

School of Engineering

Introduction to Engineering Management

Mark Sanford

Engineering Management

Why Bother ?

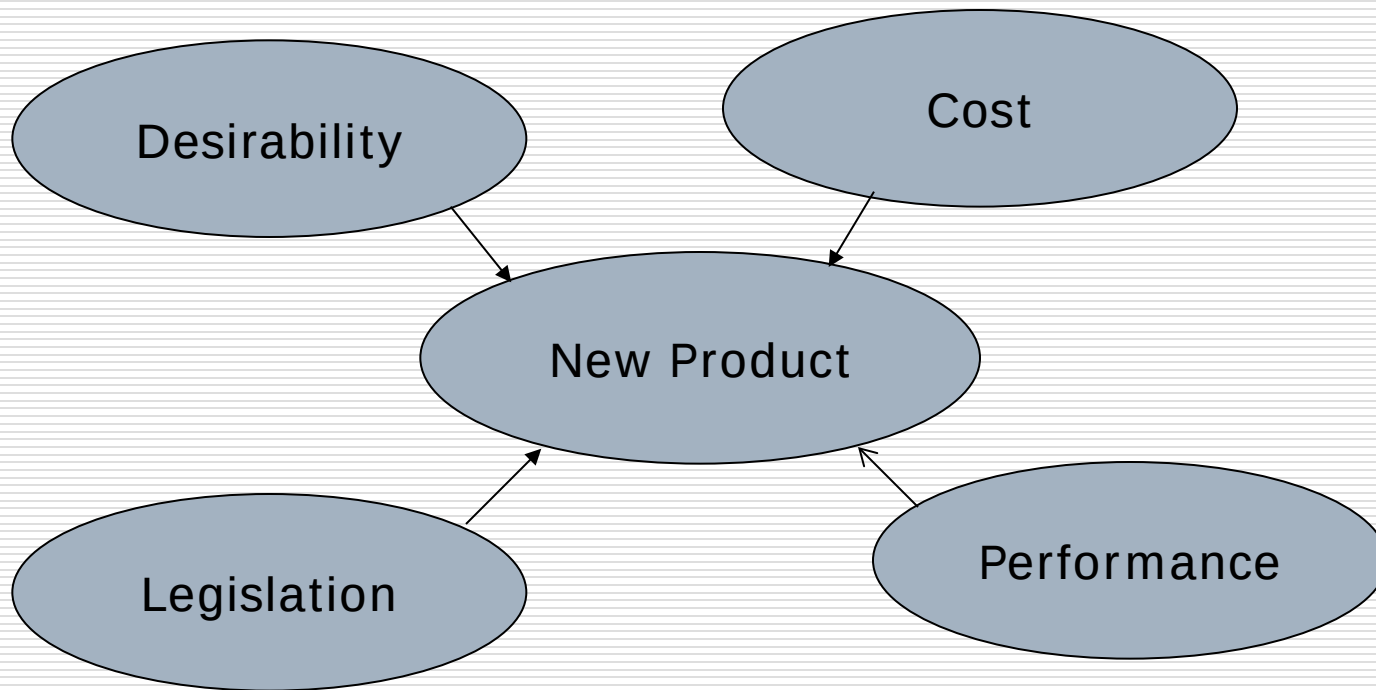
- ☐ As engineers
 - ☐ You want to be paid
 - ☐ You want to work for a stable/successful organisation
 - ☐ You need equipment
 - ☐ You need training
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- ☐ Therefore you need to understand and influence the environment around you
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Engineering Business

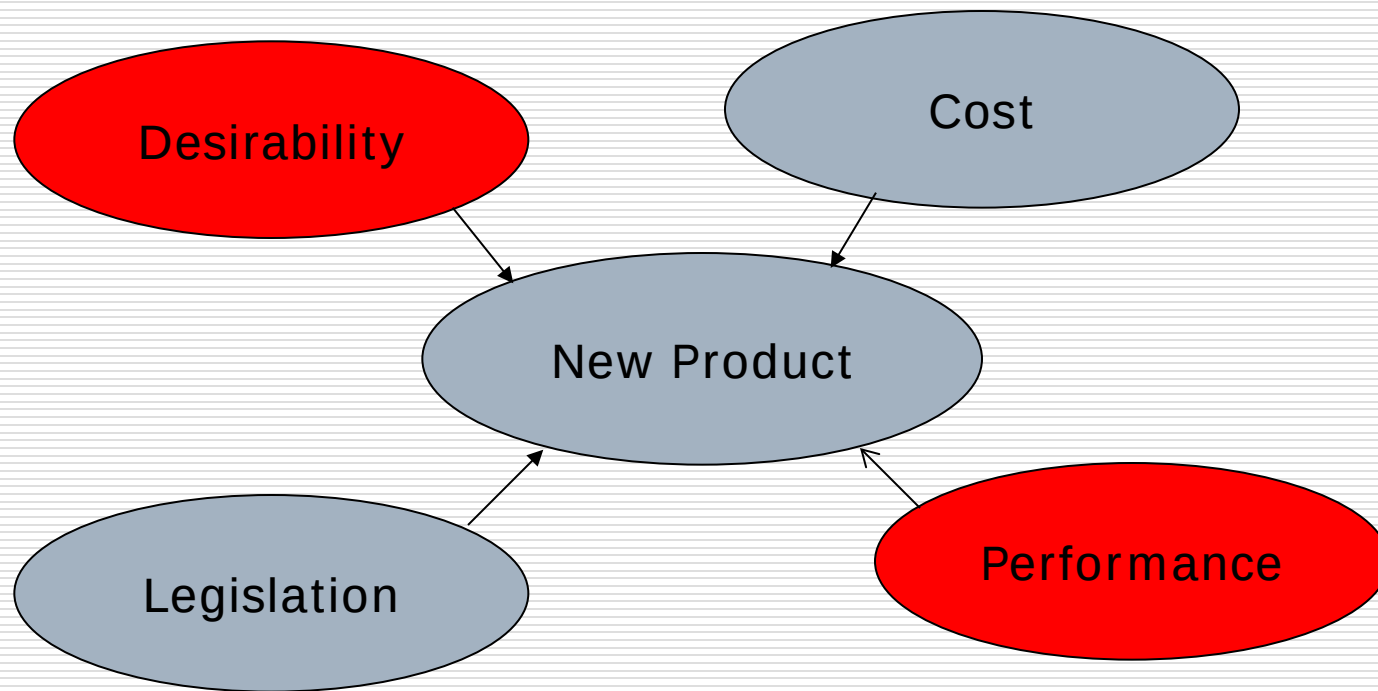
Different Business Models

- 1. Dream, design, develop, build, sell
 - Vehicle manufacturers (OEM's)
 - Aftermarket product suppliers
 - 2. Quote, design, develop, build, sell
 - Component suppliers, tier 1,2 etc
 - 3. Quote, design, develop
 - Engineering consultants
 - 4. Quote, operate
 - Fleet maintenance
 - Race teams
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Vehicle Manufacturers Influences on products ?



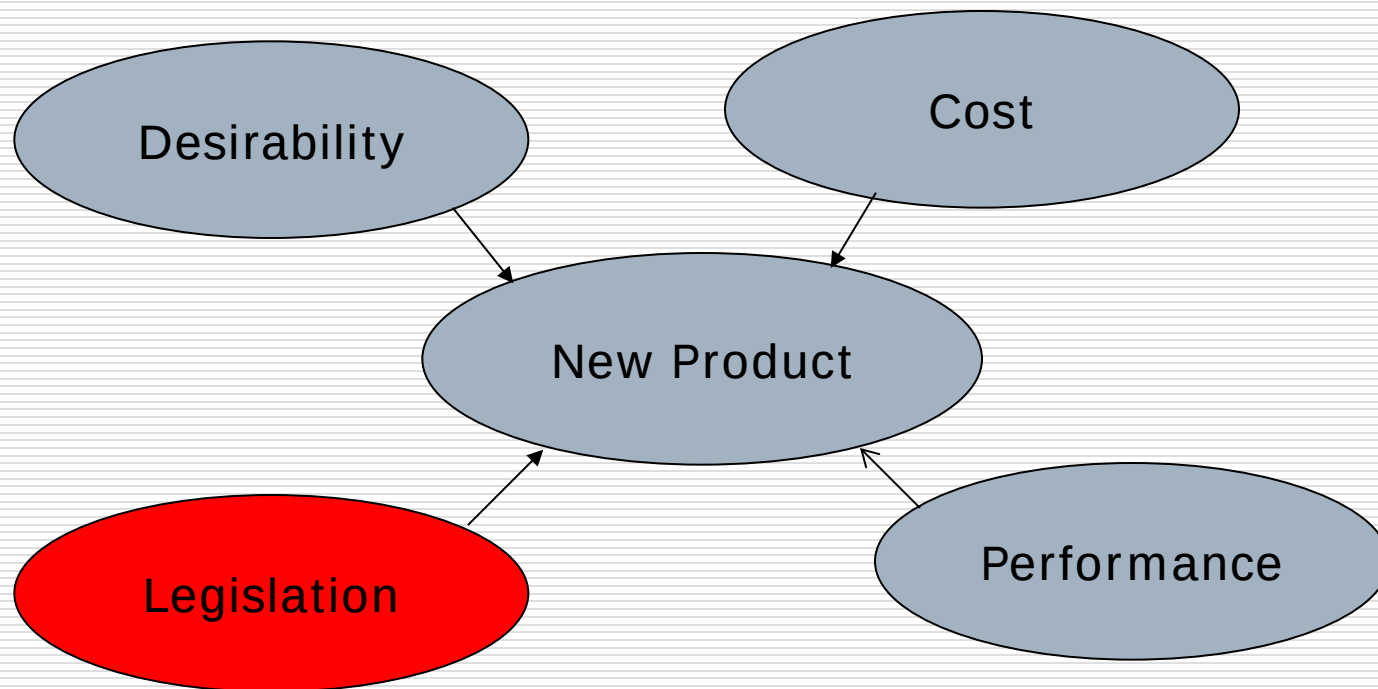
Vehicle Manufacturers Influences on products ?



Vehicle Manufacturers Influences on products

- ☐ Why do people buy cars/bikes/products
 - Fashion
 - ☐ Shape
 - ☐ Social positioning of marque
 - Price
 - ☐ Purchase price
 - ☐ Cost of ownership
 - Improved performance
 - ☐ Go faster
 - ☐ Improved economy
 - ☐ Better comfort
 - ☐ Reliability / safer
 - ☐ More space
 - ☐ No point in engineering product nobody wants
-

Vehicle Manufacturers Influences on products ?



Influences on products

Legislation – road vehicles

- ❑ Performance
 - Emissions - from exhaust
 - CO2 ?
 - ❑ Safety
 - Crash, structure, airbags, seatbelts, pedestrian impact, cabin safety
 - Braking, ABS, ESP
 - Lighting
 - ❑ Environmental
 - Emissions – from vehicle
 - End of life regulations – vehicle disposal
 - Noise
 - ❑ No point in engineering product that nobody is allowed sell
-

Influences on products

Legislation – race vehicles

☐ Performance regulations

- Emissions - from exhaust – cats ?
- Inlet features
- Tyres
- Dimensions – Aerodynamic limitations
- Control system limitations

☐ Safety

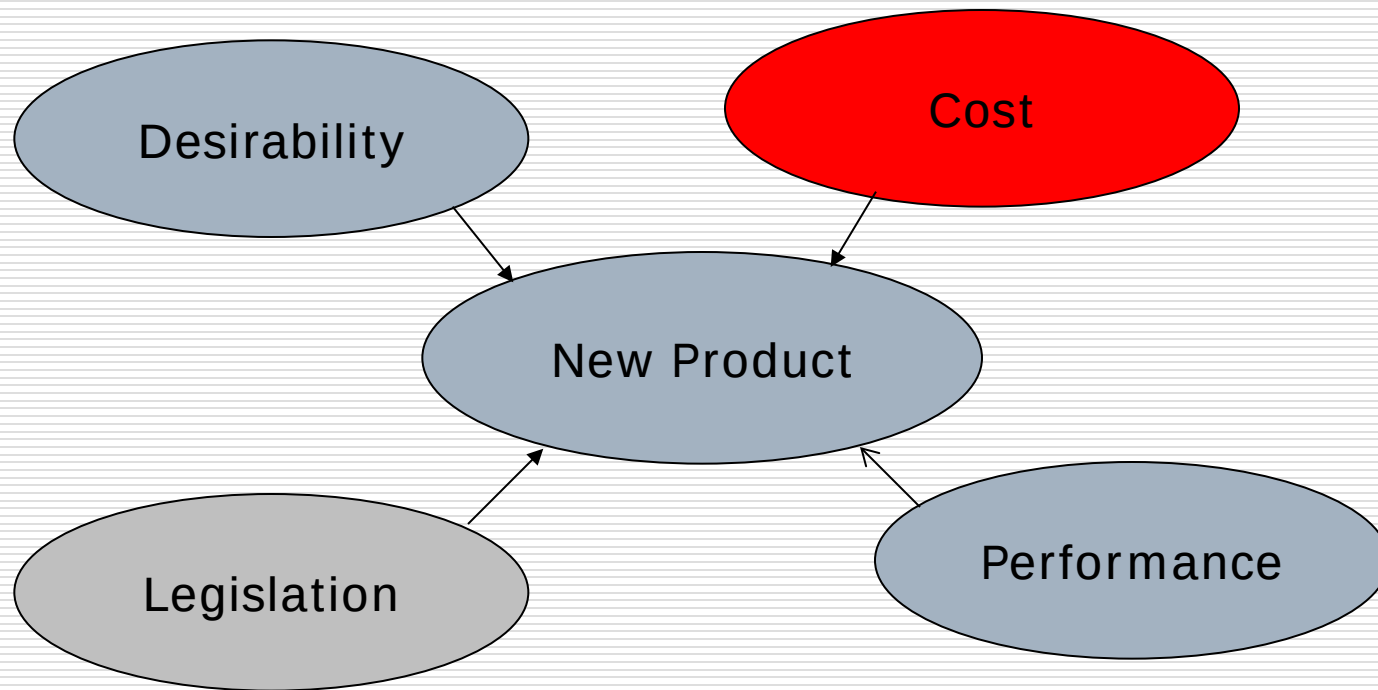
- Crash, structure / cages, belts, wheel retension, helmets
- Lighting

☐ Environmental

- Noise

☐ No point in engineering product that nobody is allowed to race

Vehicle Manufacturers Influences on Dream products ?

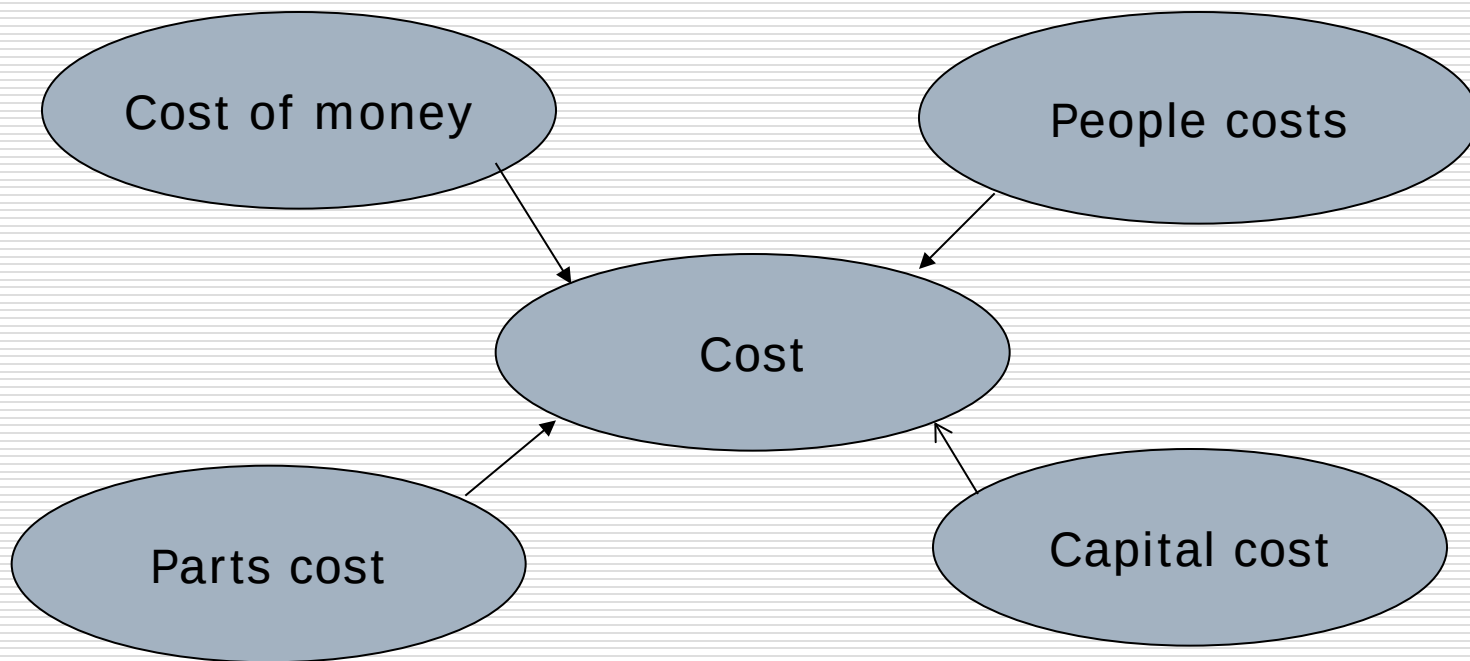


Influences on Dream products

Costs incurred

- ❑ Cost of specification
 - Market survey - Competitor survey
 - Legal requirements
 - ❑ Cost of design/development
 - Design, prototypes, testing
 - Testing, proving
 - ❑ Cost of production
 - Tooling, parts, purchase
 - Assembly
 - ❑ Cost of sales
 - Advertising, Agent network, Warranty
 - ❑ No point in engineering product that nobody will want to pay for it for what it does
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Vehicle Manufacturers Influences on cost ?



Soft ? - Business skills

Getting the best results

- Team working
 - Team members and skills
 - Leadership
 - Roles and Responsibilities
 - Motivation
 - Self motivation
 - Team motivation
 - Communication
 - Effective meetings
 - Delegation
 - Negotiating and influencing
 - Juxtaposition
 - Creating win-win situations
-

Project Management

Keeping the project on the road

- Planning
 - Task identification
 - Gant chart
 - Interaction between time and cost
 - Critical path analysis
 - Risk management
 - Identification of risks
 - Risk reduction strategies
 - Project control
 - Milestones
 - Project monitoring KPI's
 - Dealing with deviations
 - Time management and prioritisation
-

Organisations

The right structure for the job

- Legal entities
 - Sole trader
 - Partnerships
 - Ltd companies
 - Organisational structures
 - Organisational structures
 - Change management – technical and structure
 - External influences
 - Fiscal policy
 - Competitor analysis
 - Self analysis models, SWOT, etc
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Legislative Requirements

- ☐ Vehicle compliance
 - ☐ Workplace compliance
 - Health and safety
 - Employment law
 - ☐ Product liability
 - No 'state of the art defence'
 - Proof of 'fit for purpose'
 - Failure Mode Effect Analysis
 - ☐ Intellectual property
 - Patents
 - Non disclosure agreements
 - ☐ Contracts
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Business and Financial planning Requirements

- ☐ Getting the money
 - Borrowing money
 - Sponsorship deals
 - ☐ Spending the money
 - Cost of purchase
 - Depreciation
 - Buy or rent
 - ☐ Making the money
 - Marketing
 - Selling
 - ☐ Business plans
 - How much can be made (or lost)?
 - How long will it take – is it all worth it ?
-

Engineering Management Conclusions (or why to bother)

- ☐ You will be part of an organisation
 - ☐ You will not be engineering in a vacuum
 - ☐ You will need to generate plans
 - To quote for jobs
 - To generate budgets
 - ☐ You will be part of a team
 - ☐ You will need to be effective
 - Working efficiently
 - Managing time and priorities
 - Understanding tasks/requirements-delegating
 - ☐ You will be dealing with customers and colleagues and suppliers
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