RMIT School of Engineering - Engineering Learning Factory
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Engineering Learning Factory
Engineering Learning Factory Project Example

• Fetha – Custom Bicycle Components
  – SME from Melbourne’s outer South East
  – ELF Conceived & developed a new consumer product, from scratch
    – Requirements creation
    – Specification creation
    – Concept creation
    – Concept refinement
    – Finite Element Modelling
    – Physical verification testing
    – Product Build verification
  – Initial batch of production material produced at the Advance Manufacturing Precinct (AMP)

The Engineering Learning Factory within the RMIT context, and Industry Context?

AMP
Advanced Manufacturing Precinct

SME’s
RMIT Activator
Technical Start-ups

RMIT
Engineering Learning Factory

Large Companies

Pure Research
Commercialisation

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The Engineering Learning Factory is set up to be a fully functioning R&D department, as would be found in a large company. Students form the workforce, guided by experienced Industry Practitioners. The key to the learning experience is to ensure the work is real. These are not simulated projects. This is actual product development.
Melding supply & demand, integrating graduates into the larger ecosystem

Large Companies have capability SMEs & Start-ups can not afford. ELF can bolster capability for SMEs allowing them to push the bounds and integrate research that is normally only available to large industry, while creating a demand for RMIT graduates

RMIT
- Student resources (Industry Based Learning)
- World class research
- Deep field specific knowledge
- World Class facilities & equipment

SMEs
- Product development support
- Expert advice
- Access to latest technology
- Flexible/multi skilled work force

“Large” Industry
- Work ready graduates
- New products for manufacture
- Research translation into new product/process &/or improved product/process

Start-ups
- Development resources
- Expert Advice
- Project Management
- Networks
Product Development funnel – where ELF can add value to the broader ecosystem

Small projects can be offered to explore ideas at the very earliest stages. At this point, simulation tools are used extensively as rapid iteration at a course level is required before setting in to a more detailed workflow.

Strategic use of the ELF can allow projects that are riskier in terms of success expectation to be tackled and explored.

This blue portion is what is traditionally thought of as Product development, however, the early phases are critical and very expensive to resource effectively.
**Students** learn by being part of project teams within a function product development business environment. **Students** learn to engage experts, communicate cross-functionally, and deal with all the imperfections the real world throws up. **Start-ups/SMEs** gain access to research & development skills. **Start-ups/SMEs** gain a cost-effective method of exploring product/process options.
A key deliverable of this phase is to package up the work ready for the ELF. Advice is given, and bounds are described. The limitations of the capability are clearly explained and an agreement formulated as to the deliverables that the ELF will work to. Alternately, this phase will provide the SME with clear scope to allow internal development, or to contract external resources if the time is critical.

Capacity of each industry fellow is nominally 2 projects/day. This allows for regular weekly meetings, and some time to allow recovery meetings when the project demands. Within those projects multiple students can be accommodated, perhaps as many as 20 per project.
Example Projects in the pipeline this Summer

- City of Melbourne
  - Green Waves for cyclists

- Cycling Victoria
  - Designing criterium circuits for Melbourne

- Diaxi
  - Refining the design of a dual plane hinge system

- SMCC / Vic Govt / Bosch
  - Creating e-bikes for special needs kids
The German Experience - Fraunhofer

The Fraunhofer Network: Development Pipeline for High Quality People from Universities to Industry Fraunhofer-Gesellschaft offers university graduates - Bachelor's or Master's - opportunities to move into industry projects as their training ground where they learn to identify customer needs and begin to understand the complex communication process required for successful technology uptake by industry. Like an apprentice, they learn project management practices and develop interpersonal skills; these are skills which industry employers seek. The training ground at FraunhoferGesellschaft is unique and provides graduates with a broad range of management experiences that are of enormous value and relevance to industry.

This typical five to seven year career path also allows graduates to complete PhD studies if relevant. The Head of a Fraunhofer Institute in nearly all cases is also a Professor at a local university and can therefore supervise PhD students to completion of the doctorate. While the PhD candidates I spoke to find being supervised by a Fraunhofer head useful, PhD research is completed over and above their daily tasks as the PhD topics rarely coincide with those of industry-based projects. Therefore the Phd candidates often work long hours to achieve all objectives. However their efforts in education are often well rewarded. Phd graduates who have worked at Fraunhofer are highly valued by German companies.

There is a very high turnover of staff at Fraunhofer. Fraunhofer regard this as a positive way of transferring technology from Fraunhofer into private industry. About 70% of scientists who leave Fraunhofer-Gesellschaft each year do so to take up leading positions in business. (The others go into research and teaching or into business for themselves.) This results in strong networks across the board, upholding and strengthening the vital link between scientific research and innovation in industry. 18 Once people leave Fraunhofer and join private industry they often become powerful advocates for the use of Fraunhofer services in industry. This is an unofficial Alumni of business development people working to the benefit of Fraunhofer across Germany.

Source: Thomas, D. 2008. To investigate methods to improve the competitiveness of Australian manufacturing through enhanced technology application. 