Managing a Successful Computing Project

RESEARCH (p1)

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Aims

- To introduce research in the context of computing projects

Learning objectives

- Discuss what research means
- Understand the research process
- Classify research and understand different research methods

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WHAT IS RESEARCH?

What is research?

- *The good researcher is not 'one who knows the right answers' but 'one who is struggling to find out the right questions might be'.*
  Phillips and Pugh

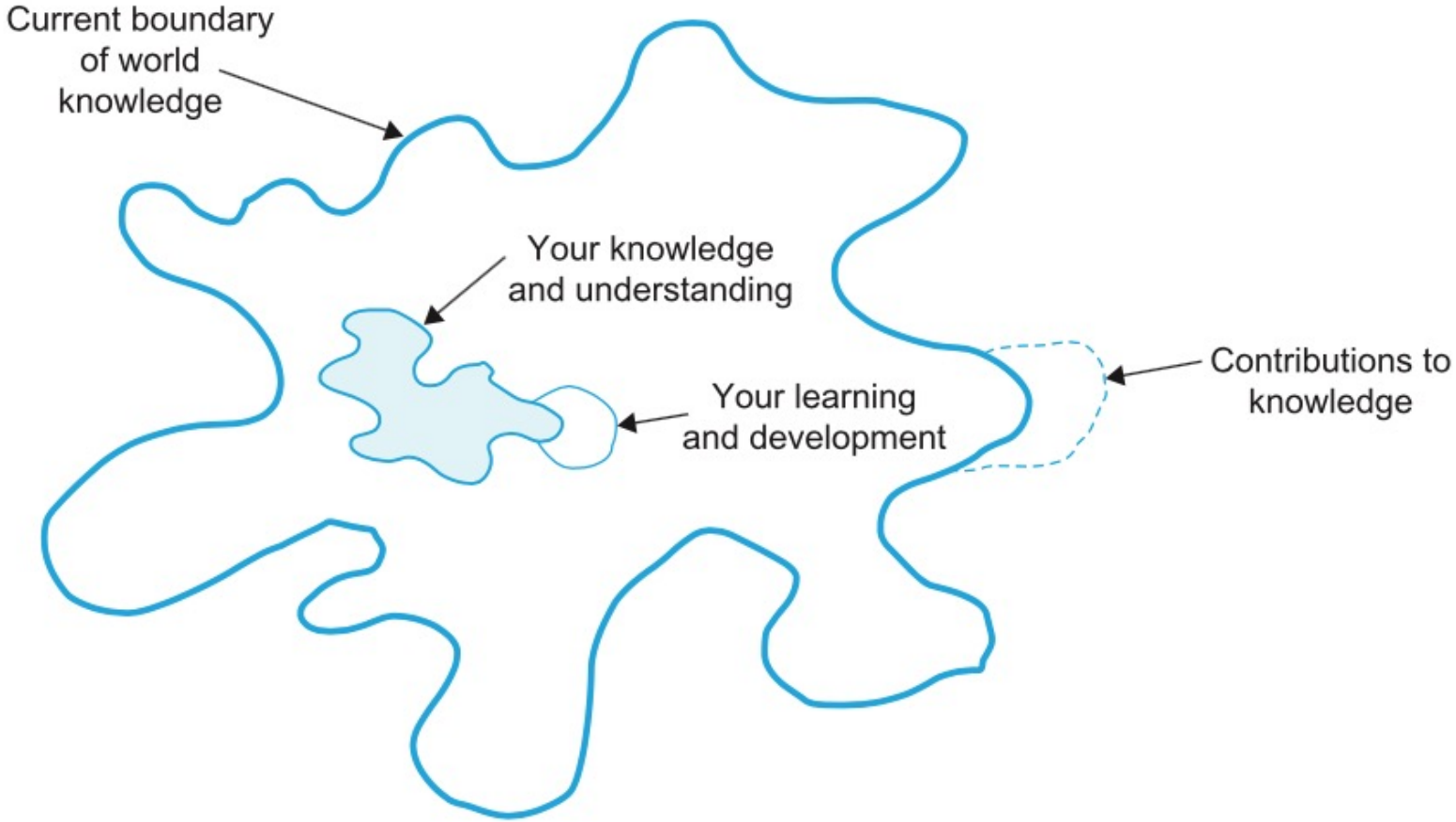
A definition

- Research is defined by the Higher Education Funding Council for England (HECFE) as '***original***' investigation undertaken in order to ***gain knowledge*** and ***understanding***'

Originality

- Doing something that has not been done before
  - Original in the ways you do things (using different technique or approach)
  - Original by producing or developing something new
- In term of originality in the ways you do things, there are several ways
  - Tools, techniques, procedures and methods
  - Exploring the unknown
  - Exploring the unanticipated
  - The use of data

Contribution to Research



Knowledge and understanding

- There is a hierarchy: data, information, knowledge and wisdom
- Data
  - Factual elements that describe events
  - E.g., collecting data for your program's peer feedback
- Information
  - Represents data that have been processed in order to provide meaning
  - E.g., summaries of the results of your program's peer feedback
- Knowledge
  - Your high-level understanding of things (instead of 'what', this is about 'why')
  - E.g., explanation about the results of your peer feedback
- Wisdom
  - Ability about putting your knowledge into practice (create new knowledge and adapt to different situations)

Theory

- Data, information, knowledge, and wisdom represent understanding
- Theory
  - Represents ideas, opinions, suppositions based on observations
  - Not necessarily true, at time, but is best explanation of the what observed

Collecting data and research

- Collecting data and information
  - Is termed “intelligence-gathering”
  - Used to answer “what” questions (what is happening, what don’t we know, what can we find out)
- Research
  - Must go beyond gathering data and describing what we see
  - Must make contribution to knowledge
  - Looks for “explanations, relationships, comparisons, predictions, generalizations and theories”
  - Addresses “why” questions (why do things happen the way they do? etc)

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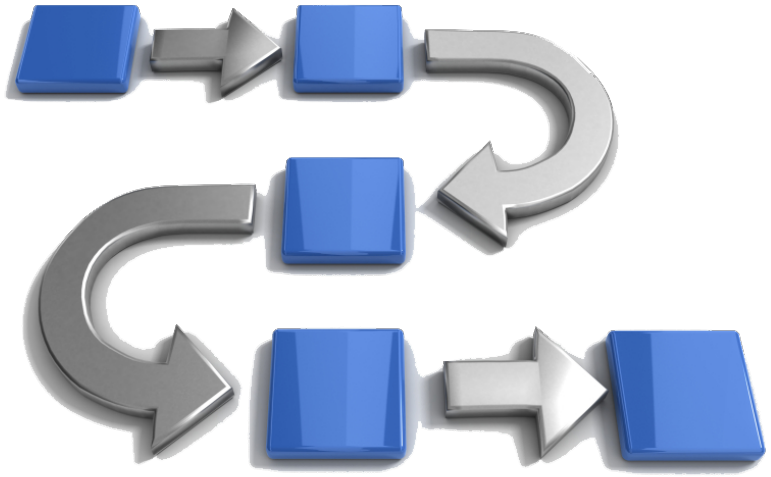
THE RESEARCH PROCESS

Overview

- Research should follow a recognized process
- Common views of research process:
  - Sequential
  - Generalized
  - Circulatory
  - Evolutionary



Sequential

- Series of activities are performed as a “fixed, linear series of stages”
- E.g., steps
  - Identify the broad area of study
  - Select a research topic
  - Decide on an approach
  - Plan how you will perform the research
  - Gather data and information
  - Analyze and interpret data
  - Present the results and findings

Generalized

- Also define a sequence of activities to performed after one another
- However, not all stages are applicable and some steps may require performing in different ways depending on the nature of the research
  - I.e., identify alternative routes that may be taken at different stages
  - E.g., Kane defined 11 distinct stages and number of alternative methods

Circulatory

- It recognizes that any research is only part of a continuous cycle of discovery and investigation
- Research will uncover more questions than it answers and can begin again by attempting to answer these new found questions

Evolutionary

- It takes the circulatory interpretation one step further, it recognizes
  - That research must evolve and change over time
  - That research does not necessarily follow a defined circulatory pattern
  - That research does not necessarily repeat the same forms of analysis and interpretation that were performed before
- The outcomes of each evolution impact on later ones to a greater or lesser extent

Qualitative Research

- *'Qualitative Research…involves finding out what people think, and how they feel - or at any rate, what they say they think and how they say they feel. This kind of information is subjective. It involves feelings and impressions, rather than numbers'*
  - Bellenger, Bernhardt and Goldstucker, Qualitative Research in Marketing, American Marketing Association

Qualitative Research

- Qualitative research is multimethod in focus, involving an interpretative, naturalistic approach to its subject matter.
- Qualitative Researchers study “things” (people and their thoughts) in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.

Qualitative Research

Research problems focusing on:

- Person's experience or behaviour;
- Uncovering and understand a phenomenon about which **little is known**
- Employ a **limited number** of observations

Qualitative Research

- Emphasis on **understanding**
- Focus on understanding **from respondent's** point of view
- **Interpretation** and rational approach
- Observations and measurements in **natural settings**

Qualitative Data Collection Techniques

- In depth Interviewing: are optimal for collecting data on individuals' personal histories, perspectives, and experiences
- Focus Groups: are effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern to the cultural groups or subgroups represented.
- Participant Observations: is appropriate for collecting data on naturally occurring behaviors in their usual contexts.

FOCUS GROUPS

Question	Techniques	Problem	Requirement
Research question	**Discussion** on a certain **topic** with **several respondents** at the **same time**	Discussion is influenced by: - the **size** of the group, - **personalities** of people involved, - the physical and geographical arrangement of the meeting, - the "**chemistry**" between the interviewer and the group	Skilful **coordination** of the group's interactions

INTERVIEWS (BY MAIL, BY PHONE, PERSONAL

- **Interviews demand real interaction between the researcher and the respondent** and that is why **the researcher needs to know the respondent**
- Interviews are often considered the **best data collection methods**

- There are **two types** of interviews - **structured and unstructured** interviews
- Semi-structured and unstructured interviews **demand greater skills** from the interviewer
- **Unstructured interviews are considered advantageous in the context of discovery**.
- Interviews also are **difficult to analyse**

Analysis Qualitative Data

- Categorisation
- Unitising data
- Recognising relationships and developing the categories you are using to facilitate this
- Developing and testing hypotheses to reach conclusion

Analysis Qualitative Data

- Data collection, data analysis and the development and verification of relationships and conclusion are all interrelated and interactive set of processes
- Allows researcher to recognise important themes, patterns and relationships as you collect data
- Allows you to re-categorise existing data to see whether themes and patterns and relationships exist in the data already collected
- Allows you to adjust your future data collection approach to see whether they exist in other cases

Exercise

- ToyRus company has a very successful product line of super hero toys but business indicators show the slowdown of this product line. The company wants to bring to market an alternative product line of super villain toys. They should study the feasibility of this product line. The two selected research methods are focus group and interview. Research objects are boys 5-12 years old.
- Choose 2-3 topics to discuss for focus group
- List 5 interview questions