



The Engineering Design Cycle

Research the Need

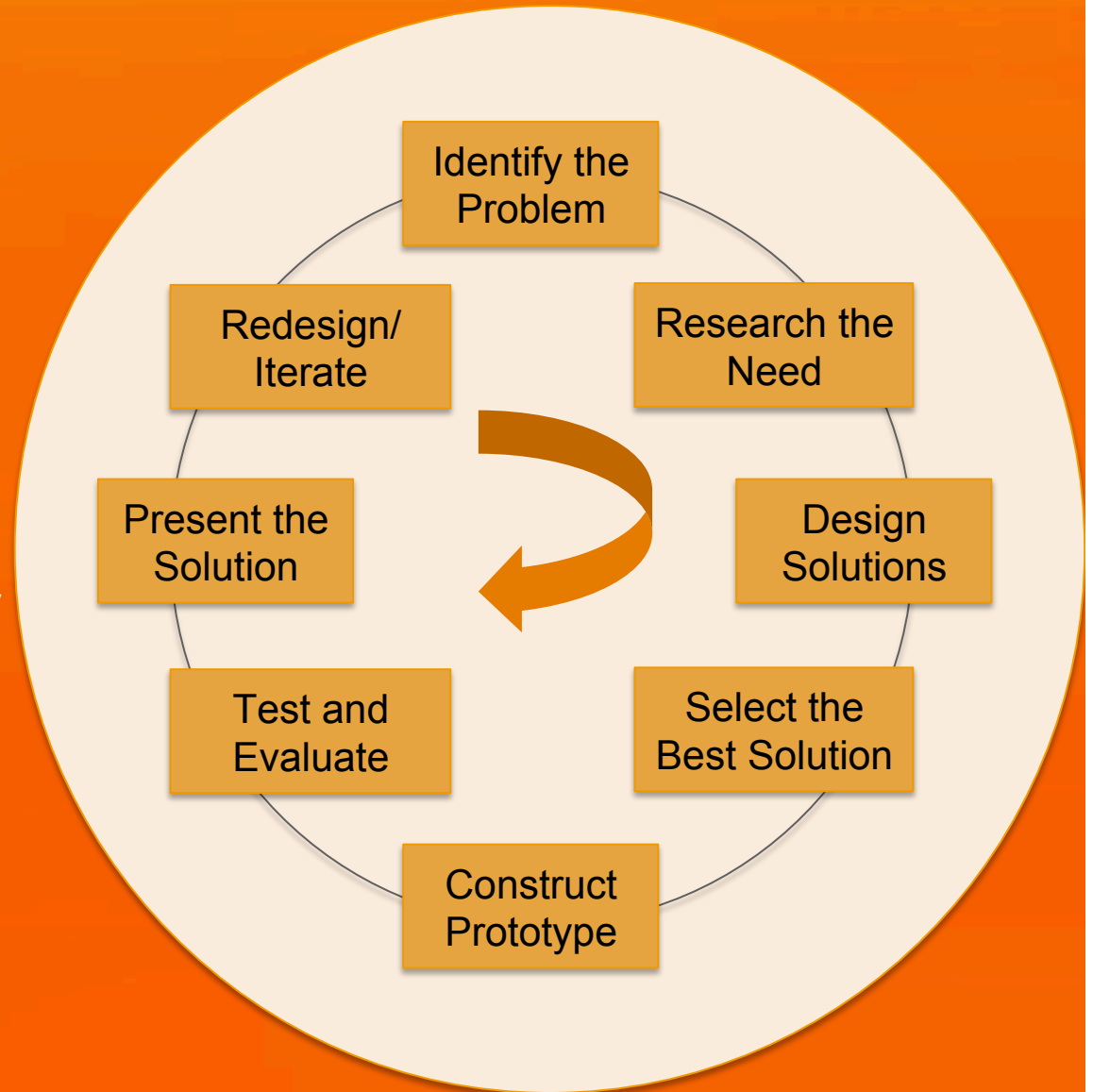
Identifying Credible Information

Once information has been gathered from a variety of different sources, the credibility of the information must then be evaluated so that the credible can be separated from the questionable.



The Engineering Design Cycle

Once the design team has gathered information to establish the relevance of the problem (and the design intended to solve that problem), it is time to sort the credible from the questionable sources from which the information was gathered. Once sorted, the credible sources will be retained for project proposals, design project reviews, and other formal communications of the design with those outside the team. The questionable sources can be retained for internal team use only or may be discarded altogether.





Identifying
Credibility
during the
*Research
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phase of the
Engineering
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Many, many sources of Information

Source of Information	Credible?	How to Determine Credibility
Peer-Reviewed Journals	Very Often	Eigenfactor, Impact Factor
Technical Conferences	Often	Acceptance Rate, Reach
Trade Magazines	Often	Reach, Stature, Reputation
Market Research	Often	Potential Bias, Reach & Reputation
Organizations, Government	Often	Stability and History of Government
Organizations, Non-Government	Sometimes	Potential Bias, Possible Agendas
Blogs, Discussion Forums	Rarely	Author Reputation & Expertise
Newspapers, Magazines, Popular Publications	Sometimes	Potential Bias, Underlying Sources
Web Documents, Author not disclosed	Rarely	Reputation of Organization
Companies	Sometimes	Potential Bias, Possible Agendas



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Gathering Information from: Peer-Reviewed Journals

Use a reputable database (IEEE Xplore, Web of Science, etc.) to search for articles from the peer reviewed literature. Then, check the credibility of journals and journal articles using:

- Journal Citation Reports, or
- Eigenfactor.org

When considering
Journal Articles in
Science and
Engineering

Is the Journal Listed?

- Yes – look at impact factor or article influence score?
 - Is it well below average? (reject altogether or find another source to back up the information gathered in and needed from the article)
 - Is it average or above (great!)
- No – reject as not credible, or
- Maybe – combine with a more reputable source

Gathering Information from: Technical Conferences

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Use a reputable database (IEEE Xplore, Web of Science, etc.) to search for conference articles. Then, check the credibility of conference articles by:

Is it a conference sponsored by a well known professional or trade society?

Yes: it is likely credible

No: is questionable, information will need to be backed up by another source.

Is the acceptance rate for articles well below 100%?

Is the conference?

Regional: credibility may be poor

National: credibility is likely to be solid

Truly International: credibility is good





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Gathering Information from: Trade Magazines

Is the organization established?

Is it well known?

Does it have many members?

IEEE Spectrum:

- IEEE was founded in 1963 and now has over 400,000 members.
- Its trade magazine, IEEE Spectrum, will for the most part contain credible information.

The Journal of Petroleum Technology:

- SPE originated in AIME (another reputable organization) in 1957. SPE has over 160,000 members
- The Journal of Petroleum Technology is the "flagship magazine" of SPE and will for the most part contain credible information.



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Gathering Information from: Trade Magazines

- American Academy of Environmental Engineers
- American Institute of Aeronautics and Astronautics
- American Institute of Chemical Engineers
- American Society for Engineering Education
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- American Society of Safety Engineers
- American Society for Nondestructive Testing
- ASM International
- Association for Computing Machinery
- Biomedical Engineering Society
- Institute of Biological Engineering
- Institute of Electrical and Electronics Engineers
- Institute of Industrial Engineers
- Institute of Transportation Engineers
- National Society of Professional Engineers
- Society of Automotive Engineers
- Society of Manufacturing Engineers
- Society of Petroleum Engineers

These are some of the major professional and trade societies in the U.S. and would provide the most reliable and credible data for design teams operating in the U.S. Trade organizations that are young or do not have an established reputation should be questioned.



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Gathering Information from: Market Research Organizations

Market Research

Provides important historical and projected markets for a particular product or class of products.

Free & reputable sources of market data/statistics from the U.S. government:

- SBA.gov (U.S. Small Business Administration)
- U.S. Census Bureau
- FedStats.gov
- EconomicIndicators.gov

The following publication is provided by many university/college libraries:

- Market Share Reporter

Private market research firms charge \$\$\$\$ for detailed reports but will often provide valuable & credible summaries free of charge and on line:

- Google/Web Search: "Market research <product>"

Some major non-profit organizations also provide valuable information about consumer attitudes and trends:

- pewresearch.org



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Gathering Information from: Government Organizations

The more established and the more relevant the government, the more credible the information.

In the United States, this means....

Environmental Protection Agency (EPA)

Food and Drug Administration (FDA)

Department of Agriculture (USDA)

Center for Disease Control (CDC)

National Institutes of Health (NIH)

National Highway Traffic Safety Administration

More local agencies (city, county, state) can also provide credible information, but not as reliably as federal government agencies –and should be backed up by additional sources for best credibility. The same is true for governments that are not stable or globally recognized.



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Gathering Information from: Non- Government Organizations (NGOs)

The more established the agency, the better.

- Peace Corps
- American Cancer Society

The more well known the agency name, the better.

- World Health Organization

The more unbiased the mission statement, the better.

The more unbiased the funding of the organization, the better.

What is PATH's mission?

"Our mission is to improve the health of people around the world by advancing technologies, strengthening systems, and encouraging healthy behaviors."

"Greenpeace exists because this fragile earth deserves a voice. It needs solutions. It needs change. It needs action. Greenpeace is an independent global campaigning organization that acts to change attitudes and behavior, to protect and conserve the environment and to promote peace."



Identifying Credibility

Research the Need

Information gathered to support the relevance of the problem and of the proposed design must be filtered for its credibility:

- Category 1: CREDIBLE
- Category 2: LIKELY CREDIBLE (but needs backup from CREDIBLE sources)
- Category 3: NOT CREDIBLE (this information should be retained for internal use only, and never be seen in an presentation or report to an outside audience)

