

MPSW5013/ PPSW6013 RESEARCH METHODOLOGY

Research Management & Ethics

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Overview

- Research management – from inception to completion
- Challenges facing a researcher

Research Tools Managing Your Project R & D

- What is research? a process that acquires new knowledge.
- Development - a process that applies knowledge to solve problems.
- R- seeks truth
- D- seeks utility.
- Without Research nothing would get developed.
- Without Development (no production and no sales), no research could be funded

The Scientific Method

- The iteration of four recursive phases for the planning, conduct, and stepwise refinement of a research or development task.

Analysis

Describe Problem
Set Performance Criteria
Investigate Related Work
State Objective

Synthesis

Implement Solution
Design Experiments
Conduct Experiments
Reduce Results

Hypothesis

Specify Solution
Set Goals
Define Factors
Postulate Performance Metrics

Validation

Compute Performance
Draw Conclusions
Prepare Documentation
Solicit Peer Review

What to do?

- Decide on the field of research
- Title
- Proposal
- Literature Review - Critically analyse previous work
- Look for opportunities/MAJOR improvement
- Problem statement/Motivation/Hypothesis
- Scope of work
- Objectives
- Output/Expected result/KPI's
- Methodology
- Quantitative/qualitative?
- Result analysis/Presentation of results
- Schedule

Measurement/validation

- Validity and validation are the most fundamental issues in the development, evaluation, and use of measurement instruments.
- Validity refers to the quality of the inferences, claims, or decisions drawn from the scores of an instrument and
- validation is the process in which we gather and evaluate the evidence to support the appropriateness, meaningfulness, and usefulness of the decisions and inferences that can be made from instrument scores (i.e., to understand and support the properties of an instrument) (Zumbo 2007, 2009).

Methodology

Elaborate your methodology in details specifying on the

- approaches,
- sampling,
- types of sampling,
- instrument,
- validity/reliability tests
- Data collection
- Any pilot study?

Tools and resources necessary

- Notebook- a complete record of all your activities, updated faithfully and regularly.
- A thorough understanding of descriptive statistics to avoid blind reliance on statistical packages.
- thorough knowledge of all functions and capabilities of a powerful spreadsheet program {e.g., Excel or MatLab}.
- Thorough knowledge of all functions and capabilities of a powerful slideshow design program {e.g., PowerPoint}.
- Access to a wide variety of specialized software packages for data analysis and visualization.
- Very fast and unconstrained Internet access.

More tools

- A very fast and large-RAM-capacity desktop workstation or laptop at home and at work.
- Convenient access to a well-stocked technical library, including books and professional journals.
- A small collection of professional books, including handbooks and trade references.
- Regular attendance at and participation in professional conferences and workshops.
- Subscriptions to a few professional journals and magazines in your technical area.
- The services of a professional technical editor for in-house technical reports and published papers.

More tools

- Google sites
- Google docs
- Drop box, Google cloud
- PDF Document
- Management Tools For Organizing Your Research (eg. Mendeley, Zotero, Benubird PDF)
- Turnitin

NOTEBOOK

- Write everything in your notebook
- ideas, creations, sketches, designs, graphs, reminders, reading and lecture notes, off-the-wall thoughts, lists, opinions, abstracts, copies of pages in documents and papers, spreadsheet printouts, program listings, pictures, photographs, scanned images, cartoons, doodles. . . Everything!!!

How to use research notebook??

- Put EVERYTHING in your notebook — use it like a diary and a scrapbook, both professional and personal.
- Keep your notebook with you at all times so that you are always ready to record your thoughts and ideas.
- Your notebook is your private record.
- Ask other people to sketch or write suggestions or information for you in your notebook.
- Resist using loose sheets of paper for "casual" notes and ideas. Use your research notebook.

How to use your research notebook??

- Use paginated notebooks with high-quality paper.
- Put your telephone number and a request for return on the cover; loss of this record can be very serious.
- Number and date each notebook. You will fill one every few months. Archive the filled books in a safe place.
- State every new subject, and date every new entry. Specify the sources of non-original information.

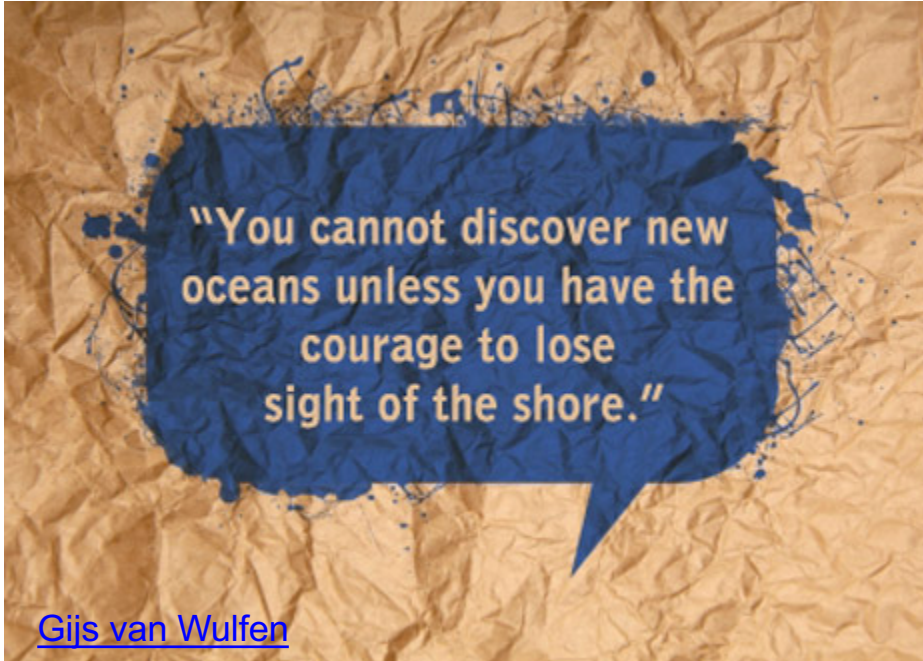
How to use your research notebook??

- Paste or tape copies of important and useful documents into your notebook, including computer printouts.
- Do not erase major "mistakes." Cross them out and explain them. You may need to re-evaluate them later.
- When a notebook is full, put copies of important pages in a loose leaf binder using sheet protectors.

Sources of chaos and confusion in typical R&D groups

- Research results cannot be reproduced because of poor methodology and documentation.
- Experiment methods are chaotic, dominated by a "try this, try that" mentality.
- Experiment processes cannot be audited or reviewed due to a lack of logs and records.
- Reports are too long (or too short), poorly organized, incomplete, and confusing.
- Project documentation is sparse or nonexistent.
- Statistical analysis of results is missing
- Oral presentations are disorganized, confusing, and emphasize the wrong things.
- Data visualization techniques are poor and the presentations are hard to follow.
- Project activities are isolated and inbred.

The End

A quote is presented on a background of crumpled brown paper. The text is contained within a dark blue, irregularly shaped area that resembles a torn piece of paper or a speech bubble. The text is in a light blue, sans-serif font.

"You cannot discover new oceans unless you have the courage to lose sight of the shore."

[Gijs van Wulfen](#)