Research Article

# Discussing an Economic Perspective for MAESTRO, an Assessment Platform for Ambient Assisted Living Products

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**Abstract**

MAESTRO is an Ambient Assisting Living (AAL) research and innovation project whose objective is to build a viable quality assurance service platform of the same name. This paper examines the process of building an effective and sustainable business model and business plan for MAESTRO to address the current and future economic context. The MAESTRO project's aim is to develop an on-line platform that can create and showcase 'confidence, trust and reliability' in the emerging marketplace for monitored and self-monitored devices, systems and services that promote health and wellbeing for older people.  With the pace and quantity of new products, services and technologies emerging within the AAL marketplace, it is difficult to source reliable and trustworthy product and service quality information that can underpin selection and procurement decision making. The MAESTRO platform is being developed to address this identified gap and market weakness, and it is being co-designed with solution providers, service commissioners and end users across the value chain, within a set of pilot projects in 4 European territories.

**Keywords**: Ambient Assisted Living (AAL), Service Platform, Self-monitored devices, Economic model

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## Introduction

Nowadays, there is a big quantity of new products, services and technologies emerging within the Ambient Assisted Living domain, see the works of Aggoune-Mtalaa et al., (2014) and Aggoune-Mtalaa and Aggoune (2014). However the clues and control references for adequate orientation of the consumer are lacking and the result is a media-supported image of a fantastic potential for follow-up of one's activities and even some vital parameters, but with often no verified nor legitimised and verified less certified criteria (there are exceptions of course), regarding such key dimensions as performance, reliability, user-friendliness, acceptability, potential for delivering medically ascertained data, privacy issues, etc, see the papers of Park et al. (2017) and Mainetti et al. (2016). This confusing and probably in many cases misleading landscape is problematic for the elderly, often non fully digitally literate and not always in the capacity to know, understand and distinguish the key elements of the underlying promises associated with these technologies. There is therefore at the same time a claim to give access to truly helpful devices for well-being and health-related monitoring capabilities, but most of the time as an emerging market not accompanied by the kind of references and metrics which could establish the basis for an effective user-centered affordance of these new means, see the work of Norgall and Wichert (2013) and the one of Knegel and Auinger (2015).

The aim of MAESTRO project is therefore to deliver a reference framework for a commercially viable platform in the domain of monitored devices to promote health and wellbeing for older people. In the frame of the European Ambient Assisted Living (AAL) programme, MAESTRO project partners who are either associations helping seniors and their caregivers, enterprises or research and academic institutions are joining their efforts to develop an ICT platform which will address the gaps in the market identified through the consortium research. The final look and feel, functionality and purpose of the MAESTRO platform will be informed by the user requirement interviews, focus groups and particularly by the pilots being conducted in Switzerland, Ireland, Luxembourg and Italy during the project. Based on the analysis of initial programmatic goal, constraint and requirement data, the consortium decided on two inter-dependent and sequential 'go-to-market' value propositions for the MAESTRO platform. It will form as two overarching services into two complimentary 'spaces', a developmental and formal assessment process into the 'professional space' and a curated informal marketplace for the 'consumer space'. This work is presented as follows: the next section is dedicated to strategic considerations. Then the framework dimension and value proposition are presented. The market landscape is described in the next section. The strategic options are then discussed followed by the consideration for preferred scenarios and the options that have to be analyzed to fine tune the go to market strategy. The paper ends with a summary of the scenario analysis conducted so far.

## Strategic Considerations

The AAL market is a relatively new one, see the work of Maciaszek et al. (2017), and the MAESTRO platform will be an early development in this space. There are therefore many unknowns at this stage in the process but some of the key strategic questions need to be answered if the consortium wants to reach a successful commercialization of the platform.

Probably the starting question will be what do we see as our core target market - where are the best opportunities for MAESTRO? Is it focused on the smart homes segment, the AAL device market, eHealth? It may be better to develop a sense of a specific market segment where we feel there is a good chance for early success - with a view to

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moving into differing segments later in the enterprises life-cycle.

What is the value proposition? Is it to build trust and confidence for the consumer in choosing AAL products and services? Is it a developmental process or is it both? At this stage of the process we can see that MAESTRO could be an interdependent platform where a MAESTRO development process develops products for the MAESTRO marketplace registry. This hypothesis requires further detailed analysis. Understanding the value proposition is fundamental and needs careful consideration if MAESTRO has to be commercially successful.

Who are MAESTRO customers i.e. who will use MAESTRO services? Is it buyers of the devices and/or services? Or sellers of systems? Or companies developing services and products? Understanding the customer profile and their motivations is crucial but this question will obviously be shaped depending on the value proposition.

What are the key resources or assets? Is it a hosting platform, an online marketplace, a quality benchmarking site or a process which enables the exchange of intelligence and expertise? This will again depend on the agreed value proposition. This will also have a knock-on effect on how the enterprise will generate revenues; is it through membership fees, transaction fees, hosting or advertising revenue?

Above all, when conducting detailed marketing analysis for the strategic considerations noted above, it is vital that the goal is to come up with a value proposition that has a clear point of differentiation or a Unique Selling Proposition (USP) which is easily communicated in order to support the successful launch of MAESTRO. The early stage of market development needs also to be taken into account and should shape a 5-year plan of how the platform could be launched, supported and developed in its early life-cycle.

## Framework Dimensions and Value Proposition

There are three key variables when we look at framing the MAESTRO go to market scenarios. These are:

- Those who are selling monitored products or services - push companies.

- Those who are buying monitored products and services - pull organisations.

- Market maturity and readiness - where along the technology and market readiness spectrum does the product/service/system sit?

These variables can be further broken down to their component characteristics.

## Those Selling Monitored Products or Services (Push Companies)

We can analyse the sellers of monitored systems and services according to the complexity of the system they are selling - at one end of the axis we have simple or standalone systems e.g. smartwatch and blood pressure monitor, moving on to more complex scenarios e.g. smart homes through to fully integrated monitored systems at the opposite end of the axis, see Fig 1.

Each of these types of seller (Push Company) will have specific requirements in order to get to market which will help to define the MAESTRO value proposition from simple benchmarking or marketplace placement through to professional sales consultation and systems integration design.

In terms of market segmentation - sellers (push companies) will also broadly fit into differing market segments i.e. for simple systems it will more than likely be a mass market, consumer segment but for more complex integrated solutions it will more than likely be a smaller pool of potential

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customers however these customers will be higher in value.
Those buying monitored products or services (pull organisations)

Similarly we can analyse those buyers of monitored systems and services against the type of buyer/level of expertise required in the buying function. On one end of the axis we have the end user i.e. older person, family member or caregiver buying the system. This moves up the axis to professionals buying or advising a series of systems for different end users e.g. brokers through to the procurement manager of an organisation (either public or private) e.g. the health service at the other end of the axis.

Each type of buyer (pull organisation) will have specific requirements which will again help to define the value proposition. In a simple product/system/service the value proposition could be a trusted presentation of options from a benchmarking portal all the way through to a co-design function to allow for tailored services/devices and support systems.

In terms of market sizing, we can again look at the differing market segmentation - buyers (pull organisations) will also broadly fit into differing market segments i.e. for simple systems it will more than likely be a mass

market, consumer segment but for more complex, integrated solutions it will more than likely be a smaller pool of potential buyers who will be higher in value.

**Market and Technology Readiness**

One of the key variables in this framework in terms of defining where both the sellers and buyers are within the market is the technology and market readiness of the products, services and systems.

Overlaying technology readiness in terms of whether the products and services are new and emerging or whether they have been launched and possibly nearing maturity will offer another lens to determine what go to market scenarios are best to launch with. For sellers (push companies), there is a massive difference in their potential needs between developing new products to selling mature products and services in this space. For buyers (pull organisations), there is also a difference in their requirements based on the technology/market readiness primarily in terms of the guidance needed in purchasing.

It will be critical when choosing a winning go to market scenario that we fully map these variables to give an overview of what combination(s) offers the biggest commercial opportunity.
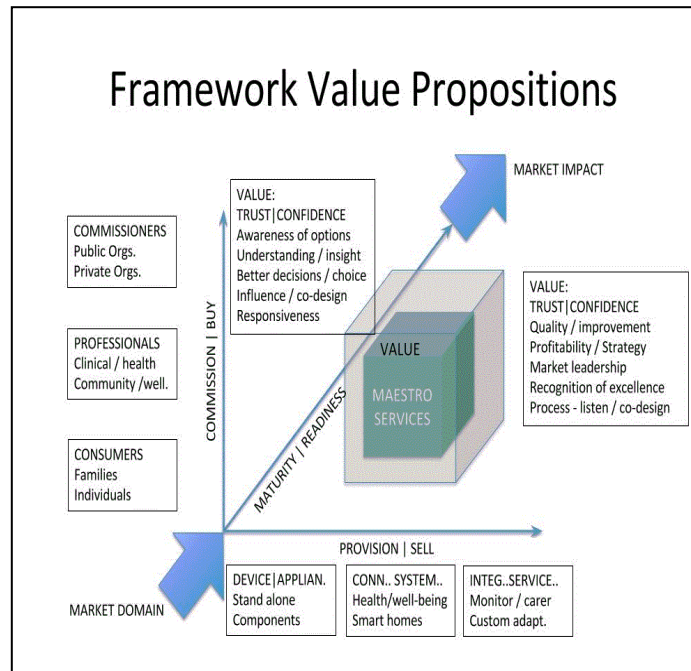
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**Fig. 1: Framework dimensions**

## Market landscape

### *Competitive Environment*

There are many online sites offering information and comparisons on a range of smart monitored devices for instance just for fall detectors there is a wide selection of websites offering advice and guidance e.g. www.telecare.ie, www.assistireland.ie, www.medicalalertadvice.com, www.livingmadeeasy.org.uk. For cognitive support www.unforgettable.org and www.alzproducts.com are just two examples. For smart homes there is again many websites offering advice e.g www.pcmags.com, www.cnet.com, www.digitalhomes.ie, www.toptenreview/best home automation service 2017. There is also some consultancy styled websites for more complex systems e.g. www.medtronic.com and www.nhsbenchmarking.nhs.uk.

Even at this early stage, it is both a complex and confusing arena for caregivers and it is quite a competitive arena in which to launch a platform. A strong understanding of the target market, gaps in that market, value proposition and the USPs are all going to be critical when launching MAESTRO.

### *Gaps and Opportunities*

Interviews with both push companies and pull organisations across Ireland, Switzerland, Luxembourg and Italy have all pointed several gaps and opportunities within this environment namely the need for guidance - both for push companies in developing their products and services and for pull organisations in procuring or advising the right solutions for the older people in their care. If we are to start to refine some of the possibilities that MAESTRO could provide commercially, investigating the gaps as perceived by end users will provide very valuable insight. The gaps identified by care

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providers (pull organisations) thus far are as follows:

- **Trust** - there's a lack of universally understood accreditation, standards or endorsements in websites offering monitored systems, products and services.
- **Online advice** i.e. benchmarking or marketplace with an initial assessment by a professional e.g. occupational therapist, which leads to a presentation of two/three options and their websites (This applies to professional 'pull' organisations as well as to end users).
- **Citizen's advice** element to the site - whereby you can have a tracker to only get options and you could receive financial assistance in procuring.
- **Links to global research** for pull organisations along with **links to feedback** from other users for families or end users in the area you are looking at e.g fall prevention.

Gaps identified by push companies looking at developing AAL products and services include:

- **Access to market research** reports initially e.g. specific Gartner styled reports to understand what the market potential is for their companies.
- **Networking** - access to other organisations who could help in the development cycle - particularly those in other jurisdictions.
- **Living Lab** - Access to end users for testing and evaluation
- **Advice on legal and ethical** issues particularly on data-sharing
- **Product monitoring and improvement**, or feedback during early post-launch phase.
- **A trusted route to market** - to give them a competitive edge.

**Market structure and size**

*Global market size in dollars*

The AAL market is a large and growing global market which is projected to be worth in the region of $60.14 billion by 2020 (this is split into $56.18 billion for smart homes and $3.96 billion for AAL products, systems and services). This represents a growth of 45% and 36% respectively in the five years from 2015, see Maclaszek (2016).

Though much of the growth in this area is anticipated to come from the US, particularly in the early adopter segment, Europe's ageing populations give rise to sizeable opportunities in this arena. Many technology companies who have developed products, services and applications in other arenas e.g. gaming or fitness are looking at the possibilities offered by an emerging health and wellness enhancement market to support a global ageing population. There is massive potential to both target individuals and the national health systems, private healthcare and health insurance companies who are supporting them.

**Stakeholder analysis**

We have already broken the AAL market from a MAESTRO perspective into both developers (push companies) and companies or individuals procuring AAL products and systems (pull organisations) who would find an information sharing site useful.
Using the detailed feedback from the field research carried out by the consortium, we can start to look at some of the characteristics of the stakeholders in this market.

a) **End users and caregiving 'pull' organisations:**

Today, older end users have a tendency to be cautious in embracing technology, this however will change as the penetration of technology increases; it is worth noting that the penetration of smartphones is estimated to increase to 70% of the global population

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by 2020 as shown in Marketsandmarkets.com (2016).

Currently end users receive guidance from professionals in the area of wellness or health supports (particularly those with a technological aspect) or family who will also seek some assurance from a trusted source before choosing wellness or health supports. A simple benchmarking or marketplace site in this arena is not enough for them - they need guidance in making decisions.

Brokers or professional care-giving organisations see the value that technology offers in supporting older people, especially where there is a lack of government, community or family support - which is often the case. However, in our field research the overarching theme of risk came up. As a broker or professional caregiver they will not advise or recommend something they are not 100% sure of. Also, they need to know if the options are financially feasible i.e. the person can afford them.

Further detailed analysis of the care giving organisations and the end user profile will be required for the business case.

### b) Developers or 'push' organizations

The analysis of stakeholders in the domain of developer or push company is complex and will depend on the type of product or service they are developing and the markets they wish to access. Some of the characteristics will be common to all developers however. These include the need to access a network of expertise and most importantly access to end users in testing their solutions. All developers wish to utilise a route to market which gives them a competitive advantage. Ultimately what developers need is the ability to plug a gap in the market with their solution, delivered in a manner which meets their target customers' needs. Our stakeholder analysis needs further development throughout the project in order to complete the business case.

### Strategic options

The market framework described in the preceding section which overlays the key variables of product complexity against market and technology readiness led us to come up with four market scenarios or strategic options for further investigation:

- A development process for new technology to support mass market products and services.
- An online curated/benchmarked marketplace for mass market product and services which will be purchased in a relatively simple transaction.
- A development process for new technology to support niche, high end and more complex products and services.
- An online consultative marketplace for niche high end and potentially more complex integrated systems, which require complex purchasing capability and sales support.

We have added a further layer to this model, shaped by the gaps in the market as identified by the detailed field research across the consortium. This layer addresses the expressed need for guidance and trust by both push companies and pull organisations.

The strategic options which we are now considering are built on those listed above and can be viewed as an interdependent, sequential platform which meets the needs of push companies both developing and selling the right, trusted products and services and pull organisations and end users who want to procure the right, trusted services and products.

This will be described further as MAESTRO development process which feeds the MAESTRO online registry.

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### Mass Market - Development process and curated marketplace registry

The characteristics of the mass market in this context are that it is driven by the consumer i.e. business to consumer sales [B2C] with a high volume of lower value units.

**Mass Market early technology or early market scenario**-emphasis on development (consultation, feedback forums, off the shelf research, advice on commercial partnerships, standards etc.). This scenario, as shown in Fig 2. focuses on push companies offering them

access to a range of development and testing tools for mass market devices or services.

**Mass Market mature technology or early market scenario**-emphasis on availability (impartial curation/advice, benchmarking, branding). This scenario focuses on both the push companies and pull organisations, offering push companies a route to market and offering pull organisations or end users an impartial guide (curated comparative or benchmarking) platform where they can feedback user experiences.
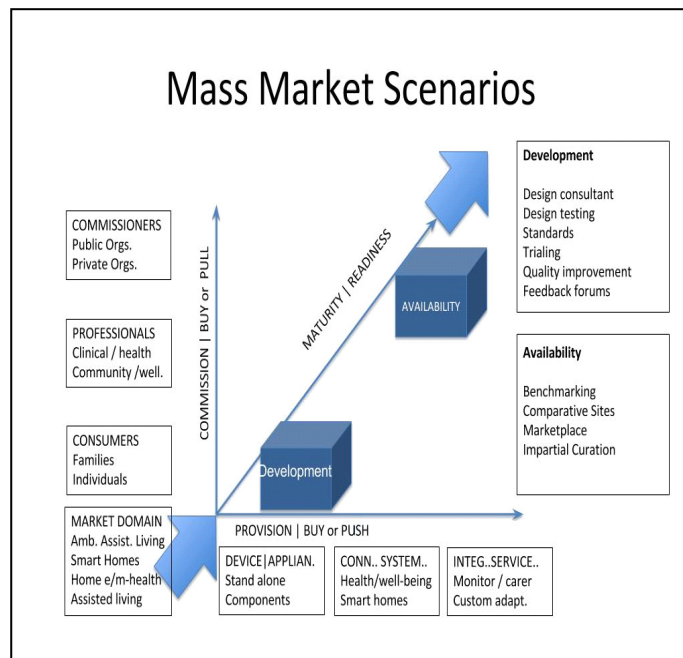


**Fig. 2: Mass market scenarios**

### Niche market. Development process and consultative online sales channel

The niche market characteristics in this context are more business to business (B2B) in nature, developing and selling high value, complex solutions in lower volumes.

**Niche high value, early technology or market scenario** -emphasis on development

(co-design, collaboration, consultation, integrated design and testing). This scenario, illustrated in Fig 3. focuses on push companies as they could use this platform to help develop their complex products and services by engaging expert pan European consultants to aid in design, interoperability, standards etc. Pull organisations may be interested in joining this type of forum to receive information/research analysis and to

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potentially participate in conferences, testing/trials.

**Niche high value mature technology or market scenario** - emphasis on market availability (complex consultative sales and procurement). This scenario focuses on both

push companies and pull organisations as it facilitates a complex sales/purchasing transaction and could offer a range of consultative integration/training services to both.
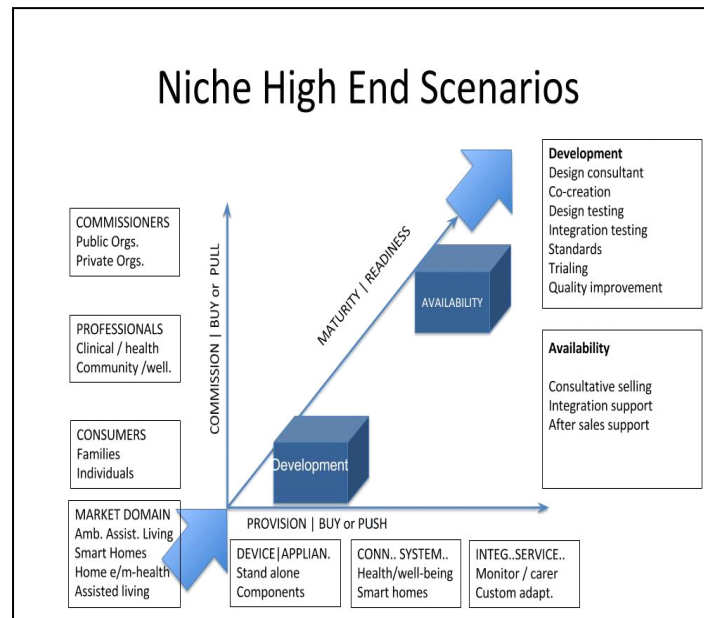


**Fig. 3: Niche High End Scenarios**

### *The MAESTRO Development and Formal Assessment Process (B2B)*

The model highlighted above for both mass market and niche or high end developments can be further refined by inserting the need to build trust, confidence and reliability in both the mass market and niche product offerings which can be clearly demonstrated to consumers in the attached online registry.

This forum centres on the MAESTRO service delivery platform which is an eco-system for which push companies pay a membership to access. The platform will allow companies to access a network of companies which will help them to develop their products, systems and services to a recognised standard. These companies will encompass pull organisations,

third party in various areas of expertise along with complementary companies. The platform will most importantly offer access to end users for testing and evaluation and refinement. The output will be a reliable, trusted product/service which has been tested with end users to deliver a truly useful and competitively superior offering to the customer.

The overview of the generic MAESTRO development and assessment process is set within the process model highlighted in Fig.4.
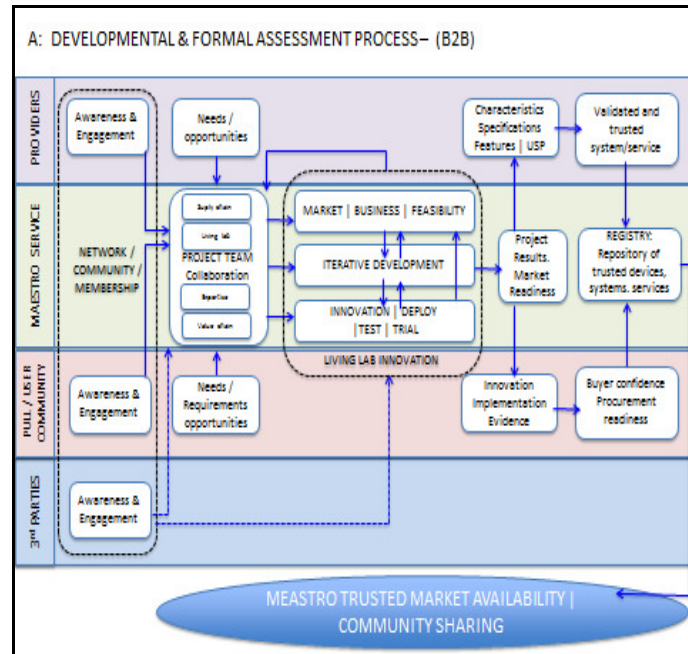
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**Fig. 4: Development and formal assessment process**

***The MAESTRO marketplace and informal assessment process (B2C)***

The marketplace model as described earlier for both mass market and niche or high end products and services can also be refined based on the gaps or needs that our consortium research has outlined.

The MAESTRO marketplace centres on trust, confidence and guidance. This is achieved in the online registry's front end configuration. The insertion of both a search by condition which would prompt an online assessment questionnaire (which could be developed by healthcare professionals e.g physiotherapists) or a search by monitored system which would again prompt an online assessment questionnaire (again developed by a healthcare professional) was deemed to be very valuable and would install a sense of confidence.

Once completed, the prompt would be to either seek further assessment from a healthcare professional e.g. your doctor (if you fall into a risk category) or else you would be offered a selection of MAESTRO developed or tested products and services - this would satisfy the requirements for a trusted source of product/service.

Further online tools such as access to brokers ('broker' is an emerging role which acts as a gateway to recommending and finding AAL technologies that meet a client's needs) in the area you have expressed an interest e.g. online dementia support forums, information on financial guidance to enable the person to access products and services along with an on-line feedback facility would all offer significant guidance, trust and therefore easily communicable USPs in the market.
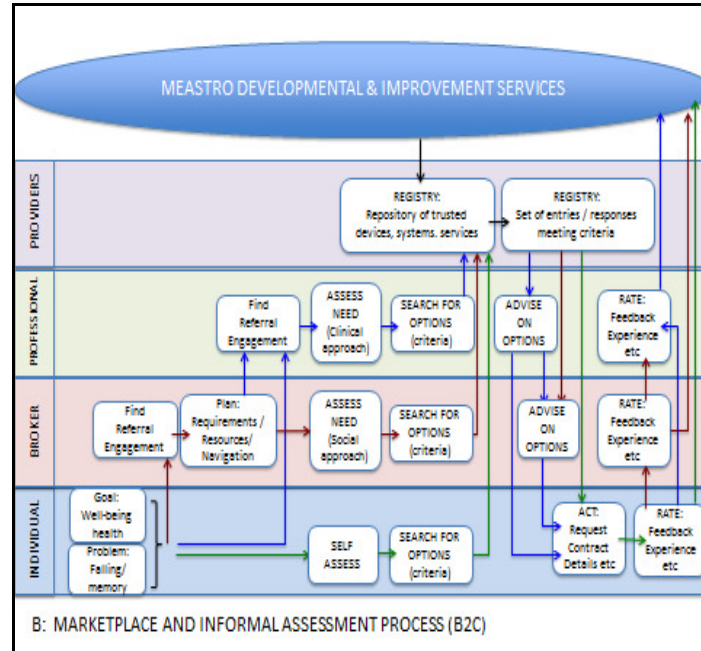
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**Fig. 5: Marketplace and informal assessment process**

To fully evaluate this MAESTRO developmental and formal assessment process and associated marketplace and informal assessment process, we will separate them into their individual categories (mass market development, mass market maturity, high end development and high end maturity) and analyse each separately around opportunities, market entry strategy, development and potential revenue models to be further fully analysed.

**Consideration for preferred scenarios**

*Consortium Readiness to approach market*

One of the key considerations in deciding which scenario or scenarios is preferred is to see how these scenarios could be brought to market. Is the consortium in a position to launch either or both of the scenarios outlined in this work? Some of the detailed

considerations can be investigated in the following sections.

*Capacity*

What resources are needed to support the launch and to maintain and grow the MAESTRO enterprise? The general organisational needs of the enterprise i.e. administrative staff, sales/marketing and commercial or accounting functions will need to be in place along with software developers and engineers.

The USP of the MAESTRO developmental and formal assessment process is access to a network of relevant, cutting edge companies and consultants and expertise in this field. This could, for the most part, be outsourced but would require a central function to maintain and grow this eco-system. The USP of the MAESTRO marketplace and informal assessment process would be the assessment

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tool, potentially access to real healthcare or wellness professionals along with a database of services, products and special interest forums. These functions could again be outsourced but would require management within the MAESTRO enterprise. The capacity required to launch and support MAESTRO should be viewed in a 1-5 year plan as the model will need to be scalable.

### Willingness to invest in enterprise

Are there any partners within the consortium who would be in a position to invest in the enterprise?  Can the partners identify other commercial entities that may be willing to invest in the MAESTRO platform either as a Joint Venture or as a separate entity?

### Market readiness

There is no doubt that the AAL market, particularly the smart homes segment, represents huge growth opportunities for the companies developing products, systems and services in this space. This is a new market and as such exhibits all the characteristics of new market i.e. early adopter leads, niche player proliferation and confusion in the mass market.  Some of the opportunities however lie in the fact that this is an early market environment as developers see huge potential but need guidance, likewise, the companies procuring AAL devices need a lot of support in their decision making. Therefore, whilst the market is in its infancy, it represents the most potential for MAESTRO.

The suggested go to market scenario of a MAESTRO developmental process which feeds a MAESTRO marketplace would fit with the general market development or readiness as the marketplace or registry, by its nature, would come later in the life-cycle of the enterprise.

### Costs

A detailed analysis of potential costs associated with launching both or either go to market scenarios identified in this document will be provided in the business plan. Costs will broadly encompass internal organisational costs, third party expertise fees, advertising, and access to up to the minute medical or wellness assessment information along with on-going customer care costs.

**Go to Market Strategy**

In order to fine tune the go to market strategy, the MAESTRO consortium will need to address the critical considerations detailed in the table below.  This can only be finalised following the feedback from the pilot phase of the project.

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| Considerations | Options |
|---|---|
| Commercialisation vehicle | Consortium<br><br>Lead partner<br><br>New Start-up<br><br>Joint Venture<br><br>Other |
| Business Model | What<br><br>Development platform<br><br>Benchmarking site<br><br>Marketplace |
|  | To whom:<br><br>- Developers<br>- Procurement officers<br>- Consumers<br>- Caregiving organisations |
|  | Money Flows: |
|  | Pricing Models:<br><br>- Subscriptions<br>- Transactional Fees<br>- Hosting Fees<br>- Advertising<br>- Fellowship fees<br>- Consultant fees |
|  | Activities:<br><br>- Core Activities<br>- Outsourced activities |
| Go to market Strategy | Route to market<br><br>- Direct<br>- Joint Venture<br>- Other |
|  | Geography<br><br>- Territories |

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**Summary**

Detailed field research has been undertaken by the consortium across Ireland, Switzerland, Luxembourg and Italy during months 1 - 18 of the project with both push companies and pull organisations. This research supports the project's overarching hypothesis, see Ouedrago et al. (2017); that there is a requirement for a collaborative ICT platform which would act as a central point for both the development of, and access to, AAL products and services to support wellness and wellbeing for older people.

This research has further refined the thinking on how this platform could look and what functions it could usefully and, most importantly, commercially provide in the AAL market, see Coan et al. (2017).

Given the overwhelming need for guidance, trust, reliability and confidence in this area, we can see two value propositions emerging at this stage of the project:

- A central MAESTRO developmental assessment process which brings together developers, users/caregiving organisations along with third party expertise to develop services, systems and products with a level of accreditation or endorsement.

- These 'MAESTRO' developed or tested products and services could then populate a marketplace, which would have an element of online assessment and guidance for both end users and professional care giving organisations or brokers.

Further refinement of this scenario analysis will come from the additional detailed research currently being undertaken in the pilot phase of the project.

**Conclusion**

The global trend towards ageing populations, coupled with technological advancements in monitored wellness products, all point to strong commercial opportunities in the Ambient Assisted Living market.

The go to market analysis conducted in this work gives some insight into the AAL market as it is today, one which is for the most part in its infancy, but one which promises much to the producers and procurers of technology to support older people.

Despite competition in this space, the gaps we have thus far identified i.e. the need for impartial guidance and trust, point to a potentially successful position for the MAESTRO platform which will need to be fully analyzed during the pilot phase of the project.

At this stage, we believe this position could be offering a sequential two staged value proposition of 1. An online development process, along the lines of a virtual living lab. In fact, the virtual living lab services could be our USP - the thing that plays to our unique strengths - access to a collaborative eco-system of research, networking and third party expertise to give guidance to developers. This would then feed 2. A MAESTRO marketplace of approved systems, services or products with online assessment, impartial advice, curated benchmarking and user feedback to give trust to caregivers and users.

We believe that both these 'market-spaces' and service concepts address clearly communicated gaps across the AAL value continuum, and can offer significant value to commissioning and supplying organisations and consumers within the AAL marketplace going forward.

There are many considerations which merit further investigation when deciding on our finalized preferred go to market scenario(s) - including how these services might look in the market, how will they be successfully brought to market, what pricing models could be attached to services, what are the

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projected revenue streams and the costs attached to the different models.

Further refinement of this scenario analysis will come from the additional detailed research currently being undertaken in the pilot phase of the project and will shape the business plan and ultimately the development of the MAESTRO platform.

**Acknowledgment**

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