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Some challenges facing software engineers developing software for scientists.

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Contents

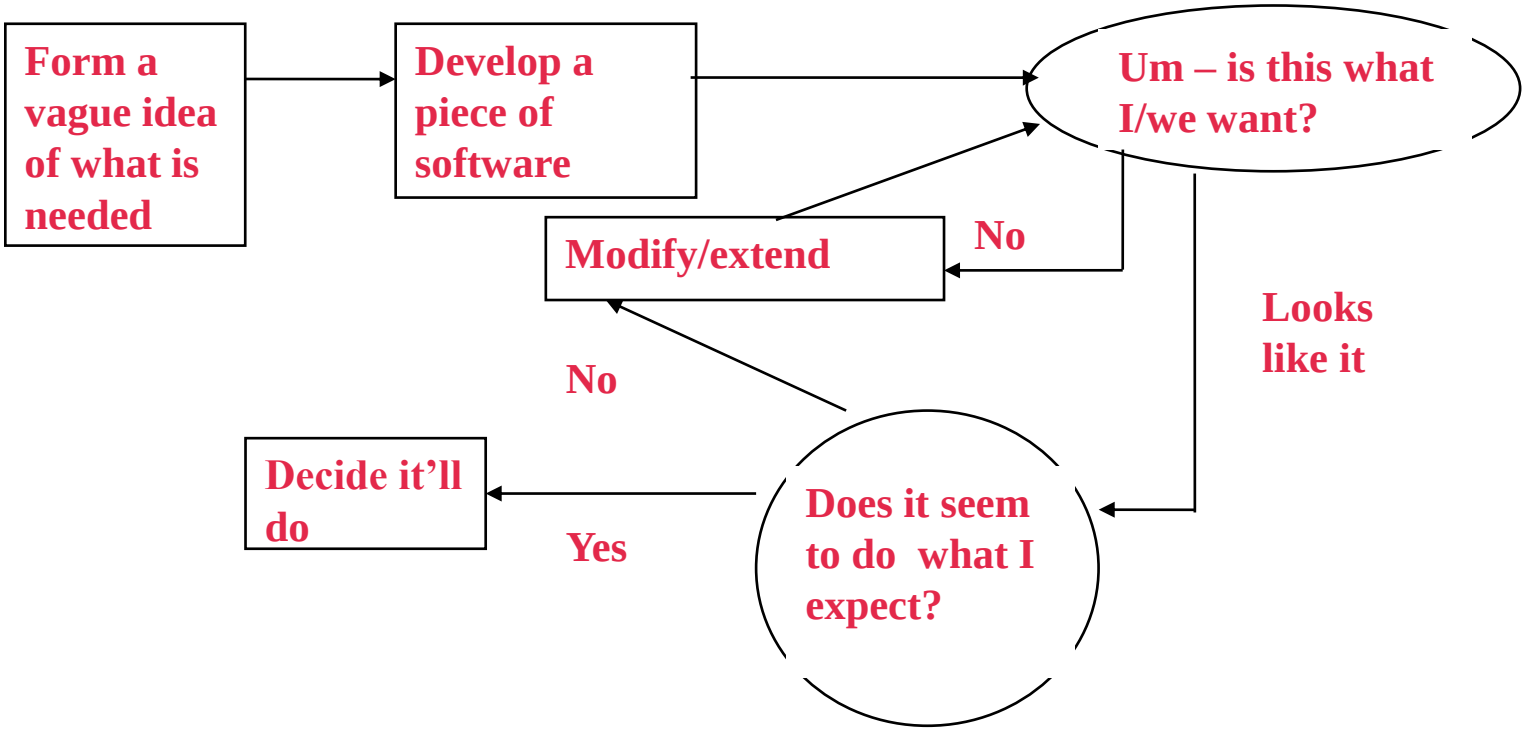
This list is far from exhaustive

- Based on my field studies (so not HPC)
- Socio-technical rather than technological

1. Those due to the scientists being ‘professional end-user developers’ (that is, having experience of developing their own software)
2. Those which are not unique to scientists but have particular salience in a scientific context
   a) The effective involvement of users
   b) Developing software for a community

1. Challenges that are reasonably well understood.

A model of scientists developing their own software – an iterative, incremental, feedback model



This is a very successful model – but only in a very **particular** context….

- The developers are the end-users or at least embedded in the end-user community. So:
  - Establishment of requirements
  - Testing

  are not considered to be major concerns.
- The software is developed to address a particular problem of a particular group at a particular point in time. So:
  - Comprehensibility, maintainability, portability not of concern

The success of this model (albeit in a very limited context) leads to the following risk:-

That scientists think they KNOW how to develop software in any context

The challenge to software engineers: managing scientists' expectations

- The establishing of requirements by software engineers is generally a more major resource intensive concern than scientists expect
- Ditto testing
- Software development in general takes longer than scientists expect.

This challenge is exacerbated by scientists' values:

- Scientists value scientific knowledge and skill over software development and skill
- "anybody can develop software"

2. Challenges which aren't well understood

- Engaging users effectively.

  Essential in the development of scientific software because of

  - the complexity of the domain
  - The preferred use of an iterative incremental feedback model.
- BUT scientists want to do science
- HOW can effective user engagement be enabled?

Developing scientific software for a community

As science “goes large” – development of cyberinfrastructure etc.

Some problems:-

- The culture of scientists is competitive
- “The tragedy of the commons”
- Variety e.g.of terminology (cf. problems with ontologies)

Thank you for listening

Any questions?