

PROBLEM

There is growing recognition that we need to design higher quality university curricula that better prepare students for employment in their chosen discipline. The figure on the right shows the complexity in the curriculum design problem for flexible degree programs that must meet multiple accreditation, professional and institutional requirements. This thesis aims to provide a software system for systematic curriculum design, reducing the complexity of this important task, and enhancing the caliber of future graduates.

APPROACH

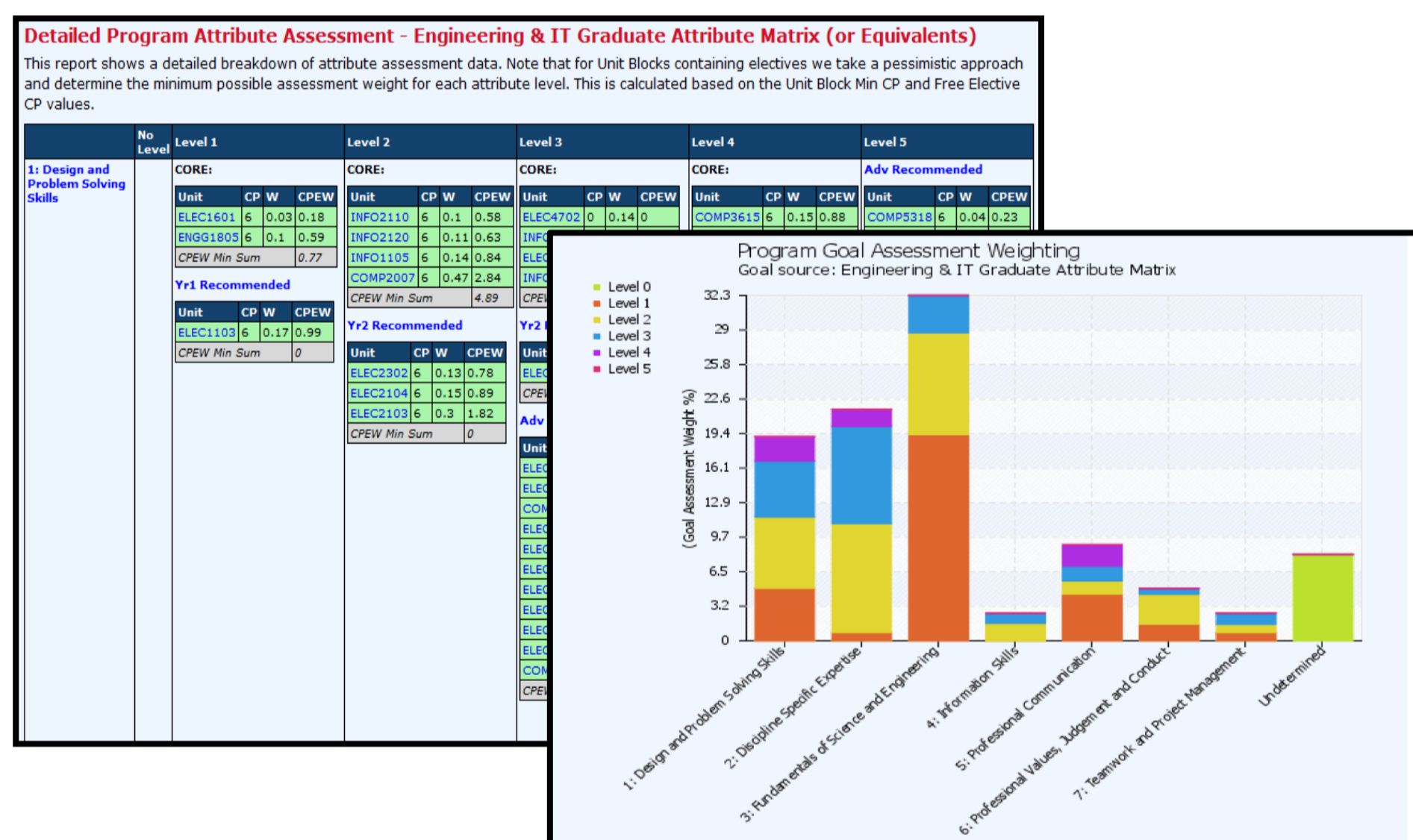
We have designed, engineered and evaluate advanced curriculum information management systems that enable systematic:

- **Mapping of relevant skills** across all subjects and assessments of a degree;
- **Mapping of competence levels** associated with skills and assessments;
- **Differentiation** between the expectations of a pass student vs. a high-distinction student.
- **Reporting and visualization** of the big-picture showing skills developed throughout an entire degree.

This enables effective degree structuring and quality control.

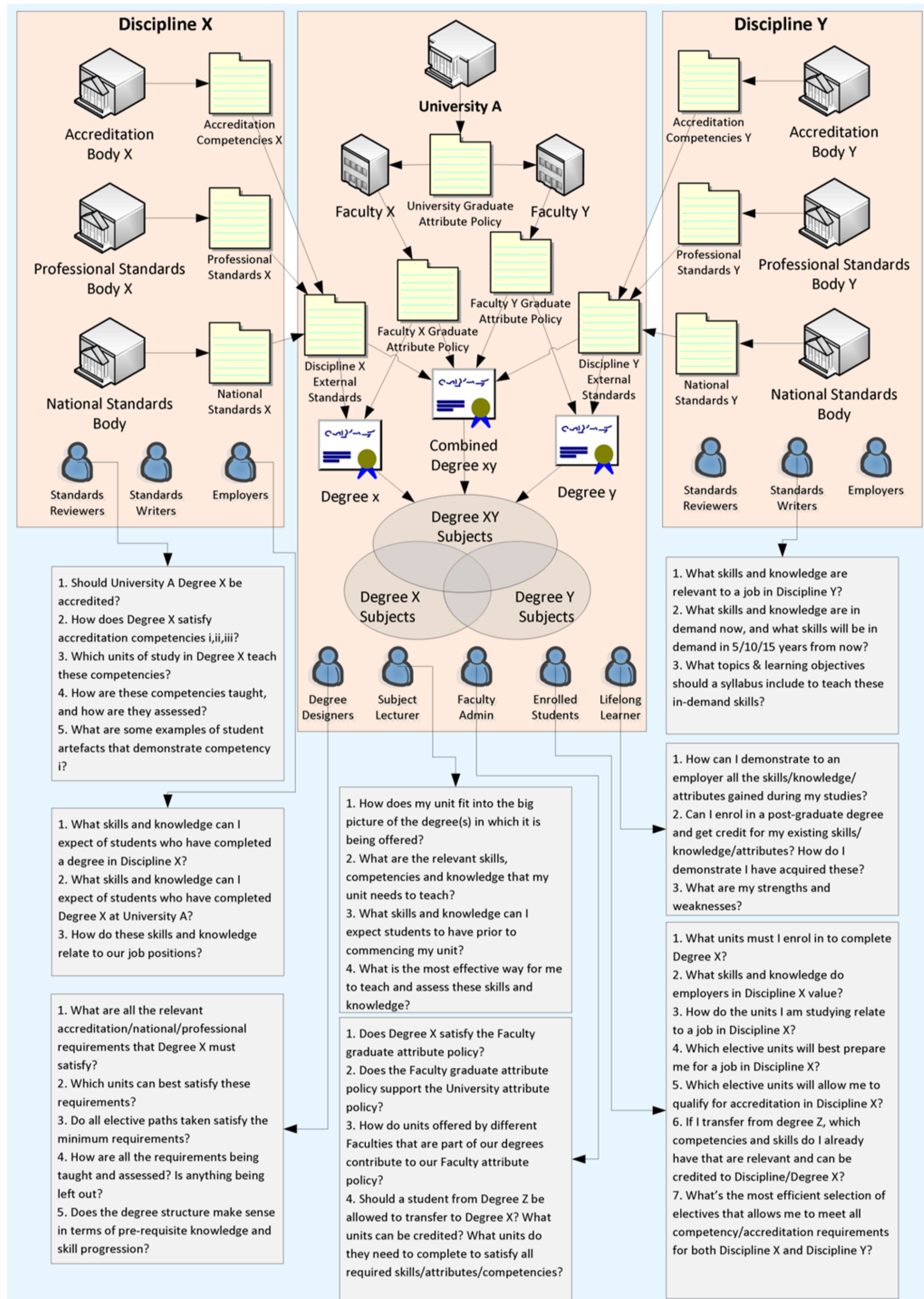
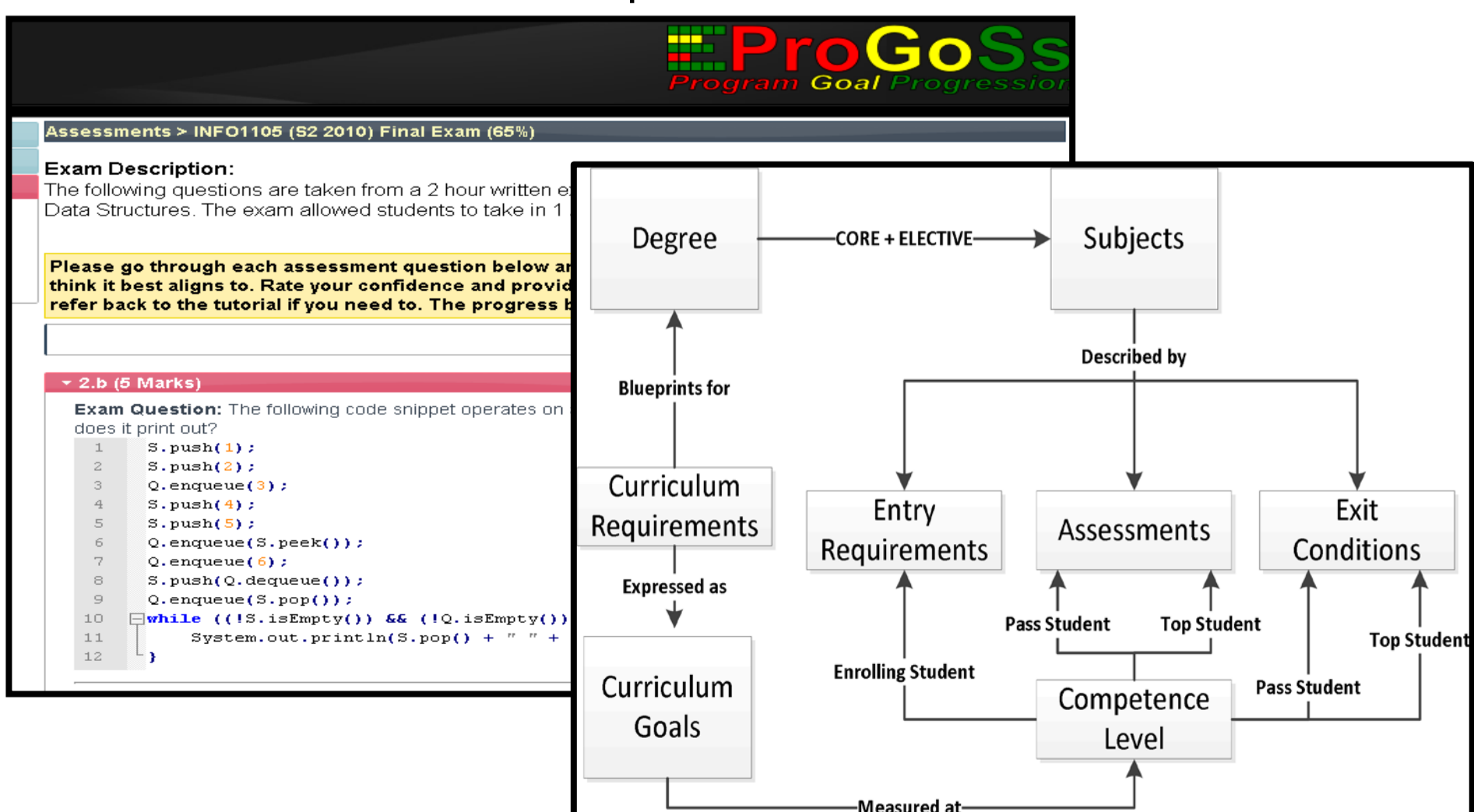
CONTRIBUTION - CUSP

We have engineered and deployed CUSP (Course and Unit of Study Portal), which is currently **used lived at the University of Sydney** to map graduate attributes and discipline competencies **across 200+ degrees** and **2000+ units of study**. CUSP provides live big-picture visualizations and reports that are vital for accreditation and curriculum quality control.



CONTRIBUTION - PROGOSS

We have built ProGoSS (Program Goal Progression), which focuses on **systematic methods to measure learning progression**. In one study we created an interactive online tutorial for educators to learn and practice the application of Bloom's Taxonomy. This proved valuable in quickly up-skilling participants in classifying exam questions using Bloom, and the method can be adapted to other frameworks of learner development.



FUTURE WORK

CUSP continues to grow at the University of Sydney. It has also been licensed to an international University who is actively participating in its future development. CUSP is additionally part of a new ALTC grant that is to unify the research work of multiple Australian universities working on related goals to improve the quality of higher education curriculum design.

ProGoSS is under active development and evaluation. The next phase will be to implement an enhanced version of our interactive tutorial that helps to disambiguate the classification process. This will be followed by experiments with alternate cognitive development frameworks such as SOLO and Neo-Piagetian Theory, after which we bring all elements together to achieve our original goals.

PUBLICATIONS

- R. Gluga, J. Kay, and T. Lever. Modeling long term learning of generic skills. In V. Alevan, J. Kay, and J. Mostow, editors, ITS2010, Proceedings of the Tenth International Conference on Intelligent Tutoring Systems, pages 85-94. Springer, 2010 (ITS2010).
- R. Gluga and J. Kay. Largescale, long-term learner models supporting flexible curriculum definition. In Proceedings of the Workshop on Scalability Issues in AIED, pages 10-19, 2009 (AIED2009).
- R. Gluga, J.Kay, R. Lister, T. Lever. An Architecture for systematic tracking of skill and competence level progression in computer science. 2nd International Conference of Computer Science Education: Innovation and Technology, 2011 (CSEIT2011)
- R.Gluga, J. Kay, R.Lister, S.Kleitman, T.Lever. Over Confidence and Confusion in using Bloom for programming fundamentals assessment. Special Interest Group in Computer Science Education, 2012 (SIGCSE2012)
- R.Gluga, J.Kay, R.Lister, S.Kleitman, T.Lever. Coming to terms with Bloom: an online tutorial for teachers of programming fundamentals. Fourteenth Australasian Computing Education Conference, 2012 (ACE2012)
- R. Lister, J.Kay, R.Gluga. Toward a Shared understanding of Competency in Programming: An Invitation to the BABELnot Project. Fourteenth Australasian Computing Education Conference, 2012 (ACE2012)
- T.Lever, R.Gluga, J.Kay. Working from the evidence of prior art and experience in curriculum database development. Australasian Society for Computers in Learning in Tertiary Education, 2011 (Ascilite2011)
- T.Lever, D. Auld, R. Gluga. Representing and valuing non-engineering contributions to engineering graduate outcomes in engineering combined degrees. Australasian Association for Engineering Education, 2011, Hobart.