

Roles of Professional Research Software Engineers in the Science Gateway Landscape

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Science gateways are increasingly used by researchers and educators evident in publications and presentations at events such as eScience [1] and PEARC [2]. Teams around science gateway development are diverse and need a diverse set of expertise. Skills needed are about developing and/or extending a science gateway framework with backend connections to complex research infrastructure or lab instruments, enabling collaboration with authentication and authorization mechanism as well as addressing FAIR (Findable, Accessible, Interoperable, Reusable) [3] principles. One of the most important aspects are the needs of the specific community for each science gateway on features and user interface development. All these are predestined tasks for Research Software Engineers (RSEs).

In the science gateway landscape, there is also the need for providing expertise like usability studies, statistical support, data management or including Deep Learning methods into a science gateway. This additional need for knowledge opens up the potential for more opportunities and different roles as RSE. While these might be directly included as RSE knowledge areas for some people in the RSE domain, the specifics for knowledge and skills of RSEs are not well defined yet.

Analyzing the overlap of the science gateway area and RSE area, there are some trends recognizable combining these two. Teams like the HUBzero team [4] develop around a product. The first step for HUBzero as a product was developed 1996 as PUNCH [5] for supporting nanotechnologies with creating an easy-to-use interface for simulations. Since then, the product went through expansion for more nanotechnology codes, diversification for different domains and then through a process for making the project sustainable considering business models (see Fig. 1). During the process also the roles in the team evolved and diversified with backend developers, user interface developers and a usability expert, to name a few. Other teams in the science gateway landscape evolve around services. At the Center for Research Computing at the University of Notre Dame, the RSE team developing science gateways is not driven by one product but by providing services to develop a best fitting science gateway for each use case employing different frameworks such as HUBzero or Jupyter Notebooks. The team can be part of the research team, the central IT department or the HPC team. The location makes a difference of the administration of the team.

The overlap between RSEs and science gateway developers are large while some roles like a usability specialist might not see themselves as RSE but belong from our understanding of RSEs to the community of RSEs.

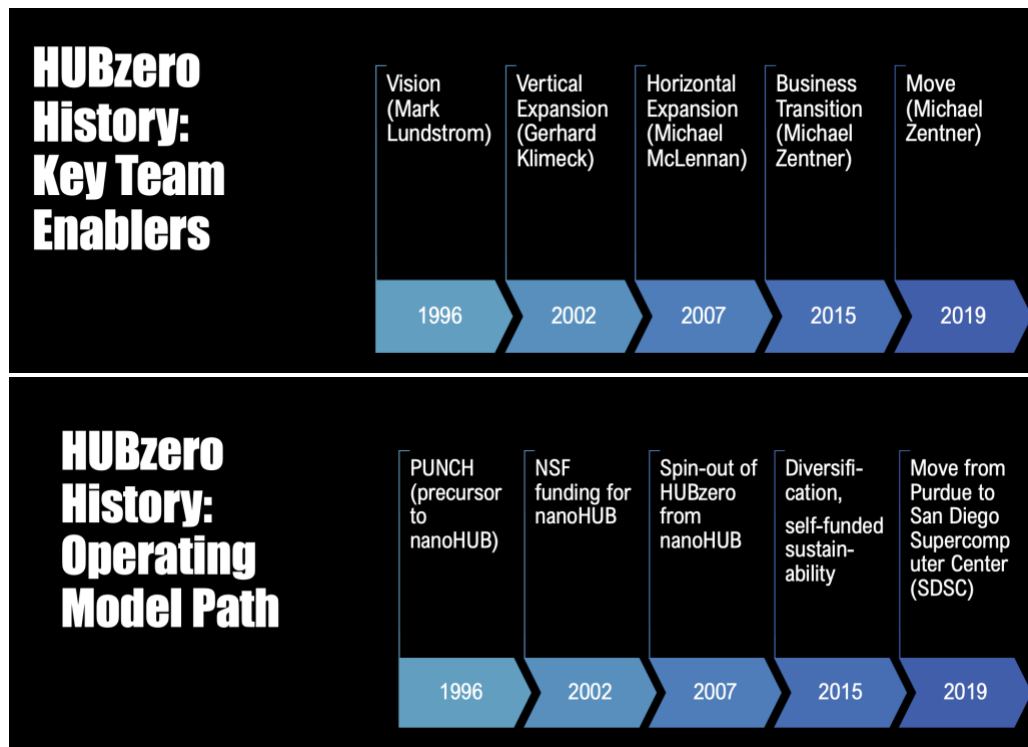


Figure 1: Operating Model Path and Key Enablers

References

- [1] <https://www.escience2021.org/timetable>
- [2] <https://pearc.acm.org/pearc22/>
- [3] Wilkinson, M. D. et al. The FAIR Guiding Principles for scientific data management and stewardship. *Sci. Data* 3:160018 doi: 10.1038/sdata.2016.18 (2016)
- [4] Gesing, S. Increasing Developer Productivity by Assigning Well-Defined Roles in Teams. *Collegeville Workshop 2020*, virtual, 2 pages, 2020
- [5] Madhavan, K., Zentner, M., and Klimeck, G. (2013). Learning and research in the cloud. *Nature Nanotechnology* 8, 786–789; DOI:10.1038/nnano.2013.231