**MANAGING YOUR TECHNOLOGY PROJECT – AN INTRODUCTORY GUIDE**

© Professor Trish Greenhalgh

University of Oxford

This guide is designed to help you plan, undertake and evaluate a technology-supported change project in health or social care. A high proportion such projects fail, but there are ways of improving the chances that your project will succeed.

Technology projects are characterized by complexity – they have multiple interacting variables which cannot be tightly controlled. Complexity makes projects unpredictable, difficult and risky.

The complexities in your project will be a combination of

* Structural (relating to size, scope, practicalities, resource constraints etc)
* Socio-political (relating to personalities, conflicts of interest, no-go areas, ‘wicked problems’) and
* Emergent (relating to how things eveolve, perhaps unexpectedly, over time)

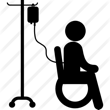
To manage these complexities, follow these principles:

1. Understand all the interacting elements of your project (see Part 1).
2. Try to reduce complexity where possible (see Part 2).
3. Build people’s capacity to respond to complexity (see Part 3).

This guide is intended to get you started and prompt conversations. You will need to revisit it (and perhaps re-write your responses to the questions) as your project unfolds.

**PART 1: UNDERSTANDING THE COMPLEXITIES IN YOUR PROJECT**

## The condition or illness

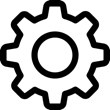
*Briefly describe the condition(s) for which the technology has been designed.*

*Complexity assessment (score 1 for every NO):*

1. *The condition is well-described and well-understood. Yes / No*
2. *It affects everyone in more or less the same way and has a predictable course over time. Yes / No*
3. *It mostly affects people who speak English and have moderate or high health literacy. Yes / No*
4. *Its management is not significantly affected by socio-cultural or religious factors. Yes / No*
5. *Most people affected can afford the treatments and other actions needed to manage it. Yes / No*
6. *Most people affected would be able to learn to use the technology. Yes / No*

***ILLNESS COMPLEXITY SCORE: /6***

## The technology

*Briefly describe the technology/ies.*

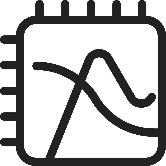
*Complexity assessment (score 1 for every NO):*

1. *The technology is already easily obtainable and dependable (e.g. doesn’t ‘crash’). Yes / No*
2. *The technology is affordable (both up-front and over time) and substitutable (i.e. if the supplier withdrew, it would be obtainable elsewhere). Yes / No*
3. *The technology is well-designed and easy to use within existing technical infrastructure & support. Yes / No*
4. *The technology generates data that are well-understood and accepted by the intended users, and which reflect how the condition is normally managed. Yes / No*
5. *If the technology is still developing, there is (or is likely to be) agreement on who owns and controls the intellectual property (IP) generated by its development. Yes / No*
6. *The technology has the potential to be adapted and further customised to take account of future clinical developments and other changes. Yes / No*

*[It may be appropriate to use the Digital Assessment Questionnaire on the NHS apps website* [*https://developer.nhs.uk/digital-tools/daq/*](https://developer.nhs.uk/digital-tools/daq/)*]*

***TECHNOLOGY COMPLEXITY SCORE: /6***

## The value proposition

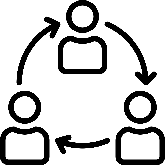
*Briefly describe the value (financial or otherwise) which the technology would bring to  
patients, to different parts of the health service and to manufacturers and investors.*

*Complexity assessment (score 1 for every NO):*

1. *The technology is desirable for patients and will bring them more benefits than harms or hassles. Yes / No*
2. *The technology has been shown to be effective through solid evidence (eg: clinical trials) and has successfully been deployed in at least one setting. Yes / No*
3. *The technology has been shown to be cost-effective (and if necessary has been ‘de-risked’ by removing costly but inessential features). Yes / No*
4. *The technology rests on a plausible business case including up-front investment, a well-defined customer base and market drivers, consideration of competing products and realistic assessment of the challenges of implementing at scale in a public-sector health or care environment. Yes / No*
5. *Relevant approvals (e.g. MHRA, CQC, NHS Safety Standards) are already in place. Yes / No*
6. *All stakeholders in the technology’s value chain will gain some value. Yes / No*

***VALUE PROPOSITION COMPLEXITY SCORE: /6***

## Potential adopters of the technology

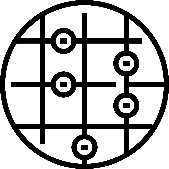
*Briefly describe the staff and lay people who are intended to use the technologies or who will be   
impacted indirectly by it. How do they perceive the technology? What are their concerns about it?*

*Complexity assessment (score 1 for every NO):*

1. *The technology is viewed positively by the staff who are intended to adopt it (e.g. they believe it will help them do their job better and/or save them time). Yes / No*
2. *The technology does not require the staff member to work in a way they would view as inappropriate, unprofessional or put patient safety at risk. Yes / No*
3. *Staff could learn to use the technology easily and require minimal support. Yes / No*
4. *Most patients could learn to use the technology easily and require minimal support. Yes / No*
5. *Patients will find the technology acceptable (e.g. appropriate for them, non-stigmatising). Yes / No*
6. *Others who may be impacted by the technology (e.g. carers, family members, support staff, budget holders) will find the technology acceptable and (where relevant) be able to learn to use it. Yes / No*

***ADOPTERS COMPLEXITY SCORE: /6***

## The organisation(s)

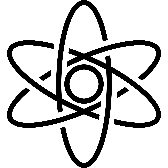
*Briefly describe the organisation(s) involved in the project and the routines and processes that  
will need to be aligned with the technology (and perhaps adapted to accommodate it). You  
may need to complete this section separately for the main and partner/impacted organisations.*

*Complexity assessment (score 1 for every NO; produce separate scores for each organisation if necessary):*

1. *The organisation has strong leadership, a clear mission and good internal relations (especially between clinicians and managers). Yes / No*
2. *The organisation is innovative (i.e. departments are encouraged to horizon-scan for new ideas and products and adopt these where appropriate without seeking top management authorisation). Yes / No*
3. *It is a learning organisation (staff are encouraged to meet and talk about new ideas and projects; there are measures in place to capture data and monitor progress; and risk-taking is encouraged). Yes / No*
4. *Resources (people, funding) are available to channel into new projects and products. Yes / No*
5. *The fit between the technology and the organisation is good; its adoption is a strategic priority. Yes / No*
6. *The technology will cause no (or minimal) disruption to existing organisational routines. Yes / No*

***ORGANISATION COMPLEXITY SCORE: /6***

## The wider context

*Describe the national and local context for the technology and the project. Why is this initiative   
happening now, and what are the key influences on its success from beyond the organisation?*

*Complexity assessment (score 1 for every NO):*

1. *The policy context for introducing the technology (and technology-supported change) is positive. Yes / No*
2. *There are no significant regulatory or legal hurdles to introducing this class of technology. Yes / No*
3. *Professional organisations (GMC, Royal Colleges, MPS) view the technology positively. Yes / No*
4. *Patient organisations, advocacy and lobbying groups view the technology positively. Yes / No*
5. *The technology industry views the technology positively and it uses industry-standard components. Yes / No*
6. *Other comparable organisations are introducing the technology and there is scope for inter-organisational knowledge exchange and mutual learning. Yes / No*

***WIDER CONTEXT COMPLEXITY SCORE: /6***

## Emergence over time

*Consider how this project, and all the different factors influencing it, will unfold over time.*

*Complexity assessment (score 1 for every NO):*

*Over the next 3-5 years:*

1. *The illness (and the population with the illness) is unlikely to change much. Yes / No*
2. *The current technology is unlikely to become obsolete or require replacing. Yes / No*
3. *The financial and wider value of the technology will remain about the same. Yes / No*
4. *There will be no major changes to target staff groups and how they view the technology, or to patient perceptions of the technology. Yes / No*
5. *The organisation(s) involved will have stable leadership, no restructurings and no changes in overall mission or strategy. Yes / No*
6. *The policy, regulatory and economic context for this innovation will be more or less stable. Yes / No*

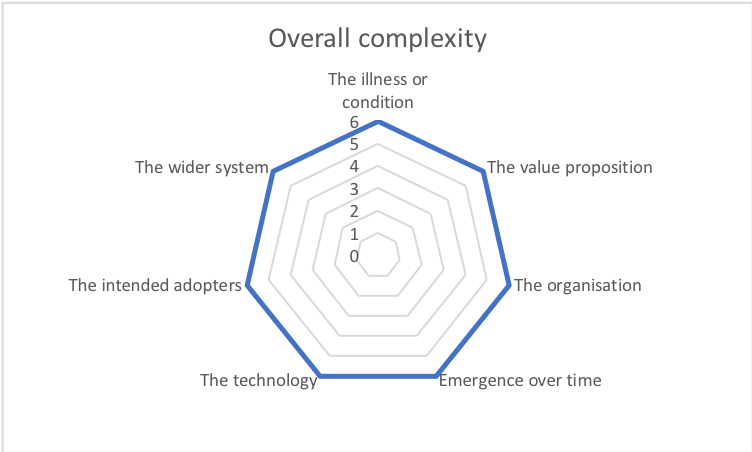
***EMERGENT COMPLEXITY SCORE: /6***

## SUMMARY

*Summarise the main themes you have described above. What do you think are the key uncertainties and interdependencies (in other words, which events or processes depend on some other event or process)? How might you begin to address them?*

*Add up the complexity scores for the different domains of the project (plot on the chart overleaf).*

* *The illness or condition: /6 The technology: /6*
* *The value proposition: /6 The intended adopters: /6*
* *The organisation: /6 The wider system: /6*
* *Emergence over time: /6* ***OVERALL COMPLEXITY SCORE: /42***



# PART 2: MAKING THE PROJECT LESS COMPLEX

Complex projects are much less likely to succeed than simple ones. Try to think of ways to reduce the complexity (that is, the uncertainties, interdependencies and unintended consequences) of the project.

|  |  |
| --- | --- |
| Aspect of complexity | Is this an issue in your project?  If so, how might you try to reduce complexity? |
| POSSIBILITIES FOR REDUCING ILLNESS COMPLEXITY | |
| 1. The illness or condition has not been clearly defined, or too little is known about it to inform planning. |  |
| 1. The illness or condition affects different people in very different ways, so a ‘one size fits all’ solution is unlikely to work. |  |
| 1. Many people with the condition have co-morbidities, which may mean they are unable to participate in, or benefit from, the innovation. |  |
| 1. Many people with the condition have cognitive impairment or low health literacy. |  |
| 1. Many people with the condition do not speak English [Welsh] fluently. |  |
| 1. Many people with the condition have relevant socio-cultural factors (e.g. homelessness). |  |
| 1. OTHER ILLNESS COMPLEXITIES (add your own suggestion here) |  |
| POSSIBILITIES FOR REDUCING TECHNICAL COMPLEXITY | |
| 1. The technology does not yet exist, and/or the project team are unfamiliar with it. |  |
| 1. It is unclear where the technology will come from, who will fund it or what it will cost. |  |
| 1. The technology supply chain is not yet in place. |  |
| 1. The technology cannot be installed until the system is upgraded (e.g. new hardware, better bandwidth). |  |
| 1. The plan is to install the technology across multiple technical systems so as to achieve ‘integration’. |  |
| 1. The technology may disrupt existing technical systems or processes. |  |
| 1. OTHER TECHNICAL COMPLEXITIES (add here) |  |
| POSSIBILITIES FOR REDUCING STRATEGIC COMPLEXITY | |
| 1. The vision and benefits for the project are not yet clear or have not yet been fully documented. |  |
| 1. The scope of the project is unclear or has not yet been agreed by all stakeholders. |  |
| 1. Measures of success do not exist or these have not yet been agreed by key stakeholders. |  |
| 1. Quality standards and regulatory requirements have not been fully defined (or key stakeholders don’t know about them or accept them). |  |
| 1. The decision to fund the project is going to involve more than one organisation or group. |  |
| 1. The financial implications of the project are unknown, or funds have not yet been agreed or allocated. |  |
| 1. The work will need to be carried out across more than one organisation or sector. |  |
| 1. The stipulated pace of the project (time to achieve key goals and milestones) seems unachievable. |  |
| 1. OTHER STRATEGIC COMPLEXITIES (add here) |  |
| POSSIBILITIES FOR REDUCING OPERATIONAL COMPLEXITY | |
| 1. The budget is insufficient or there is little or no flexibility in how it can be used. |  |
| 1. A schedule and resource plan does not yet exist. |  |
| 1. Key resources (e.g. test facilities, equipment) are not yet available where they will be needed. |  |
| 1. A great deal of work is needed to install the technology, train people to use it and align its use with organisational routines |  |
| 1. Evaluating the impact of the change will require new tools and data sources and/or additional work. |  |
| 1. Reporting mechanisms to get complete, timely, and accurate data have not yet been worked out. |  |
| 1. There are not yet sufficient people with the right skills available to participate in the project. |  |
| 1. There are not yet sufficient people who are allocated to the different aspects of the project. |  |
| 1. Project managers do not have adequate control of the staff doing key aspects of the project. |  |
| 1. Lines of responsibility for tasks and deliverables are not yet fully defined. |  |
| 1. OTHER OPERATIONAL COMPLEXITIES (add here) |  |
| POSSIBILITIES FOR REDUCING SOCIO-POLITICAL COMPLEXITIES | |
| 1. The fit between this technology-supported change and the organisation’s mission and strategy is poor, and/or people don’t agree that the change is desirable. |  |
| 1. The work does not have a clear sponsor in the organisation who recognizes its importance and helps negotiate its progress. |  |
| 1. Substantial work is needed to bring people on board and develop a shared, organisation-wide vision for the project. |  |
| 1. Key stakeholders are questioning the business case for the project. |  |
| 1. Support from external stakeholders is limited and/or they are not aligned or have in sufficient time. |  |
| 1. External stakeholders do not have a realistic, shared understanding of the implications of the project. |  |
| 1. Project team members have limited motivation and are not yet functioning well as a team. |  |
| 1. Managers are inexperienced in this kind of work. |  |
| 1. The work could be threatened by impending (or potential) organizational or cultural change. |  |
| 1. The core project team does not have the authority to make decisions and manage their work. |  |
| 1. The senior management team in the relevant department does not fully support the work. |  |
| 1. OTHER SOCIO-POLITICAL COMPLEXITIES (add here) |  |

# PART 3: IMPROVING PEOPLE’S ABILITY TO WORK WITH COMPLEXITY

However carefully you plan, complex projects always unfold in ways that are not fully predictable. Try to establish ways of running the project that includes a strong infrastructure for leadership, governance and project management but which also allows people to be flexible and creative. Here are some ideas.

## Articulate a vision for the project that people can understand and relate to

*Outline in broad terms what you are trying to achieve. Why does it matter? Why should people care about it and commit to it? Why is it a priority now? What will change as a result of the project?*

Hint: Don’t make this too detailed or too rigid (people will want to challenge it and refine it). Don’t use jargon or acronyms. Talk about patients not metrics.

## Set up an infrastructure for project management

*Who will actually manage the project (that is, assist in the planning, reporting and leadership of the project)? Where will the project office be? What are the details of the resources and lines of accountability?*

Hint: Getting the project management basics right at the start can contribute a great deal to the success of complex projects. In general, the project manager should not be a technical lead but a separate role.

## Establish strong but flexible project governance

*How will the project be overseen (e.g. steering group)? Complex projects unfold unpredictably, so the group or person that oversees the project needs to understand this and have measures in place to review progress and revise goals and milestones as needed.*

Hint: If you can get an existing committee or board to add this project to their regular agenda, you’ll find it easier to get senior people to show up to meetings.

## Negotiate a distributed leadership

*Complex projects usually need several people in leadership roles working collaboratively. Identify people to take on different role(s). Why and how might leadership be distributed and coordinated across your project?*

Hint: Get your intended leaders on board before you put their name against a task. They might like a say in which aspect of the project they take on.

## Stakeholder relationships

*Strong, trusting relationships are the foundation for effective troubleshooting when the unexpected occurs. List the different stakeholders (internal and external) who will need to be involved. What perspective will each bring? What stakeholder interactions and conflicts do you anticipate? How will you build relationships and draw all stakeholders into advancing a shared vision?*

Hint: Different stakeholder groups will see the project in very different ways and define ‘success’ differently. Bring them together for loosely-structured events. Arguments can be productive because they surface issues and values. Even if people don’t reach agreement they will learn about others’ perspectives and ‘red lines’.

## Set some short-term objectives

*Keeping the long-term vision in mind, prioritise three or four things you want to achieve in the next 6 weeks or so. Make them SMART – that is, specific, measurable, achievable, realistic and time-bound (by x date).*

Hint: When working in a complex system you won’t be able to make a detailed plan of every task or work package at the outset. But at any point in this emergent project you need to know what you’re currently working towards.

## Find light-touch but effective ways of measuring progress

*Consider how progress towards your short-term and objectives and longer-term goals will be measured (including who will collect, analyse and look at the data).*

Hint: This is not simply about monitoring and reporting on metrics in a ‘tick box’ way. It’s about capturing real-time data that allow you to build a narrative about what is happening and why, so as to inform learning and adjustment.

## Empower the front line

*Consider how you will devolve decision-making power, promote adaptive thinking and make resources available to enable individuals and teams to be creative and develop their own local solutions*

Hint: Keep rules and vertical reporting to a minimum. Don’t micro-manage. Provide a ‘draw-down’ budget for people to spend in ways they can justify to the project lead or steering group. Offer training in co-design (e.g. ‘serious play’).

## Summarise risks and challenges

*Inasmuch as they can be identified in advance, and drawing on your answers to the other questions above, outline the main risks to the project and how you plan to address them.*

Hint: Don’t focus solely on logistical risks and challenges. Think also about socio-political ones such as stakeholder conflicts and entrenched positions .

## Additional comments

*Make a note here about things not covered in the other questions but which are important for your project.*