

The Process and Delivery of a Directed Project Component:

Lessons and Methods from a Collaborative Degree Program

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The Process and Delivery of a Directed Project Component:

- History of Rolls-Royce/Purdue Collaboration
- Program Overview
- Non-Thesis (Directed Project) vs. Thesis
- Flow Chart and Outline of Directed Project Process
- Modification of Process for Professional Students
- Intellectual Property Management
- Benefits and Lessons Learned
- Examples of Past Projects
- Summary and Questions

Rolls-Royce Master's Degree Program

Master of Science Degree In Technology

Professional Education Options



The Process and Delivery of a Directed Project Component

History of Relationship

- A Master Agreement has Existed
- 1st Cohort Formed in 2005 – Graduated May 2007
- Curriculum Customized to Enhance Value for Rolls-Royce
- Fourth Cohort in Process – May 2013 Graduation



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Program Overview:

Program Uniqueness

- Duration (22 months/5 semesters)
- Customized curriculum
- Cohort format
(Target class size 22-30 students)
- Convenient location and time on site at Rolls-Royce
(Mondays & Thursday 4:00 – 7:30 pm)
- Primarily Full-time faculty from main campus
- Directed project instead of thesis

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Graduates:

Cohort #1 (2005 – 2007)

- 24 Graduates
- 3 Drops

Cohort #2 (2007 – 2009)

- 22 Graduates
- 4 Drops

Cohort #3 (2009 – 2011)

- 26 Graduate (May 2011)
- 2 Drops

Total = 72 Graduates

Overall Drop Rate = 12.5%

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Directed Project:

- An applied project instead of a thesis
 - Directed Project is jointly selected by the student & their supervisor/manager
 - Directed Projects solve a technical, business or operational problem, recommending and demonstrating an optimal solution
 - Goal is to provide a **measurable** benefit to R-R
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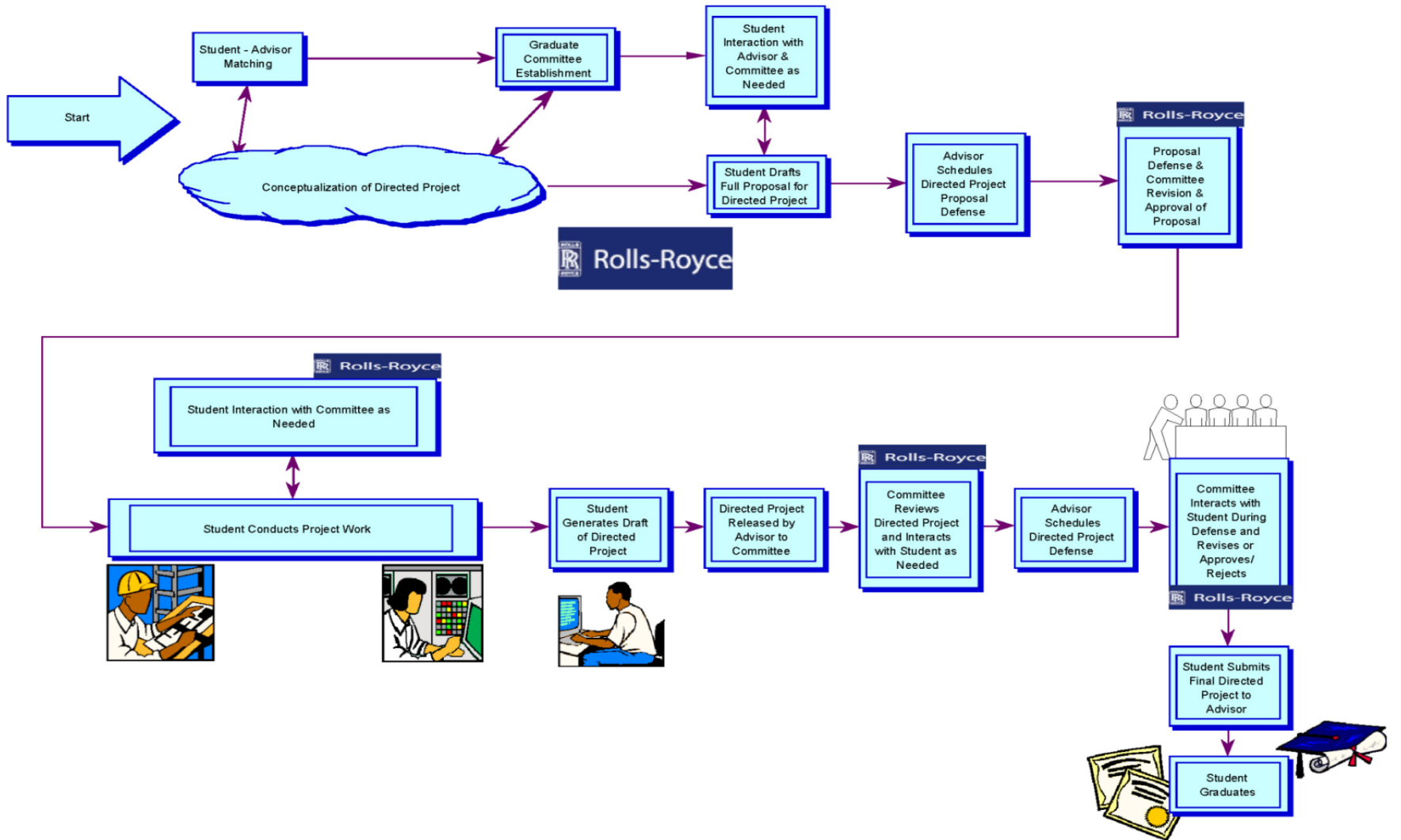
Directed Project (cont.):

Student's Committee (3 Persons):

- Purdue Advisor COT (Research interest and subject knowledge in area of D.P.)
- Purdue Committee Member
- Rolls-Royce Committee Member

Oral Defense & Final Report:

- End of program requirement (Pass /Fail)
- Student's Committee attendance required



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Directed Project Outline:

- Cover Page
 - Abstract
 - Table of Contents
 - Purpose and Problem
 - Review of Literature
 - Methodology
 - Data Analysis
 - Conclusions, Discussions and Recommendations
 - References
 - Appendices
-

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Modifications for Non-Traditional Students:

- Project Selection Process
- University Advisor Selection
- Measurable Benefit For Company
- University Advisor Compensation
- Involve Company Stakeholders

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Responsibilities of Company Committee Member:

- Available to Counsel Students
- Assist with Subject Matter Expertise
- Guidance to Identify and Verify ROI Potential
- Ongoing Consultation During Project Execution
- Evaluate Quality of Result
- Participate in Oral Defense
- Support and Assist in Implementation

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Managing Intellectual Property Concerns:

- Collaboration Benefitted From Umbrella Agreement that Existed Between Rolls-Royce and Purdue University
- Included Language for Managing Confidentiality, Non-Disclosure and Intellectual Property Rights as Well as Publishing Requirements
- Language Reinforced in a Specific Letter of Agreement
- Process Developed to Ensure Purdue Faculty/Advisors Awareness and Compliance

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Lessons Learned:

- Oral Defense Creates a Rich Dialogue
- Independent Verification of Benefits
- Average per Cohort Savings = \$6 million
- ROI Yield of 10 to 1
- Creates Opportunity for Future Sponsored Programs
- Faculty Is Exposed to Current and Future Issues Facing Business and Industry

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Student Professional Gains:

- Candidate for higher level career position
- A greater understanding of Systems Engineering
- A greater understanding of Six Sigma (DMAIC)
- Experience on developing and completing a project
- Strengthens self-image
- Concepts learned from fellow classmates

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Graduate Survey:

- Conducted January 2012 (Survey Monkey)
- Response Rate = 51.4% (37 respondents/72 Grads (Cohort #1, #2, #3))
- Respondents Proportion
 - Cohort #1 – 21.6%
 - Cohort #2 – 29.7%
 - Cohort #3 – 48.6%
- 13 Questions (12 multiple choice, ALL questions had Open text field)
- Question Category
 - 5 Directed Project
 - 2 Impact on Career
 - 2 Curriculum
 - 1 Mentor Others (Applicants)
 - 1 Recommend Program
 - 1 Personal Impact
 - 1 Cohort #

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Graduate Survey (Take Aways):

- Lifecycle of Directed Projects could be Furthered
 - 7 Projects progressed to Green Belt/Black Belt Project AFTER Degree
- The Directed Project Valued as a Requirement
 - Extremely Valuable (must be included) – 45.9%, (17 Respondents)
 - Valuable (but not essential) – 48.6%, (18 Respondents)
 - Somewhat Valuable – 0%
 - Not Needed, Replace with Thesis – 5.4%, (2 Respondents)
- Take a Closer Look on Career Impact of Degree Program
 - Substantial – 8.1%, (3 Respondents)
 - Moderate – 48.6%, (18 Respondents)
 - Slight – 18.9%, (7 Respondents)
 - None – 24.3%, (9 Respondents)
- Ensure Students are Supported (Company and University) throughout Program
 - Make it a Priority
 - Match Advisors more Quickly
 - Interactions - More in Depth and More Timely



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Graduate Survey (Take Aways):

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	<u>Company</u>	<u>University</u>
- Yes, Definitely	62.2%, 23 Respondents	75.7%, 28 Respondents
- Somewhat	32.4%, 12 Respondents	21.6%, 8 Respondents
- No, Encountered Problems	5.4%, 2 Respondents	2.7%, 1 Respondent

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Examples of Past Projects:

- A Valuation Method for Intellectual Property
- Inventory Control System Development
- Improving Customer Response Process
- Knowledge Management Process Study in Control Systems Design
- Grinding Parameter Optimization
- Cost Estimation for Experimental Test
- Development of an Interactive Computer Tool to Identify Qualification Test Requirements

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Closing Comments:

- Students From Diverse Backgrounds
- Directed Project Approach is Unique
- Curriculum was Moderately Modified Still Providing the Same Rigor and Content Previously Approved by Faculty

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CMC Award Winner
American Society Engineering Education
(ASEE - Corporate Member Council)

Rolls-Royce/Purdue
2008 - Excellence in Engineering
Education Collaboration Award

The Process and Delivery of a Directed Project Component:
Lessons and Methods from a Collaborative Degree Program

Questions???

Back-up Slides

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Benefits & Return on Investment (ROI) (Cohort #1):

1. Benefits/Cost Ratio (BCR)

$$\text{BCR} = \frac{\text{Program Benefits}}{\text{Program Costs}}$$

$$\text{BCR} = \$7,108,378 / \$627,323 = \$11.33 \text{ (11.33:1)}$$

*(For every \$1 invested, \$11.33 benefits are returned)

2. ROI (%) = $\frac{\text{NET Program Benefits}}{\text{Program Costs}} \times 100$

$$\text{NET Benefits} = \$7,108,378 - \$627,323 = \$6,481,055$$

$$\text{ROI (\%)} = \frac{\$6,481,055}{\$627,323} \times 100 = 1,033.13 \%$$

*(For every \$1 invested in program, there is a return of \$10.33 in NET benefits AFTER costs).

Master of Science Degree Program

Course Content:

- Project Management
- Research Methods
- Writing Skills
- Quality & Productivity
- Measurement and Evaluation
- Interpersonal & Group Skills
- Design of Experiments
- Systems Development & Analysis
- Financial Management
- Leadership and Ethics
- Strategic Planning & Marketing
- Directed Project



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Program Objectives:

- Advancement of analytical, innovation and creative problem-solving skills in applications of technology
- Enhancement of participants' learning skills in a continuously changing technology field
- Raise awareness of professional ethics in global, multicultural and technological environments
- Develop an understanding of the Applied Research Method and demonstrate with a relevant project

Rolls-Royce Master's Degree in Technology Program

Admission Requirements – Eligibility:

- Possession of an earned baccalaureate degree (3.00/4.00 GPA or greater) from an accredited university
- Minimum of 6 months Rolls-Royce direct employment
- Minimum of 2 years engineering/technology or related experience
- Completion of Purdue's application and admission process
- GRE or GMAT is not required

Rolls-Royce Master's Degree in Technology Program

Admission Requirements: Application Process

- Official transcripts - undergrad & graduate (if applicable)
- 2 Letters of Recommendation (Applicant)
 - ✓ Current Supervisor
 - ✓ Students' choice (academic, mentor, community leader, etc.)
- 1 Letter of Recommendation (Rolls-Royce)
- Purdue's on-line application
- Resume
- Goal statement or statement of purpose

Master of Science Degree Program

Lessons Learned:

- Improvements with each Cohort group
- Alumni will be available to answer questions
- Make sure you understand tax liability
- Graduate student expectations different than undergrad
- Directed Project timeline has been moved forward