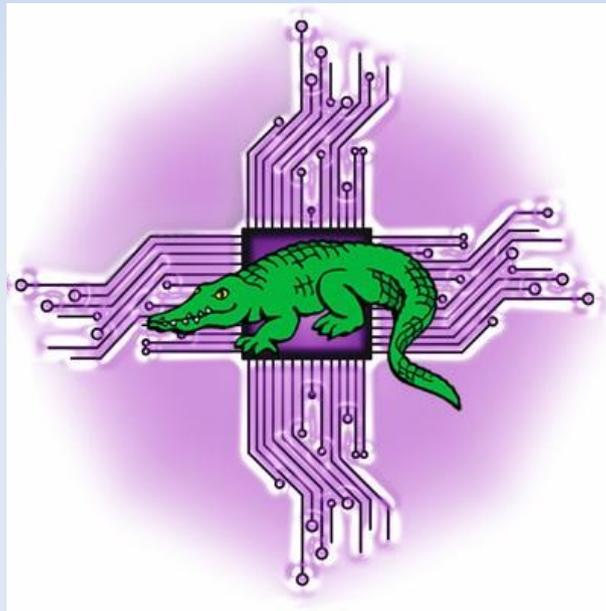


# Training and Curriculum Development for International HPC Certification

## Presentation to the International HPC Certification Forum Workshop

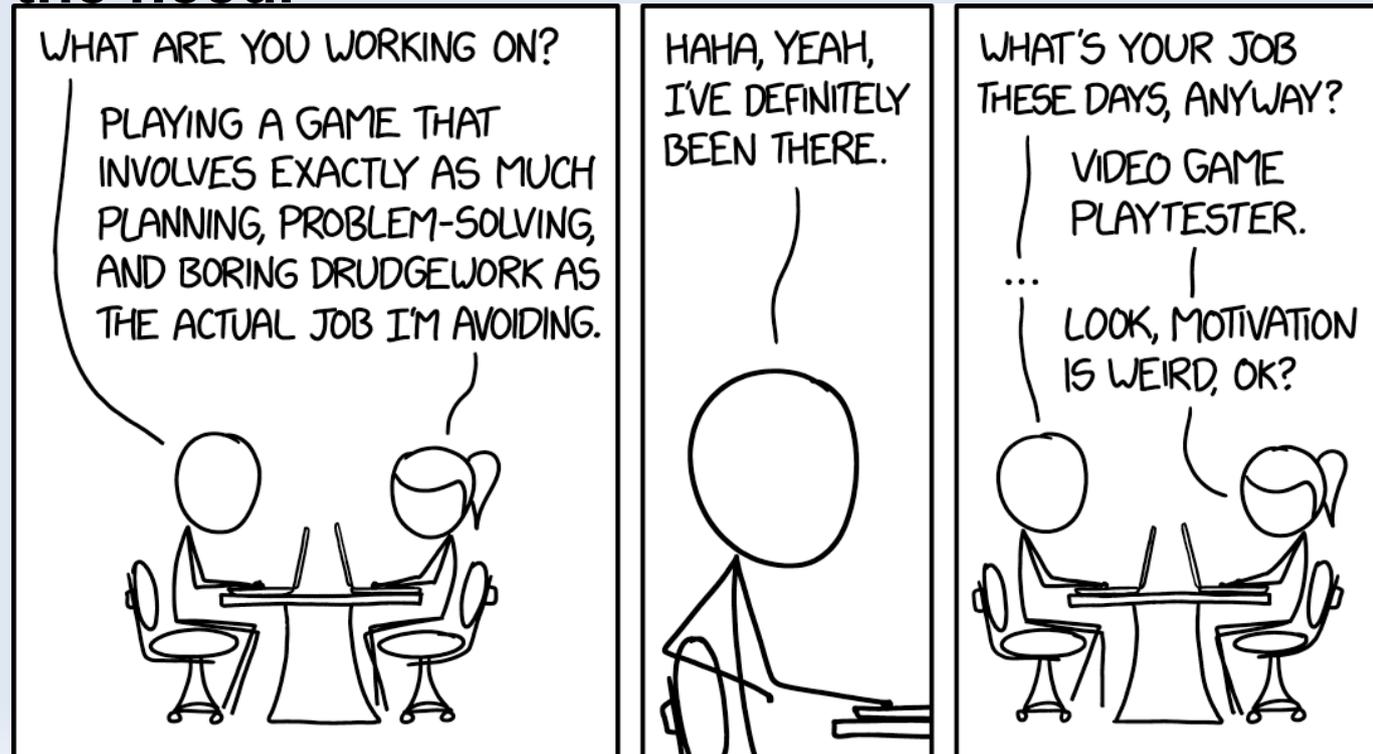


**May 20, 2020**

<http://levlafayette.com>

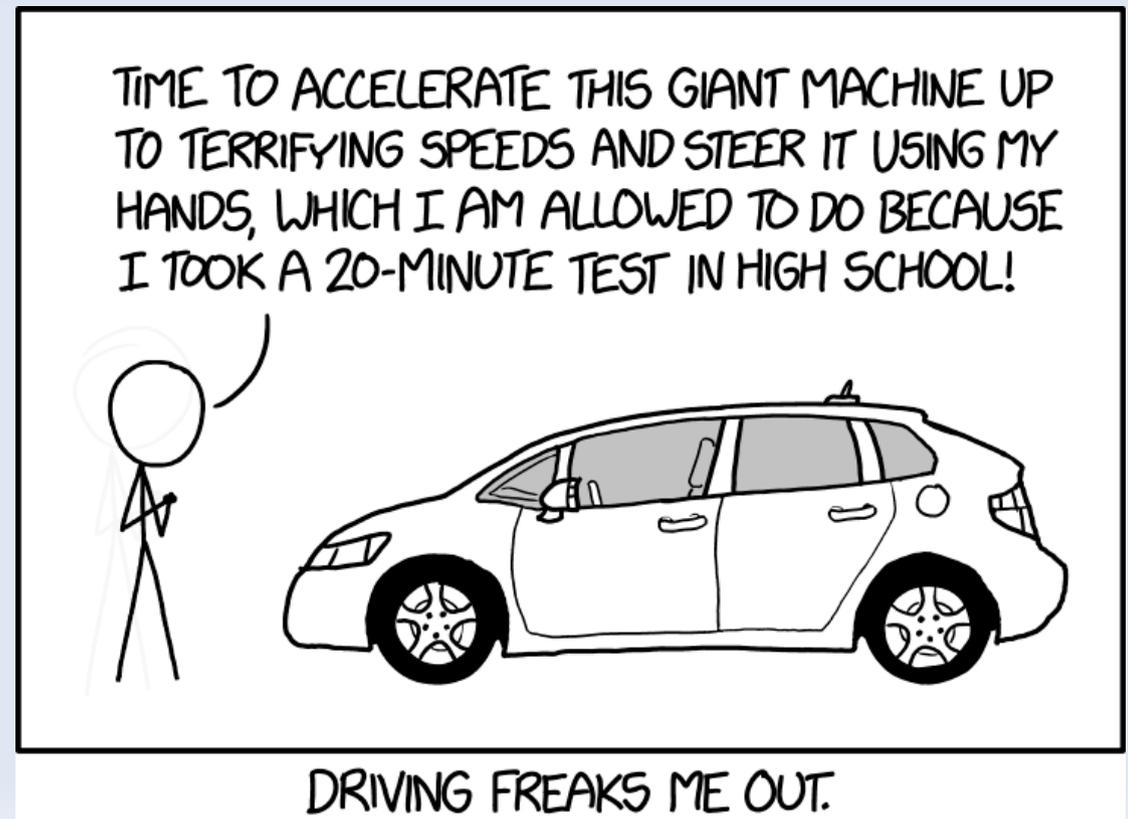
# Need and Motivation for a HPC CF

- Well-recognised growth in the volume and complexity of datasets for processing.
- Performance of personal computational devices is not keeping up with this growth.
- More people are moving to HPC-based solutions, but researchers are not familiar with the HPC environment, and higher education has not caught on to the need.
- Few courses for HPC at the university level; typically for CompSci at post-graduate level (exception: University of Waitako).
- User education carried out by HPC centres.



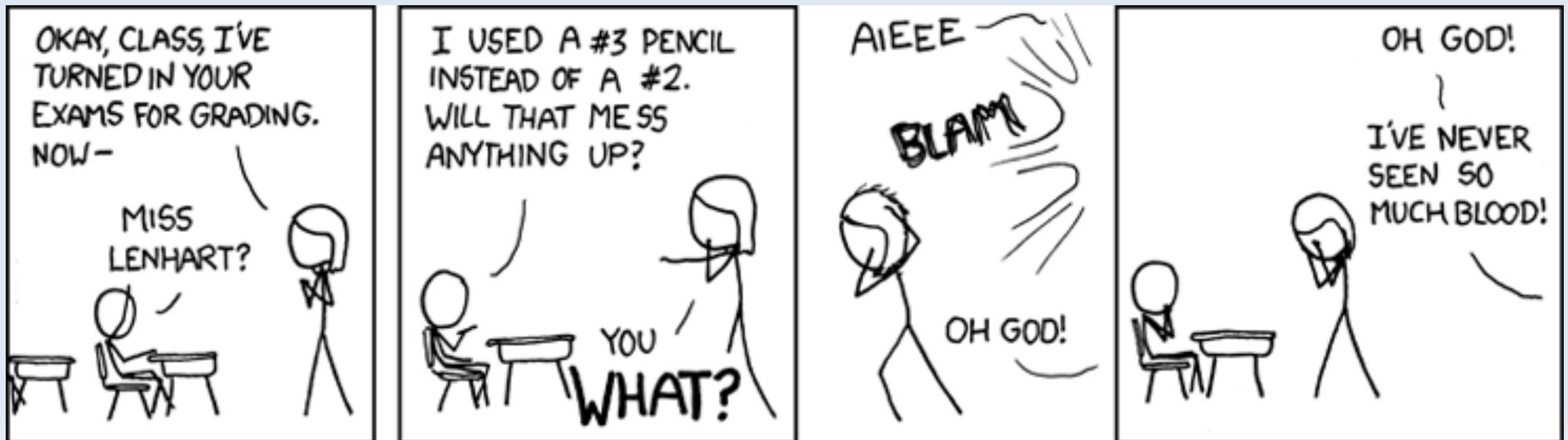
# An HPC Driving License

- The HPC CF developed from the Performance Conscious HPC (PeCoH) project in 2017 with the Hamburg HPC Competence Center (HHCC). The HHCC had an explicit goal of an "HPC driving license".
- Most HPC engineers do not have education experience or knowledge (e.g., andragogy vs pedagogy, disciplinary learning techniques, formative vs summative assessment, etc).
- Existing training programmes are suboptimal in efficiency and effectiveness; desire for better collaboration at an international level.



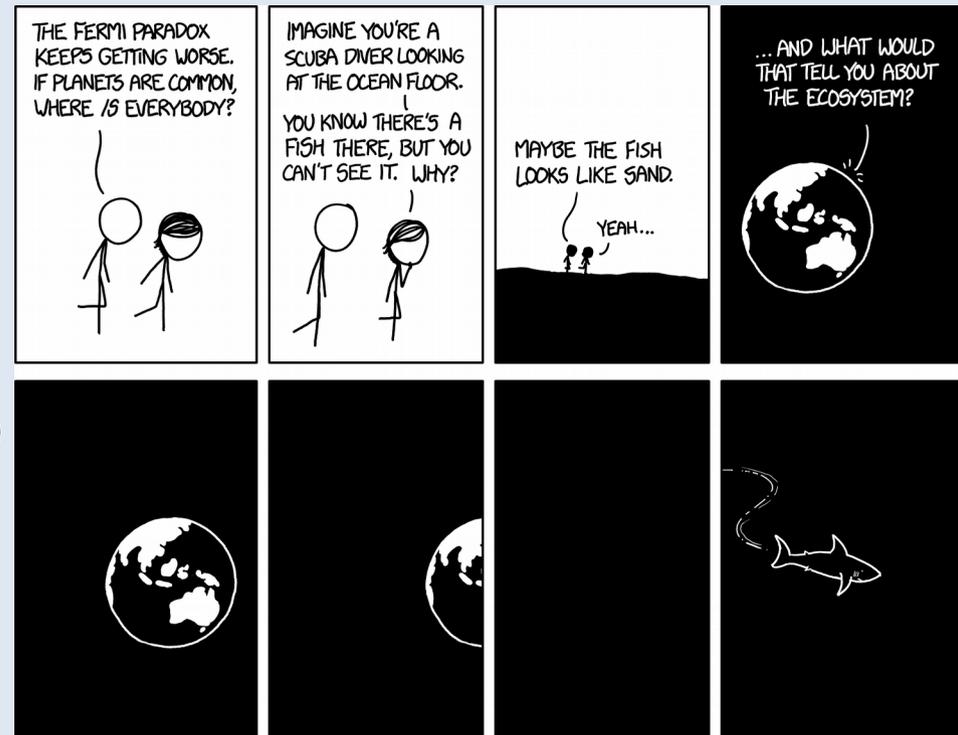
# Separate Examination from Teaching

- "The goal of the HPC Certification Forum is to clearly categorize, define, and examine competencies expected from proficient HPC practitioners".
- As such, the International HPC Certification Forum explicitly separates the examinable material from the content and delivery of teaching.
- This is necessary to ensure focus for the organisation (management and technical tasks), but also for organisational independence.



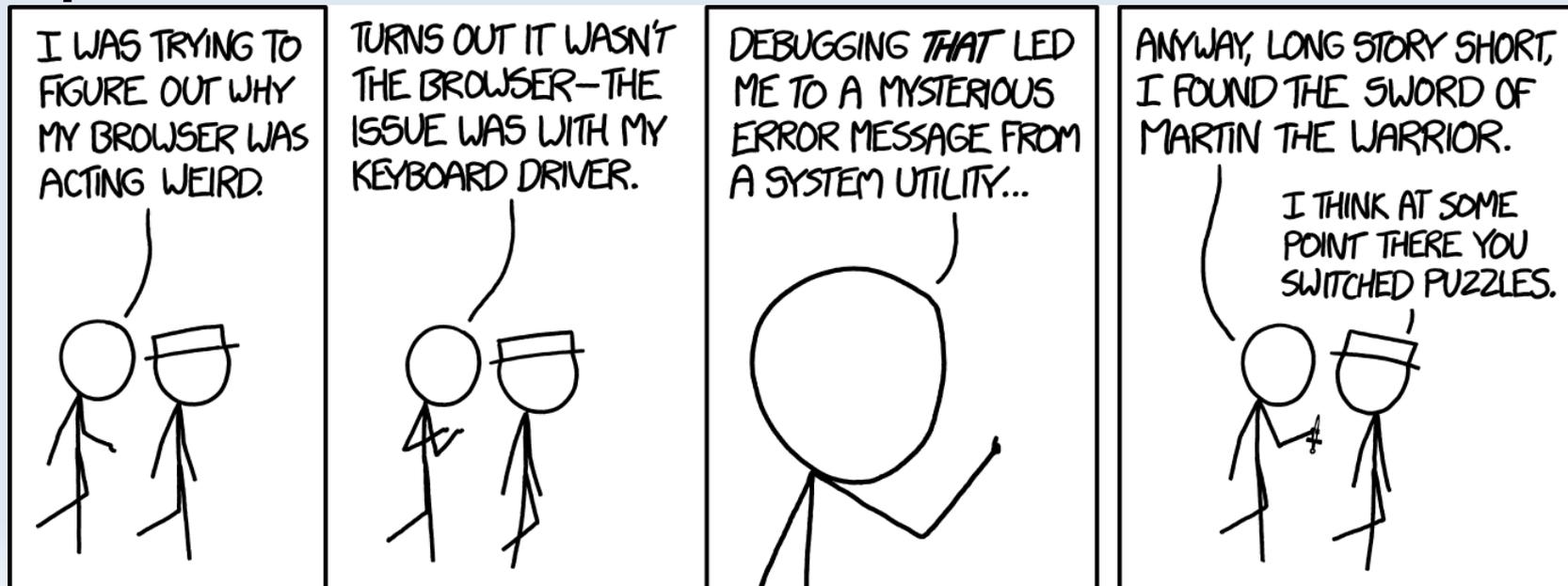
# Ecosystem Development

- There are thousands of HPC sites around the globe, and perhaps millions of HPC users. The HPC Certification Forum is less than a score of active participants.
- It is not possible, under these circumstances, for the HPC CF to provide the relevant and appropriate examinable content in the longer term, despite heterogeneity.
- The HPC CF needs ecosystem development in order to keep up-to-date with new technologies.
- Eco-system development will be driven by participating HPC Centres that will provide formal and informal feedback to the examinable content.
- HPC teaching providers will be able to describe their content as HPC CF Endorsed Training



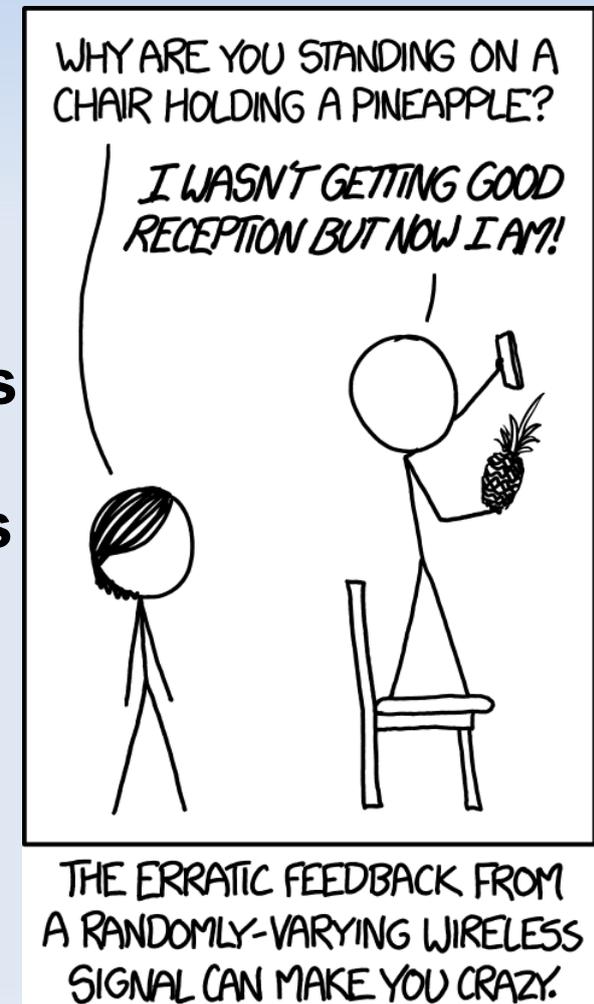
# Examinable Skills = Curriculum?

- The HPC CF examinable is expressed as a tree diagram with branches for broad areas as structured content (e.g., software development, performance engineering, HPC knowledge, HPC use)
- Skills in the HPC CF are defined as a set of learning outcomes. For each single skill, there can also be multiple levels (basic, intermediate, and expert level) which build upon each other ("scaffolding").
- For content providers this is very much like a curriculum from the end-point.



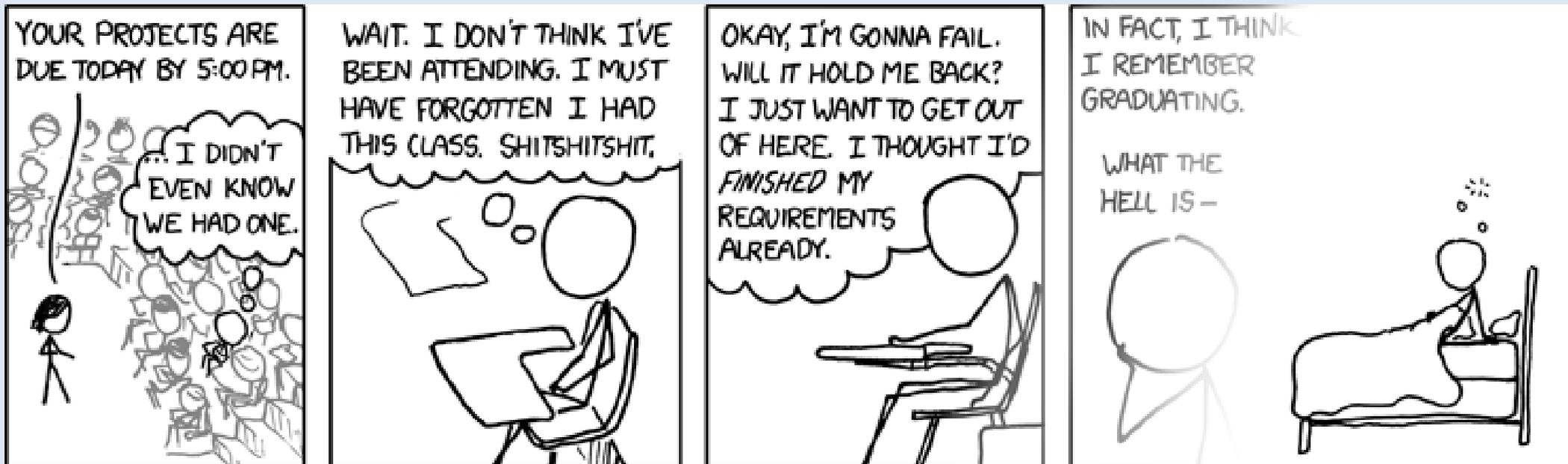
# A Feedback System

- The separation of the examination from the content-provision and delivery, but with the inclusion of endorsed training in an ecosystem allows has some advantages.
- For content-providers treating the examinable content as the end-point of a curriculum, and with the skills as learning objectives, aid the design process because it is already structured with scaffolding.
- The feedback mechanisms allow for any errors or emissions to be identified and fixed, not just for the individual providers, but for all providers and the HPC CF.
- Feedback mechanism at this stage is entirely informal! If you see something wrong, tell us!
- As the examinable content nears completion and more training centres take it up, formal processes will have to be developed.



# Content Design and Delivery

- There is an important continuum between pedagogy and andragogy. Differences in independence, experience, motivation, time orientation.
- Structured content, scaffolding with dependencies, proximal development, modelling, narratives, paired and group learning.
- Formative assessment, MCQs, spot questions etc provide explanations to answers. Summative assessment, test concepts.



FUN FACT: DECADES FROM NOW, WITH SCHOOL A DISTANT MEMORY, YOU'LL STILL BE HAVING THIS DREAM.

**THANKS FOR WATCHING**



**& LISTENING PATIENTLY**