Demonstration & Simulation Environment

Chaloner Chute, CTO, DHI
Integrating Hospital at Home

- Hospital at home is split into two basic modes
  - Focus on earlier discharge
  - Focus on admission avoidance

- Predicated on managing the clinical risk of patients using hospital processes and equipment

- Overlap with digital telecare developments

- Overlap with digital self-management, population / public health measures

- A spectrum - as acuity decreases, what is the earliest point we can ‘step down’ safely?

- There will be multiple steps.
Proposals for a National Health Service
UK Government (1945)

Quality Strategy
Scottish Government (2010)

Digital Health & Care Strategy
Scottish Government (2018)

Modern Outpatient: LTC Vision
DHI (2018)
Personal Data by Determinants of Health

- Clinical care: 44.9%
- General: 20%
- Individual behaviour: 17.3%
- Physical environment: 14.2%
- Social and economic environment: 8%

Determinants of Health: 15.6%
INDUSTRY 1.0
- Mechanization
- Steam power
- Weaving loom

INDUSTRY 2.0
- Mass production
- Assembly line
- Electrical energy

INDUSTRY 3.0
- Automation
- Computers
- Electronics
- Internet of Things (IoT)
- Networks

INDUSTRY 4.0
- Cyber physical systems
- Networks

Timeline:
- 1784
- 1870
- 1969
- TODAY
Phase 1b Simulation

ARMed
Edinburgh/Napier University and CM2000

HealthKit
Apple

Personal data store
Myllex

DHI Exchange Layer
StormID

Care coordination tools
Stockit

Self-management tools
StormID

Health & Social Care Portal Pilot
NHS Greater Glasgow & Clyde and ATOS
Example Simulation 1 - COPD
## Example Simulation 2 - Asthma

<table>
<thead>
<tr>
<th><strong>Self Monitor</strong></th>
<th><strong>Rules</strong></th>
<th><strong>Baseline</strong></th>
<th><strong>Share (Exception Reporting)</strong></th>
<th><strong>With</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Triggers</strong></td>
<td>Cold Weather</td>
<td>Notify me when...</td>
<td></td>
<td>Son/Daughter</td>
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<tr>
<td></td>
<td>Air Quality</td>
<td>Notify me when...</td>
<td></td>
<td>GP</td>
</tr>
<tr>
<td></td>
<td>Virus</td>
<td></td>
<td></td>
<td>Father</td>
</tr>
<tr>
<td><strong>Warning Signs</strong></td>
<td>O2 Sats</td>
<td>Notify me when combination is high; what to do when...</td>
<td></td>
<td>Son/Daughter</td>
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<tr>
<td></td>
<td>Croakiness of Voice</td>
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<td></td>
<td>GP</td>
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<tr>
<td></td>
<td>Breathless</td>
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<td>Father</td>
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<tr>
<td><strong>Sleep</strong></td>
<td>Quality</td>
<td>Self-monitor share when exercise to norm</td>
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<td>Son/Daughter</td>
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<tr>
<td></td>
<td>Up at Night</td>
<td>Sitting up in bed; night time waking</td>
<td></td>
<td>GP</td>
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<tr>
<td></td>
<td>Bedtime</td>
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<td></td>
<td>Father</td>
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<tr>
<td><strong>Exercise</strong></td>
<td>Swimming</td>
<td>Monitor listing of activity and Assets; share decline in exercise link to meds</td>
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<td>Son/Daughter</td>
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<tr>
<td></td>
<td>Yoga</td>
<td>Able to exercise for set time</td>
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<td>GP</td>
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<tr>
<td></td>
<td>Pilates</td>
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<td>Father</td>
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<tr>
<td><strong>Diet</strong></td>
<td>Calorie</td>
<td>Increase</td>
<td></td>
<td>Son/Daughter</td>
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<tr>
<td></td>
<td>Healthy Meal</td>
<td>Increase (excluding extra exercise)</td>
<td></td>
<td>GP</td>
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<tr>
<td></td>
<td></td>
<td>Increased Use</td>
<td></td>
<td>Father</td>
</tr>
<tr>
<td><strong>Medicine</strong></td>
<td>Baseline Meds</td>
<td>Increase with exercise</td>
<td></td>
<td>Son/Daughter</td>
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<tr>
<td></td>
<td>Reliever Use (bronchodilator)</td>
<td>Increased Use</td>
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<td>GP</td>
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<td></td>
<td>Air Chamber</td>
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<td>Father</td>
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<td>Steroids</td>
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</tbody>
</table>
Example Simulation 3 – Cardiac

High Impact Data Set:
- PROMS/PREMS
- BP
- Heart Rate
- Activity Level
- Sleep
- Weight
- Family History
- Medications
- Treatment
An Innovation Hub

• Significantly more complex to orchestrate an open platform ecosystem
• Adherence to standards during innovation
• Safe places to experiment and share knowledge
• Better joint strategy between partners
• New multi-provider, multi-purchaser business models
Google “Care 4.0”

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