social Innovation and to make it more scalable. Its complexity does not stay in obscure algorithms which make the success or failure of an investment difficult to be foreseen, as in the case of derivatives, but in the network of relationships among the actors taking part in the process. All the actors involved are mutually linked with a partnership, recognized also through formal contracts, where in addition to the "financial risk" of a normal investment the variable "trust" among partners who take part in the game does play a relevant role. The Social Investor believes that the social programme performed will lead to the fixed result; the PA think that these innovative welfare policy will bring to social improvements and to sure savings in their expenses; all the actors trust in the measurement skills of the Independent Assessor necessary to really evaluate the impacts of the Social Prevention Programmes; finally all the actors do trust in the other actors' contractual terms respect.

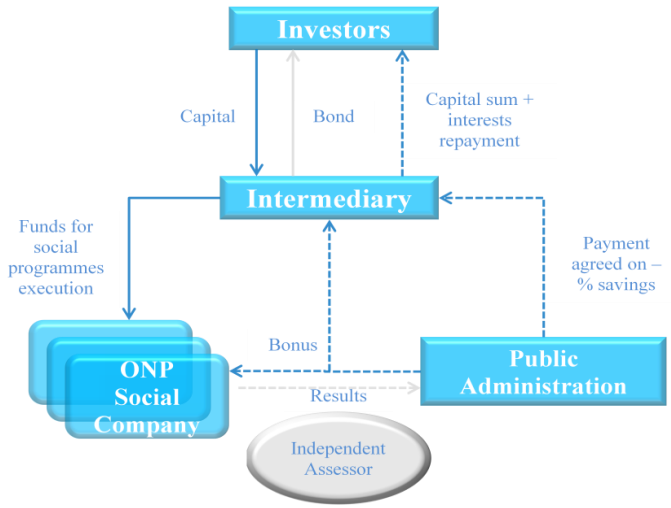


Figure 65: SIB operations, "Quaderni dell'Osservatorio" n. 11 Anno 2013

SIB criticalities

It is fundamental that the PA can quantify their actual expense to tackle a social question, are able to identify variable costs drivers and so to define the possible cost savings. To evaluate savings registered at a higher level than a single city or region a data integration and a common accounting method are necessary. In the Italian context this is a condition quite difficult to be found.

In addition the PA are not so willing in a moment of spending review like the actual to set aside part of their scarce and highly optimized financial and human resources for innovative, risky and Middle Period investment.

The financial risk is all upon the Social Private Investors: this should instead be shared. The failure risk should also be sustained by the Intermediary as it could have proposed wrong Social Prevention Programmes to the PA and the implementation risk by the Social Programme Provider as it is directly responsible of its execution. So far the Intermediary and the Social Programme Providers received a monetary reward in case of success and no losses in case of failure.

Another guarantee for the Investors could be the involvement of Bank Foundation with a guarantee fund: this could partially cover the initial investment and in case of success it could be re-used as guarantee fund for other SIB projects.

With these two adjustments it should be possible and easier to find more Investors.

SIB is a very innovative welfare policy implementation system: just two operative examples exist worldwide, one in UK and the other in NY city[16]. Both deal with the recurrence rate problem of prisoners set free less than 12 months before. Finding Providers of Social Prevention Programmes working with this new logic results quite tough: the PA and the

[16] The UK one was applied at Peterborough prison in 2010 and consisted in the execution on 3 groups of 1000 ex prisoners each of a Social Programme supposed to last 6 years. It started thanks to the collection of £5 Million. The indicator to be measured was represented by the number of re-admissions in the following 12 months among the programme recipients and a control group, composed from statistics of other prisons. The PA are supposed to pay the social investors just in case one of the three groups will register a 10% decrease in the readmission rate or if the average reduction in the three groups will be of 7.5%. A pre-fixed sum for every avoided readmitted prisoner will be paid by the PA to the Social Investors plus a yield rate.

The SIB applied instead in NY city in summer 2012 saw the involvement of Goldmann Sachs Investment Bank as "Social Investor". The Social Programme performed was called ABLE (Adolescent Behavioural Learning Experience) and was addressed to 3000 teenagers in 16-18 years old age range formerly be imprisoned in Rikers Islands jail. The recurrence rate among the young prisoners was of 50% before the intervention. A loan of $9,6 Million of entity and of 4 years of duration was granted. MDRC was chosen as the Intermediary actor. A $7,2 Million guarantee fund was given by Bloomberg Philantrophies. The indicator chosen to be evaluated was the number of avoided days in prison. The threshold is a reduction of 10%. The results will be evaluated compared with a historic baseline.

Intermediary have to make a very specific and strict selection of the possible already few providers. In addition these should prove their experience and capability in performing these kind of services, however this is another difficult condition to be respected because of the novelty of this tool.

The operative sides

It has already been said how relevant is the measurement activity, performed by the Independent Assessor, of the indicator initially discussed between the PA and the Intermediary. An improvement in the life conditions of the Programme recipients specifically due to the Prevention Programme has to be found and defined. It has then to be measured through enough representative indicators. Finally it has to be translated into a cost reduction in the PA expenses.

To measure the "programme-linked-improvement" is necessary to compare the Programme recipients with a population group not involved in the prevention programme.

SIB application cases

This kind of social financial instrument was firstly accepted and proved in UK, where the *Big Society Capital* defined as a third sector investment bank continues to raise funds in order to sustain no-profit organizations and volunteer associations which represent the Prevention Programme Providers.

Help to homeless people, to family in poor condition and at risk of social exclusion, to impaired people, to family with sons in custody and to young unemployed are some of the social questions to be tackled by worldwide experiences that can be assimilated to SIB. These mainly took place in UK, USA and Australia.

However something was also done in Europe: the European Commission established in 2010 the *Social Business Initiative* in order to enhance the Social Entrepreneurship and increase the competitiveness of the European Social Inclusive Economic Model.

The *European Social Investment and Entrepreneurship Fund* (ESIEF) of €90 Million was created in 2013 as a sort of fund of funds: it was supposed to enable the creation of others European funds specialized in the financial support of the start-up, development and growth phase of social companies.

Application to PEGASO

A SIB could be applied to finance PEGASO programme as it is a prevention programme supposed to lead to cost savings in the PA expenses, quantified in the direct costs to care the obesity among the target population and with a rolling mechanism among all the elder population.

The PA involved would be the Health Minister. The Intermediary could be Banca Prossima, a bank of the Intesa SanPaolo group which helped in the realization of the first Italian SIB [17] .The Social Investors could be Foundations like Fondazione Vodafone Italia, Fondazione Italiana Accenture, Compagnia di San Paolo. Fondazione Cariplo could grant a guarantee fund used in a leverage logic in order to raise more financings. The Prevention Programme Provider is supposed to be PEGASO start-up, of course after having taken part into a regular invitation to tender. The Independent Assessor has still to be defined.

The Social Impact that is going to be measured will be the reduced number of obese and overweight teens after a year of PEGASO programme proper execution with respect to the non-PEGASO users. Considering that an obese patient could cost, according to the degree of the disease, from €38 to €550[18] more than a normal weight and that in Italy 26,9% of people in 6-17 years old range are obese, if a 10% reduction is supposed to take place after a year of PEGASO programme execution, these are the possible savings a small reality ASL (like the one considered in the following section) composed of 5.450 patients could be:

[17] The Scampia SIB. The social problem tackled in this case is the waste disposal: at the moment ASIA, the municipality company in charge of the waste disposal in Neaple, spends €140 to send a ton of wastes to the North of Italy incinerator sites. After the intervention which will be financed through a kind of SIB, the same ton will be disposed for €100 in the compost plant supposed to be built in the Neaple quarter of Scampia. Considering that the yearly capacity of this innovative wastes disposal plant will be of 20.000 tons, the savings would be of €800.000 every year. The intervention sees Banca Prossima as Intermediary and Banca Intesa SanPaolo as Guarantee and Issuer of zero-risk bond called TRIS (Titolo di Riduzione di Spesa Pubblica). The capital collection, facilitated by the guarantee fund granted by the same Issuer, will allow the realization of the €14,6 Million wastes compost plan once an invitation to tender offer is concluded. The TRIS has to be considered as a bond with the same remuneration profile of a state bond lasting 5 years. The Scampia compost plant area is supposed to be inaugurated in Spring 2016.

The main difference with a traditional SIB is the issuing by Intesa SanPaolo bank group instead of a PA and also the guarantee for the investors to be returned the capital sum in case of project failure.

[18] Source: http://www.ilsecoloxix.it/p/magazine/2015/07/03/ARkZk9zE-obesita_costano_miliardi.shtml

$n° \ PEGASO \ recipients = 5.450 \ patients$

$OBESITY \ prevalence \ among \ Italian \ 6 - 17 \ years \ old = 26{,}9\%$

$yearly \ average \ cost \ to \ care \ OBESITY = 300€$

$GOAL \ reduction \ in \ obesity \ rate \ after \ a \ year \ of \ PEGASO \ execution = 10\%$

Costs to be sustained in the AS-IS=

$$[(26{,}9\% \times 5.450 \ students) \times 300€] \times 10\% = 43.981{,}5€$$

n° obese students in the AS-IS=

Easy Credits Terms Usage

If PEGASO start-up comes to life, it will be able to apply for some easy credits terms offered by the Milan Chamber of Commerce and Milan Municipality for medium and small enterprises. It will have to be compliant with all the requirements needed, i.e. to have a legal seat enrolled at the Milan Chamber of Commerce Register[19]. AgevolaCredito2015 is an example of easy credits term: it is composed of four interventions, two of which are compatible with PEGASO situation.

The first, called "Productive Investments Programmes", was thought to support different productive expenses categories, i.e. the ones needed to design Web sites and Web systems, as PEGASO Application and ICT platform, the ones necessary to acquire patents, as the one

[19] "*The enterprises able to access to AgevolaCredito 2015 favourable credit terms can belong to any industries and have to respect the definition of micro, small and middle enterprise and to be compliant with the following requirements:*

-they must have a legal seat registered at the Milan Chamber of Commerce Register

-they must not be in liquidation or involved in bankruptcy proceedings

-they must be in compliance with their commencement notice

-they must have paid on time the Chamber Fee

-they must be up to date with the employees social security contribution deposit"

protecting PEGASO Game realized by Imaginary and also the ones to promote the product, as the different actions constituting the PEGASO Marketing Plan. This first intervention allows to ask for a financing going from a minimum €10.000 to a maximum of €300.000 with a fixed interest, calculated as the Euribor at 6 months plus a spread of 4%. The spread value can be reduced depending on the real amount of debt required (from €10.000 to €150.000 of 2 basis points, from €150.000 to €300.000 of 1.5 basis points) and on the months passed from the enrolment at the Milan Chamber of Commerce Register (if less than 24 of 1 basis point, if less than 48 of 0.5 basis point). The financing can last from 36 to 60 months.

The fourth intervention, called "liquidity operations realized by innovative start-ups", is addressed to corporations of less than 48 months of life taking part in Incubators, Accelerators programmes. The financing required could go from a minimum of €10.000 to a maximum of €75.000. The maximum interest rate applicable is the Euribor at 6 months plus a spread of 5%. In this case the discount applied on the interest rate is of the total amount of it if the start-up is compliant with the requirements over listed. In addition the guarantee cost is also deducted thanks to a non repayable grant: this could reach the 50% of the guarantee cost till a maximum of €3.000. The duration of the credit goes from 24 to 60 months.

Incubators and Accelerators programmes

Figure 66: Polihub logo, source Google Image

PEGASO start-up could be supported by Polihub: Politecnico di Milano Incubator, managed by Fondazione Politecnico di Milano with Milano Municipality contribution. Polihub mission is to offer to the new born start-ups an entrepreneurial empowerment process, a unique network, spaces specifically thought for start-uppers and innovative services. Traditional services are also provided: management services, legal services, communication and PR services, infrastructural and applicative ICT services, fund-raising services and tutoring services- to better define the entrepreneurial idea. The partners network the start-ups can have access to is formed by specialists in all the above listed services: accounting firms, law firms, communication and PR experts, ICT services exploitable as Web services.

5.APPLICATION of PEGASO programme to a REAL CASE: Merate

Why Merate?

In order to test the feasibility of the business model so far theoretically defined, a real case of its application will be presented: PEGASO product will be proposed to different Secondary School students and teenagers of the city of Merate, a medium size town in the heart of Brianza.

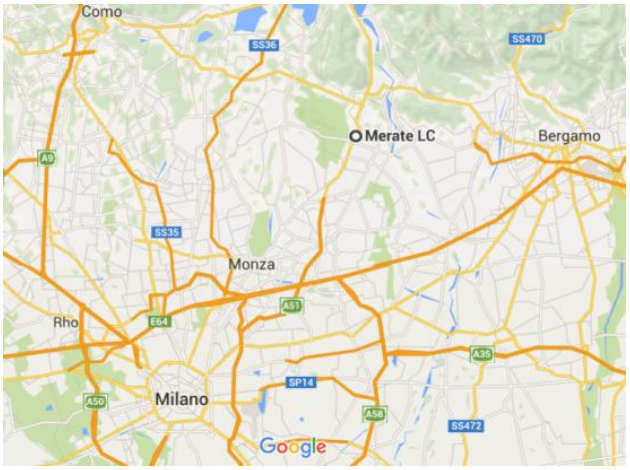


Figure 67: Merate Area, source Google Maps

The Secondary Schools involved in the simulation are *Liceo Statale M. G. Agnesi*, which is composed of the Linguistic Liceo, Scientific Liceo, Applied Science Liceo and it counts totally 1200 students, *Istituto Viganò*, which counts up to 800 students and *Fondazione L. Clerici*, whose students amount to 500. The assumption to involve teens who do not perfectly represent the target (at a normal secondary school people study from the age of 14 till the age of 19, whereas the target supposed to be served was 13-17) is made. The reason why these city and its Secondary Schools were chosen is twofold: first of all they represented a little scale system (Merate has less than 15.000 inhabitants) where the gaming dynamics and the social competitions could take place and be tested easier than in a bigger city, furthermore it resulted very easy to get in contact with the teachers and vice-headmaster especially of the *Liceo* as was the one attended by the author of the thesis.

The food net and sport net composed by the places mostly frequented by the students is the following: the cafè internal to the *Liceo*, the *Istituto Viganò* and the *Fondazione L. Clerici*, a shopping mall and a Sport Center.

Commercial partnership

Figure 68: Merate FITNESS VILLAGE by GESTISPORT, source Google Image

Merate FITNESS VILLAGE by GESTISPORT is the most important and closest sport centre to the Secondary Schools where PEGASO programme is supposed to be proposed. This FITNESS VILLAGE is composed of a swimming pool and of a gymnasium. They carry on many projects with children and teens and are already aware of the fact that they always performed less physical activity. This is one of the reason why they would form with ease a commercial partnership with PEGASO start-up: they would offer trial lessons for free, once they knew in advance the number of PEGASO users coming on a specific date, and a 30% discount on gym or swimming-pool membership. These two promotion actions can be seen as good examples of "rewards" won within PEGASO Serious Game. GESTISPORT made also in the past similar deals addressed to specific customer targets: they offered the same discount on subscriptions to the MS, a sport garment and accessories shop, clients. They recognize in fact the added value of forming this kind of partnership: a way to reach a considerable users group.

It was thought to create a PEGASO-gif-card in order to store points gained inside PEGASO Game and use them as discounts on specific food and sport goods categories.

Figure 69: Auchan logo, source Google Image

The Auchan placed in Merate, the shopping mall in touch with, is already using a special benefits card addressed to students: 10% discount on stationery with a minimum expense of €40. A similar mechanism could be apply to prize the most virtuous PEGASO users.

Marketing Plan

In order to promote in the most effective way an innovative and teens addressed product like PEGASO a promotional campaign have to be designed. The idea is to organize a PEGASO launch event lasting one month and hosted outside the Secondary Schools, beginning from *Liceo Statale M. G. Agnesi*. The students will have in this way the opportunity to see PEGASO product for real and to try it. This aspect turns to be crucial considering the not immediate understanding of PEGASO system and functioning. The costs to be sustained are the ones connected to the purchase of PEGASO trial products (Smart Bracelets, Smart T-Shirts and also some Smart Phones as it was discovered that not all the students own a smart phone), the ones to pay the personnel who will stay at the informative desk, will explain PEGASO product and will enable and monitor its trials and finally the ones linked to the event promotion. A multichannel marketing plan, lasting the two weeks before the event and the one just after it as a "follow-up", is in need to inform of the promotional event itself: flyers distribution and post in the Secondary Schools and in all the places reasonably frequented by the students and their parents (bars, shops, gyms, hospitals, medical centres), some promotion actions on Facebook proprietary pages of the Secondary Schools, on local newspapers (*Giornale di Merate*) and on local radios (*HEYDJ!radio*, a Web Radio mainly heard by people living in Merate Area).

The involvement of a sponsor is necessary to cover all these expenses: the same can be searched in the healthy food industry, in the sport industry or in general in any industry related to the youngest. Supporting the promotion of a prevention product like PEGASO will improve the sponsor public image and will promote as well the sponsor with its target market. In Merate Area companies like Decathlon, MaxiSport, Diana, BluFrida which operate in the sport business could be potential PEGASO sponsors.

The Secondary Schools involved, especially *Liceo Statale M.G. Agnesi*, agreed on a future possible collaboration to inform their student of PEGASO educative programme. PEGASO informative desk could be present at the self-management days: special school days when thematic lectures and special workshops are offered instead of normal lessons. On the 26th November at *Liceo M. G. Agnesi* was actually hold one of these special school days about the "Sport" issue: it would have been deeply coherent to present PEGASO in that occasion. Furthermore special conference related to food diseases topic are usually held at the *Liceo*:

these represent another good opportunity to promote PEGASO programme. Finally the vice-headmaster suggested to address PEGASO promotion effort towards specific classes who would actually be studying topics related to the healthy eating and the physical activity promotion within the Science and Physical Education courses.

PEGASO FIT FOR FUTURE, PROJECT survey

In order to evaluate the degree of acceptance a prevention product like PEGASO could have among *Liceo M. G. Agnesi* students a Web survey was conducted posting it on *Liceo* Facebook proprietary page. The number of answers has no statistical relevance as they are just 18 (out of 1200 possible), however some considerations can be done.

A copy of the survey can be found in **Attachment 4**.

All of the interviewed students consider obesity, overweight and all the health complications related to these two diseases as serious problems and almost all of them know people who are actually suffering from them. Speaking with a school teacher she affirmed that especially girls care always more about their diet, favouring salads, fruits and healthy foods to the traditional lunch options proposed by the School bar (consisting in pizza, panzerotti, sandwiches and pasta).

17 students out of 18 interviewed own a Smartphone, so this eases PEGASO App and Serious Game exploitation and decreases the costs to be sustained for the promotional event as a very limited number of Smartphones are going to be purchased to allow PEGASO product trial. And the most of the tested students use Android as Operative System: this is aligned with the choice to realize PEGASO App and Serious Game first for this OS.

13 students out of 18 find useful and motivating the use of a Fitness Tracker in order to translate their physical efforts into numbers with significance: this is a very encouraging condition.

By the way at the same time the bigger obstacle in wearing such a Device would actually be the idea to have on a Technological Device 24/7: this evidence may suggest some promotion on the little degree of invasiveness of PEGASO Wearable Devices.

The motivation to execute PEGASO Programme seems to be effective: 13 out of 18 students say to be keen on Games with rewards. Speaking about these: the most appreciated turn to be the discounted entrance to swimming-pools and fitness centres and this data is coherent with the availability to collaborate showed by MERATE Fitness Village.

The price sensitivity is quite high: the most of the interviewed would acquire PEGASO product just if it was less expensive than €50. This fact has to be taken into consideration when defining the final price.

Most of the students that did the Web-survey are driven to school by their parents, this fact confirms the little scale of Merate reality where the use of cars is still possible and comfortable when compared to a congested city centre.

Most of the students do sports thrice a week and consume until 3 different fruits and vegetables a day: this is a good starting condition to propose PEGASO programme.

6.PEGASO BUSINESS PLAN

As a result of all the previous analysis, the financial statement, that PEGASO start-up will be supposed to handle a year after PEGASO programme launch, is going to be calculated in order to really prove the economical sustainability of the proposed Business Model. Some assumptions have to be made.

1_Target Market: PEGASO programme is supposed to be firstly commercialized in a little scale reality, which Merate is, as the gaming dynamics and the social competitions can take place and be tested easier than in a bigger city. *Liceo Statale M. G. Agnesi*, *Istituto Viganò* and *Fondazione L.Clerici* can therefore represent PEGASO initial target market. It has to be considered that Merate Secondary Schools hub is a reference point for many other small cities: Paderno d'Adda, Robbiate, , Imbersago, Villa D'Adda, Brivio, Calusco d'Adda, Cisano Bergamasco when considering the North-East direction, Casatenovo, Calco, Missaglia, Barzanò when the North-West one, Cernusco Lombardone, Osnago, Lomagna, Ronco Briantino, Bernareggio, Carnate when considering the South side, Verderio, Aicurzio, Mezzago watching the South-East and finally Usmate Velate, Lesmo when considering the South-West.

City	*Population*
Merate	14.920
Robbiate	6.106
Paderno d'Adda	3.927
Imbersago	2.431
Calusco d'Adda	8.358
Villa d'Adda	4.787
Cisano Bergamasco	6.354
Brivio	4.690
Calco	5.254
Santa Maria Hoè	2.220
Barzanò	5.191
Sirtori	2.935
Viganò	2.011

Missaglia	8.779
Casatenovo	12.915
Montevecchia	2.494
Cernusco Lombardone	3.842
Osnago	4.556
Ronco Briantino	3.452
Lomagna	4.935
Verderio	5.750
Cornate d'Adda	10.710
Bernareggio	10.501
Aicurzio	2.067
Sulbiate	4.450
Mezzago	4.163
Carnate	7.348
Usmate-Velate	10.019
Arcore	17.860
Lesmo	8.106
Total	**191.131**

Table 17: Cities and their Population in Merate Area, source Wikipedia

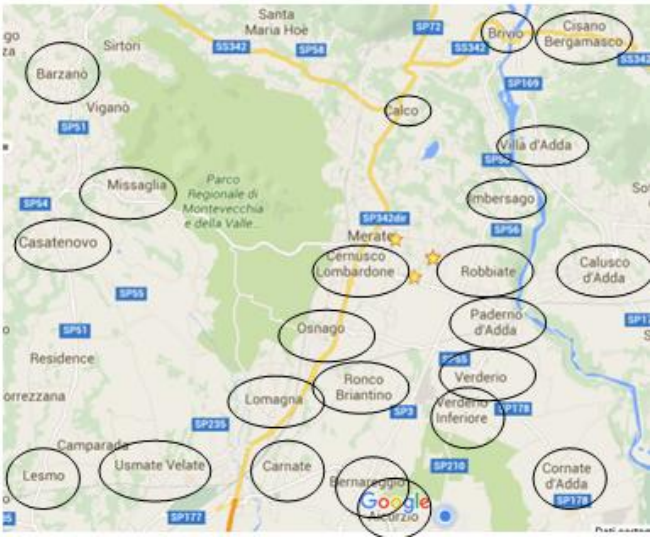


Figure 70: Merate Area Map, source Google Maps

The total population of Merate area is up to: 191.131 inhabitants. This value can be assumed as the *potential market* for PEGASO product. It can be considered that the population is equally distributed and that the average life expectancy is 82, so the 13-17 years old target results composed of: (191.131/82)*5= **11.654 units**. This is the *available market* in Merate Area for the commercialization of PEGASO product. The purchasing power of the family of the teenagers should actually be investigated in order to quantify the really available market. By the way the market which is going to be served will have as a upper bound a size of 11.654 units.

2_Promotional Event: PEGASO product will be launched through a special promotional event lasting 7 weeks. The first two will be necessary to inform of the promotional event itself: flyers will be put in the *Liceo M.G. Agnesi*, *Istituto Viganò*, *Fondazione L. Clerici*, in the shopping mall *Auchan* and in all the other places mostly frequented by the potential PEGASO programme interested. Some promotion actions will also be made on the Secondary Schools Facebook pages and some advertisement spaces are going to be bought on the *Giornale di Merate* and finally up to 10 daily Web-Radio advertisement messages will be launched by *HEJDJ!radio*. The Word of Mouth of the teachers and students involved as PEGASOambassadors will be of primary importance too.

Figure 72: Giornale di Merate logo source Google Image

Figure 71: HEJDJ!radio logo, source Google Image

Promotional event cost:

1000 flyers cost= **€15**

2 weeks Radio campaign (10 spots will be launched during the day) cost= **€60**

Via Carlo Forlanini, 3/C 23807 Merate (Lc)
Mobile +393393027240 info@heydjradio.com

LISTINO PREZZI SPOT PUBBLICITARI

SPONSORIZZAZIONE CONTRIBUTO SPESE	SPOT 10 GIORNALIERI	REALIZZAZIONE SPOT	TOTALE	SCONTO	TOTALE SCONTATO
SPONSORIZZAZIONE MENSILE	60 € x 1 mese = 60 €	60 €	120 €		120 €
SPONSORIZZAZIONE TRIMESTRALE	60 € x 3 mesi = 180 €	30 €	210 €	20%	168 €
SPONSORIZZAZIONE SEMESTRALE	60 € x 6 mesi = 360 €	OMAGGIO	360 €	35%	234 €
SPONSORIZZAZIONE ANNUALE	60 € x 12 mesi = 720 €	OMAGGIO	720 €	50%	360 €

Figure 73: HEYDJ!radio pricing, source HEYDJ!radio website

2 weeks newspaper advertisement cost: the idea is to buy the "piede" of the first page of *Giornale di Merate* on alternating days, it means on Monday and on Wednesday, and so on. €500/daily "piede" * 7days= **€3500**

Figure 74: Giornale di Merate pricing, source dmediagroup website

Then the promotion event could actually begin: it will last one month and will find place in different parts of Merate. The first week just outside *Liceo M.G. Agnesi* gate: the students will be informed of PEGASO programme and will have the chance to try PEGASO Wearables for real. This could happen before the beginning of the lessons or just after their end. The second week PEGASO desk will be placed outside *Fondazione L. Clerici* gate, close to the centre of Merate, with the same purposes and modalities. The third week it will be positioned just outside one of the exit of *Auchan* shopping mall, but at a different time: in the afternoon, when the teenagers are supposed to do the shopping with their parents. Finally the last week it

will be set outside the *Istituto Viganò* gate. As not all the students are supposed to have a Smartphone also some PEGASO App compatible phones will be at disposal.

When? Where?	1st week: *Liceo M.G. Agnesi*	2nd week: *Istituto L. Clerici*	3rd week: *Auchan*	4th week: *Istituto Viganò*
				
Time Scheduling	Before lessons (from 7:45 to 8:15) and after lessons (from 13.00 to 14.00)	Before lessons (from 7:45 to 8:15) and after lessons (from 13.00 to 14.00)	In the afternoon (from 17:00 to 19:00)	Before lessons (from 7:45 to 8:15) and after lessons (from 13.00 to 14.00)
Human Resources needed	½ h of PEGASO desk assembling ½ h of promotion 1h of promotion ½ h of PEGASO desk disassembling Repeated for 6 days -> 30 hours of Human Resources needed	½ h of PEGASO desk assembling ½ h of promotion 1h of promotion ½ h of PEGASO desk disassembling Repeated for 6 days -> 30 hours	½ h of PEGASO desk assembling 2 h of promotion ½ h of PEGASO desk disassembling Repeated for 7 days ->28 hours	½ h of PEGASO desk assembling ½ h of promotion 1h of promotion ½ h of PEGASO desk disassembling Repeated for 7 days -> 30 hours

Table 18: Promotional Event Scheduling

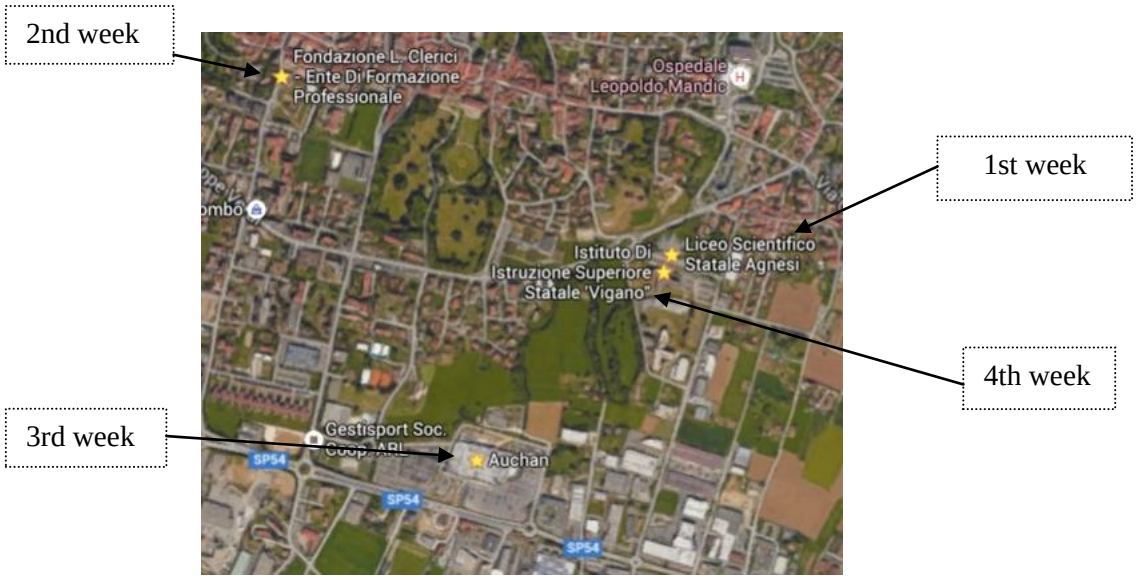


Figure 75: Promotional Event placement, source Google Maps

Figure 76: PEGASO Desk

n° PEGASO Bracelets purchased= 9

n° PEGASO Smart T-Shirts purchased= 9

n° Smart-phones purchased= 1

n° people necessary to stay at the PEGASO desk,
inform about it, supervise the products trial= 3

PEGASO system purchasing costs:
250€[20]/ PEGASO system * 9 PEGASO systems = **2250€**

SMARTPHONE purchase:
100€/ Samsung Galaxy * 1 Samsung Galaxy = **100€**

PERSONNEL cost: 3people * (30+30+28+30)hours * 15€/hour = **5310€**

PEGASO desk cost= **€200**

[20] This was the price asked by CSEM to prototype PEGASO Wearables for the pilot test at Liceo Vittorini, the Italian Secondary School placed in Milano where PEGASO pilot is on go.

Finally the week just after the promotional event, the so called "follow-up" week, will be characterised by other marketing activities to enhance PEGASO promotional and trial efforts. Again *HEYDJ!radio* and *Giornale di Merate* channel will be used.

1 week Radio campaign (10 spots will be launched during the day) cost= **€30**

1 week Newspaper advertisement cost: The same logic of before will be used. €500/daily "piede" * 4days= **€2000**

Promotional Event total cost:

€15 + €60 + €3500 + €2250 + €100 + €5310 + €200 + €30 + 2000 = **€13465**.

The same promotional event will be repeated with similar modalities (2 weeks of preparation, 4 weeks of PEGASO desk put outside strategic places, 1 week of "follow-up") in three other cities of Merate Area. These could be: Casatenovo (going West), Calusco d'Adda (going East) and Bernareggio (going South). The same have a higher population with respect to the average of Merate area: Casatenovo counts 12.915 inhabitants, Calusco d'Adda 8.358 and Bernareggio 10.501. *HEYDJ!radio* could continue the partnership already begun, whereas maybe more local newspapers like *Giornale di Vimercate* and *Eco di Bergamo* could be as well involved in the event promotion.

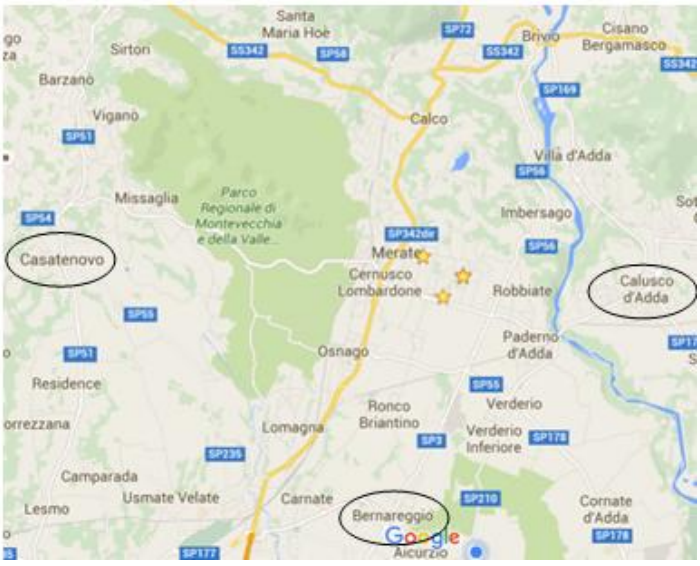


Figure 77: Other Promotional Event Locations, source Google Maps

So the costs to be sustained to execute the 4 promotional events are: €13465*4= **€53.860**.

3_Start-up seat: PEGASO start-up could find her seat in Polihub space as for the closeness of the Incubator to the Politecnico di Milano, PEGASO, FIT FOR FUTURE project coordinator who could continue collaborating during PEGASO exploitation phase, as for the relative closeness of Bovisa, where Polihub is located, to Merate.

The renting of a private office provided of all the necessary facilities (lighting, heating, cleaning, secretary service, Wi-fi connection) and composed of 4 desks is of €1000 monthly.

Polihub office will be occupied from the beginning of the first month: so the renting costs to be sustained will be of **€12000**.

4_Functions and Business Model:

Modality of Execution	***Centralized***	***Outsourced***	***Distributed***	***Self-organized***
Explanation	The activity is conducted by the start-up itself. Usually the **most strategic activities** are kept *in-house*, as they allow the start-up to distinguish from the others. In fact she can perform these activities better than whoever else.	The activity is executed by an external actor. This kind of activities must have **particular features** that enable them to be actually "externalized".	This activity is again carried out by an external actor, but the **central coordination** is still performed by the start-up. These activities are **less isolated** than the previous one and so need to be aligned with the centralized ones.	This activity is directly made by the final users: their execution approach is really " **bottom-up**".
Activities	PEGASO platform management. PEGASO commercial partnership management.	Wearables production (Flextronics) Distribution (Amazon)	R&D activities (CSEM) PEGASO platform updating and maintenance (NEOS)	PEGASO programme execution. PEGASO Data generation.

Table 19: Activity Modality Execution

The core competence of PEGASO start-up will actually be managerial and informatics: on one side many commercial partnerships will have to be created and maintained and so soft and project management skills are in need. On the other the management of PEGASO platform in all its sections has to be performed too: the Health Companion, the Serious Game, the Wearables, the Social Network, the Health Counselling are all front-end services that required to be constantly granted to PEGASO users. As a matter of fact two management

engineers and two informatics engineers could lead PEGASO start-up. These could be recruited from the nearby Politecnico di Milano Management Engineering and Informatics Engineering departments.

PEGASO Wearables production will have to be assigned to an external actor in order to exploit his learning and scale economies: Flextronics could be a possible provider as its long partnership with Fitbit proves its production capability. It will be in charge just of the Wearables production since the sensors development activity will be executed by another actor.

The **cost** to have a **Smart Bracelet** produced has already been calculated: $43,8, so **€41**. (look at the section Cost Structure of the chapter **3.3_PEGASO, FIT FOR FUTURE Business Model proposal).**

Instead the cost of a Smart T-Shirt could be evaluated through a bench-marking analysis: the following are prices of some Smart T-Shirts present on the market.

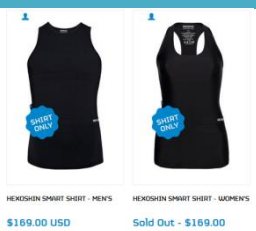
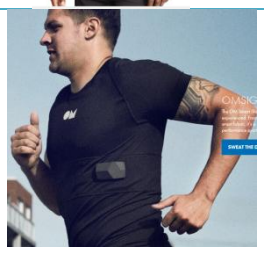
Smart T-Shirt name		*Price*
	**Hexoskin Biometric Shirt**	$169
	**Ralph Lauren Polo Tech Shirt**	$295
	**OMsignal Biometric Smartwear**	$250

Table 20: Smart-T-Shirt Benchmark Analysis

Their average price is of $238 and considering that the common mark-up in the Wearable Device Industry is of 40-60%, the Smart T-Shirt production cost can be of $148,75-$170, so €139,66-€159,61. It will be assumed a **Smart T-Shirt production cost** of **€150**.

The distributive activities will be outsourced to Amazon: a **€40 monthly fee** will have to be recognized and also a commission equal to the 7% of the price of the good sold. As a matter of fact it will only be possible to acquire PEGASO devices through the E-Commerce channel. It will be possible to buy PEGASO product from the beginning of the promotional event.

The R&D activity will continue to be performed by CSEM: the 9 PEGASO system ordered and be manufactured by CSEM itself for the promotional event will be embedded of the updated version of CSEM sensors, whose electronics specification will be passed to Flextronics. So **€2250** (€250/ PEGASO integrated system * 9 PEGASO integrated system) could be considered as a first initial R&D investment.

Finally PEGASO platform administration and maintenance and PEGASO platform infrastructure management are going to be carry out by another PEGASO project partner: Neosperience. The following deal was proposed: **€2500 monthly** for the rent and the use of their Hardware infrastructure to let PEGASO programme working and **€5000 monthly** to have the platform maintained and managed. These services will be initially exploited from the beginning of the promotional event, in order to grant a proper trial of PEGASO products.

Month_1				Month_2				Month_3			
		Preparation to the "promotional event"		*Promotional Event: PEGASO desk*				"Follow-up" week			
		-flyers -newspapers Adv -Radio Adv -WOM	-flyers -newspapers Adv -Radio Adv -WOM	MGAgnesi	Clerici	Auchan	Viganò	-newspapers Adv -Radio Adv -WOM			
Polihub office Renting cost				Polihub office Renting cost				Polihub office Renting cost			
				Infrastructure cost & maintenance and administration of PEGASO platform cost				Infrastructure cost & maintenance and administration of PEGASO platform cost			
				Distribution costs amazon				Distribution costs amazon			

Table 21: Representation of the costs to be sustained during the first three months

5_Price Definition. To fix a reasonable price it has to be remembered that that the average mark-up applied in the Wearables Industry is between 40 and 60% of the productive cost and that PEGASO forecasted productive cost is of €191. Adopting a penetration strategy and considering the scarce willingness to pay showed during the Web Survey a prudential mark-up of 40% is going to be preferred. As a consequence the final price for PEGASO system will be: €191 * 1,4 = €267,4. For Marketing reasons it will rounded off **€269**.

€2250 are the actual R&D expenses: however allocating such a small amount of money on a such an important and possibly source of competitive advantage activity is too risky. As a consequence the amount of money which will be really assigned to R&D activities will be proportional to the one of Fitbit. It was calculated that Fitbit allocated a minimum of 6% of its prior term sales to this expense category: PEGASO start-up will actually do the same, but on the total sale forecasted for the first 11 months of PEGASO product commercialization.

quarter	Q12013	Q22013	Q32013	Q42013	Q12014	Q22014	Q32014	Q42014	Q12015	Q22015
Revenues (thousand $)	33,121	47,169	83,667	107,13	108,815	113,572	152,862	370,184	336,754	400,412
R&D	5,346	6,507	7,766	8,254	9,088	11,809	14,945	18,325	22,426	30,492
%R&D on revenues (Q-1)		20%	16%	10%	8%	11%	13%	12%	6%	9%

Table 22: Fitbit Revenues and R&D expenses from the first term of 2013 till the second term of 2015

The budget already allocated to Marketing and Communication Expenses is of €53.860. Looking at Fitbit strategy, it usually assigns to Sales and Marketing activities at least the 7% of the sales: PEGASO start-up is going to devolve at most 4% of the sales to the Marketing activities alone.

quarter	Q12013	Q22013	Q32013	Q42013	Q12014	Q22014	Q32014	Q42014	Q12015	Q22015
Revenues (thousand $)	33,121	47,169	83,667	107,13	108,815	113,572	152,862	370,184	336,754	400,412
Sales and Marketing	4,217	5,433	6,159	11,038	11,273	13,311	17,539	69,882	43,867	69,69
% Sales and Marketing on revenues (n)	13%	12%	7%	10%	10%	12%	11%	19%	13%	17%

Table 23: Fitbit Revenues and Sales & Marketing expenses from the first term 2013 till the second term 2015

PEGASO Financial Statements.

The available market, composed by all the people who could benefit of a more healthy lifestyle through the use of Wearables and a Serious Game, is assumed now to be theoretically composed by the teenagers in the 12-19 years old range. The age range has been augmented as the youngest are always closer to the technological devices and so a 12 years old child could reasonably play PEGASO Game. On the other hand the older, the 18-19 years old, like playing Video Games and so could as well continue to be interested in trying a new kind of Video Game: as they are supposed to attend the last years of the Secondary School they could still totally exploit the rewards offered by the local partners.

So the *available market* gets to: (191.131 / 82) *8 = **18.647 units**.

Hp for the definition of PEGASO Profit and Loss Account:

1-The market that needs to be served to reach the Break Even point is of 5.450 units: these represent nearly the 30% of the available market, constituted by the 18.647 potential PEGASO recipients in Merate Area. The total sales will be: €269* 5.450= €1.466.050.

2-The R&D expenses supposed to be sustained represent the 6% of the forecasted Sales, following Fitbit strategy. 6%* €1.466.050= €87.963.

3-The Wearables Production unitary cost was calculated to be of €191, so the total Wearables production costs will be of: €191*5.450= €1.040.950.

4-The SW contents generation, updating and management costs that have to be recognized to Neosperience are of €2.500 + €5.000 monthly, so €7.500 * 11month= €82.500 in total.

5-The Marketing and Communication Expenses are of €53.860 as previously explained.

6-The Distributive costs to be recognized to Amazon will be computed in the following way: €40/month + 7%*PEGASO product price* number of PEGASO product sold, so €40/month * 11months + 0.07*€269*5.450= €103.063,5.

7-The four engineers are going to get a gross salary of €1.500 and at the end of the year their *Retirement and other employees long-term benefit provisions* is going to be put aside.

8-The legal costs represent all the expenses necessary to open a new company: registration at Milan Chamber of Commerce, payment of the Chamber Fee, notarial expenses.

9-The Infrastructural Cost consists in the monthly payment of the renting of the office in Polihub. So €1000*12 Months= €12.000.

10-The taxes which have to be paid are the IRAP and the IRES. The IRAP rate amount to 3,9% and has to be computed on the EBT increased by the Personnel and the *Retirement and other employees long-term benefit provisions*: 3,9% * (€6.379,5 +€77.334)=€3.265. Whereas the IRES is about the 30% of the EBT: 30%*€6.379,5= €1.913,85. In total the taxes amount to: €5.178,6.

Profit and Loss Account	
Continuing operations	
Revenues	
PEGASO system sale (Wearables + App)	€ 1.466.050,00
PEGASO generated Data sale	Still not available
Advertisement space on PEGASO ICT platform sale	Still not available
Affiliate Marketing Programme Commissions	Still not available
PREMIUM version of PEGASO App sale	Still not available
R&D expenses	€ 87.963,00
Wearable production cost	€ 1.040.950,00
SW contents generation, updating and management costs	€ 82.500,00
Communication and Marketing costs	€ 53.860,00
Distributive costs	€ 103.063,50
Personnel costs	€ 77.334,00
Legal costs to open a SPA	€ 2.000,00
Infrastructure costs (connection, office renting, general expenses)	€ 12.000,00
EBIT	€ 6.379,50

Finance costs	none
EBT	€ 6.379,50
Taxes	€ 5.178,68
NET EARNING	€ 1.200,82

Table 24: PEGASO Profit and Loss Account

PEGASO start-up can be considered a kind of no-profit organization as no appreciable earnings (they amount to € 1.200) are supposed to be made: this is aligned with the social aim of PEGASO product.

However the first year will be the worst when compared to the following: other revenue sources are in fact supposed to occur as PEGASO customer base will begin to grow.

PEGASO start-up will be a "Public Company": as a matter of fact a minimum Share Capital of €50.000 needs to be collected. Different sponsors can be involved and encouraged in devolving a representative sum to foster the foundation of a Social Impact Start-Up: Politecnico di Milano, Centro Nazionale delle Ricerche, Neosperience, CSEM, Lombardia Informatica among the Italian PEGASO, FIR FOR FUTURE project partners; CONI, FIPAV, FIDAL, FIGC among the Sport Associations; GRANAROLO, YOMO, MELINDA, SANTHAL, DANONE among the Healthy Food Companies. The Share Capital which is going to be collected will be of €60.000, representing the first necessary funding to begin PEGASO entrepreneurial activity.

It could be considered as a mistake not seeing any investments in *Property, Plant and Equipment*, but this fact is totally coherent with the managerial choices which have so far been discussed. PEGASO start-up will make use of Polihub office: so no investments in buildings will be necessary. Neosperience will offer the use of its Hardware Infrastructure to let PEGASO platform work: PEGASO start-up will exploit of this IaaS (Infrastructure as a Service) instead of having a proprietary Web Infrastructure. Finally the four founders are supposed to have their own laptop to carry out all the necessary managerial and informatics activities.

Assets		Liabilities & Equity	
Non current Assets		**Equity**	
Property, Plant and Equipment	-	Share Capital	€ 60.000,00
Capitalized Development costs	-	Net Income of the Year	€ 1.200,82
Goodwill	-	Current Liabilities	-
Deferred Tax Assets	-	Account Payable	€ 260.237,50
Current Assets		**Non Current Liabilities**	
Cash	€ 326.617,00	Retirement and other employee long-term benefit provisions	€ 5.334,00
Total	€ 326.617,00	**Total**	€ 326.772,32

Table 25: PEGASO Assets and Liabilities & Equity

The Total Assets and Total Liabilities differ for €155,32 for question of Excell rounding.

Hp for the definition of the Cash Flow Statement of PEGASO:

1-The revenues are supposed to be equally distributed in the 11 months of commercialization.

2-R&D expenses are supposed to be sustained at the beginning and at half of the year, in order to eventually update PEGASO Wearables.

3-Flextronics, the Wearables provider, is going to be paid with 90 days of delay, so the account payable corresponds to the production of three months. The Production plan is supposed to be level.

4-SW contents generation, updating and management costs have to be paid to Neosperience in the same month.

5-Marketing expenses have also to be paid in the same month to *Giornale di Merate* and *HEYDJ!radio*.

6-Distributive costs as well have to be immediately recognized to Amazon.

7-The personnel costs is going to be paid on time. At the end of the year the *Retirement and other employee long-term benefit provisions* is going to be paid as well. This value was calculated in the following way: total gross salary/ 13,5 -> €72.000/13,5= €5.333,33.

8-The Polihub renting has to be paid on time as well.

*Initial cash of the Month n°1 is equal to the Share Capital.

**Final Cash of the Month n°12 is equal to the Cash value in the Current Assets.

Cash Flow Statement													
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	1
Revenues	0	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	€ 133.277,27	
Legal costs to open a SPA	€ 2.000,00												
R&D expenses	€ 43.981,50						€ 43.981,50						
Wearables production costs				€ 260.237,50			€ 260.237,50			€ 260.237,50			€ 260.237,50
SW contents generation, updating and management costs		€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	€ 7.500,00	
Communication and Marketing costs	€ 3.575,00	€ 7.860,00	€ 2.030,00	€ 3.575,00	€ 7.860,00	€ 2.030,00	€ 3.575,00	€ 7.860,00	€ 2.030,00	€ 3.575,00	€ 7.860,00	€ 2.030,00	
Distributive costs		€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	€ 9.369,41	
Personnel costs	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 6.000,00	€ 11.334,00	
Infrastructure costs (connection, office renting, general expenses)	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	€ 1.000,00	
total monthly costs	€ 56.556,50	€ 31.729,41	€ 25.899,41	€ 287.681,91	€ 31.729,41	€ 25.899,41	€ 331.663,41	€ 31.729,41	€ 25.899,41	€ 287.681,91	€ 31.729,41	€ 31.233,41	€ 260.237,50
monthly revenues - monthly costs	-€ 56.556,50	€ 101.547,86	€ 107.377,86	-€ 154.404,64	€ 101.547,86	€ 107.377,86	-€ 198.386,14	€ 101.547,86	€ 107.377,86	-€ 154.404,64	€ 101.547,86	€ 102.043,86	-€ 260.237,50
Initial cash	€ 60.000,00*	€ 3.443,50	€ 104.991,36	€ 212.369,23	€ 57.964,59	€ 159.512,45	€ 266.890,32	€ 68.504,18	€ 170.052,05	€ 277.429,91	€ 123.025,27	€ 224.573,14	€ 326.617,00
Final cash	€ 3.443,50	€ 104.991,36	€ 212.369,23	€ 57.964,59	€ 159.512,45	€ 266.890,32	€ 68.504,18	€ 170.052,05	€ 277.429,91	€ 123.025,27	€ 224.573,14	€ 326.617,00**	€ 66.379,50

Table 26: Cash- Flow Statemen

Conclusions

The initial aim to prove the Economical Sustainability of a prevention product coming out from PEGASO, FIT FOR FUTURE project has been theoretically reached: PEGASO start-up Net Income turn to be positive, although of modest entity.

In addition other possible revenue sources are expected in the future: a partnership in fieri with Assicurazioni GENERALI is showing the interest of the Insurance Company in the possible acquisition of the Data generated through PEGASO Wearables usage, but this could be considered a real revenue source once PEGASO users will have reached at least the target market dimension. When PEGASO users will have get to a significant number the sale of Advertisement spaces on PEGASO platform could also represent an additional Revenue Source. The commissions obtained through the participation in the Commercial Partners Affiliate Marketing Programme do represent another potential Revenue Streams, however as far as regards Merate case none of the commercial partners in touch with is now using an Affiliate Marketing Programme. A PREMIUM version of PEGASO App could also be prototype in the future and could represent as well another revenue source.

However all these additional revenue streams are still not available: they will acquire relevance once PEGASO customer base grows, so in the growing and maturity phase of the PEGASO product life cycle.

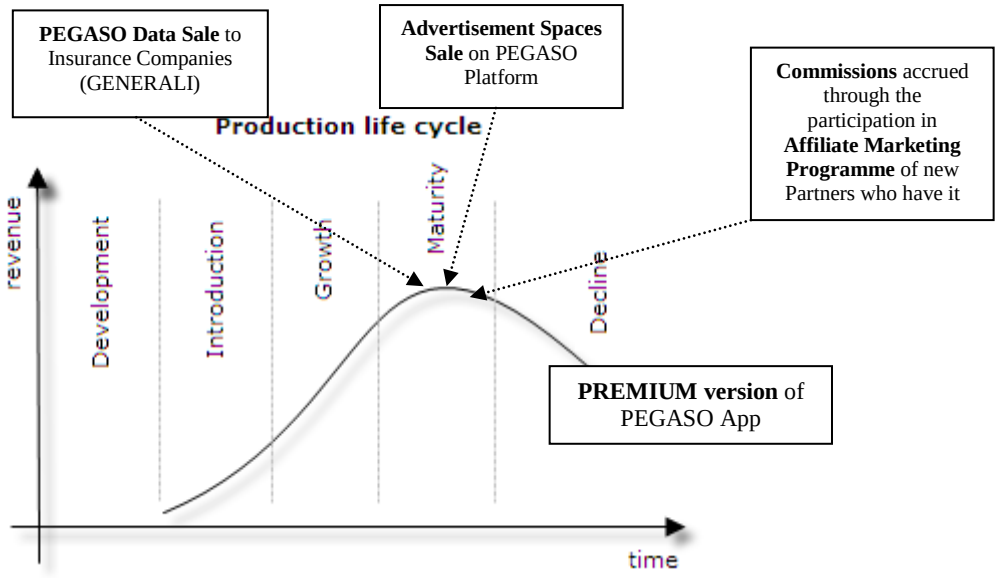


Figure 78: PEGASO Product Life Cycle, source Google Images

The SIB tool could also be exploited, once it was promoted in an adequate way and an actors network was built: it was in fact calculated that the potential saving registered by the Health System of a small scale reality could reach €44.000.

$$n° \, PEGASO \, recipients = 5.450 \, patients$$
$$OBESITY \, prevalence \, among \, Italian \, 6 - 17 \, years \, old = 26{,}9\%$$
$$yearly \, average \, cost \, to \, care \, OBESITY = 300€$$
$$GOAL \, reduction \, in \, obesity \, rate \, after \, a \, year \, of \, PEGASO \, execution = 10\%$$

Costs to be sustained in the AS-IS=

$$[(26{,}9\% \times 5.450 \, students) \times 300€] \times 10\% = 43.981{,}5€$$

n° obese students in the AS-IS=

The degree of innovation of this product and of the related system has turned to be his strength and peculiar feature: the reason why many of the potential partners showed a sincere interest towards it, as in the case of Assicurazioni GENERALI, Merate Fitness Village, Auchan in Merate, *Liceo Statale M.G. Agnesi*. By the way it does also represent its main limitation: to be really performed in the most systematic way, through the involvement of Food Providers, Sport Associations, Health System, many bureaucratic obstacles will have to be passed.

To conclude the potential gains which could be obtained by the different partners are going to be remembered: the Secondary Schools involved could offer their students PEGASO educational programme inserting it within Science or Physical Education Curricular Programme; the Food providers, the Sport Associations, the Shopping Malls involved could enhance their visibility among PEGASO users, also through the Digital advertisement offered by PEGASO platform, and be considered as more socially responsible Service Providers. The Insurance Companies could build an economical advantage using the huge amount of Biometric Data generated through the use of PEGASO Wearables to design specific Insurance Products. The Health Systems could as well benefit from the Data Set created: more accurate analysis and diagnosis could be executed on the Target Population.

Ringraziamenti

Vorrei in primis ricordare oltre che ringraziare il Professore di Ingegneria Biomedica Giorgio Santambrogio, che mi ha offerto questa interessantissima opportunità di tesi, ma che, purtroppo, non potrà apprezzarne i risultati. Giorgio, oltre che professore contraddistinto da una professionalità inusuale per il Sistema Universitario Italiano, mi ha soprattutto dimostrato, nelle seppur limitate occasioni di incontro, una profonda gentilezza e una squisita disponibilità e supporto per il lavoro di tesi che mi accingevo a compiere.

Ringrazio la professoressa di Design Maria Renata Guarnieri, project Manager del Progetto PEGASO, per la flessibilità avuta nei miei confronti (e nel modus operandi e nella modalità di impostazione del lavoro di tesi) e per le varie opportunità di partecipare a meeting e impegni relativi al progetto, che mi ha costantemente offerto.

Ringrazio Giuseppe Andreoni, Professore di Design for Health System, che per primo mi ha parlato di questo interessante progetto: per la sua disponibilità di ascolto e per la sua costante positività.

Ringrazio Marco Mazzola di Neosperience per la pazienza mostrata nell'aiutarmi a definire determinati aspetti operativi della start-up di PEGASO.

Ringrazio Cesare Delaini di Lifegate per l'interesse, l'accoglienza e il supporto offertomi nell'ideare il piano promozionale di lancio per il prodotto PEGASO.

Ringrazio la professoressa Marisa Negretto e la vicepreside Isabella Rossi per il tempo dedicato al progetto PEGASO e ad una sua possibile applicazione al Liceo, in cui le stesse lavorano.

Ringrazio Oscar Pietro Merelli per il supporto datomi nel cercare di concretizzare una partnership con Assicurazioni GENERALI.

Ringrazio i miei genitori che mi hanno sempre sostenuto, ognuno a suo modo, durante questo particolare e talvolta incerto percorso: papà Orazio con i suoi concreti e comprovati consigli di uomo d'affari e mamma Adele con le sue infinite premure e offerte di aiuto.

Ringrazio Filippo che, empaticamente e grazie ad un maggiore senso pratico, mi ha fatto optare per la soluzione migliore in diverse occasioni.

Ringrazio Sara che con la sua serenità e il suo immancabile sorriso mi ha spesso fatto sentire più calma.

Ringrazio mia nonna Carolina che ha sempre creduto in me e nelle mie capacità di raggiungere questo finale traguardo scolastico.

Ringrazio gli amici e compagni di studio Diego Zecchino e Silvia Verderio per il prontissimo aiuto dimostratomi nei diversi momenti di incertezza.

Ringrazio la carissima Kaitlin che si è sempre mostrata molto interessata a seguire gli sviluppi di questo tesi così poco convenzionale, che mi ha messo in comunicazione con svariati professori del *Liceo Statale M.G.Agnesi* e che ha corretto parte del lavoro stesso di tesi.

Ringrazio l'amico Canadese Rami Kamel per le impeccabili correzioni oltreoceano.

Ringrazio Roberto, che si è costantemente interessato, Alessio, con cui ho avuto varie occasioni di confronto e scambio.

Ringrazio la cara amica, compagna di studi e molto altro ancora Cristiana che mi ha sempre sostenuto e si è sempre dimostrata pronta ad aiutarmi.

Ringrazio Veronica, Virginia, Giulia per la loro incondizionata e sincera amicizia.

Ringrazio Ronny, amico e quasi fratello, per essermi sempre stato vicino.

E infine ringrazio Luca: preziosa risorsa, principale revisore e affettuoso sostenitore.

Acronyms explanation

BCFN: Barilla Centre for Food and Nutrition

OECD: Organization for Economic Co-operation and Development

SME: small medium enterprise

PMI: project management institute

HCI: human computer interaction

ECG: ElectroCardioGram

ABI: Allied Business Intelligence

OS: Operating System

API: Application Programming Interface

GA: General Practitioner

PR: Public Relations

Attachments

Attachment 1: PEGASO Partner name, occupation and role

Partner name	*Partner occupation*	*Partner role / Competence Field*
Politecnico di Milano (POLIMI)	Research and Education centre	Project coordinator
Fondazione Politecnico di Milano (FPM)	Bridge between universities, companies and municipalities	Project manager
Consiglio Nazionale delle Ricerche (CNR)	Research centre	Human Factors, Medical, SW Design and Development
Centre Suisse d'Electronique et Microtechnique (CSEM)	Research organization	Sensor Technologies
Universidad de Leida (UdL)	Research and Education centre	Human Factors, Medical
Gruppo SIGLA S.r.l. (SIGLA)	SME	SW Design and Development, Business Organization and Dynamics
HAUTE ECOLE SPECIALISEE DE SUISSE OCCIDENTALE (HES-SO)	University	SW Design and Development, Business Organization and Dynamics, Sensor Technologies
Fundaciò Privada Barcelona Digital – Centre Tecnologic (BDIGITAL)	R&D	Human Factors, SW Design and Development, Media and Marketing, Sensor Technologies, Data Mining and Reasoning
Agencia de Informaciò, Avaluaciò i Qualitat en Salut (AIAQS)	Public body	Medical
Lombardia Informatica SPA	Public Large Company	Medical

(LISPA)		
NEOS Sistemi srl (NEOS)	SME	Human Factors, SW Design and Development, Learning Technologies, Media and Marketing, Business Organization and Dynamics
The University of Nottingham (UNOTT)	Academia	Human Factors, Medical
ROPARDO	SME	SW Design and Development, Data Mining and Reasoning
Coventry University (COVUNI)	Higher Education	SW Design and Development, Learning Technologies, Media and Marketing
LifeGate (LGATE)	SME	Human Factors, Media and Marketing
IMAGINARY S.r.l. (IMA)	SME	Human Factors, SW Design and Development, Learning Technologies, Media and Marketing, Business Organization and Dynamics
Bildungsberatung Till Becker & Co. GmbH (BTB)	SME	Learning Technologies, Business Organization and Dynamics
Lothian Health Board / University of Edinburgh (LOTHIAN)	Public Body	Medical

Attachment 2: Serious Game categories.

Advergames

The use of games for advertising. The approach can include numerous different ways of advertising more or less well-known from other media. You can have product placement, banners in-game or just traffic triggers.

Edutainment

A combination of education and entertainment.

Edumarket Games

When a serious game combines several aspects (such as advergaming and edutainment aspects or persuasive and news aspects), the application is an Edumarket game.

Games-Based Learning or "Game Learning"

These games have defined learning outcomes. Generally they are designed in order to balance the subject matter with the gameplay and the ability of the player to retain and apply said subject matter to the real world.

Newsgames

Journalistic games that report on recent events or deliver an editorial comment.

Simulations or Simulation Games

Games used for the acquisition or exercise of different skills, to teach effective behaviour in the context of simulated conditions or situations. In practice, are widely used simulation driving different vehicles (cars, trains, airplanes), simulation of management of specific industries, and universal business simulation, developing strategic thinking and teaching users the basics of macro-and microeconomics, the basics of business administration.

Persuasive Games

Games used as persuasion technology

Organizational-dynamic games

Teach and reflect the dynamics of organizations

Games for Health

Such as games for psychological therapy, cognitive training, emotional training or physical rehabilitation uses. Technology and mental health issues can use Serious Games to make

therapy accessible to adolescents who would otherwise would not find a psychotherapist approachable.

Exergaming

Games that are used as a form of exercise.

Art Games

Games used to express artistic ideas or art produced through the medium of video games.

Productivity game

Games which reward points for accomplished real-world tasks using to-do lists.

Games with a purpose

Try to solve various tasks that require common sense or human experience in an entertaining setting.

Attachment 3: Crush the Crave strategies to beat the Craving.

• **Have a snack, not a smoke.** When you get a craving, chew some gum or suck on some candy. Keeping your mouth busy without smoking is actually very effective at keeping cravings at bay. If you want to snack on something healthy, why not try carrot or celery sticks?

• **Take up a hobby.** Keeping your hands busy is equally good for helping distract yourself from cravings. Drawing, sculpting, and playing an instrument are all great hobbies you can try.

• **When in doubt, clean.** Cleaning and organizing are two excellent ways to distract yourself. Plus it helps to get that closet, room or car neat and tidy.

• **Get active.** Go for a walk, bike ride, or engage in some other form of exercise, and channel those cravings into physical fitness.

• **Surf the net.** The internet is a great source for distractions. The next time you have a craving, play a quick game online or watch a funny YouTube video.

Attachment 4: PEGASO, FIT FOR FUTURE project Web-survey

PEGASO, FIT FOR FUTURE project

Ciao a tutti ragazzi e ragazze! Vorrei proporvi un nuovo modo per prendervi cura di voi... vediamo come lo trovate!

*Campo obbligatorio

OBESITA' e SOVRAPPESO: quanto gravi per voi sono queste malattie? *

Sapevate che 1 persona su 2 al mondo soffre oggi di una di queste due malattie? Sapevate che essere obesi oltre alle difficoltà che tutti intuiscono (motorie, respiratorie e sociali) aumenta di molto la probabilità di avere malattie gravi come il diabete- e quindi una vita di iniezioni di insulina, di rinunce a cibi gustosi e dolci-, l'ipertensione- che porta all'estremo ad avere infarti- e anche perfino tumori? Quanto vi spaventa tutto questo?

	1	2	3	4	
Per niente: questi sono problemi "da grande"	○	○	○	○	molto: queste malattie possono venire ad ogni età e peggiorare di molto la qualità della tua vita

OBESITA' e SOVRAPPESO: quanto gravi per voi sono queste malattie? *

Quante persone obese o in sovrappeso conoscete?

SMARTPHONE *

Avete uno Smartphone?

- ○ Sì
- ○ No

SMARTPHONE *

Qual'è il suo sistema operativo?

- ◯ iOS
- ◯ Android
- ◯ Windows Mobile
- ◯ Altro: [ ]

PEGASO, FIT FOR FUTURE project: programma di prevenzione all'obesità e al sovrappeso. *

Una strategia per combattere l'insorgere di queste malattie è: fare TANTO MOVIMENTO. Quanto vi piacerebbe indossare un Braccialetto Intelligente che vi dice quanti passi fate, quante calorie bruciate normalmente ? E una Maglietta Intelligente, da indossare nei momenti di intensa attività sportiva, che vi misura le pulsazioni e la vostra capacità respiratoria?

	1	2	3	4	
poco: non mi interessa e mi farebbe sentire diverso dagli altri che non li indossano	◯	◯	◯	◯	molto: trovo utile tradurre i miei sforzi in numeri con significato

Esempio di Braccialetto Intelligente

Maglietta Intelligente

Bracialetto Intelligente e Maglietta Intelligente *

Che cosa vi bloccherebbe nell' indossare e usare questi dispositivi?

- ◯ mi farebbero sentire "osservato" e "diverso" dagli altri
- ◯ non mi piacerebbe indossare un dispositivo tecnologico 24h su 24
- ◯ non mi piacciono esteticamente
- ◯ li trovo inutili
- ◯ Altro: [ ]

PEGASO SERIOUS GAME *

Va bene che "prevenire è meglio che curare", ma facciamolo divertendoci! PEGASO, FIT FOR FUTURE prevede anche un Gioco, scaricabile sul proprio Smartphone. Questo gioco consiste nel sopravvivere su di un pianeta appena colpito da un evento catastrofico. Come? Portando a termine determinate missioni all'interno e all'esterno della realtà virtuale (come compiere un determinato numero di passi in un arco di tempo fissato) e in base alle proprie scelte alimentari (per esempio: mangiando una banana si ottengono 1000 punti, se invece si sceglie uno snack se ne ottengono solo 200). Quanto vi piacerebbe giocarci se sapeste che in base alle vostre azioni e scelte (interne ed esterne al gioco) potreste vincere anche dei premi esterni al gioco? Si tratterebbe di sconti in Bar, Punti Ristoro, Palestre, Piscine.

	1	2	3	4	
per niente: non mi piacciono i VideoGame e non mi interessano i premi in palio	◯	◯	◯	◯	molto: adoro i VideoGame/mi attirano molto i premi

PEGASO SERIOUS GAME *

Quali premi vi stimolerebbe di più? Mettete in ordine decrescente le seguenti scelte:1) sconto su "snack sano" (spuntini e merende 'light' e sane), 2) sconto su "pasto sano" (come quello che vi cucinerebbe la mamma) ,3) sconto su ingresso/corso in palestra, 4) sconto su ingresso/corso in piscina.

PEGASO, FIT FOR FUTURE associato ai crediti scolastici *

Se l'esecuzione completa e corretta del programma PEGASO (che prevedrebbe di indossare i dispositivi 24h su 24, raggiungere gli obiettivi proposti dal gioco tutti i giorni) portasse ad accumulare dei crediti scolastici (massimo 2 all'anno), quanti lo acquisterebbero? Nel prezzo è compreso l'acquisto del braccialetto e maglietta intelligenti.

- ◯ sì se il prezzo fosse inferiore ai 50€
- ◯ sì se il prezzo fosse inferiore ai 100€
- ◯ no non penso che i miei genitori mi farebbero spendere così i miei soldi
- ◯ no non sarei comunque interessato ad un programma del genere

VEDIAMO QUANTO SIETE GIA' PEGASIANI... *

STILE DI VITA: come vi recate a scuola?

- ◯ col pullman
- ◯ in macchina
- ◯ in motorino
- ◯ in bici
- ◯ a piedi
- ◯ Altro:

VEDIAMO QUANTO SIETE GIA' PEGASIANI... *

STILE DI VITA: quanto siete sportivi? Quanti giorni a settimana fate sport?

- ◯ nessun giorno
- ◯ 1 giorno
- ◯ 2 giorni
- ◯ 3 giorni
- ◯ 4 giorni e più

VEDIAMO QUANTO SIETE GIA' PEGASIANI... *

STILE DI VITA: quanta frutta e verdura mangiate complessivamente ogni giorno?

- ◯ 0 (frutta/verdura)
- ◯ 1 (frutto/verdura)
- ◯ 2 (frutta/verdura)
- ◯ 3 (frutta/verdura)
- ◯ 4 (frutta/verdura)
- ◯ 5 (frutta/verdura)

VEDIAMO QUANTO SIETE GIA' PEGASIANI...

Se desiderate avere una risposta, lasciateci il vostro indirizzo mail e sarete presto informati sul vostro attuale stato (PEGASIANO: il programma PEGASO è in linea con il tuo stile di vita/TARGET: il programma PEGASO fa giusto al caso tuo!/ ACERBO: il tuo stile di vita è molto lontano da quello che PEGASO potrebbe arrivare a farti assumere, mettiamoci al lavoro!) con cui iniziare il programma PEGASO. In ogni caso se questo questionario vi ha incuriositi, scoprite di più circa il progetto PEGASO, FIT FOR FUTURE qui www.pegasof4f.eu

Invia

100%: completato.

Non inviare mai le password tramite Moduli Google.

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