Australian National University

CECS executive summaries and introductions

ANU Academic Skills

Executive Summary vs. Introduction

Executive summary

- Condenses key elements of the report
- Can be read on its own to give a concise overview
- Focus on implementation (recommendations)

Introduction

- Sets up the problem
- Explains why it is of interest
- Indicates how it is addressed in the report

Executive summaries

- Provide a succinct overview of the entire report.
- They typically include:
  - Brief outline of the context and aim
  - Outline of main findings
  - The key message
  - Recommendations

Engineering executive summary

PowerBlocks brings an innovative approach to modular technology in the electronics industry. Our product's Unique Selling Point is based on customisability and user-centred design, also reflected in our business and brand.

The electronics industry is a growing and transforming one, with an increasingly technology-dependent and mobile culture pervading globally…

Our product is composed of functional modules which 'snap' together to create a powerboard with more customisability and flexibility than any existing product on the market…

The initial target market for PowerBlocks is the 'innovator' segment of the consumers [1]. The 'innovative' population is characterised by higher prosperity, education and risk orientation. They like to try new things, have the capability to do so and may also be more interested in being involved with the design and development of the product. Hence, our marketing strategy is designed to capitalise on the product's customisability and target market's willingness to experiment.

A KickStarter campaign and an interactive website will provide engagement with consumers, a platform for initial sales, and funds to start the venture. Competitions for new module designs will be run through the website, further engaging the target market and providing an avenue for 'open innovation' - allowing us to outsource development of the blocks and respond to user feedback. Eventually, we envision PowerBlocks being sold through regular retail outlets as well in order to compete with established manufacturers.

Forecasts of PowerBlocks' financials for the first year indicate that the company can maintain positive cash flow throughout the year due to KickStarter funding and high potential revenues. Our net revenue for the year has been projected close to $0.9 million with a net profit of $150,000 ensuring we achieve growing ROI (Return On Investment).

While risks and challenges for both the technology and our venture exist and have been identified, we believe PowerBlocks has the capability and opportunity to succeed in a growing market. Our marketing strategy and product alike have been carefully tailored to succeed in our target market. With a growing ROI in offer for a start-up funding of $100,000, we believe the PowerBlocks venture presents a sound opportunity for investors who can partner with us to develop the business.

Executive summary: context

PowerBlocks brings an innovative approach to modular technology in the electronics industry. Our product's Unique Selling Point is based on customisability and user-centred design, also reflected in our business and brand.

The electronics industry is a growing and transforming one, with an increasingly technology-dependent and mobile culture pervading globally…

Executive summary: aims

Our product is composed of functional modules which ‘snap’ together to create a powerboard with more customisability and flexibility than any existing product on the market…

The initial target market for PowerBlocks is the ‘innovator’ segment of the consumers [1]. The ‘innovative’ population is characterised by higher prosperity, education and risk orientation. They like to try new things, have the capability to do so and may also be more interested in being involved with the design and development of the product. Hence, our marketing strategy is designed to capitalise on the product’s customisability and target market’s willingness to experiment.

Executive summary: approach

A KickStarter campaign and an interactive website will provide engagement with consumers, a platform for initial sales, and funds to start the venture. Competitions for new module designs will be run through the website, further engaging the target market and providing an avenue for 'open innovation' - allowing us to outsource development of the blocks and respond to user feedback. Eventually, we envision PowerBlocks being sold through regular retail outlets as well in order to compete with established manufacturers.

Executive summary: key findings

Forecasts of PowerBlocks' financials for the first year indicate that the company can maintain positive cash flow throughout the year due to KickStarter funding and high potential revenues. Our net revenue for the year has been projected close to $0.9 million with a net profit of $150,000 ensuring we achieve growing ROI (Return On Investment).

Executive summary: key message, recommendations

While risks and challenges for both the technology and our venture exist and have been identified, we believe PowerBlocks has the capability and opportunity to succeed in a growing market. Our marketing strategy and product alike have been carefully tailored to succeed in our target market. With a growing ROI in offer for a start-up funding of $100,000, we believe the PowerBlocks venture presents a sound opportunity for investors who can partner with us to develop the business.

Introductions contain…

- Background or context
  - e.g. details of problem addressed
- Aim, scope and limitations
- State your key message
  - e.g. suggested solution/response
- Outline the report structure
  - e.g. what you did

Computer Science introduction (Wang 2014, pp. 87-88)

Consensus problems generally involve information exchange between agents within the network; a common group objective is reached through agents interacting with each other. These problems cover many disciplines. For example biologists use them to study the collective behaviour of animals such as ants, birds and fish, known as flocking [1]; physicists use them to study synchronization of coupled oscillators [2], which could increase the performance of oscillator networks; the engineers implement the theory to solve real world problems such as Smart Grid, a modernization of the electricity grid, that can significantly increase the efficiency of electricity distribution; yet most theoretical analyses have so far relied on matrix and graph theory.

A consensus protocol is a distributed method of obtaining global information or achieving a common group objective by enabling communication between agents in the system. Distributed methods are more suitable for large networks than centralised methods, as they enable better performance and faster operation. Another advantage is that they are able to increase the ability of the system to survive single point failures, therefore creating a more robust system. The protocols can also be designed specifically for different applications due to their versatility.

In this report, we further investigate consensus protocols. Firstly, we outline preliminary knowledge and notation on matrix theory and graph theory. Secondly, we present a discussion on different forms of consensus protocols that currently exist, such as switching topology versus fixed topology and nearest neighbour versus multi-hop protocol. We also outline some of the important applications of these protocols, including Smart Grid , flocking, and synchronization of coupled oscillators.

In the second part of the report, we investigate two main problems. Firstly, the effect of network topology on consensus speed, specifically tree, ring, star, two-hop and complete topologies. Secondly, an investigation of two-hop relay (second-order neighbour) protocol performance. We briefly introduce the twohop consensus protocol which has previously been discussed in [3] and [4]. Since there are no explicit descriptions about the coefficients, we fill in this gap by proposing an adaptive coefficient setting method for the two-hop consensus, which leads to the key contribution of this paper. We provide simulation results followed by discussions on the consensus process in comparison with the existing method. At last, we will conclude our project and propose some future research directions.

The goals of this project are to understand the basic concepts of consensus protocols, their applications, and to investigate different ways of increasing the consensus speed. This investigation was motivated by Smart Grid and other power system applications. Ideally this project will set the foundation for the future research in the field of Consensus Protocols.

Introduction: broad context

Consensus problems generally involve information exchange between agents within the network; a common group objective is reached through agents interacting with each other. These problems cover many disciplines. For example biologists use them to study the collective behaviour of animals such as ants, birds and fish, known as flocking [1]; physicists use them to study synchronization of coupled oscillators [2], which could increase the performance of oscillator networks; the engineers implement the theory to solve real world problems such as Smart Grid, a modernization of the electricity grid, that can significantly increase the efficiency of electricity distribution; yet most theoretical analyses have so far relied on matrix and graph theory.

Introduction: narrower context

A consensus protocol is a distributed method of obtaining global information or achieving a common group objective by enabling communication between agents in the system. Distributed methods are more suitable for large networks than centralised methods, as they enable better performance and faster operation. Another advantage is that they are able to increase the ability of the system to survive single point failures, therefore creating a more robust system. The protocols can also be designed specifically for different applications due to their versatility.

Introduction: initial aims, outline report structure

In this report, we further investigate consensus protocols. Firstly, we outline preliminary knowledge and notation on matrix theory and graph theory. Secondly, we present a discussion on different forms of consensus protocols that currently exist, such as switching topology versus fixed topology and nearest neighbour versus multi-hop protocol. We also outline some of the important applications of these protocols, including Smart Grid , flocking, and synchronization of coupled oscillators.

Introduction: implementation aims, outline structure

In the second part of the report, we investigate two main problems. Firstly, the effect of network topology on consensus speed, specifically tree, ring, star, two-hop and complete topologies. Secondly, an investigation of two-hop relay (second-order neighbour) protocol performance. We briefly introduce the twohop consensus protocol which has previously been discussed in [3] and [4]. Since there are no explicit descriptions about the coefficients, we fill in this gap by proposing an adaptive coefficient setting method for the two-hop consensus, which leads to the key contribution of this paper. We provide simulation results followed by discussions on the consensus process in comparison with the existing method. At last, we will conclude our project and propose some future research directions.

Introduction: key message

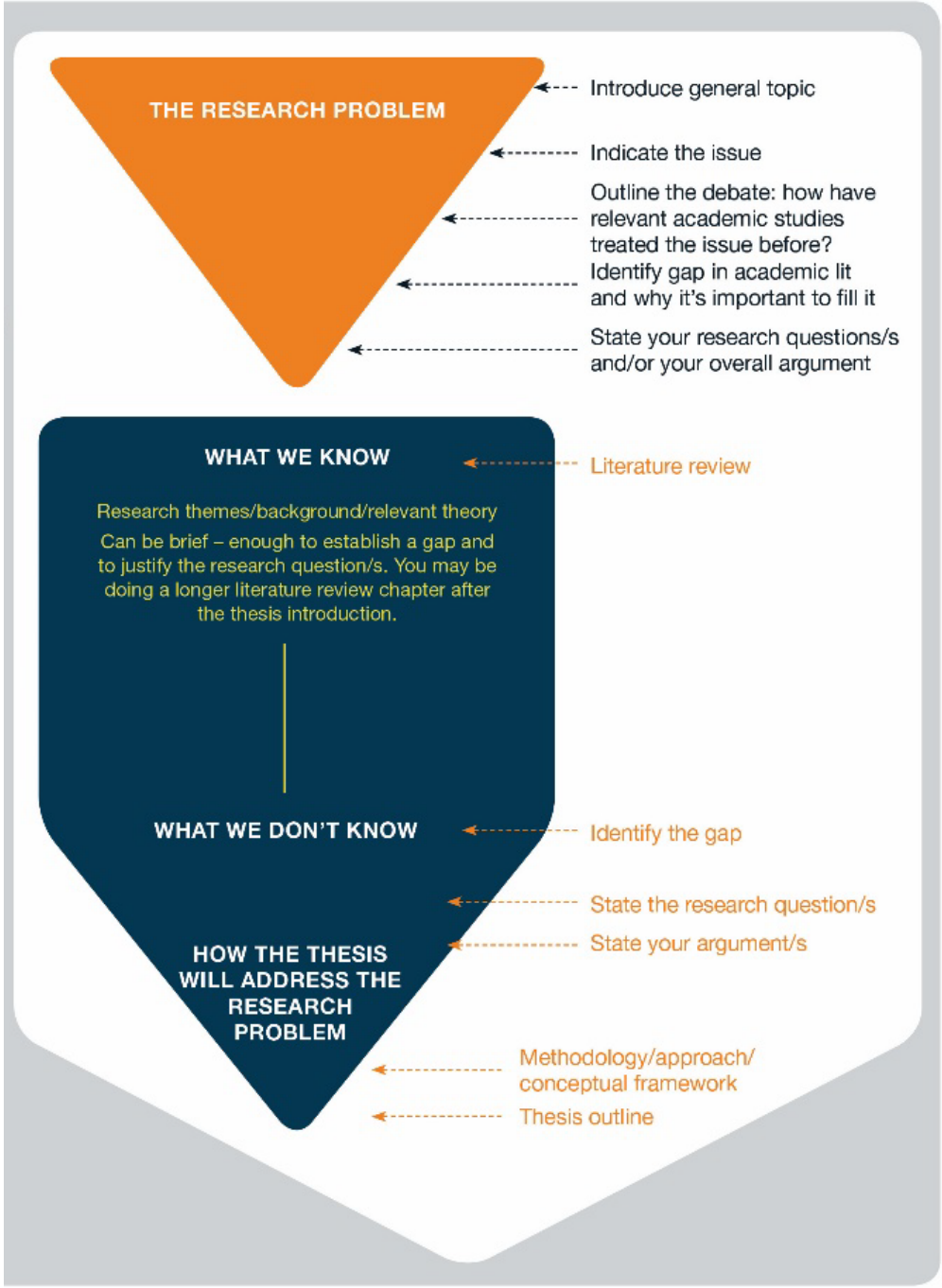
In the second part of the report, we investigate two main problems. Firstly, the effect of network topology on consensus speed, specifically tree, ring, star, two-hop and complete topologies. Secondly, an investigation of two-hop relay (second-order neighbour) protocol performance. We briefly introduce the twohop consensus protocol which has previously been discussed in [3] and [4]. Since there are no explicit descriptions about the coefficients, we fill in this gap by proposing an adaptive coefficient setting method for the two-hop consensus, which leads to the key contribution of this paper. We provide simulation results followed by discussions on the consensus process in comparison with the existing method. At last, we will conclude our project and propose some future research directions.

Introduction: recap of aims, contribution to the field

The goals of this project are to understand the basic concepts of consensus protocols, their applications, and to investigate different ways of increasing the consensus speed. This investigation was motivated by Smart Grid and other power system applications. Ideally this project will set the foundation for the future research in the field of Consensus Protocols.

Literature review placement

- Sometimes embedded in your introduction
- As a separate 'literature review' section
- Provided a little bit at a time in the relevant sections



Literature reviews

- Use the literature to explain the motivation for your study
  - Critically evaluate the literature
  - Identify gaps, problems, issues, limitations in the field
  - If relevant provide background information and definitions
  - Demonstrate where your work fits in
  - Justify the approach for your project

In sum

- Executive summaries give a comprehensive account of your report's purpose and findings
- Introductions provide the motivation for your work
- Introductions may include or be followed by a literature review that explains in detail the motivation for your work

References

Wang, C 2012, 'An investigation of the adaptive coefficient setting method for the two-hop consensus protocol and the effect of network topology on power systems', *The ANU Undergraduate Research Journal*, vol. 4, pp. 87- 102