Why do so many technology programmes in health and social care fail?

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The NASSS framework
Health technology adoption, non-adoption, abandonment, and challenges to scale-up, spread and sustainability
Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies

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Objective: To explain why telehealth (and similar) programmes fail

Primary research:
- 7 diverse case studies of technology-supported health or care programmes:
  - Video consultations
  - Care organising apps
  - Telemonitoring for heart failure
  - Pendant alarms
  - Integrated case management
  - GPS tracking for dementia
  - m-health for epilepsy

Secondary research:
- Narrative systematic review

Draft framework covering 7 key domains

Peer review and testing on 10 new case studies

Final NASSS (nonadoption, abandonment, scale-up, spread, sustainability) framework
The NASSS framework

1. Condition
2. Technology
3. Value proposition
4. Adopter system
   - staff
   - patient caregivers
5. Health / care organization(s)
   - implementation work, adaptation, tinkering
6. Wider system
7. Continuous embedding and adaptation over time
<table>
<thead>
<tr>
<th>SIMPLE</th>
<th>COMPLICATED</th>
<th>COMPLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straightforward</td>
<td>Multiple interacting components or issues</td>
<td>Dynamic, unpredictable, not easily disaggregated into constituent components</td>
</tr>
<tr>
<td>Predictable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Few components</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COMPLEXITY can occur in various domains

- Clinical
- Technical
- Value-related
- People-related
- Organisational / inter-organisational
- Environmental

EACH OF THESE DOMAINS MAY HAVE ELEMENTS OF

Structural or logistical complexity (scale/ scope/ pace/ resources etc)
Socio-political complexity (stakeholder goals /conflicts of interest etc)
Emergent complexity (change over time / scope creep etc)
1. CONDITION
1A Nature of condition or illness
1B Comorbidities  1C Socio-cultural factors
DOMAIN 1: The condition or illness

**THE CONDITION**

**SIMPLE OR COMPLICATED**
- Well-characterized, well-understood, predictable (=> standardised management)

**COMPLEX**
- Poorly characterised, unpredictable or high-risk

**CO-MORBIDITIES / SOCIO-CULTURAL FACTORS**

**SIMPLE OR COMPLICATED**
- Unlikely to affect care significantly

**COMPLEX**
- Pose significant challenges to care planning & services
1. CONDITION
1A Nature of condition or illness
1B Comorbidities
1C Socio-cultural factors

TECHNOLOGY
2A Material properties
2B Knowledge to use
2C Knowledge generated
2D Supply model
2E Who owns the IP?
**DOMAIN 2: The technology**

<table>
<thead>
<tr>
<th>WHAT ARE THE TECHNOLOGY’S MATERIAL FEATURES?</th>
<th>SIMPLE OR COMPLICATED</th>
<th>COMPLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Already installed or off-the-shelf; dependable; freestanding OR interoperable with current system</td>
<td>Not yet developed; inter-operability [will be] a headache</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHAT KNOWLEDGE IS NEEDED TO USE IT?</th>
<th>SIMPLE OR COMPLICATED</th>
<th>COMPLEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or a simple set of instructions / IT support</td>
<td>Advanced training plus ongoing support</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHAT KIND OF KNOWLEDGE DOES IT BRING INTO PLAY?</th>
<th>SIMPLE OR COMPLICATED</th>
<th>COMPLEX</th>
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<tbody>
<tr>
<td>Data generated directly measures [changes in] the condition</td>
<td>Questionable link between data and [change in] condition</td>
<td></td>
</tr>
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</table>
## Domain 2: The technology

### What is the technology supply model?

<table>
<thead>
<tr>
<th>Simple or Complicated</th>
<th>Complex</th>
</tr>
</thead>
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<tr>
<td>Generic, plug-and-play or COTS (customisable off-the-shelf); easily substituted</td>
<td>Requires significant reconfiguration of current system; hard to substitute</td>
</tr>
</tbody>
</table>

### Who owns the IP generated by the technology?

<table>
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<th>Simple or Complicated</th>
<th>Complex</th>
</tr>
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<td>Data remains on local system; its ‘ownership’ is unambiguous and agreed</td>
<td>Technology generates higher-order data e.g. algorithms, whose IP is contested</td>
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3. VALUE PROPOSITION
3A Supply-side value (to developer)  3B Demand-side value (to patient)

4. Adoptor system
staff  patient caregivers

5. Health / care organization(s)
implementation work, adaptation, tinkering

6. Wider system

7. Continuous embedding and adaptation over time
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<tr>
<td>Business case is clear and rests on firm assumptions; strong chance of return on investment</td>
<td>Business case rests on questionable assumptions; significant risk to investors</td>
</tr>
<tr>
<td>Technology is known to be desirable for patients, safe and cost-effective</td>
<td>Patients may not want or need the technology, or it may be unsafe or unaffordable</td>
</tr>
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4A Staff (role, identity)
4B Patient (passive v active input)
4C Carers (available, type of input)

5. Health / care organization(s)
   implementation work, adaptation, tinkering

6. Wider system

7. Continuous embedding and adaptation over time
DOMAIN 4: The adopter system

**WHAT CHANGES ARE IMPLIED FOR STAFF?**

- SIMPLE OR COMPLICATED: No changes OR staff must learn new roles OR new staff be appointed
- COMPLEX: Threat to people’s jobs, scope of practice or professional identity

**WHAT IS EXPECTED OF THE PATIENT OR PRIMARY CARER?**

- SIMPLE OR COMPLICATED: Nothing OR very routine tasks e.g. log on, converse, enter data
- COMPLEX: Complex tasks e.g. make judgements, adjust treatment

**WHAT IS ASSUMED ABOUT THE WIDER CARE NETWORK?**

- SIMPLE OR COMPLICATED: No lay carer assumed
- COMPLEX: Network of lay carers is assumed
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5. ORGANISATION
   5A Capacity to innovate
   5B Readiness for this technology
   5C Nature of adoption / funding decision
   5D Extent of change needed to organisational routines
   5E Work needed to implement change

6. WIDER SYSTEM
   implementation work, adaptation, tinkering

7. Continuous embedding and adaptation over time
### DOMAIN 5: The organisation

**WHAT IS ITS CAPACITY TO INNOVATE (IN ANYTHING)?**

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<thead>
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<th>SIMPLE OR COMPLICATED</th>
<th>COMPLEX</th>
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<tr>
<td>Well-led; flat hierarchies; good relationships; slack resources; risk-taking is encouraged</td>
<td>Weak leadership; poor relations; rigid hierarchies; severe resource problems; risk-taking is punished</td>
</tr>
<tr>
<td>High tension for change; good innovation-system fit; widespread support (or opponents lack power)</td>
<td>No tension for change; poor innovation-system fit; key opponents have wrecking power</td>
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**HOW READY IS IT FOR THIS TECHNOLOGY-SUPPORTED CHANGE?**
### DOMAIN 5: The organisation

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<th>HOW EASY WILL THE FUNDING DECISION BE?</th>
<th>SIMPLE OR COMPLICATED</th>
<th>COMPLEX</th>
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<tbody>
<tr>
<td></td>
<td>One organisation OR existing partnership; adequate funds; anticipated cost-neutral or savings; no new infrastructure</td>
<td>Many organisations, not yet in partnership; funding model depends on cross-system savings</td>
</tr>
<tr>
<td>IMPLICATIONS FOR TEAM ROUTINES</td>
<td>None or minor</td>
<td>Significant disruptive changes needed</td>
</tr>
<tr>
<td>WHAT WORK IS NEEDED TO IMPLEMENT?</td>
<td>Shared vision already exists; few measures needed to develop and evaluate new practices</td>
<td>Significant work needed to build shared vision and implement it</td>
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6. WIDER SYSTEM e.g.
6A Political / policy context
6B Regulatory / legal issues
6C Professional bodies
6D Socio-cultural context
6E Inter-organisational networking

7. Continuous embedding and adaptation over time
DOMAIN 6: The wider system

**POLITICAL AND POLICY CONTEXT**
- Current or potential policy push
- Political opposition

**REGULATORY OR LEGAL HURDLES**
- None or easily surmountable
- No easy way through

**PROFESSIONAL BODIES**
- Positive or open to discussion
- Opposed

**CITIZENS / LAY PUBLIC**
- Positive or open to discussion
- Opposed

**INTER-ORGANISATIONAL NETWORKING**
- Already occurring
- Limited scope
7. EMBEDDING AND ADAPTATION OVER TIME
7A Scope for adaptation over time 7B Organisational resilience

5. ORGANISATION
5A Capacity to innovate
5B Readiness for this technology
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1. Continuous embedding and adaptation over time
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DOMAIN 7: Embedding and adapting over time

**SIMPLE OR COMPLICATED**
- Considerable scope, built into programme design
- Sense-making, reflection and adaptive action are ongoing and encouraged

**COMPLEX**
- Significant barriers to further adaptation
- Implementation model is rigid and inflexible; no reflection / adaptation allowed

**HOW MUCH SCOPE IS THERE TO ADAPT / CO-EVOLVE TECHNOLOGIES AND SERVICES?**

**HOW RESILIENT IS THE ORGANISATION FOR ADAPTING TO CRITICAL EVENTS?**
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5. ORGANISATION
   5A Capacity to innovate in general
   5B Readiness for this technology
   5C Nature of adoption / funding decision
   5DExtent of change needed to organisational routines
   5E Work needed to plan, implement and monitor change

6. WIDER SYSTEM e.g.
   6A Political / policy context
   6B Regulatory / legal issues
   6C Professional bodies
   6D Socio-cultural context
   6E Inter-organisational networking

7. EMBEDDING AND ADAPTATION OVER TIME
   7A Scope for adaptation over time
   7B Organisational resilience

7. Continuous embedding and adaptation over time
A technology-supported programme will be readily adopted, spread and sustained if all domains are ‘simple’

If several domains are ‘complicated’, the programme will be difficult, expensive and slow (but not impossible) to implement and sustain

If several domains are ‘complex’, it will be almost impossible to achieve sustained and widespread adoption of the programme
WHAT TO DO WITH THE NASSS FRAMEWORK?

1. Inform technology design
2. Reject technology ‘solutions’ that have limited chance of success
3. Explain past failures
4. Use NASSS Complexity Assessment Tool to identify, understand, reduce and manage complexity in new and emerging programs
5. YOUR IDEA HERE

We have begun to work with policymakers, design consultancies and technology companies in UK, Australia, Italy & Canada to apply the NASSS framework
IN PROGRESS: USING NASSS TO MANAGE COMPLEXITY

IDENTIFY AND UNDERSTAND COMPLEXITY
• Apply NASSS complexity assessment tool
• Tease out uncertainties and interdependencies (e.g. via narrative)

REDUCE COMPLEXITY WHERE POSSIBLE
• Limit scale / scope / interdependencies / pace (extend timescale)

‘RUN WITH’ COMPLEXITY e.g.
• Strengthen programme leadership
• Co-develop and sustain a clear and compelling vision
• Develop individuals and support their adaptive actions
• Provide slack resources
• Create incentives (but leave the detail to front-line people)
• Build relationships and manage stakeholder conflict
• Control programme growth (e.g. minimise scope creep)
• Improve policy or regulatory context
THANK YOU FOR YOUR ATTENTION

Professor Trisha Greenhalgh

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