

# Linking Professional Skills to RSE Career Paths

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## Abstract:

The professional skills needed for RSE work are changing – A proposal.

The majority of RSE workers are in occupations with uncertain futures, and under pressure to ensure they can respond to agile skill demands and stay up to date with computational training (Bakhshi, Downing, Osborne and Schneider, 2017; Djumalieva and Sleeman, 2018; Tytler et al., 2019). In the current changing economic landscape, policymakers, businesses, educators and individuals need timely information on how RSE occupations are changing. This is to ensure RSE's can move away from at-risk positions where skills are overlooked or misunderstood, and positions often reliant on *ad hoc* funding and short-term contracts.

We need a clear framework that links skills to occupations to generate these insights.

**Keywords:** RSE “career paths” “job adverts” “interviews” “RSE occupations map.”

## Introduction:

The current professional terminology does not map cleanly to skills or career pathway for RSEs. The primary grouping of professional occupations, for example, the Standard Occupational Classification (SOC) in the UK assigns jobs to nine major occupation groups. Further, each group is split another three times (Djumalieva and Sleeman, 2018). The career mapping methods, like SOC (for the UK), ESCO (Europe) and O\*NET (USA), are created through a process of consultation and periodically updated every ten-years or so (Tytler et al., 2019). Over such a period, the landscape for occupations may change significantly, as it did for IT professionals between 2000 and 2010, necessitating the addition of new occupations and terms.

While the stability of SOC, ESCO and O\*NET makes these different frameworks ideal for reporting labour market statistics, it is difficult to integrate specialist computational fields. This means the grouping is not particularly well suited for understanding professional skills of RSEs or allowing global indicators of their professional roles. We need a more responsive way of capturing information on occupational dynamics for RSEs.

## RSE Occupational Mapping Study Proposal:

In this position paper we are proposing an ongoing study using two complementary techniques to explore the state of practice of RSE job skills. We want to create an ontology that can start to map out RSE occupations and how these relate and map to skills and career paths. By starting to compile this ontology, we aim to put structure into our understanding of the RSE career which we can evolve within the field of computing technologies.

- Analyse real RSE job adverts to develop an understanding of occupational skill terminology using Natural Language Processing (NLP);
  - To identify terms correlated with “RSE” and to map commonly co-occurring skills and responsibilities.

- Interview RSEs that develop software for a variety of disciplines, e.g., natural sciences, humanities and social sciences; for a variety of hardware, e.g., HPC, computer graphics, robotics, IoT and different parts of the innovation pipeline;
  - Using the map of RSE occupations to show how these are linked.
  - Identify areas of growing interest and skills develop.
- Group occupations into categories relevant to RSEs and those that wish to recruit and interact with them.
- Look at recruitment data to understand the resulting occupational classifications in the commercial sector around RSEs
- Take the key terms provided by the authors of each chapter for the The Handbook of Research on Computational Science and Engineering: Theory and Practice (Leng & Sharrock), along with the results from the NLP analysis and interviews to create a new glossary of skill terminology
- Develop a new way to identify skills and occupations within RSE.

### **Identify future areas for intervention and change**

This is a proposal for a scheme of work to be undertaken over a substantial period of time. The idea is to produce a number of outcomes to better serve the RSE community concerning employment opportunities, understanding job families, where to go for career support, role terminology and ways in which individuals and specialist groups within RSE can advocate for each other.

Ultimately this work will allow us to identify areas for intervention and bring together a conceptual understanding of and attitudes towards RSE professional roles. The immediate study and data collection into identifying RSE role families will be useful in producing job descriptions within a job family.

As the computing technologies change quickly over time, we will need to continue analysing job adverts and interviewing experts to adapt the occupational classifications. We will produce a glossary and ontology of skills and terminology that is kept up to date. Having this resource will help RSEs to plan how they move between specialisations. This is especially important as the need for specific skills can change rapidly, creating career winners and losers. Such a resource would also allow other professional communities such as IT services, HR and senior university management to work better with RSEs.

### **References:**

- Bakhshi, H., Downing, J.M., Osborne, M.A. and Schneider, P., 2017. The future of skills: Employment in 2030. Pearson.
- Djumalieva, J. and Sleeman, C., 2018. An open and data-driven taxonomy of skills extracted from online job adverts. *Developing Skills in a Changing World of Work: Concepts, Measurement and Data Applied in Regional and Local Labour Market Monitoring Across Europe*, 425.
- Tytler, R., Bridgstock, R.S., White, P., Mather, D., McCandless, T. and Grant-Iramu, M., 2019. 100 Jobs of the Future.
- Leng, J. & Sharrock, W. (Ed), (2011). *The Handbook of Research on Computational Science and Engineering: Theory and Practice*, IGI Global; publication set for October 2011.