

The Phylogenetic Tree in Forms Design

Making forms work for complex academic applications

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Hi, I'm Karen

- Background in biology
- Worked in bioinformatics
- Moved into digital product management
- Currently Digital Product Manager
at the University of Cambridge



Hi, I'm Caroline

- Background in mathematics and project management
- Moved into human-computer interaction
 - Which became usability
 - Which became user experience
- Forms and survey specialist at Effortmark
- Associate lecturer, course team member, forms consultant, and web consultant with the Open University, 1996 to 2013



Both of us worked with the European Patent Office

Caroline worked with Rank Xerox to create their service to scan and digitise European patents, 1990-91.

Lesson learned: patents are hard on spell-check.

Karen worked as a Technical Writer for Bioinformatics at the European Patent Office, 2007.

Lesson learned: 3D patent data is hard on databases



We knew you'd want an example

USE OF (RS)-S-CYCLOPROPYL-S-(4-{[4-{[1R,
2R)-2-HYDROXY-1-METHYLPROPYL]OXY}-5-(TRIFLUOROMETHYL)PYRIMIDIN-2-YL]AMINO}PHENYL)SULFOXIMIDE FOR
TREATING SPECIFIC TUMOURS

Abstract

The invention relates to the use of (R)-S-cyclopropyl-S-(4-{[4-{[(1R,
2R)-2-hydroxy-1-methylpropyl]oxy}-5-(trifluoromethyl)pyrimidin-2-yl]amino}phenyl)sulfoximide and/or
(S)-S-cyclopropyl-S-(4-{[4-{[(1R, 2R)-2-hydroxy-1-methylpropyl]oxy}-5-(trifluoromethyl)pyrimidin-2-yl]amino}phenyl)sulfoximide
for treating specific tumours.

To read this patent:

<https://worldwide.espacenet.com/patent/search/family/047891732/publication/WO2013139734A1?q=WO2013139734A1>

We both use lots of user-centred design techniques

User research

Service design

Content design

Interaction design

Data mapping

Data science

The problem space

We now both work in forms

Academics must apply for grants, awards, funds

For example, these are some current areas of work

- “Lights could be the future of the internet and data transmission”
- “Conservation: it’s time to look at the evidence”
- “Tumour ‘signatures’ could provide key to more accurate treatment for deadliest cancers”
- “The future of work”

There are many roles in grant applications

“You need to be registered with [redacted] to **apply** or **participate** in an application, unless you are a **Collaborator** or **Mentor** only ...

If you previously had an [redacted] account, are a **Committee Member** or have been a **Peer Reviewer** with us ...”

Other roles mentioned:

Applicant

Sponsor

Supervisor

Delegate

Authorised Approver

Head of Department

Authorised Organisational Approver

Extract from the help from an organisation that gives major grants

The questions are often complex

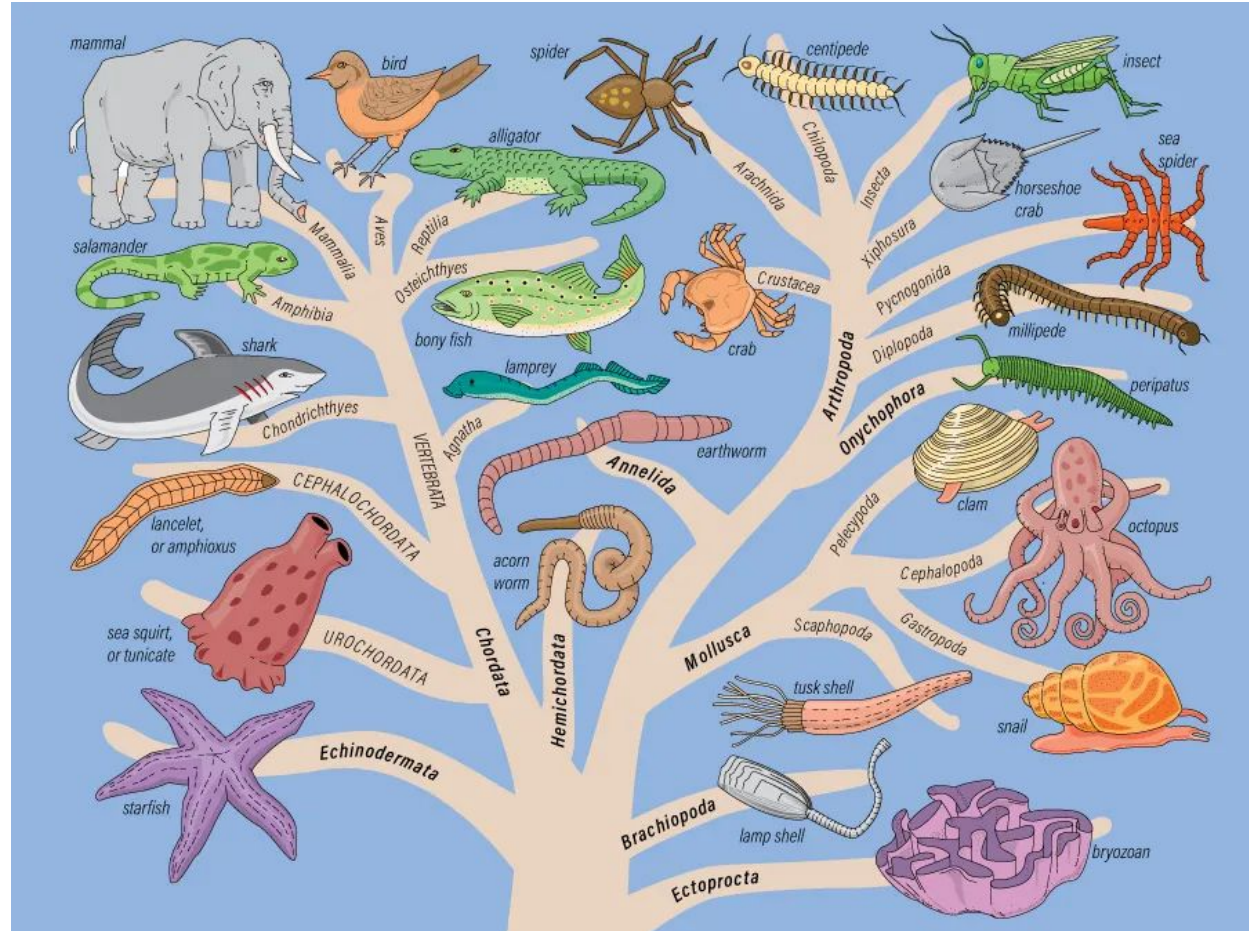
“8 Scheme of Research or Training (Please describe in no more than 750 words the project for which you are seeking an award drawing attention to the aims and context of your research, the significance of your project, and previous results that are of relevance to this application).”

Extract from an application form for grants of “up to £3000 but usually in the region of £1000” in archaeology
K

Thinking about the problem

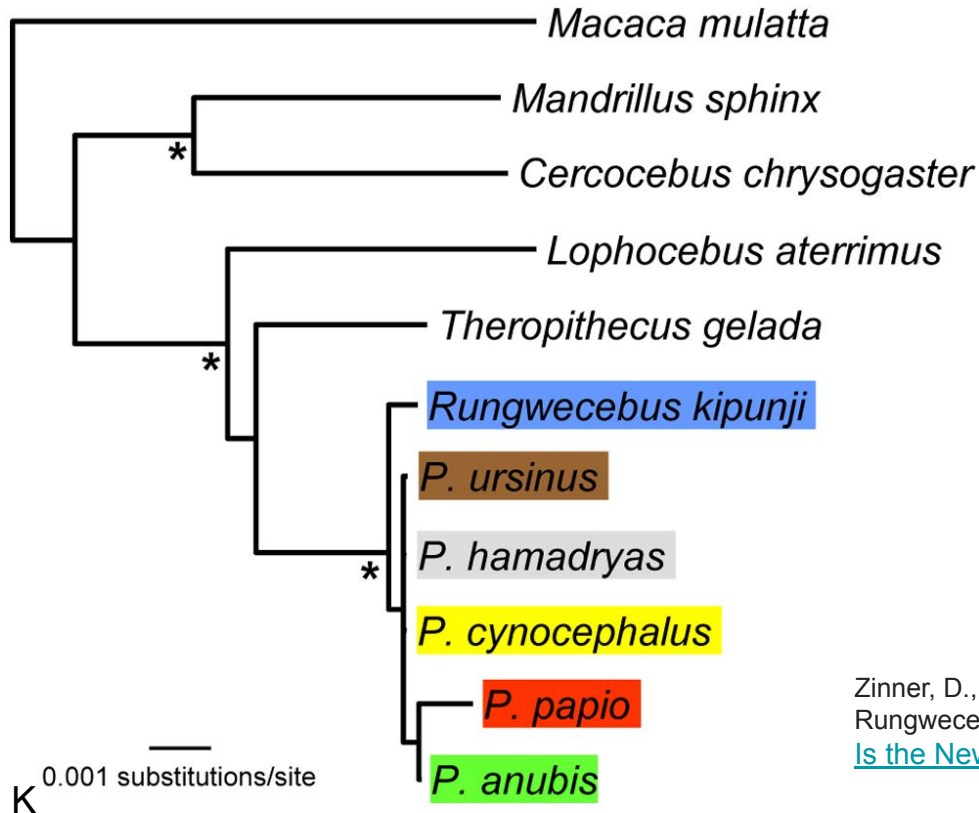
How to organise many people and diverse questions

Phylogenetic trees show relationships



Dubey, Anna. "How Do You Read Phylogenetic Trees?". *Encyclopedia Britannica*, 27 Jul. 2022, <https://www.britannica.com/story/how-do-you-read-phylogenetic-trees>. Accessed 14 August 2023.

Biologists use them for organisation, too



Zinner, D., Arnold, M. L., & Roos, C. (2009). Is the new primate genus *Rungwecebus* a baboon?. *PloS one*, 4(3), e4859.

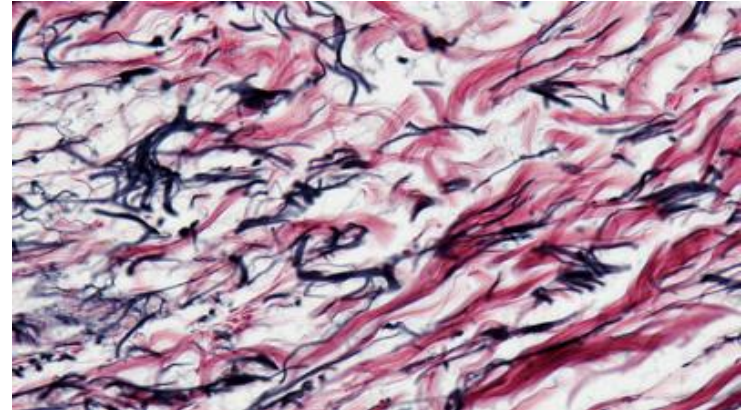
[Is the New Primate Genus *Rungwecebus* a Baboon? | PLOS ONE](#)

Grant awards request different types of information

What are the areas that create a pivot in the phylogenetic tree?

Some examples:

- Are you working on an international collaboration?
- Will you need assistance from your university's contracts team?
- What are your infrastructure needs?
- What is your research type?
- Are there any ethics requirements based on your research type?



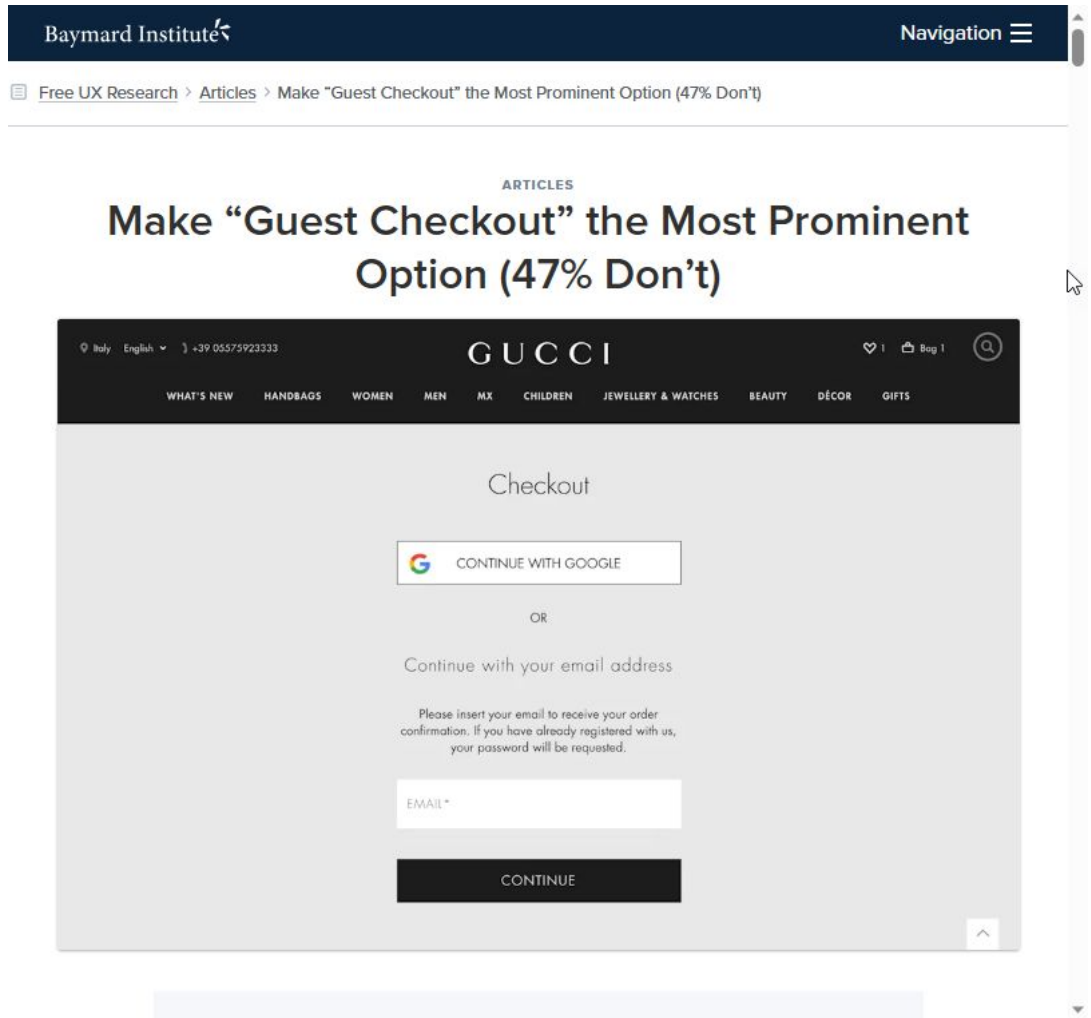
Connective Tissue: Human Elastic Tissue,
microscope image from Berkshire Community College
<https://www.flickr.com/photos/146824358@N03/41813163882>

Patterns and their limits

Where we are with forms advice

Much of our current forms advice is for simple forms

<https://baymard.com/blog/make-guest-checkout-prominent>



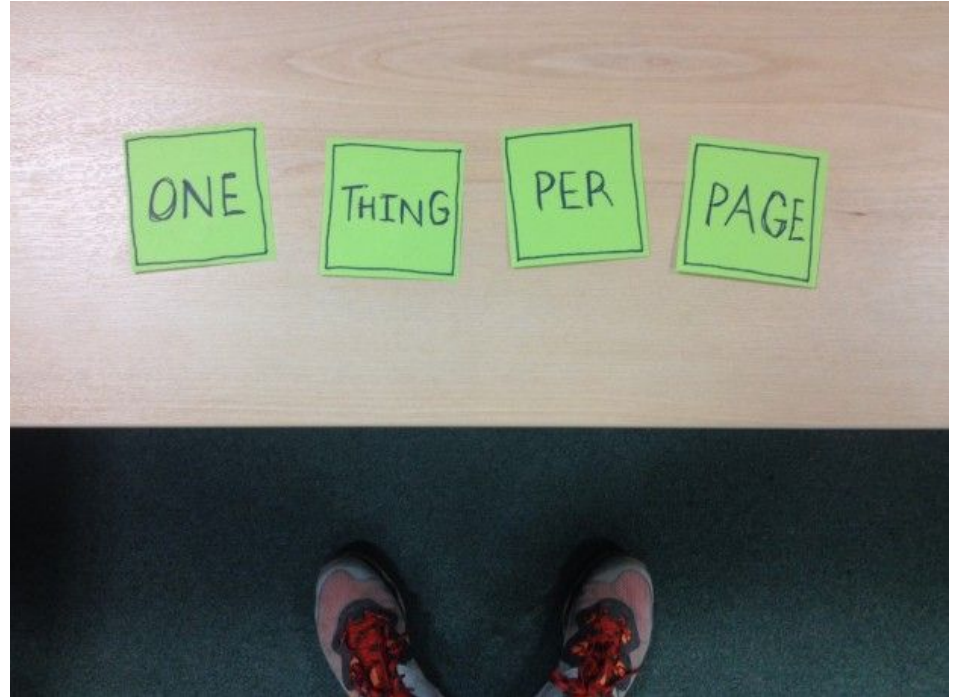
“Begin prototyping with one thing per page”

We noticed that many forms we reviewed had far too much stuff on each page.

It's better to:

- begin prototyping with one thing per page
- do user research to decide how to group things into pages

Sometimes one question per page is plenty.



Some forms have hundreds of boxes

We need structures to help people to understand and get through complex forms like this one

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1164692/IHT400_English.pdf

What makes up your Inheritance Tax account – schedules

To make a complete account of the estate you may need to fill in some separate schedules.

Answer the following questions by ticking the 'No' or 'Yes' box.

29a Residence nil rate band Do you want to use the residence nil rate band? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT435	35 Household and personal goods donated to charity Do the people who inherit the deceased's household goods and personal possessions want to donate some or all of them to a qualifying charity and deduct charity exemption from the value of the estate? For example, they may wish to donate the deceased's furniture to a charity shop No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT408
29b Transfer of unused residence nil rate band Do you want to transfer any unused residence nil rate band from the deceased's spouse or civil partner who died before them? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT436	36 Pensions Did the deceased have any provision for retirement other than the State Pension? For example, a pension from an employer, a personal pension policy (or an alternatively secured pension) No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT409
29c Transfer of unused nil rate band Do you want to transfer any unused nil rate band from the deceased's spouse or civil partner who died before them? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT402	37 Life assurance and annuities Did the deceased pay premiums on any life assurance policies, annuities or other products which are payable either to their estate, to another person or which continue after death? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT410
30 Gifts and other transfers of value Did the deceased make any lifetime gifts or other transfers of value on or after 18 March 1986? See IHT400, 'Notes' No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT403	38 Listed stocks and shares Did the deceased own any listed stocks and shares or stocks and shares ISAs (excluding control holdings)? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT411
31 Jointly owned assets Did the deceased jointly own any assets (other than business or partnership assets) with any other persons? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT404	39 Unlisted stocks and shares and control holdings Did the deceased own any unlisted stocks and shares, or any control holdings of any listed shares? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT412
32 Houses, land, buildings and interests in land Did the deceased own any houses, land or buildings or have rights over land in the UK in their sole name? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT405	40 Business Relief, business and partnership interests and assets Do you want to deduct Business Relief from any business interests and assets owned by the deceased or a partnership in which they were a partner? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT413
33 Bank and building society accounts Did the deceased hold any bank or building society accounts in their sole name, including cash ISAs, National Savings and Premium Bonds? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT406	41 Farms, farmhouses and farmland Do you want to deduct Agricultural Relief from any farmhouses, farms or farmland owned by the deceased? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT414
34 Household and personal goods Did the deceased own any household goods or personal possessions? No <input type="checkbox"/> Yes <input type="checkbox"/> Use Schedule IHT407 If the deceased did not own any household goods or personal possessions or they do not have any value, please explain the circumstances in the 'Additional information' boxes on page 16.	

The 'task list' pattern helps with complex forms

Task lists break up the form into sections

For the Census, this task list appeared after doing the section 'People who live here'.

Choose another section to complete

✓ People who live here	Completed	View answers
Household and accommodation	Not started	Start section
Caroline Jarrett	Not started	Start section
Malcolm Jarrett	Not started	Start section

> [If you can't answer someone else's questions](#)

Continue

Task lists still need attention and content design

Ask users for...

[Addresses](#)

[Bank details](#)

[Dates](#)

[Email addresses](#)

[Equality information](#)

[Gender or sex](#)

[Names](#)

[National Insurance numbers](#)

[Passwords](#)

[Payment card details](#)

[Telephone numbers](#)

Help users to...

[Check a service is suitable](#)

[Check answers](#)

[Confirm a phone number](#)

[Confirm an email address](#)

[Contact a department or service team](#)

Pages

Task list pages

BEING WORKED ON

A cross-government group is collaborating on work to [update this pattern and build it as a component](#).

Task list pages help users understand:

- the tasks involved in completing a transaction
- the order they should complete tasks in
- when they've completed tasks

The screenshot shows a GOV.UK page header with the logo and 'Service Name'. Below the header, the main heading reads 'Service name goes here'. Underneath, there is a section titled 'Application incomplete' with the text 'You have completed 3 of 8 sections.' Below this, a numbered list starts with '1. Check before you start'. At the bottom of the list, there is a link 'Check eligibility' followed by a blue 'COMPLETED' badge.

We don't yet have patterns for multiple people answering



Office for National Statistics

census2021 Save and sign out ↗

Choose another section to complete

✓ People who live here	Completed	View answers
Household and accommodation	Not started	Start section
Caroline Jarrett	Not started	Start section
Malcolm Jarrett	Not started	Start section

> [If you can't answer someone else's questions](#)

Continue

We can see some tasks lists in grant applications

Have all eligible costs been included in the application?

Have you complied with the funder guidance?

What is your statement of intent?

Have you completed the risk assessment?

Do you require a data management plan?

Have you completed the justification of resources?

Forms get harder as they get more complex

Forms that have one person dealing with them

- Single use / one off (buy something from a website we're using once)
- Simple, repeated (pay congestion charge)
- Complex / individual (Self Assessment tax)

Forms that have multiple people dealing with them

- Complex / multi-person (Getting a joint bank account for three people)
- Complex / multi-person / multi-department / multi-organisation (Collate, check, submit grant application)

Patterns work OK for the first three

We have patterns for single-person forms

- Single use / one off (buy something from a website we're using once)
- Simple, repeated (pay congestion charge)
- Complex / individual (Self Assessment tax)

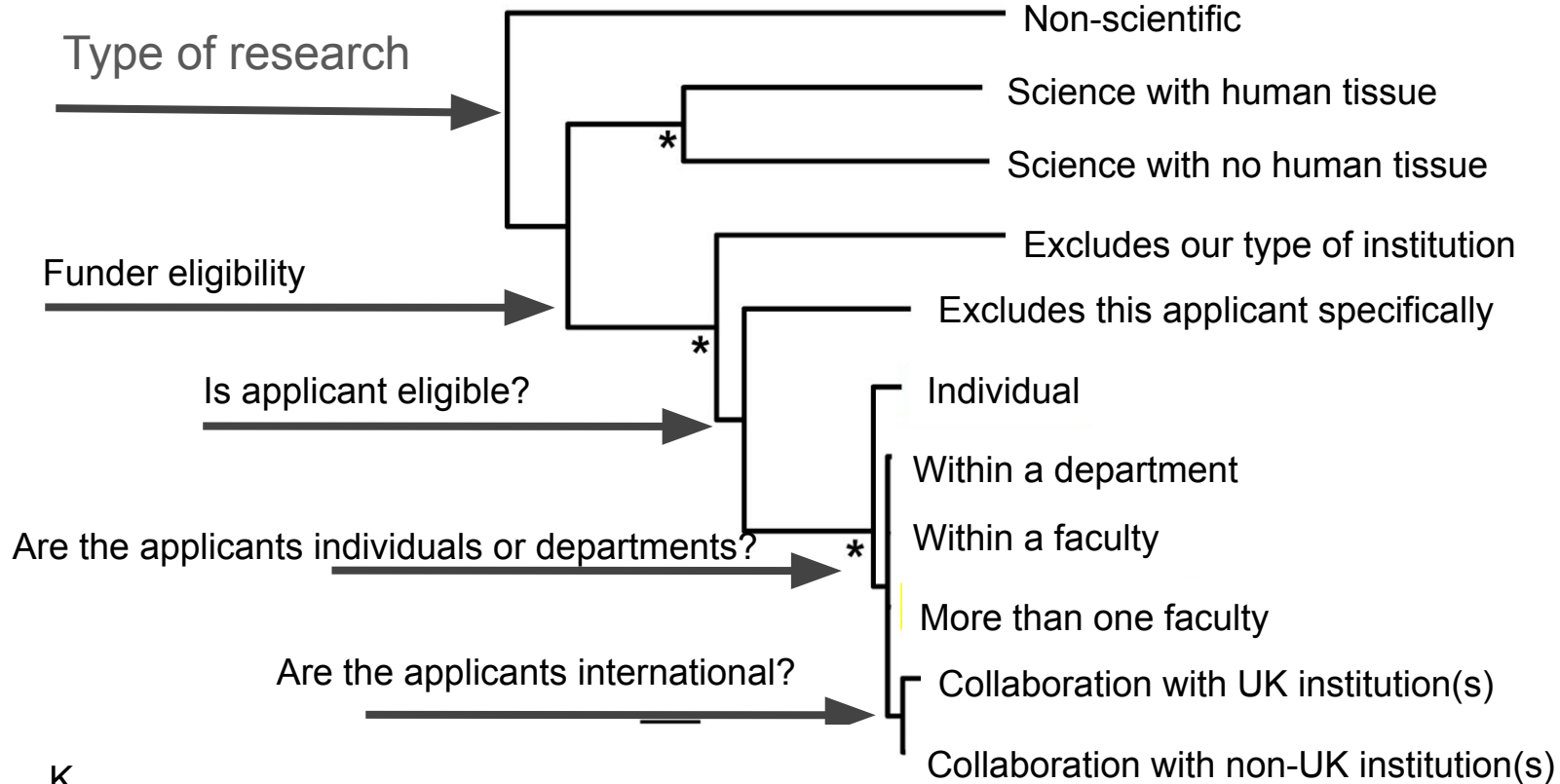
But not for these ones, we don't do multi-person well at all

- Complex / multi-person (Job application including getting references)
- Complex / multi-person / multi-department (Collate, check, submit grant application)

How this could work

Trees and storyboards

Our phylogenetic tree might show the complexity



We want process clarity and transparency

Everyone involved needs to:

- Know what they have to do and why
- Understand where they are in the process
- Commit to and meet deadlines
- Communicate information between users in as few steps as possible
- Increase process transparency
- Prevent duplication of effort

There's a tension between people involved

PIs want to do this at the last minute and prefer to get on with their research (their real work)

Administrators want to manage their workload and this is their real work

Dept admin want reassurance that the application covers everything the main central office is looking for

We want to:

- Reduce frustration over checking deadlines and perceived delays
- Eliminate the perception that getting applications checked is a battle

Here is an example of a PI



Andrew White

@andrewwhite01



Academia has drifted so far from reality, where grant writing/admin is more important than science. And your students' livelihood is held hostage for things like not wanting to keep writing grants, not wanting to focus on maximizing publication number, or taking a sabbatical. 4/7

1:35 AM · Sep 27, 2023 · **16.5K** Views



We use storyboards to understand patterns of use



Ideate | storyboards to understand context of use

1 Reese Researcher is working on a grant application and Drew (her admin) wants to make sure they complete all the correct application checks to ensure it moves along the pipeline quickly.

Drew Reese

2 Drew logs in to the checklist portal and inputs the application information. The system generates a personalised application checklist for Drew to follow.

For Drew to check:

- 1
- 2
- 3
- 4

3 Drew notices the need to check on the funding eligibility, and he wonders why he has to use the checklist form and asks a brief and light explanation of why he needs to do this.

For Drew to check:

- 1 *(This is why Rita needs to respond)*
- 2
- 3
- 4

4 With a better understanding of why he is doing the checks, Drew confidently follows the checklist, knowing that he is working on the correct checks in the right order.

For Drew to check:

- 1
- 2
- 3
- 4

5 Rita (Drew's admin) confirms that Drew has completed checks. She helps her with a warning about the pipeline and goes for her weekend.

For Rita to check later:

- 1
- 2
- 3
- 4

6 Drew completes his checks, and the checklist notifies Rita to carry on with the next step.

For Rita to check:

- 1
- 2
- 3
- 4

7 Checks by Rita (Drew's admin) are complete and all accurate. The checklist app notifies Drew by sending a congratulatory message.

WOOHOO!

text blurred because this is work in progress

[Costing & pricing co-creation findings.pptx](#)

Please help us: what do we call this thing?

Checklist? - not about checking

Guided pathway? - sounds like something a bus is doing

Pre Award Application Guidance

Any ideas?

Feel welcome to connect with us

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[@cjforms@mastodon.social](https://mastodon.social/@cjforms)
[@cjforms.bsky.social](https://bsky.social/@cjforms)
[linkedin.com/in/carolinejarrett/](https://www.linkedin.com/in/carolinejarrett/)

A few quick notes on the discussion afterwards - 1

Comparing the concept with deciding on a bus journey / making an itinerary

How important is it to see status? Have a look at tools that devs use e.g. for Agile

Think about filtering - (build Jira) - across teams

Application system for the Federation of European Biochemists, which had decision trees

Navigation was a keyword

Formstack has a concept of 'workflows' where a form gets assigned to different people. What about 'grantflow' as a name?

Every department has their own checklist(s) - disparate. Putting it all together is where the challenge

A few quick notes on the discussion afterwards - 2

Make sure we understand the pressures on individual people. Think about prototyping the workload - understand all the (competing) deadlines and the pre-deadline deadlines.

Creating visibility would help here

“Tracking” and “predicting” are words to think about

Knowing where to step in because some things aren't happening on time

What about 'Clearview' as a name?