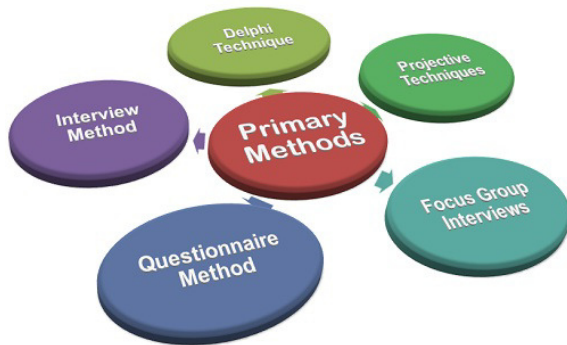


Data Gathering & Brainstorming



Data gathering is a process of preparing for and then collecting data needed to facilitate project decision making. Data is collected to provide information regarding a specific topic, and the information obtained is kept on record and used to make decisions about important issues. Because of this, it is important to understand the quality of the data collected in terms of its accuracy, reliability and relevance.

Data collection is often formalised through a data collection plan which should include:

- **Pre collection activity** – Agree goals, target data, definitions and methods
- **Collection** – data collection step is where the requirements are first gathered. To elicit accurate requirements, the analyst must ask the right kind of questions and then listen carefully to the answers. There are a number of techniques for eliciting requirements and your project may need to use multiple techniques depending on the circumstances. This includes interviews, facilitated sessions, prototypes, questionnaires and more (see below).
- **Validation** – this step is where analysis of the data starts. The purpose of validation is to make certain that the information gathered during elicitation accurately represents the requirements, needs and/or expectations of the stakeholders. The work here includes consolidating requirements, rationalising them, looking for overlaps and gaps and creating models to help visualise processes.
- **Documentation** – the analyst organises, prioritises, analyses (see below) and documents the data to assist the decision making processes. Requirements are numbered in a way that allows them to be tracked through the rest of the lifecycle, and are checked to make sure that they can be tested.
- **Present Findings** – final step is verifying that the documented information accurately and completely represents the needs and expectations of the stakeholders, or the data gathered. Where appropriate, any requirements are reviewed and formally approved and the analyst can start to develop acceptance criteria and write test cases for the final solution.

The pre-collection activity is one of the most crucial steps in the process. The quality of the data collected can be devalued as a consequence of poor design or sampling of both questions and informants, and poor elicitation techniques. After an effective pre-collection phase, data collection can be carried out in a structured, systematic and scientific way.

If the data is to be relied on for decision making, a formal data collection process is necessary to ensure that data gathered is both defined and accurate, and that subsequent decisions based on the findings are valid.

Data collection techniques

Data can be gathered using a range of techniques. Each option has advantages, and weaknesses. Some of the options include:

- **Personal interviews:**
 - One-on-one interviews are the most common technique for gathering requirements. Sit down with the key stakeholders and ask them what they need.
 - Group interviews involve more than one person being interviewed at the same time. They require more preparation and more formality to get the best information from all the participants.



- **Questionnaires** (post, email) and Web survey forms are good tools to gather requirements from stakeholders in remote locations or those that will have only minor input into the overall requirements. It can also be the only practical way to gather requirements from large numbers of people. Strategies need to be developed to deal with low response rates. Options include:
 - Sampling and statistical surveys.
 - Opinion polls and censuses¹.
- **Observational studies**, just following people around is especially helpful when gathering information on current processes. By watching people perform their job you can understand the entire picture. In some cases, you may need to participate in the actual work process to get a hands-on feel for how the business function works today.
- **Facilitated sessions**. In a facilitated session, you bring a larger group together for a common purpose. In this case, you are trying to gather a set of common requirements from the group in a faster manner than if you were to interview each of them separately². Options include Brainstorming, Nominal Group Techniques and Open Space Technology (see below).
- **Delphi**. The Delphi technique operates virtually and is designed to build consensus among a group of experts. The process is conducted by an administrator with the participants contributing anonymously. The sequence of working is:
 - The administrator develops a panel of experts and/or contributors
 - Each member of the panel responds to a question (or questions)
 - The administrator combines the responses and re-circulates the combined answers for further input (eg, a list of the most important xxx for comment or addition). The administrator should not influence or change the input, and keep the source of individual comments confidential.
 - After two or three rounds, a consensus is normally reached. The power of Delphi is that anonymity allows people to change their mind without 'losing face' and all inputs are equal –different levels of seniority between participants is removed from the process.
- **Statistical sampling**: Options used to collect data from a large population can involve the use different types of statistical sampling :
 - **Systematic sampling** relies on arranging the study population according to some ordering scheme and then selecting elements at regular intervals through that ordered list.
 - **Quota sampling** divides the population into mutually exclusive sub-groups, then judgement is used to select the subjects or units from each segment based on a specified proportion.
 - **Simple random sampling** (SRS) gives an equal probability of selection to each element within the population. However, the randomness of the selection may result in a sample that doesn't reflect the makeup of the population.

¹ Developing a useful survey is difficult. Whilst they are a relatively inexpensive way to gain feedback from many stakeholders and the feedback can be interpreted mathematically for precision and ease-of-use, there are problems:

- Not receiving feedback from a high percentage of people, or worse from a small biased sample of people with a strong opinion that is not reflective of the whole group.
- Question design 1. Asking how satisfied a stakeholder was with the quality and frequency of communication is not helpful – stakeholders may have different opinions as to the "quality" and the "frequency" which makes this difficult to answer with one response.
- Question design 2. Are you seeking data (a value input by the person surveyed), a 'yes/no' answer, a selection from a list or "shades of grey" on a continuum such as a 1 - 5 scale? Each question type has benefits and limitations.
- Question design 3. Asking leading questions designed to get a particular response (deliberately or accidentally) for a brilliant example of 'leading questions' see: <https://www.youtube.com/watch?v=G0ZZJXw4MTA>

² For more on **facilitation** see: https://www.mosaicprojects.com.au/WhitePapers/WP1067_Facilitation.pdf



- **Stratified sampling** is used where the population embraces a number of distinct categories, the total population is organised by these categories into separate "strata." Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected.
- **Prototyping and joint development:**
 - Prototyping is a way to build an initial version of the solution; this may be a mock-up, a part model or a simplified sample. You show this to the client, who then gives you additional requirements.
 - JAD (Joint Application Development) sessions are similar to general facilitated sessions. However, the group typically stays in the session until a complete set of requirements is documented and agreed.
 - Experimentation to test elements of the requirements
- **Using administrative by-product data** collected as a by-product of an organization's day-to-day operations

Each option has advantages, such as accuracy, speed, flexibility, simplicity and detail; and disadvantages, such as cost, lack of control and time. Particular care is needed to ensure survey questions³ are not designed to bias responses towards a particular point of view and that the sample used is representative of the whole 'population' being analysed.

Big data

The term 'big data' captures the approach to data collection and analysis that has evolved in line with improvements in computing since the 1960s. Stages in this evolution include:

- **1960s** – database management, allowing the storage and retrieval of structured information
- **1970s** – data warehousing significantly increased the amount of data stored
- **1980s** – KDD knowledge discovery in databases, and ERP enterprise resource planning
- **1990s** – Data mining to identify patterns in randomly stored data
- **2000s** – CRM customer relationship management, and business analytics
- **2010s** – Big data, the unification of all of these trends, increasing the information we can access.

The emerging trend is machine learning and artificial intelligence. Computers are being programmed to use big data to identify patterns, trends, anomalies, and needs and learn what matters as they proceed. This source of information will increasingly be used to identify requirements and prioritise projects based on smart analytics. Implementing ERP, CRM, 'big data', and AI generates projects, once configured the systems will then be able to identify areas needing process improvement projects.

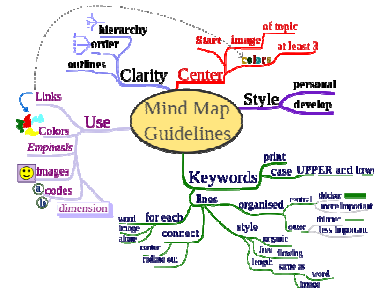
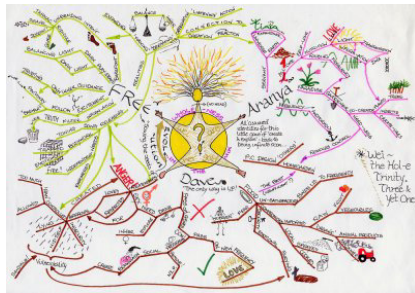
Data analysis techniques

The analysis of the data collected requires specific skills and knowledge. It involves the inspection, cleaning, transforming, and modelling of the data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains. Some creative options include:

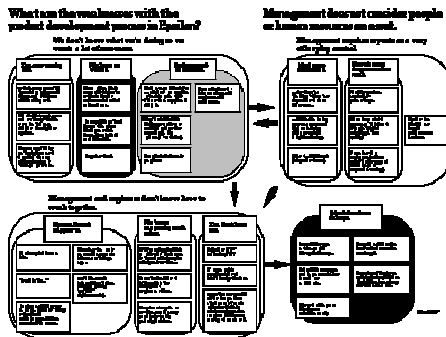
³ For more on **questioning** see: https://www.mosaicprojects.com.au/WhitePapers/WP1012_Active_Listening.pdf



- **Idea/mind mapping:** This technique consolidates ideas derived from brainstorming (see below) or other processes into a single map to reflect commonality and differences in understanding and to stimulate new ideas⁴



- **Affinity Diagram:** groups similar or associated ideas for review and analysis:



- **Multi criteria decision analysis:** uses a decision matrix to provide a systematic approach to analysing preferences⁵.

If your data are at all complex, seek expert advice!!

Data gathering conclusions

Good questions outrank easy answers! The skill in data gathering is asking the right people, the right questions, in the right way. Then analysing the data you have gathered to extract the information needed for decision making.

Brainstorming

Brainstorming is focused on gathering ideas, in many ways it is similar to data gathering; the difference is the ‘data’ exists to be discovered, ideas need to be created.

Brainstorming is a facilitated⁶ group creativity technique by which a group tries to find a solution for a specific problem by gathering a list of ideas spontaneously contributed by its members. There are usually one or two people assigned the roll of recorder/scribe whose job is to quickly record all of the ideas (often on a whiteboard or flip chart) for discussion later. Inexperienced people may benefit from a practice session before starting to brainstorm on the main issue.

⁴ **Idea / mind mapping** – see https://en.wikipedia.org/wiki/Mind_map

⁵ For more on **Multi criteria decision analysis** see: https://www.mosaicprojects.com.au/WhitePapers/WP1062_Ranking-Requirements.pdf

⁶ For more on **facilitation** see: https://www.mosaicprojects.com.au/WhitePapers/WP1067_Facilitation.pdf



The four general rules of brainstorming are.

1. **Focus on quantity:** This rule is a means of enhancing divergent production of ideas, and removing inhibitions, the aim is to facilitate problem solving through the maxim *quantity breeds quality*. The assumption is that the greater the number of ideas generated, the greater the chance of producing a radical and effective solution. This works best if the session is focused on one problem and there is a time limit.
2. **Withhold criticism:** In brainstorming, criticism of ideas generated should be put 'on hold'. Instead, participants should focus on extending or adding to ideas, reserving criticism for a later 'critical stage' of the process. By suspending judgment, participants will feel free to generate unusual ideas.
3. **Welcome unusual ideas:** To get a good and long list of ideas, unusual ideas are welcomed. They can be generated by looking from new perspectives and suspending assumptions. These new ways of thinking may provide better solutions.
4. **Combine and improve ideas:** Good ideas may be combined to form a single better idea. It is believed to stimulate the building of ideas by a process of association.

Surprisingly, you can brainstorm on your own and some research suggests groups are less effective than individuals when it comes to creativity.

When brainstorming is done well, you get to think big, you get to think 'out-of-the-box', you get to see how others in your team see the business. This is great fun but it's what happens **after** the brainstorming session that is really important!

This is where you whittle the big group of ideas to a handful you think are valuable and without care this analysis can destroy most of the value! Without a conscious effort, the ideas that you choose to keep are unlikely to be the far out crazy ones that may offer huge potential! By default, the ideas you tend to keep will be the ones that you know you can do easily, because they fit with what you are doing now. And herein lays the problem. Although you've used brainstorming to generate new, innovative 'blue-sky ideas', your innate biases work against these objectives driving you towards the safe, low risk understandable ideas so that all you end up doing is the same things in a different way⁷. Opportunity lost!

Variations on the basic brainstorming process:

Nominal group technique: encourages all participants to have an equal say in the process and to generate a ranked list of ideas. Participants are asked to write their ideas anonymously (or in small groups). Then the moderator collects the ideas and each is voted on by the group. The vote can be as simple as a show of hands in favour of a given idea, or more complex systems such as allowing each person to vote for 5 ideas and picking the ones with the most votes, or giving each person 20 points to allocate as he/she wishes between ideas and selecting those with the highest number of points. This process is called distillation. After distillation, the top ranked ideas may be sent back to the group or to subgroups for further development. This approach can also be used to distil a list of ideas generated by brainstorming, a survey or any other process⁸.

⁷ For more on **innate bias** see: https://www.mosaicprojects.com.au/WhitePapers/WP1069_Bias.pdf

⁸ Options for group decision making include:

- **Unanimity/consensus**, everyone agrees
- **No sustained opposition**, everyone may not agree, but those that disagree can 'live with the decision'
- **Majority**, a simple majority or a defined percentage (usually more than 66% or 75%) agree
- **Plurality**, the largest block decides, even if its not a majority (useful for multiple options)
- **Dictatorship**, one individual, usually the manager, decides on behalf of the group.

For more on **ranking ideas** see:

https://www.mosaicprojects.com.au/WhitePapers/WP1062_Ranking-Requirements.pdf

For more on **decision making** see: https://www.mosaicprojects.com.au/WhitePapers/WP1053_Decision_Making.pdf



Group passing technique: each person in a circular group writes down one idea, and then passes the piece of paper to the next person in a clockwise direction, who adds some thoughts. This continues until everybody gets his or her original piece of paper back. By this time, it is likely that the group will have extensively elaborated on each idea.

Team idea mapping: begins with a well-defined topic. Each participant brainstorms individually, then all the ideas are merged onto one large idea map. Once all the ideas are captured, the group can prioritize and/or take action.

Electronic brainstorming: is a computerized version of the manual brainstorming technique typically supported by an electronic meeting system. Simpler forms can be done via email and may be browser based, or use peer-to-peer software. Ideas are entered independently. Contributions become immediately visible to all and are typically anonymised to encourage openness and reduce personal prejudice.

Question brainstorming (or Questorming): involves brainstorming the questions, rather than trying to come up with immediate answers and short term solutions. Once the questions are defined, the answers to the questions form the framework for constructing future action plans.

Open Space Technology⁹ (OST)

OST is a way for hosting meetings and events, focused on a specific and important purpose or task; but beginning without any formal agenda, beyond the overall purpose or theme; the meeting's participants create the agenda for themselves, in the first 30 to 90 minutes of the meeting or event. Typically, an *open space* meeting will begin with short introductions by the sponsor and usually a single facilitator. The sponsor introduces the purpose; the facilitator explains the *self-organising* process called *open space*. Then the group creates the working agenda,

OST is characterised by a few basic mechanisms:

- a broad, open invitation which articulates the purpose of the meeting;
- participants' chairs arranged in a circle;
- a *bulletin board* of issues and opportunities posted by participants;
- a *marketplace* with many break-out spaces that participants move freely between, learning and contributing as they *shop* for information and ideas;
- a *pulsation* pattern of flow, between plenary and small-group breakout sessions.

Café conferencing (or *A knowledge café* or *World Café*) uses similar unstructured conversations to develop ideas in small groups and then report back to the coverall community¹⁰. However, the questions to be discussed are usually pre-determined.

Innovating ideas using SCAMPER

SCAMPER is an acronym for a useful list of words that can be applied as stimuli to make you think differently about the problem area and stands for:

Substitute. Change a component or an ingredient within an idea. What can you substitute? What can be used instead? Who else instead? What other ingredients? Other material? Other process? Other power? Other place? Other approach? Other sounds? Other forces?

⁹ For more on OST see: https://en.wikipedia.org/wiki/Open_Space_Technology

¹⁰ For more on Café conferencing see: https://en.wikipedia.org/wiki/Knowledge_Cafe



Combine. Combine different ideas or components. Combine units? Combine purposes? Combine appeals? Combine ideas?

Adapt. What can you adapt for use as a solution? What else is like this? What other idea does this suggest? Does past offer a parallel? What could I copy? Who could I emulate?

Modify, magnify or minimize. Can you change the item or idea in some way? Change meaning, form, shape? Other changes? What can you add? More time? Greater frequency? Stronger? Higher? Longer? Thicker? Extra value? Plus ingredient? Duplicate? Multiply? Exaggerate? What can you remove? Smaller? Condensed? Miniature? Lower? Shorter? Lighter? Omit? Streamline? Split up? Understate?

Put to other use. How can you put the thing to different or other uses? New ways to use as is? Other uses if it is modified?

Eliminate. What can you eliminate? Remove something? Eliminate waste? Reduce time? Reduce effort? Cut costs?

Rearrange or reverse. What can be rearranged in some way? Interchange components? Other pattern? Other layout? Other sequence? Transpose cause and effect? Change pace? Change schedule?

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