



WHITEBOOK · VERSION 5.3

# Retirement Planning Through Personal Aging Trajectories

A canonical reference describing a retirement-planning product, the science it rests on, the three-stage commercialisation through which it is delivered to individuals, advisors, and pension providers, and the privacy posture under which it operates.

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## At a glance

Most retirement planning starts from the year on a person's identity document. That single number — chronological age — is the foundation of mortality tables, contribution schedules, payout assumptions, and the financial advice that flows from them. Yet two individuals born in the same year can differ in remaining healthspan by more than a decade. Planning that ignores this variance is planning against an average that hardly anyone actually is.

This document describes a retirement-planning product that begins from a different starting point: how a person is *actually* aging, measured continuously from data they already generate. Its central reading is **biological age** — expressed as the signed difference in years between a person's biological and chronological age. Tracked over time, this reading produces a second indicator — **aging speed** — the long-term trend in how that biological-age gap is moving. Together they give an individual, their advisor, or their pension provider a personalised view that complements traditional actuarial inputs. The document then describes how the same intelligence is delivered through three commercialisation channels, in deliberate order, each serving a different counterparty.

The document is for prospective end-users evaluating the consumer product, for independent financial advisors evaluating the white-label channel, for pension and insurance providers evaluating integration, and for partners considering the broader proposition. Each section indicates which audience it primarily addresses.

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# 1. Introduction — why retirement planning needs a new frame

People spend roughly five hours a year planning for their retirement. They spend more time than that researching a major appliance purchase. They spend, by some measures, around fourteen hours each week worrying about their finances — with retirement among the leading concerns. The disproportion is not laziness or indifference. It is the symptom of a planning frame that has not earned the time. People do not engage with a process that gives them generic answers to the questions that matter most about how their lives will unfold.

Retirement planning, as practised by most providers, advisors, and individuals, is built on a small set of inputs: age, sex, current savings, planned contributions, target retirement age, and a payout choice. These are combined with population-level mortality and morbidity tables to produce a projection. The framework is venerable, transparent, and well understood — and it is also coarse.

Coarseness comes from averages. National mortality tables describe a *population's* expected lifespan distribution; they say very little about a *given person*. Two people who happen to share a birth year may have radically different physiological trajectories. One has been physically active for thirty years; the other has not. One sleeps well, the other has been chronically stressed. The first will likely outlive the second by a meaningful margin, and will need a retirement plan that funds a longer life. The second may need very different financial decisions, made earlier.

The shortcomings compound for everyone in the chain. Individuals who are aging faster than average plan as if they have time they do not. Individuals aging more slowly than average plan as if they will need less than they will. Advisors offering generic projections cannot tailor conversations beyond the inputs the framework permits. Pension providers carrying long-tail liabilities operate on the same averaged inputs and cannot segment risk with the precision the data, in principle, allows.

The thesis of this document is straightforward: **retirement planning should start from how a person is actually aging, not from the year on their identity document.** Modern smartphones already capture data that, properly analysed, yields a personalised aging trajectory. Combining that trajectory with the standard financial inputs produces projections grounded in the individual rather than averaged across the population.

The remainder of this document explains what those personalised indicators are, how they are produced, what the user experience looks like, and how the same intelligence is delivered to three distinct counterparties through three commercialisation stages.

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## 2. Core concept — biological age and aging speed

### 2.1 Biological age — the central reading

The product's central reading is **biological age**, expressed as a signed difference in years from a person's chronological age. A reading of **0** means the body is at the calendar age — biological and chronological age coincide. A reading of **+4** means biological age is four years ahead of the calendar — the body has accumulated wear equivalent to being four years older. A reading of **-3** means biological age is three years behind the calendar — the body is in a state typical of someone three years younger.

This framing matters. Compared with abstract rate-based language, a signed gap in years is immediately interpretable: a user, an advisor, or a pension analyst can read "+4 years" and know what it means without translation. It is also the unit in which retirement decisions naturally live — extra years of healthy life, earlier or later retirement age, longer or shorter drawdown periods. Biological age in this form is a number that already speaks the language of the decision it supports.

Biological age is a slow-moving reading. It shifts over weeks and months in response to sustained patterns of activity, recovery, stress, and lifestyle. A change of one or two years in biological-age gap reflects a meaningful, sustained shift; transient day-to-day fluctuations are not informative and are smoothed away by the methodology.

### 2.2 Aging speed — the long-term trend

Biological age tells a person where they are. The second indicator, **aging speed**, tells them where they are going. Aging speed is the long-term trend in biological age — the direction and rate at which the biological-age gap is moving over time.

A user whose biological-age gap has held steady at +4 for two years has an aging speed near zero: their body is aging in step with the calendar, and the calendar is winning by exactly four years' worth of accumulated state. A user whose gap has moved from +4 to +6 over the same period has a *rising* aging speed — their trajectory is moving in the wrong direction even if the current reading is still in a moderate range. A user whose gap has moved from +4 to +1 has a *falling* aging speed — the trajectory is improving.

Aging speed is the metric that responds to behaviour. Biological age shifts slowly because it integrates the full history; aging speed picks up sustained behavioural change earlier, because it captures the *change* in that integrated history. A person who begins exercising regularly, sleeping better, or managing stress will see their aging-speed trend bend before their biological-age reading itself reaches a new equilibrium. This makes aging speed the meaningful feedback signal in a product that connects daily choices to long-term outcomes.

The behavioural premise is straightforward. People want to live longer and healthier lives. When the trend in how their body is aging is surfaced through regular contextual feedback, it nudges them toward healthier choices. And when biological age and its trend are tied to the financial projections that depend on them, the link between the two becomes visible in a way that traditional planning frames do not show.

For retirement planning the implication is direct. Biological age informs the realistic horizon — a person whose gap is large and negative may plan for a longer healthspan; a person whose gap is large and positive may need to bring decisions forward. Aging speed informs the conversation about trajectory — whether the user's current way of living is moving them toward or away from their retirement goal.

### 2.3 Why locomotor activity is the right input

Both readings are derived from locomotor activity — patterns of movement captured passively by a smartphone or wearable. Three properties make this the right input.

It is **already available**. Modern smartphones record steps and movement continuously, with no additional hardware, sensors, or appointments required. Anyone with a recent device has already generated the data needed to begin.

It is **longitudinal by design**. A blood test or DNA assessment is a snapshot. Locomotor data accumulates daily, automatically, capturing the patterns of activity, intensity, recovery, and consistency that the algorithms rely on. The reading improves with the length of the record — a property that matters especially for aging speed, which is itself a trend over time.

It is **scientifically validated**. Raw step counts on their own are noisy and insufficient. The methodology relies on patterns *within* movement — intensity transitions, duration, recovery cadence, perpetuity of activity — that have been shown in peer-reviewed work to correlate with biological age, mortality risk, and chronic-disease incidence. The relevant publications are listed in Appendix A.

The product does not require the user to wear a specialised device, undergo medical testing, or change behaviour during data collection. It builds its picture from data the user already produces, applies algorithms validated against external biomarkers, and translates the result into indicators the user can act on.

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### 3. Product experience

The product is delivered first as a mobile application. Its first-time experience is intentionally short. A user installs the app, indicates their year and month of birth and sex, grants the application access to step data already on their device, and optionally enters basic information about their pension savings, planned contributions, and target retirement age. From there, the application analyses the available historical step data and produces an initial reading.

The dashboard is the centre of the experience. It shows the user's current biological-age gap and its trend — what we call aging speed — alongside their chronological age. Alongside these, it shows the financial projection: with the user's declared inputs, what is their expected fund at retirement, what monthly income does that imply, and how does it compare with their current spending. The user can adjust assumptions and see the projection respond. The point is to make the link between physiology and finance tangible.

A more detailed personal report is available on demand. It captures the indicators, the financial projection, and the parameters that produced both. Reports can be saved, compared over time to make trends visible, and — with the user's explicit consent — shared with a financial advisor. The report is the artefact that turns a single dashboard view into a longitudinal record.

Notifications surface meaningful changes. When biological age shifts noticeably, or when a sustained trend emerges in either direction, the user receives a non-prescriptive prompt that interprets the change in the context of their plan. The communication is informational, not directive: the product helps the user think about decisions; it does not make those decisions on their behalf, and it does not provide regulated financial advice.

The financial-modelling layer underneath the dashboard and the report is **transparent and based on publicly available information**. National actuarial statistics, demographic data, and publicly available information about retirement products inform the projection. The model is intentionally simple at present — accessible to non-specialists, easy to explain, easy to adjust. Its sophistication will increase progressively, including through future integrations with retirement-product providers, as discussed in §7.

#### How biological age reshapes the conversation

A useful way to see what the readings do is to look at the concrete decisions retirement planning rests on, and how each one changes when a person's biological-age gap comes into view alongside their chronological age. Traditional planning answers each of these questions with a single number derived from population averages. With a biological-age reading in the picture, the answer takes a different shape depending on whether the person's body is ahead of, in step with, or behind the calendar.

Decision	Traditional approach	Biological age ahead of calendar (e.g. +4 years)	Biological age behind calendar (e.g. -3 years)
<b>Planning horizon</b>	A generic age (often "to 95")	Calibrated to a shorter expected healthspan	Calibrated to a longer expected healthspan
<b>Sustainable withdrawal rate</b>	Fixed-rule heuristic (often "4% over 30 years")	A shorter horizon supports a higher initial rate	A longer horizon calls for a more conservative initial rate
<b>Asset allocation</b>	Age-based formula (e.g., "120 minus age" in equities)	Shift toward defensive positioning sooner	Stay in growth-oriented assets longer
<b>Roth-conversion (or equivalent tax-efficient) cadence</b>	Even cadence over a long stretch	Front-load conversions into a shorter horizon	Spread conversions gradually over a longer horizon
<b>Healthcare reserve</b>	Population-average estimate	Fund earlier; the timing need arrives sooner	Fund later; assets can grow first
<b>Retirement age</b>	Anchored to social or institutional norms	Consider an earlier, lower-stress exit	Extend working life or pursue a second career with confidence

None of these reshaping is a recommendation by the product. Each of them is a decision the user — together, where applicable, with their advisor — makes. The product's role is to make the input that drives each decision personal rather than averaged, so that the decision rests on the user's biological-age reading and its trend rather than a population average.



## 4. Three-stage commercialisation

### 4.1 Overview

The product reaches its market through three commercialisation channels, introduced in deliberate order. Each builds on the learnings of the previous; none replaces the earlier ones. The same underlying intelligence — the indicators, the projection model, the science — is delivered in all three. What differs is the relationship with the counterparty and the form in which the product is consumed.

**Stage 1 — Direct to consumer.** The mobile application is offered to individuals who pay for it themselves through standard mobile-app channels. This stage establishes the user-facing experience, the indicator presentation, and the notification tone. It produces the empirical foundation for the conversations that follow.

**Stage 2 — Advisor channel.** Independent financial advisors offer the product to their clients under the advisor's own brand. The product becomes a tool for client engagement, retention, and differentiation. This stage builds on Stage 1: the consumer experience, refined through B2C operation, becomes the foundation of the advisor offering.

**Stage 3 — Provider channel.** Pension funds, life insurers, and retirement-planning platforms integrate the product's intelligence — through an application programming interface — into their own consumer applications. The provider keeps ownership of their consumer experience; the product's indicators, signals, and projections enrich it. This stage builds on the prior two: the indicators have been refined through consumer use, the framing has been validated through advisor conversations, and the integration is an enrichment of an existing relationship rather than a new one.

The stages are additive. A direct-to-consumer user, an advisor's client, and a provider's customer can all be served by the same back-end at the same time. Each counterparty receives the form most appropriate to them.

### 4.2 Stage 1 — Direct to consumer

The Stage 1 audience is middle-aged and pre-retirement individuals who are actively engaged with planning their later life and are open to a more personal frame than population averages provide. They are typically already curious about health metrics — they have a smartwatch, they track activity, they have read about biological age — and they are looking for a way to connect that interest with their retirement decisions.

The value the product offers them is **clarity on a question that current tools cannot answer**: given how I actually live, am I on track for the retirement I want? The standard inputs (savings, contributions, target age) are necessary but not sufficient; the personalised biological-age reading and its trend complete the picture. A user who sees that their biological-age gap has been widening over the last two months has a piece of information they can act on, both in their lifestyle and in their financial planning.

The product is offered through the standard mobile-app stores under a Freemium model. The base tier is free and useful on its own, surfacing the biological-age reading and a baseline projection. A paid tier extends history depth, opens richer scenario modelling, and increases the cadence of personalised notifications. The user-side commercial relationship is direct and conventional.

### 4.3 Stage 2 — Advisor channel

The Stage 2 audience is **independent financial advisors** — practitioners running their own books, with their own client relationships, looking for tools that strengthen those relationships. The advisor channel is offered as a *white-label* arrangement: the advisor's brand sits on the application; the underlying technology is provided by the platform.

The value to the advisor is multi-dimensional. The product is a **conversational tool**: a quarterly review based on portfolio performance can become a richer conversation about long-term trajectory when the client's biological-age reading and its trend are on the table. It is a **differentiation asset**: in a market where investment management has commoditised and most advisor offerings look similar, a personalised health-and-finance product stands out. It is a **retention mechanism**: clients who find the product engaging come back to the advisor's brand for it. It removes a development cost: the advisor offers a sophisticated product without building software.

The Stage 2 commercial structure is built around a workspace seat licence — the advisor pays a monthly fee to use the platform. On top of that, the channel includes a **sponsored-subscription mechanism**: an advisor can offer to pay for a client's premium subscription on the client's behalf. This is a tool for advisors who want to demonstrate

care for their premium clients, or who are running engagement programmes for specific cohorts, without requiring the client to open their wallet.

The sponsorship mechanic is built around explicit consent on both sides. The client accepts the offer through a separate consent flow distinct from any data-sharing consent — sponsorship and data-sharing are independent decisions. Either party can terminate the arrangement at any time. If the advisor terminates, the client receives notice and a grace period during which the premium experience continues; after that, the client either continues themselves or returns to the free tier. If the client terminates, the arrangement ends immediately. The mechanic is bilateral, transparent, and reversible.

#### 4.4 Stage 3 — Provider channel

The Stage 3 audience is **pension funds, life insurers, retirement-planning platforms, and similar consumer-facing operators of regulated retirement and longevity products**. These organisations have their own consumer apps, their own client bases, and their own brand identities. The Stage 3 channel does not displace any of these. It enriches them.

The integration is **API-first**. The provider's existing application calls the platform's interfaces; the biological-age readings, signals, and projections are returned and incorporated into the provider's own user experience. Optional ready-made user-interface components are available for providers seeking to accelerate integration. The provider chooses the depth: some will use only the readings and embed them in custom screens; others will adopt the components for faster time-to-market.

The value to a provider has both an actuarial and an experiential dimension, and different providers will respond to different framings.

On the **actuarial and risk-management side**, biological age and its trend give a provider a personalised input that complements the chronological-age-based assumptions on which their existing models depend. Cohort segmentation becomes finer — clients can be grouped by their biological-age reading and by the direction in which it is moving, not only by where they currently are. Long-tail liability exposure to mis-segmented cohorts becomes lower; conversations about reserve calculations, payout schedules, and pricing tiers gain a personalisation lever. The readings do not replace traditional actuarial work; they add a dimension to it.

On the **client-experience side**, the integration gives the provider a way to talk to its clients about something more interesting than statements. A pension provider whose app shows a client only a balance and a projection competes with every other pension provider whose app does the same. A pension provider whose app also shows the client where their biological age sits relative to their calendar age, and what their lifestyle is doing to their projected retirement, has a relationship that is harder to switch away from. The retention and engagement implications are real and measurable.

The Stage 3 channel is built to accommodate the realities of regulated counterparties. Where a provider operates in a jurisdiction with strict data-residency requirements, the integration is structured so that user data does not leave the regulated perimeter. The architecture details belong to a contractual conversation; the principle is that the channel is friendly to regulated operations rather than a bolt-on that disregards them.

The commercial model is bulk licensing — a contracted base fee per provider — combined with metering on the volume of monthly active users above an included threshold. Onboarding is contracted and supported.

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## 5. Value by stakeholder

This section repeats the audiences but takes their point of view rather than the product's.

### 5.1 For individuals

Individuals using the product gain three things that traditional retirement-planning tools do not provide.

They gain **clarity on their own trajectory**. Instead of being told that they have an average life expectancy of  $N$  years, they see whether their body is currently ahead of or behind the calendar, and in which direction the gap is moving. The reading is theirs, not their cohort's. It validates positive habits and surfaces concerning trends early enough to act on them.

They gain **a feedback signal on lifestyle that responds in weeks, not years**. The biological-age reading shifts with sustained behavioural change, and its long-term trend — the aging speed — picks up directional changes earlier than the reading itself reaches a new equilibrium. A user who begins exercising regularly or sleeps better does not have to wait years to see the impact in long-term health markers; the trajectory is visible from the trend.

They gain **scenario modelling on their own terms**. With personalised inputs, a user can ask better questions: what if my biological-age gap stays where it is? What if I retire at 65 versus 67? What if my contributions increase? The answers are grounded in their own readings, not a generic chart.

The financial planning that emerges is more honest. A user whose biological age is behind the calendar can plan a longer life with more confidence. A user whose biological age is ahead of the calendar can plan with eyes open. Neither has to rely on assumptions that may not match their reality.

### 5.2 For independent advisors

Advisors offering the product to their clients gain several practical advantages.

**Conversations get richer.** A traditional review covers portfolio performance, risk allocation, and progress against the plan. With the product on the table, the conversation extends to the client's aging trajectory, what that means for the realistic horizon of their plan, and which lifestyle factors are reinforcing or undermining the financial trajectory. The advisor remains the financial expert; the product gives them a different angle from which to do their job.

**Differentiation is concrete.** In an industry where investment-management services are commoditising, advisors who can offer a genuinely distinctive client experience defend their margins better. A health-aware retirement product is not yet a commodity, and the advisor's brand sits on it from the moment the client opens the application.

**Retention has a new mechanism.** Clients who return to the application to check their reading and its trend are clients who do not switch advisors lightly. The engagement loop the product creates — see your biological-age gap, see how it is moving, see how it interacts with your plan — keeps the advisor's brand in the client's life between formal reviews.

**The sponsorship mechanic gives a care-demonstration tool.** Premium clients can be offered the premium tier as part of the relationship, without explicit pricing conversations every time. The mechanic is reversible by either party, which keeps it honest.

**No development burden.** The advisor offers a sophisticated, branded product without building software, hiring developers, or carrying ongoing maintenance. The platform's roadmap is the advisor's roadmap.

**The advisor population is heterogeneous, and the product fits some practice models more naturally than others.** Different advisors operate under different economics, serve different client segments, and engage their clients with different cadences. The product fits most naturally with practice models that hold the most direct relationship with the client and the longest planning horizon — practitioners whose primary deliverable is comprehensive advice rather than product transactions, who hold periodic in-depth plan reviews, and who differentiate through depth rather than breadth. In other practice models the fit is partial; the product remains useful but the integration with the advisor's process is shallower. The channel will mature first in the practice models where the natural fit is highest, and reach the others as the platform demonstrates value in the early ones.

### 5.3 For pension and insurance providers

Providers integrating the product's intelligence gain in two directions.

**On the actuarial side.** Chronological age is the foundation of pension and insurance modelling, but it is a coarse foundation. Biological age, together with its long-term trend, adds a dimension that is grounded in evidence rather than survey data, captured continuously rather than at discrete points, and produced from data the provider's clients are already generating. Cohort segmentation becomes finer because clients can be grouped by where their biological age sits and by the direction it is moving, not only by where they currently are in calendar time. Long-tail liability exposure to averaged assumptions becomes more transparent. New product opportunities — tailored to clients with different aging profiles — open up.

**On the client-experience side.** Provider apps that show only balances and projections compete with every other provider app that does the same. Adding a layer of personalised health intelligence creates an experience the client returns to, not because they are required to but because it is interesting and useful. Client retention follows from engagement; engagement follows from offering something the client wants to know.

The integration is API-first by design, which means the provider keeps full ownership of the consumer experience and the brand relationship. The platform is an intelligence layer beneath the provider's product, not a competitor for the customer's attention.

The provider's regulatory and operational realities are accommodated. Data residency, the contractual basis of integration, and the governance model are matters for the negotiation; the architecture is friendly to all three.

**A structural alignment that today is largely absent.** Pension providers, in their current form, often serve clients whose long-term decisions rest on too little objective information about the direction their physiological trajectory is moving. When the data needed to make a long-horizon decision well is not available, the practical effect is that the responsibility for the decision is delegated back to the client — without the tools that would let the client make the decision well. The result is a meaningful population of clients who own decisions they are not equipped to optimise, and a corresponding population of suboptimal financial outcomes. The product addresses this by giving the provider — and through the provider, the client — objective trajectory data on which to anchor those decisions.

There is a deeper structural point. Pension and life-product economics today are most easily managed when client lifespans match population averages: actuarial assumptions, reserve calculations, and product pricing are all built around that expectation. Clients living substantially longer than the assumption is, for the provider, a long-tail risk to be managed; clients living substantially shorter is, for the provider, a relief that their reserves were sufficient. Genuine alignment of interest — where the provider materially benefits when their clients live longer and healthier lives — is largely absent from current pension models. We propose a different alignment is possible. When a provider's offering helps its clients understand and improve their physiological trajectory, the provider gains client engagement, retention, and an ESG-aligned narrative; the client gains agency over their health and over the financial decisions that depend on it; and the structural divergence between provider economics and client interests narrows. The product is offered to providers as one practical way to begin building toward this alignment.

## 5.4 Societal and ESG dimension

The product's mission has a societal layer that resonates with environmental, social, and governance considerations.

It contributes to the United Nations' Sustainable Development Goal of *ensuring healthy lives and promoting well-being for all ages* (SDG 3) by giving individuals tools to monitor and improve their physical state and to connect that effort with their financial future.

It empowers individuals to act on their own health rather than receive averaged judgements about it. Self-determination, in the health and financial-planning context, is a core ESG-aligned outcome.

It addresses, at population level, one of the structural challenges facing retirement systems: the divergence between average assumptions and actual trajectories. Tools that close this gap reduce the long-term pressure on pension systems.

For pension and insurance counterparties, integrating the product reinforces a brand position as an organisation invested in clients' long-term well-being, not only their short-term financial outcomes. The narrative is consistent with ESG reporting and with the direction of regulatory expectation across major markets.

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## 6. Methodology and scientific foundation

### 6.1 The methodology

The product's methodology produces a continuous, personalised reading of how a person is aging. It rests on patterns within locomotor activity rather than on raw step counts. Step counts on their own are too noisy to be informative; aggregations such as daily totals lose the structure that contains the signal. The methodology examines the patterns *within* movement — intensity transitions, duration of sustained activity, recovery cadence between bouts, perpetuity of activity over weeks. These patterns have been shown in peer-reviewed work to correlate with biological age, mortality risk, and chronic-disease incidence.

The primary output of the methodology is the **biological-age reading** — the signed difference in years between the person's biological age and their chronological age. Tracked over time, this reading produces a second output, **aging speed** — the long-term trend in how the biological-age gap is moving. The biological-age reading is the foundation; aging speed describes how that foundation is shifting. Aging speed reflects sustained patterns in the recent record and is reliable once the data history is long enough to separate trend from short-term variation; the biological-age reading itself is reliable from a shorter window of input data.

The algorithmic foundation has been validated against external biomarkers — assessments based on DNA methylation, blood-based markers, and other clinical inputs — with consistent agreement across the methods. The methodology has been further refined against large-scale activity datasets, including more than 50,000 individual activity tracks analysed during research, which independently confirm the robustness of the approach.

The product applies this validated methodology to the data its users contribute, with their consent, and presents the readings in the form discussed in §2 and §3.

### 6.2 Financial projection — public-data foundation

The financial-projection layer of the product computes retirement projections from a small set of inputs that the user provides — current savings, planned contributions, expected investment return, target retirement age, payout scheme — combined with **publicly available actuarial statistics** (national mortality tables, demographic data) and **publicly available information about retirement products** (annuity rates, plan-type structures, return distributions).

The model is intentionally transparent. A user, an advisor, or a provider's analyst can inspect each input, follow the calculation, and see how the output changes when an assumption changes. There is no opaque black box; there is no hidden parameter.

The model is also intentionally simple at present. Inflation is not yet modelled separately from the return assumption. Contribution-growth profiles are not yet user-configurable. Family and household plans are not yet supported. These are deliberate simplifications that keep the model accessible, easy to explain, and easy for non-specialist users to interrogate. The model is on a clear path of progressive sophistication, discussed in §7.

### 6.3 Peer-reviewed foundations

The scientific basis of the methodology is documented in a series of peer-reviewed publications, listed in Appendix A. Readers seeking the technical depth that this whitebook deliberately avoids are referred to those papers. The publications cover the original methodology, validation against external biomarkers, the role of wearable data in longevity research, and digital biomarkers of ageing more broadly.

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## 7. Roadmap — direction of travel

The roadmap below describes the direction of the product's development. It is intentionally directional rather than dated. The order is approximate; some elements may move ahead of others depending on demand and partnership.

### Geographic and language coverage

The product launches in a single market and language. Subsequent releases extend to additional markets, with country-specific actuarial data populated as each market is added, and to additional languages as the user base expands.

### Methodology refinement

The methodology continues to be refined as longer activity histories accumulate and as new validation evidence emerges. Refinements that improve robustness on edge cases, on lower-volume data, and on diverse user populations are part of the regular cadence of releases.

### Biological age presentation

The way biological age and its trend are surfaced to users continues to evolve. Richer trend views, contextual framing of short-term movements versus sustained shifts, and audience-specific presentations (for example, advisor-facing views that differ from end-user-facing ones) are part of near-term iterations. The objective is to make the readings easy to interpret for users without specialised training while remaining substantively useful for advisors and provider analysts.

### Financial-modelling sophistication

The financial-projection layer extends beyond its current public-data foundation. Inflation is modelled as a separate input. Contribution-growth profiles, expense-growth profiles, and richer return assumptions are incorporated. **Provider integrations are the channel through which the deepest improvements arrive:** live annuity quotes from contracted providers replace public-data approximations, real-time information about retirement products supersedes generic averages, and the projection becomes more grounded in the actual options available to a given user.

### Family and household plans

The current model treats each user as an individual planning entity. A future extension supports household plans — joint planning, spousal benefits, dependent-aware projections — that better reflect how many people actually plan their retirement.

### Advisor toolset

The advisor channel deepens with cohort analytics, communication templates, deeper portfolio integration, and additional engagement tooling that extends the channel's value beyond the initial branded-app proposition.

### Provider-channel depth

The provider channel deepens through richer integrations, including the live financial-product integrations described above, broader signal subscriptions, and where contractually permitted, cohort-level analytics outputs to support the provider's own business intelligence.

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## 8. Privacy, consent, and compliance

The product handles data of an inherently sensitive kind: health-related signals derived from movement, longitudinal activity records, financial inputs, and personal trajectories. We treat the careful handling of this data as a first-order responsibility, not as a marketing item, and our position on it is straightforward.

We are committed to operating to the standards expected of products that work with sensitive personal and health-related information, and to complying with the regulatory requirements applicable to each market and counterparty we serve. The applicable framework differs by jurisdiction, by audience type, and by the maturity stage of the relationship. Privacy, consent, and compliance is therefore developed as a dedicated workstream — built and advanced alongside the rest of the business rather than retrofitted to it, and scaled in step with the product's reach.

A few principles are in place from the outset and are not stage-dependent. Data is collected with explicit consent, and consent is revocable. Counterparty isolation is built into the architecture, so that an advisor sees only their own clients' data, with each client's consent, and a pension provider sees only the users it has provisioned. Sponsorship of a client's premium subscription is an independent act from any data-sharing consent — sponsoring does not, by itself, grant the sponsoring advisor visibility into the client's data. The product avoids storing regulated medical signals such as raw heart-rate or electrocardiogram data, and works instead from locomotor activity records that do not require medical-device classification. Recommendations and signals are non-prescriptive: the product produces information; it does not make decisions on behalf of regulated processes.

Beyond these starting principles, the depth of the privacy and compliance programme grows with the business. As new markets enter scope, the data-protection requirements specific to those markets are addressed. As advisor relationships scale, the contractual frameworks appropriate to those relationships are formalised. As regulated provider integrations are pursued, the additional rigour those relationships demand — data residency, formal partner agreements, audit and certification expectations — is met on the timeline those relationships set, not retroactively. We do not present this as a finished compliance posture. We present it as a posture appropriate to the product's current stage, deliberately scaled to the product's trajectory, and treated with the seriousness that handling sensitive data calls for.

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## 9. About and contact

Life & Health Metrics is the publisher of this document and the operator of the platform it describes. The platform combines validated biological-age science with personalised retirement-planning capability, delivered to consumers, financial advisors, and pension and insurance providers through the channels described in §4.

For more information, partnership inquiries, or evaluation of the platform for your organisation, please contact: **info@lhmetrics.com**.

Further information, including the most recent version of this whitebook, is available at **<https://lhmetrics.com>**.

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## Appendix A — Peer-reviewed publications

The methodology described in this document is grounded in the following peer-reviewed publications. Readers seeking technical depth beyond the summary in §6 are referred to these works.

1. *Quantitative characterization of biological age and frailty based on locomotor activity records* — Aging (Albany NY). <https://www.aging-us.com/article/101603>
2. *Hacking aging: a strategy to use big data from medical studies to extend human life* — Frontiers in Genetics. <https://www.frontiersin.org/articles/10.3389/fgene.2018.00483/full>
3. *Biological age is a universal marker of aging, stress, and frailty* — bioRxiv preprint. <https://www.biorxiv.org/content/10.1101/578245v1>
4. *Deep longitudinal phenotyping of wearable sensor data reveals independent markers of longevity, stress, and resilience* — Aging (Albany NY). <https://www.aging-us.com/article/202816/text>
5. *Digital biomarkers of ageing for monitoring physiological systems in community-dwelling adults* — The Lancet Healthy Longevity. [https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568\(25\)00044-3/fulltext](https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568(25)00044-3/fulltext)
6. *Assessment of aging parameters using wearable electronics* — recorded lecture, June 2019. <https://drive.google.com/file/d/1ppTACQiTwPrVix0HSBxMJPQs1jc3uqfe/view>

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