Brainstorming for ICOM 5047
Capstone in Computer Engineering

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Brainstorming?
Recall our last presentation

- ICOM 5047: Capstone in Computer Engineering
  - Work in groups
  - Undertake a Major Design Experience
  - Hardware and Software Components
- Faculty
  - Fernando Vega
  - Miguel Figueroa
  - Nayda Santiago
- Customers
  - Dani Santiago – beisbol project – database and units
  - Rafael Rodriguez – EMAG project – sensor data collection
Outline

- Brainstorming
- Concept Map
Goal

- Our goal is to form Capstone groups which will be able to generate a set of ideas to solve a particular large problem and start working on the solution of the problem.
Brainstorming

- Group Creativity Technique
- Generate ideas for solution of a problem
- Used since 1930
- Proven
  - Brainstorming is more effective than individuals working independently [1-3].

Brainstorming Rules

- Focus on quantity
  - The greater the number of ideas generated, the greater the chance of producing a radical and effective solution

- No criticism
  - The participants focus on extending or adding to an idea
    - Reserving criticism for a later 'critical stage' of the process
    - By suspending judgment, one creates a supportive atmosphere where participants feel free to generate unusual ideas
Rules (cont.)

- Unusual ideas are welcome
  - Unusual ideas
    - may open new ways of thinking and provide better solutions than regular ideas
    - can be generated by looking from another perspective or setting aside assumptions

- Combine and improve ideas
  - Good ideas can be combined to form a single very good idea.
    - $1+1=3$
  - lead to better and more complete ideas than merely generating new ideas alone
    - stimulate the building of ideas by a process of association
Outline of the method

- Set the problem
- Create a background memo
- Select participants
- Create a list of lead questions
- Conduct Session
Part I: Define the problem

- Problem must be clear
  - not too broad
  - capture the problem in one question
  - if it is too big: divide into smaller questions
- the purpose of writing a definition is to establish accuracy and clarity in the scope of your project
- involves determining the problem’s characteristics, limitations, and applications
Part II: Background Memo

- Invitation and informational letter for the participants, containing the session name, problem, time, date, and place.
- The problem is described in the form of a question, and some example ideas are given.
- The memo is sent to the participants at least two days in advance, so that they can think about the problem beforehand.
Part III: Select participants

- Compose the brainstorming panel
  - Consists of the participants and an idea collector
  - Ten or fewer group members
    - generally more productive than larger groups
- Suggestion
  - Several core members of the project who have proved themselves.
  - Several guests from outside the project, with affinity to the problem.
  - One idea collector who records the suggested ideas
Part IV: List of lead questions

- The leader should stimulate creativity by suggesting a lead question to answer
- Ask how to combine ideas
- Look from different perspectives
Conduct the Session

- There are basic rules
- Respect other ideas
- Everyone should participate
Basic Rules

- The leader presents the problem and gives a further explanation if needed.
- The leader asks the brainstorming panel for their ideas.
- If no ideas are coming out, the leader suggests a lead to encourage creativity.
- Every participant presents his or her idea, and the idea collector records them.
- The participants try to elaborate on the idea, to improve the quality.
- When time is up, the chairman organizes the ideas based on the topic goal and encourages discussion.
- Ideas are categorized.
- The whole list is reviewed to ensure that everyone understands the ideas. Duplicate ideas and obviously infeasible solutions are removed.
- The leader thanks all participants and gives each a token of appreciation.
Exercise

- Brainstorm on either Dani’s or Rafael’s problem. You may also bring up your own problem.
  - Define the problem
  - Compose your group
  - Create lead questions
  - Conduct a brainstorm session

Workflow of a Brainstorming Session

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Variation: Brain Write

- Brain write
  - When there are several groups with different problems.
  - Write the problem on a sheet of paper.
  - Groups rotate and contribute with ideas.
  - No criticism.
Variation: Concept Map

- **Concept mapping** is a technique for visualizing the relationships among different concepts.
  - Diagram showing the relationships among concepts
  - Concepts are connected with labeled arrows or lines
  - Concept maps are used to stimulate the generation of ideas, and are believed to aid creativity.
Examples

- Trees give
- Oxygen is important to
  - Humans
  - Plants
  - Animals
- Wood is used to make
  - Houses
  - Paper
  - Furniture

Learning Content
- Language Arts
- Mathematics
- Science
- Social Studies
- Reading

Social Skills
- Band
- Chorus
- Orchestra
- Cooperation
- Sports Teams
Exercise: Concept Map

- Do a concept map on either Dani’s or Rafael’s problem. You may also bring up your own problem.
  - Draw circles for the concepts
  - Labeled lines for the relationships
Questions?

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