Wearables and the Internet of Things: Working Party Update

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Colin Bullen – Partner, Habits at Work
Agenda

• Introduction
• Overview of wearable devices and the Internet of Things
• Types of measurements
• Current examples of use
• Data considerations
• Risks and challenges
• Technical developments – what the future may bring…
• Considerations for the future of insurance
Introduction to Working Party and Brief
Working Party Brief

This Working Party aims to look at the emergence of wearable technology and the internet of things and their current and potential use within the health and care area.

Wearable technology related to healthier wellbeing is developing quickly and the working party looks to develop an understanding of the currently available technology, and the capabilities of the next generation. This includes considering the impact of wearables on individually underwritten protection products and/or employee benefit schemes.
# Working Party members

<table>
<thead>
<tr>
<th>Workstream 1 – Stakeholder analysis</th>
<th>Workstream 2 – Devices and uses</th>
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<tbody>
<tr>
<td>Chair: Anna Spender</td>
<td>Deputy Chair: Colin Bullen</td>
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<tr>
<td>James Cripps</td>
<td>Lisa Altmann-Richer</td>
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<td>Robin Duffy</td>
<td>Mark Farrell</td>
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<td>Chris Falkous</td>
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<td>Tony Horn</td>
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<td>Expert: Oliver Werneyer</td>
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23 May 2018
Introduction

• Rapidly developing area
• Wide and ever expanding range of wearables, devices, apps, data aggregators & platforms
• Increasing numbers of insurers have started incorporating technology into their product offerings
• More than 30% of insurers worldwide* are already using wearable technology for customer engagement

* Accenture Technology Vision for Insurance 2015
## Devices Investigated

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<th>Body</th>
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Sensors

• Accelerometer
• Compass/magnetometer
• EEG biosensor
• ECG biosensor
• Galvanic skin response (stress monitor)
• GPS
• Gyroscope
• Heart rate monitor
• Oximetry monitor
• Skin conductance
• Skin temperature
## Measures Available

<table>
<thead>
<tr>
<th>Measurements current available</th>
<th>Activity time</th>
<th>Coughing</th>
<th>Goal progress</th>
<th>Respiration rate and patterns</th>
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<td>Ankle curvature</td>
<td>Distance</td>
<td>Heart rate/pulse</td>
<td>Sleep duration</td>
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<td>Ascent/Decent (Floors)</td>
<td>ECG/EKG</td>
<td>Heart rate variability (HRV)</td>
<td>Sleep quality (N3/light/REM)</td>
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<td>Blood pressure</td>
<td>EEG</td>
<td>Impacts to head (forces)</td>
<td>Steps</td>
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<td>Blood sugar</td>
<td>Falls (in the elderly)</td>
<td>Light exposure (pre-sleep)</td>
<td>Swimming lengths</td>
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<td>Body composition</td>
<td>Fitness (Cardiovascular)</td>
<td>Location</td>
<td>Swimming strokes</td>
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<td>Body temperature</td>
<td>Focus/attention</td>
<td>Pace/speed/cadence</td>
<td>UV exposure</td>
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<td>Calories</td>
<td>Galvanic skin responses (emotional health)</td>
<td>Pollution</td>
<td>V02 Max (derived from HRV)</td>
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<td>Contractions</td>
<td>Girth</td>
<td>Posture and balance, pressure distribution and weight shift information</td>
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Wearables accuracy and consistency

Laboratory conditions
- +/-10% accuracy on steps
- Heart rate measures +/-5% accurate
- Derived energy measures unreliable

Considerations
- How device is worn
- Self reported information
- Direct measures versus derived measures

Real world
- Over 100% variance in real life steps tracked
- Consistency is better – individual issues seem to be systematic
Current uses
Overview of Uses

• Measure health biometrics, health-related behaviours and outcomes
• Engage customers in new ways
• Potentially improve health as part of wider program of change
• Offer disease specific products while tracking disease management
• Manage chronic conditions
Current Uses

- Life + Health insurance
- Customer Engagement
- Marketing
- Disease specific products
- Initial underwriting
- Continuous underwriting
- Reward determination
- Behaviour data
- Biometric data
Current Uses

- Monitoring health behaviours
- Coaching to the wrist
- Wellbeing
- Monitoring health biometrics
- Performance feedback
Current Uses

- General insurance
- Vehicle tracking
- Claims risk management
- Cover as you need it
- Claims processing
- Social media
Data Considerations
Data considerations

Value of data

Future Use?

What data?

Cost of collection vs benefit

Limitations

GDPR

Actuarial constraints

Permissions and availability

IT constraints
Data considerations

Data reliability
- Fraud
- Selective tracking vs frictionless tracking
- Fit for purpose?

Potential systematic errors
- The device itself, and changes in the device during the data collection period
- How the device is used when collecting data of interest
- How the device is worn, and impact on results

Data use
- Changes over time vs a point in time
- Data aggregation and analysis of cohorts
- Application at individual level
Data considerations

Aggregators

- Choice of technology = better engagement
- Upgrading technology
- Using API integration data aggregators collect, format and clean data from multiple sources
Risks and challenges
Risks & Challenges

Willingness to adopt new technology
Effectiveness of behavioural change
Need for insurance solution

Data quality and processing
Pace of change

Technological Capabilities

Customer Needs & Engagement

Viable Insurance Products

Regulators’ Objectives

Insurers’ Objectives

Cost vs benefit
Changing role of insurer

Data privacy
Risk pooling
Pace of change
Technical Developments – what the future might bring
Tech Developments – What the future might bring…

Tracking emotional states

Affective computing attempts to recognise and interpret human emotional states via:
- Camera-based systems
- Voice patterns
- Brainwave activity
- Electrodermal activity
- Breath analysis

Embedded Technology

- Microchipping humans!
- Tracking, payment, make calls, send texts and emails, monitor health, access buildings, attend events…
- Less than 10 years away…

Wearables in sport

- Often at forefront of technology uptake
- Can give us an indication of current and future uses of technology
- Some uses deemed as unfair advantage

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Tech Developments – What the future might bring…

Brain – computer interface

• Directly reads users’ thoughts
• Control augmented and virtual realities

Exoskeletons

• Bionic suits controlled using thought
• Rehabilitation help for spinal cord injuries
• Smart underwear as a solution for back pain
• A “chairless chair” for use in industries such as manufacturing
Considerations for the future of insurance

The future of insurance

- Technology take up
- Asymmetries / anti selection
- New opportunities

Revolution or evolution

- Evolution vs revolution
- Living up to the hype
- Who will take advantage?

- Short term vs long term
- Game changing innovations

When will you get involved & how?
Conclusion

- Rapidly developing area
- Market opportunity vs catalyst for change
- Technology is only part of the solution
- Data considerations – data capture, legislation and interpretation
- Ethical and moral behaviour in terms of sensitive personal data
- Risk of market fragmentation through reduced cross subsidization
- Specialist products
- Those engaging will be on an evolving business case and product development journey
- When will you get involved and how?
Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenters.