90 Minute Tutorial

UCAAT October 2016

Human Factors for Test Automation

Isabel Evans

ie@isabelevans.uk

www.isabelevans.uk
Introduction

Agenda

• (Some) human factors
  – Exercises
• Lessons from Industrialisation
  – Exercises
• People and teams
  – Exercises

Objectives

1. Understand that automation / industrialization involves human factors;
2. Remember that other disciplines and industries have lessons for us;
3. Be introduced to models to help us understand how to work with people.

Abstract

Although this conference is about automation, people are at the heart of what is to be achieved by that push to industrialisation and tooling. People in teams are making the change from manual to automated testing and therefore factors of attitude to change, teamwork, motivation and communication are going to be very important. If automation projects are to succeed, we also need to consider human factors required for success.

When people’s jobs are industrialised, their reaction is often fear, disbelief and denial. Evidence from the history of the industrial revolutions – whether mechanical or information industrialisation – tells us that the very idea that activities requiring craftsmanship, cognitive skills, inventiveness, intelligence and other human traits can be done robotically or broken down into industrial steps is anathema to the people whose roles are affected. We can all see why other people’s roles can be automated… but we protect our own roles and humanity. At the same time, once roles have been automated and industrialised, the humans still required to operate the automation, or even over-ride it if it malfunctions, may become over-reliant and over-trusting of the automation and not notice when it goes wrong. Evidence from usability and user experience studies, as well as air crashes caused by pilot over-trust of the automatic pilot tell us that the automation and industrialisation includes encouraging people to continue to think.

Delegates will be provided with an opportunity to identify and discuss problems and potential solutions to human factor problems around implementation of industrialised automation, and a number of practical ways to address teamwork and human problems in projects. The methods presented are applicable to people in all forms of endeavour where change and specifically a move to automation/industrialisation is intended.

Isabel’s biography

Independent quality and testing consultant Isabel Evans has more than thirty years of IT experience in quality management and testing in the financial, communications, and software sectors. Her quality management work focuses on encouraging IT teams and customers to work together via flexible processes designed and tailored by the teams that use them. Isabel authored Achieving Software Quality Through Teamwork and chapters in Agile Testing: How to Succeed in an eXtreme Testing Environment; The Testing Practitioner; and Foundations of Software Testing. A popular speaker at software conferences worldwide, Isabel is a Chartered IT Professional and Fellow of the British Computer Society, and has been a member of software industry improvement working groups. Her latest research and practice is in User Experience Design and Testing, and the application of that to test automation tools.
Some human factors

Slide 3

1. Implementing automation and industrialization involves human factors of teamwork and beyond teamwork

(SOME) HUMAN FACTORS TO START

Slide 4: territory

Managing mental and physical territory

- Personal space: Continually panicky
- Flight distance: Continually alerted
- Alert distance: Can retreat
- Home range: Pathological behaviour
- Alerted: Able to roam
- Territory: Hyperaggressive
- Alerted: Coexist

People are at the heart of it all! The Conference is about automation but People are at the heart of what is to be achieved: People in teams, People making changes. Different people have different attitudes to change, and to teamwork. We are animals! We have Territory (Mental and physical).
Kubler-Ross: Attitudes to change

- Denial
- Ager
- Bargaining
- Depression
- Acceptance

Slide 6 & 7: adopter curve

Temperament – when do people adopt?

For the cartoon see https://ameyakulkarni.com/2014/06/

And when do ideas cross the chasm?

For the cartoon see https://ameyakulkarni.com/2014/06/
“Focus your effort on crossing the chasm and the first half of the curve”

https://scheubel.wordpress.com/2014/06/27/the-snake-that-swallowed-the-elephant-the-changeinnovation-adoption-curve/

Remember the Little Prince and the Snake eating the elephant.
Slide 9: Exercise

Have a go... think pair share

- Influences on automation
  - Why automate?
    - Reasons to automate
    - Reasons NOT to automate
  - How to automate
    - Enablers to automation
    - Blockers to automation

5 mins

Influences on automation

Why automate?

<table>
<thead>
<tr>
<th>Reasons to automate</th>
<th>Reasons NOT to automate</th>
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How to automate

<table>
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<th>Enablers to automation</th>
<th>Blockers to automation</th>
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Slide 10: Influence diagrams

Influences (1)

- hunger
- eat
- fullness

Slide 11

Influences (2)

- fat
- sad
- eat
**Influence, Habits and Triggers**

- Identify the routine
- Experiment with rewards
- Isolate the cue
- Have a plan

The Power of Habit: Why we do what we do and how to change by Charles Duhigg
Trickster Makes This World by Lewis Hyde

Slide 13: changing the habit by changing the short term reward
Have a go…  
think  
pair  
share  

- Influences on automation  
  - One reason (for managers) to automate... is to reduce cost and time?  
  - What happens to cost and time when you automate?  
    - Discuss what happens to cost and time when you introduce automation  
    - Draw a diagram to show what happens to cost and time when you introduce automation
**Slide 15**

**Automation – short term effect on perceived cost and time**

Be happy - do good - leave the world a better place than you found it

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change disruption
morale
trust in change
new automation
Desire for automation
change
disruption
trust in change
desire for change
change in direction

**Slide 16**

**Automation – medium term effect on actual cost and time**

Be happy - do good - leave the world a better place than you found it

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change disruption
morale
trust in change
new automation
Desire for automation
change
disruption
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desire for change
change in direction

Cost / Time to run Tests (this time)

Time to market

Automation – medium term effect on actual cost and time
Be happy - do good - leave the world a better place than you found it

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change disruption

morale

trust in change

Desire for automation

Cost/time to run once bedded in

Bedding in

Time to market

Cost / Time to run Tests (this time)

new automation

change in direction

desire for change

change in direction

automation – long(er) term effect on cost and time

Cost/time to run once bedded in

Bedding in

Time to market

Cost / Time to run Tests (this time)
Lessons from industrialisation

2. Other disciplines and industries have lessons we should apply to the industrialisation of our own industry

LESSONS FROM INDUSTRIALISATION

Industrial revolution 1

Factories & Steam Power (~1760)

Opposed by: Luddite Rebellion 1811 - 1813

Textile workers with Grievances
- Wage cutting
- Use of un-apprenticed youths
- “wide frames” which produced
- Cheap inferior quality goods... Destroying the reputation of their trade.
- http://www.luddites200.org.uk/theLuddites.html
Industrial revolution 2

Steel & Mass Production (~1850)

Opposed by e.g. Tolpuddle Martyrs 1832

https://en.wikipedia.org/wiki/Tolpuddle_Martyrs
https://en.wikipedia.org/wiki/Trade_union

God is our guide! from field, from wave,
From plough, from anvil, and from loom;
We come, our country's rights to save,
And speak a tyrant faction's doom:
We raise the watch-word liberty;
We will, we will, we will be free!

Opposed by: e.g. Sheffield Outrages 1860's

Early success in steel production
Long working hours
Desperately unpleasant conditions
Little or no safety

Grinder’s Asthma:
They usually begin their work in the fourteenth year, and if they have good constitutions,
rarely notice any symptoms before the twentieth year...
https://en.wikipedia.org/wiki/Sheffield_Outrages
**Industrial revolution 3**

“in 20 years time, there won’t be any working class people – they will have just died out…”

Computer Science student 1976

Electronics & IT (~1970)

“The Collapse of Work” Sherman and Jenkins 1979

... a career on the stage or in the arts...

**Industrial revolution 4**

“Industrie 4.0 with the idea of the smart factory, made up of smart communicating robots – and where the product itself is ‘smart’ enough to know aspects of how it should be built (for example, with an RFID chip describing its size, colour, etc.)”

Dr Stuart Reid STA
And whose job is affected now?

http://crest.cs.ucl.ac.uk/cow/47/slides/cow47_White.pdf (Borrowed from David White, CREST, UCL)

“Looks forward to a world in which our successors regard human programmers as a quaint anachronism of the past” in the same way that we now regard the human computers of our nineteenth and twentieth century forbearers…”


http://www.theallium.com/engineering/computer-programming-to-be-officially-renamed-gogling-stackoverflow/


People fear automation

- We value...
  - Craftsmanship
  - Cognitive skills
  - Inventiveness & intelligence
  - and other human traits
- We resent and fear
  - Robotics
  - Industrial steps
  - When they affect our speciality.
- What fears might people have about automation?
- Choose 2 or 3 roles in an IT project
- For each role discuss and list
  - What affect will automation actually have for them?
  - What might they perceive as the effect of automation?
More People- Models for teamwork

3. Models exist to help us understand how to work with rather than against people in and affected by our projects

MORE PEOPLE - MODELS FOR TEAMWORK

Slide 27: heroes and demons

Wish Mania: From heroes to demons...

‘a rapid, spontaneous spread of false, exaggerated, or unsubstantiated beliefs within a diffuse collective such as a community, region or country’

Heightened level of adoration
Euphoric joy, awe and hope
Positive expectations
That are disproportional to what can be achieved

Volatile and easily replaced by dashed hopes and hostility
Leading to...

Heightened level of concern
Viewed as a threat
Consensus that it is a serious threat
Requiring action

“the demands, incentives and pressures of democratic politics creates and sustains a boom-and-bust cycle of heroic expectations and dashed hopes”

Moral Panic Studies Working Paper Series* From Folk Devils to Folk Heroes: Rethinking the Theory of Moral Panics Matthew Wood and Matthew Flinders University of Sheffield, UK

https://www.brunel.ac.uk/__data/assets/pdf_file/0009/255339/20122FromFolkDevilstoFolkHeroesWoodandFlinders.pdf
Safety bias: can we trust automation?  
Always...?

- We still need people
  - operate the automation
  - over-ride it if it malfunctions
- We need a team
  - Wallace needs Gromit, and
  - Gromit needs Wallace

Safety bias: becoming over-trusting
People become over-reliant and over-trusting
  not notice when it goes wrong
  usability and user experience studies
  air crashes caused by pilot over-trust of automatic pilot
Encourage people to continue to think!
  Roger McKinley (one of the developers of the satnav) recently remarked “My fear is that blindly following the commands of a satnav can generally make us less alert” (I journal 20-05-16).

Who flies the plane?

“...a contributing factor to the accident was the fact that two crewmembers failed to successfully communicate concerns to the captain that the plane was running low on fuel. They knew the plane would likely run out of fuel, but the captain didn’t get clued in...”

See also:
Malcolm Gladwell:
“Outliers”
Do you trust your automation?

Software tester finding decision making not supported by IT toolset:

“The test tool marked all the tests as passed except 1, but in fact none of the tests marked “passed” had actually run”

Quote from Fewster and Graham “Experiences of Test Automation”
80% of the success is due to preparation
We’re here at the testing conference: before your team starts testing, test your team first
Imagine: you’re starting a project with a team, you don’t really know the people in the project well or at all: what happens typically?

This is the Drexler-Sibbert model for team work, I was introduced to it by Nadine Raes from AQIS.

See: https://www.youtube.com/watch?v=WA3VkPHp2z0

See: http://aqis.be/

The model is summarized in words on the next page.
The model in words:

<table>
<thead>
<tr>
<th>Step</th>
<th>Summary</th>
<th>if unresolved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ME-step:orientation</td>
<td><strong>WHY am I here?</strong>-&gt; purpose Why am I here?-&gt; identity within group Why are WE here?-&gt; membership of group</td>
<td>If Unresolved: Disorientation Uncertainty Fear</td>
</tr>
<tr>
<td>2. OTHERS – trust building</td>
<td><strong>Who are you?</strong> Understanding the others... Personalities... Think or feel? Talk it through or think it through? Detailed instructions or helicopter view? Make decisions quickly or postpone? Monitor steady progress or feel the adrenaline towards the end? Does the other one have the competencies? Open up to each other’s talents and contributions Willing to share (info, expertise, cultural differences)</td>
<td>If Blocked in here: caution/façade/silence/skepticism mistrust</td>
</tr>
<tr>
<td>3. Goal clarification</td>
<td><strong>WHAT are we doing?</strong> Clear understanding of the job Generate agreements about the goals and specific deliverables -&gt; explicit assumptions (write them down) -&gt; measurable objectives -&gt; shared vision / imagine the success (sports)</td>
<td>If Blocked: skepticism/silence / irrelevant competition</td>
</tr>
<tr>
<td>4. Commitment</td>
<td><strong>HOW will we do it?</strong> Committing to specific actions Making decisions about resources Being clear about roles</td>
<td>If Blocked: Unclarity -&gt; dependent on leader Resistance Step 1 – 4: if blocked in these stages: like petanque ball – it won’t bounce</td>
</tr>
<tr>
<td>5. Implementation</td>
<td><strong>WHO does WHAT, WHERE and WHEN?</strong> Scheduling &amp; sequencing the work over time Clear processes Alignment with the purpose/goals Disciplined execution</td>
<td>If Blocked: conflict, blame, nonalignment &amp; missed deadlines, disagreements about qual. standards</td>
</tr>
<tr>
<td>6. High performance</td>
<td><strong>WOW – a flow state!</strong> Spontaneous interaction Synergy Surpassing their expectations on results (with hard work, practice, mastery of tools) ! Is not a stable state! Really important!</td>
<td>If Blocked: overload (workaholics) and disharmony (new members) – expressed discontent, stress, sickness</td>
</tr>
<tr>
<td>7. Renewal</td>
<td><strong>WHY continue?</strong> Examine “lessons learned” Still needed? – changes? – back to step 1 If not: wrap up, recognize &amp; celebrate and free team members to move on</td>
<td>If Blocked: boredom and burnout Signs: working day &amp; night, over weekends over a long time, feeling underappreciated or disengaged</td>
</tr>
</tbody>
</table>
Clean workspaces

- Keep it clean!
  - Ship shape and Bristol Fashion
  - Back stage rules
  - Horticulture and garden sheds

- So – code, automation, tests?

Information design

- People-centred, not tech-centred
- Apply Nielsen’s Heuristics to the automation interfaces
  - [https://www.nngroup.com/articles/ten-usability-heuristics/](https://www.nngroup.com/articles/ten-usability-heuristics/)
- Apply information design models from Tufte to the reporting from the automation
  - [https://www.edwardtufte.com/tufte/](https://www.edwardtufte.com/tufte/)
Quality viewpoints

• When designing automation, remember to consider all quality viewpoints:
  – Manufacturing
  – Product
  – User
  – Value
  – Transcendent
Slide 34: Exercise

Have a go…
think
pair
share

- Is there hero-worship or demonization in your workplace?
- Any safety bias?
- When you built the automation team did you go through steps to build it?
- Did you include automation users?
  - People centred approaches?
  - Quality viewpoints?

10 mins
Slide 35: Action plan

As a result of this session I will....
Three key points

• 1. Implementing automation and industrialization involves human factors of teamwork and beyond teamwork;
• 2. Other disciplines and industries have lessons we should apply to the industrialisation of our own industry;
• 3. Models exist to help us understand how to work with rather than against people in and affected by our projects.

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ie@isabelevans.uk
www.isabelevans.uk

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