Comments on ISCB competency framework v3 paper and guidelines

Please use this google doc to comment on the competency paper and guidelines document.

Paper

Please comment as though you were peer-reviewing this paper.

1) When available, provide literature references for the various organisations discussed on p3 1st paragraph, and expand the abbreviated names when first used

~~2) The versions are variously referred to as version 3, version 3.0 or v.3 This needs to be consistent~~

(Easy fix for Michelle) The figures and tables need to be correctly labelled with captions, and the text needs to refer to these figures by label

~~(Easy fix for Michelle/Melissa) There are a lot of typographical errors e.g. extra spaces, extra punctuation marks etc. I'm correcting some of these as I go through (hopefully this is okay) but a thorough proofreading is needed. +1~~

~~(Was there; revisit - Michelle) The numbering e.g E2 and D3 needs to be explained. For example, it is not clear that E2 belongs to version 2 while D3 belongs to version 3. There is a section on this in the results that really should be earlier in the paper.~~

~~Under methods there is the heading 'Incorporating new themes'. Should this be in bold? Or in italic?~~

~~(Easy fix for Michelle) In p2 of background there are two sentences too similar. "A competency framework defines …" and then " The competency framework used the concept of …" Maybe you can remove the second one changin the following sentence to "The framework defined the level required for each competency for each persona in the context (or related to) a specific activity or role."~~

~~Is the **"Mapping to other frameworks"** part of the **Methods** section? If it is, thus this title should be in italic instead of in bold.~~

~~This section also needs to be fleshed out. It appears to be only an outline at the moment.~~

(Easy fix for Michelle) ~~It could be helpful to add the links or references to RItrain, CORBEL and BioExcel.~~

In the “Tools to apply/use” section, it is stated “It is worth noting in this process that KSAs act as indicators of attainment of the competency, but that not all KSAs need necessarily be “achieved” in order for the competency to be attained”. Does this contradict the earlier statement that the KSAs define a minimum standard and that all KSAs must be attained in order for the competency to be attained?

- Must have all competencies A-M for a particular persona/standard to be labelled as “competent as that persona/standard”
- To meet the competency you must achieve all of the KSAs within that competency
- Need to distinguish which competencies any given course is going to deliver (link to learning outcomes; see guidelines document); a course may not achieve all of the KSAs within a competency (refer to guidelines)

(Marta, Sarah) - ADD a section on how an individual can use the competency framework and persona they are trying to achieve

~~(already there) Including a screenshot of the competency framework site (for instance of this view) for explaining the mapping and the nomenclature could be really helpful.~~

~~**Future plans for the competency framework section** “In the specific case of FAIR, one of the pillar in open sciences, a committee representative of the research data community, create a project **term4FAIRskills”** - I’m not quite understanding this sentence. Is it FAIR that is being referred to as a pillar of open science? Possible edited version [In the specific case of FAIR, one of the pillars in open sciences, a committee representative of the research data community, created a project called **terms4FAIRskills.** Include link - https://terms4fairskills.github.io/]~~

~~UKNOS: UK National Occupation Standard* - what is the asterix for?~~

~~Is the section in yellow part of the paper?~~

~~(Easy fix for Michelle) For anyone (and especially a reviewer) who is not familiar with competencies and educational theory, there is a lot of jargon to cut through. For example, Bloom’s taxonomy is referred to without much explanation. → put back text from previous papers~~

~~This paper is probably a culmination of a long history of various efforts throughout the world, and has become very well coordinated now under the auspices of ISCB and its affiliated organisations such as GOBLET and APBioNet. So the various points highlighted which finally made it to this paper, has had origins from many efforts, and so there should be some text to explain that it did not appear de novo, and derived weight from many threads of efforts through the decades.~~

~~For example, you might like to cite some efforts notably~~
~~ISCB's efforts in outreach to India in collaboration with APBioNet, led to India developing its Certification system, which is still in operation. President ISCB Mike Gribskov was present at this conference with me (Tan Tin Wee) representing APBioNet, and colleagues in India who drove the certification effort included DBT Secretary MK Bhan and Madhan Mohan., http://dbtindia.gov.in/schemes-programmes/building-capacities/national-fellowships/bioinformatics-national-certification~~
~~"The Department is supporting the scheme, Bioinformatics National Certification (BINC) since 2005 to identify and certify bioinformatics professionals to improve their job placement opportunities. Top ten candidates also received the cash award. The successful post-graduate candidates are eligible for availing JRF/SRF for pursuing Ph.D. in Indian Institutions/Universities. This programme is equivalent to UGC-CSIR-NET, DBT-JRF and all other such programs. This year, 1037 applications have been received and total 600 students appeared in exam for Paper I. 28 students have qualified the Paper I and appeared in Paper II and Paper III. The BINC exam was conducted at 12 places in the country and 17 students could qualify the BINC 2018.The total number of ongoing students is 20, which includes 2 newly joined."~~
~~So there should be some reference to this early and extant effort.~~

~~In terms of skill sets, we have also made an early effort to promote awareness of the need which ISCB is today taking on the lead to champion through this Working Group.~~
~~**Tan TW**, Lim SJ, Khan AM, Ranganathan S. A proposed minimum skill set for university graduates to meet the informatics needs and challenges of the "-omics" era. BMC Genomics. 2009 Dec 3;10 Suppl 3:S36.~~

~~→ Look at this abstract and consider relevance for inclusion in background section~~

~~(Michelle to rework sentence) In the results "Each component KSA has no more than seven items, which we considered to be a good balance between adding enough detail and having too much information." → why was this considered to be a good balance?~~

~~Note: this version seems very unfinished. There are many notes and extra pieces of text that I would not expect to see in a manuscript that is ready for submission. Is this definitely the version we should be working from?~~

~~(Michelle to fix) Figure/table legends needed.~~

Results: In the section that refers to the competency mapper website it would be useful to have a screenshot to show people exactly what you're talking about. → Potentially add a screenshot of the landing page for competencies

~~In Table X (list of the 13 competencies) maybe an extra column can be added for indicating the field of each sub-group of competencies (bioscience, data science, computer science, professional conduct) : +1 (is that what the colour coding is for?)~~

#	Competency	
A3	*Work at depth in at least one technical area aligned with the life sciences*	*Bioscience*
B3	*Prepare life science data for computational analysis*	
C3	*Have a positive impact on scientific discovery through bioinformatics*	
D3	*Use data science methods suitable for the size and complexity of the data*	*Data science*
E3	*Manage own and others' data according to community standards and principles*	
F3	*Make appropriate use of bioinformatics tools and resources*	

The name of the second subsection of **Results** is a bit confusing since the major changes from V2 to V3 were introduced at the beginning of the **The updated competency framework** subsection. Maybe it could be renamed to **High level changes in competencies** or similar to avoid confusions.

Related to the guidelines maybe it could be helpful to add some of the explanatory text that is in the results section in a subsection of the methods → Don't repeat content twice; methods and results overlap slightly currently; may have opportunity to alter later

Major changes in competencies: it seems like some kind of map or figure is needed to visually show the relationship between the old and new numbering.

Mapping to other frameworks (results): is there more to come in this section? It seems unfinished.

(references insertion - Michelle) **Tools to use/apply the ISCB competencies:** "The previous versions of the ISCB competencies have been successfully applied in course design, evaluation and review for courses at multiple levels as well as entire degree programs (ref: previous competencies paper)." References and examples are needed here.

(Nicky to address) There is a lot of repetition in the section about applying ISCB competencies, especially about reviewing needs, learning outcomes etc. As a reviewer I would prefer to see a generalised version of this and concrete examples of where it has been applied

Guidelines

Please comment on the clarity and usability of the guidelines.

1.1 What is a competency?

Examples of uses of competencies include:

Potentially a missing example here is the use of competency to allow/enable the identification of overlap in training courses – negating the need to re-invent wheels, i.e. avoiding duplication of effort through re-writing training material that already exists.

Dissemination Ideas

- Journal - Bioinformatics Advances
- Twitter, social media, competency campaign
- GOBLET mailing lists
- Other mailing lists - Brazil, Chile
- ISCB forums - newsletter, conference, affiliates mailing list, list of educational programs, etc.; already part of endorsement programs for degrees/short-courses;
- Presentations at various country based societies (e.g. Bruno at education committee at Australian Bioinformatics Society; wants to create persona in hub)
- Jason Williams slack/community
- Hold implementation workshops to provide process for implementing; separate out into hands-on workshop (shared examples) and hackathon (bring your own); begin any workshop or training session on the basics of competency
- Can use in assessments: 1) hiring, 2) course final survey,
- Can already use career profile in competency hub, and can assess yourself against competency - **https://competency.ebi.ac.uk/framework/iscb/3.0**
- The link to the create your own profile is https://competency.ebi.ac.uk/framework/iscb/3.0/profile/create/guest It is saved in your browser, you can also print a pdf version of it
- Acknowledgement of using the competency framework - does it need a creative commons license? DOI will come from paper
- How to reach trainers who are outside of bioinformatics? Other life science groups?
- Frontiers journal has educational strategies special submission option; can put up a strategy or opinion piece (due June 17, 2021) - https://www.frontiersin.org/research-topics/17876/original-strategies-for-training-and-educational-initiatives-in-bioinformatics
- Guidelines document should have a DOI and link to competency framework (e.g. Zenodo or a training-specific repository?,

Comments on extending ISCB competency framework into “Data science - biomedicine”

Australia/Asia Time Zone Session 1 notes

- Landscape review
    - UK - Cath to add notes here, re UK model of
        - funding Manchester Uni Master Clinical Bioinf which included immersive elements. BUT limited pool of experienced supervisors
        - Health Education England formed “task and finish” group to address workforce shortages - identifying skills gaps, created M Clin Bioinf CoP reference group.
        - Then created competency framework (2015) for all professions interacting with genomic medicine, different/similar to ISCB framework, with three skill levels - awareness, working knowledge, specialist knowledge. Personas in columns (each persona sent to minimum 5 professionals within each to assign skill level).
            - Raised query of how to describe/group professions to be more inclusive/acknowledge international terminology (e.g., “other healthcare scientist” includes ‘genetic technologist, immunologist, epidemiologist’ in the UK but those roles may not exist in other countries)
        - Similar goals to Australian work - to enable people to interact w genomic data at a level appropriate to their profession
    - Australia (Amy/Nat)
        - Described process of developing LOs for variant curators (medical/lab scientists) based in education programs (Masters subjects, ‘immersion workplace learning’, CPD workshops).
        - showed how they defined ‘personas’ across professional roles for medical scientists (graduate, staff, established staff, Team Leads, Service Leads) and how each LO aligned with Bloom’s taxonomy (know, comprehend, apply, analyse, synthesise, evaluate).
        - PDF of slides in Day 1 folder - please do not distribute as paper in prep
    - India (Raghu please check)
        - national board overseeing any Masters program but no formal framework.
        - Formal bioinf training in genomic medicine since 2019 (6mo program for medical residents). No one, specific training centre
        - Attempts to get up bioinfo training proposals but unsuccessful

        - India DBT since InCoB 2005 Delhi has set up the BINC Bioinformatics National Certification exams (see above), however, this effort has not reached the medical biomedicine communities.
    - Indonesia (Rohmatul please check) -
        - Have orgs (Bioinf Indones) but no formal framework/regulations
        - APBioNet has outreached to Indonesia over the decades. No traction with university administration or government officials.
        - Within ASEAN, under the ASEAN Committee on Science and Technology (COST) and now COSTI (Committee on Science, Technology and Innovation), the Subcommittee in Biotechnology (SCB) has promoted bioinformatics while I (Tan Tin Wee) was its Chairman in the mid2000s, but again, the medical communities operate in a separate silo. This effort on data science in biomedicine will serve a key role in providing the impetus for crosstalk between the bio and the medical communities.
    - Singapore (Tan Tin Wee)
        - Founding of APBioNet at 1998 PSB Hawaii has led to greater awareness of bioinformatics and its role in biomedicine. Secretariat based in Singapore with myself as its founding secretariat
        - The importance of certification and standards has underlined our conferences which started since 2002, including APBioNet's Flagship event, the International Conference on Bioinformatics (InCoB).
        - Within Singapore, the Association for Medical Informatics Singapore (AIMS) for medical informatics professionals had its scope expanded to include bioinformatics, and was renamed AMBIS, Association for Medical and Bio Informatics Singapore.
        - AMBIS has promoted standardization and published papers towards this effort: for example:
          Tan TW, Lim SJ, Khan AM, Ranganathan S. A proposed minimum skill set for university graduates to meet the informatics needs and challenges of the "-omics" era. BMC Genomics. 2009 Dec 3;10 Suppl 3:S36.
          Tin Wee Tan, Joo Chuan Tong, Asif M Khan, Mark de Silva, Kuan Siong Lim, Shoba Ranganathan (2010) Advancing standards for bioinformatics activities: persistence, reproducibility, disambiguation and Minimum Information About a Bioinformatics investigation (MIABi) BMC Genomics 2010, 11(Suppl 4):S27 (2 December 2010) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3005918/
- **Activity:** working through the blank grid for clinical version of ISCB V3.0 with each key competency defined in terms of knowledge, Skills, Attitudes for each, then columns that Nicky Mulder proposed for roles in biomedicine
    - Physician (generic)
        - Secondary care (hospital-based, need referral) - not specialist genetics/genomics as more broadly applicable (and genomic specialists should be trained by the College)
        - Does NOT include primary care physicians (as defined in the UK/AUS/ASIA - noting this is different in the Americas so that group may create separate column for that group?)

    - Nurse
    - Biomedical scientist
    - Pathologist
    - Counsellor
    - Query other roles/purpose of the spreadsheet/definitions of clinical bioinf
        - e.g., epidemiologists/statistician? Not needed on this speadsheet b/c it's more what bioinformatics they would need to know to interact with clinical bioinformatics, rathe than needing the competency themselves.
        - Need to very carefully define what do we mean by 'clinical bioinformatics' in the modern era, it's changed a lot in last five years and lots of different terms used, e.g., 'bioinf' vs 'data science' vs 'cloud computing' all distinct but starting to merge… (Australian view - e.g., qualifications in Health Informatics distinct from 'Bioinformatics' but no 'Clinical Bioinformatics', and certainly no accredited healthcare role). It's either bioinf brought into the clinical sphere, or the pathology sphere. [*cf* British experience, with M Clinical Bio at Manchester Uni, qualified to work in pathology setting]
        - Also small set of data scientists who work with clinical data. "Clinical data scientists"? 90% are computer scientists at moment, but some from lab/biology. Possibly also some of those people are coming from health informatics, understand electronic health records, etc. "Health informaticians" (so interact with data, but not genomic data - so need data linkage)
    - Need to be very clear in overlap/distinction between roles (and evolution) needed b/c raises new competencies such as privacy issue, vendor product selection, etc., so not core to ISCB framework but central to these other professions in data science.
        - Possibly could reference Vitae's work from the UK. R&D framework after assessing needs across academic researchers, different phases of development across career stages. **Overlay "lenses" onto the core framework and blank out the bits that weren't relevant to those professionals and also bolt additional bits on. So allows 'core competencies' then role-specific competencies**
            - Would allow us to then extend the competencies into other arenas, like agronomy, etc.
- **Decisions**
    - Not aware of any other frameworks, **so will use this grid and approach** (which aligns with both UK and Australian previous endeavours)
    - **Need some additional professions in the grid** (clinical bioinf, health informaticians/data scientists)
    - **Need some additional competencies** - ethical, policy, AI, ways cloud is used, vendor selection, data linkage (list is longer, Cath also has notes); version 4.0
- **Actions taken**
    - **The following roles have been completed and are ready for consultation with professionals in these roles:**

        - Data scientist
        - Data engineer
        - Clinical bioinformatician
    - The remainder are open to proposals from all members of the group - and ideally need to be sanity checked against what's already been done in the UK and Australia. After summarising in plenary we might also take inspiration from the framework developed by the Faculty of Clinical Informatics in the UK. Georgina Moulton is our contact there.
    - We agreed to reach out to stakeholder bodies for input including…
        - GHIF - Nicky,
        - ELIXIR health data focus group - Venkata
        - AMA - Russell
        - Canadian Association of Pathologists - Michelle
        - AMIA - who?
        - Where possible gain buy-in from supranational bodies with an interest in genomic medicine training and CPD - e.g. H3ABioNet, PAHO?
    - We agreed to set up task forces for each of the themes covered by this year's summit. These could meet regularly and report back to the main monthly update meeting.