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Technology planning approach for Very Small Entities

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Authors

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Agenda

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1. Systems Engineering standard for VSEs;
2. Definition of new product opportunities;
3. Technology strategy process;
4. Technology roadmapping as a tool for technology planning and project execution;
5. Case.

SE Standard for VSEs

Entry

VSEs typicaly developing 6 person-month project or start-ups

Basic

VSEs developing only one project at a time

Intermediate

VSEs developing multiple projects with more than one team

Advanced

VSEs whch want to sustain and grow as an independent competitive software / system development business

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SE Standard for VSEs

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Deployment Packages dedicated to the SE Basic Profile:

1. Change Management;
2. Configuration Management;
3. Functional & Physical Architecture;
4. Interface Management;
5. Integration;
6. Product Deployment;
7. Project Management;
8. Requirements Engineering;
9. Verification & Validation.

SE Standard for VSEs

Critical aspects for VSEs:

1. Requirement management;
2. Consortium management;
3. Strategy management.

SE Standard for VSEs

Structural Business Statistics for 2010-2013 in Poland
(Source: Central Statistical Office in Poland)

Type of enterprise	No. of employees	2010	2011	2012	2013
Micro	1-9	94,98%	94,96%	95,45%	95,59%
Small	10-49	4,13%	4,16%	3,68%	3,57%
Medium	50-249	0,76%	0,76%	0,75%	0,73%
Large	250-999	0,11%	0,10%	0,10%	0,09%
Large	>999	0,02%	0,02%	0,02%	0,02%
	Total	100,00%	100,00%	100,00%	100,00%

Definition of new product opportunities

Criteria for identification of new product opportunities:

1. Market size (units / year x average price);
2. Market growth rate (percent per year);
3. Competitive intensity (numbers of competitors and their strengths);
4. Depth of the existing knowledge of the market;
5. Depth of the existing knowledge of technology;
6. Fit with other products;
7. Fit with capabilities;
8. Potential for patents, trade secrets, or other barriers to competition;
9. Existence of a product champion within the company.

Based on: Christensen 1997

Definition of new product opportunities

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Commonly used methods of knowledge acquisition:

1. Customer or market survey;
2. Intenral analysis (e.g. brainstorming);
3. External analysis (e.g. brainstorming, Delphi analysis or expert opinion);
4. Scenario development;
5. Product technology roadmapping;
6. Experience curves.

Based on: Lichtethaler 2004

Technology strategy process

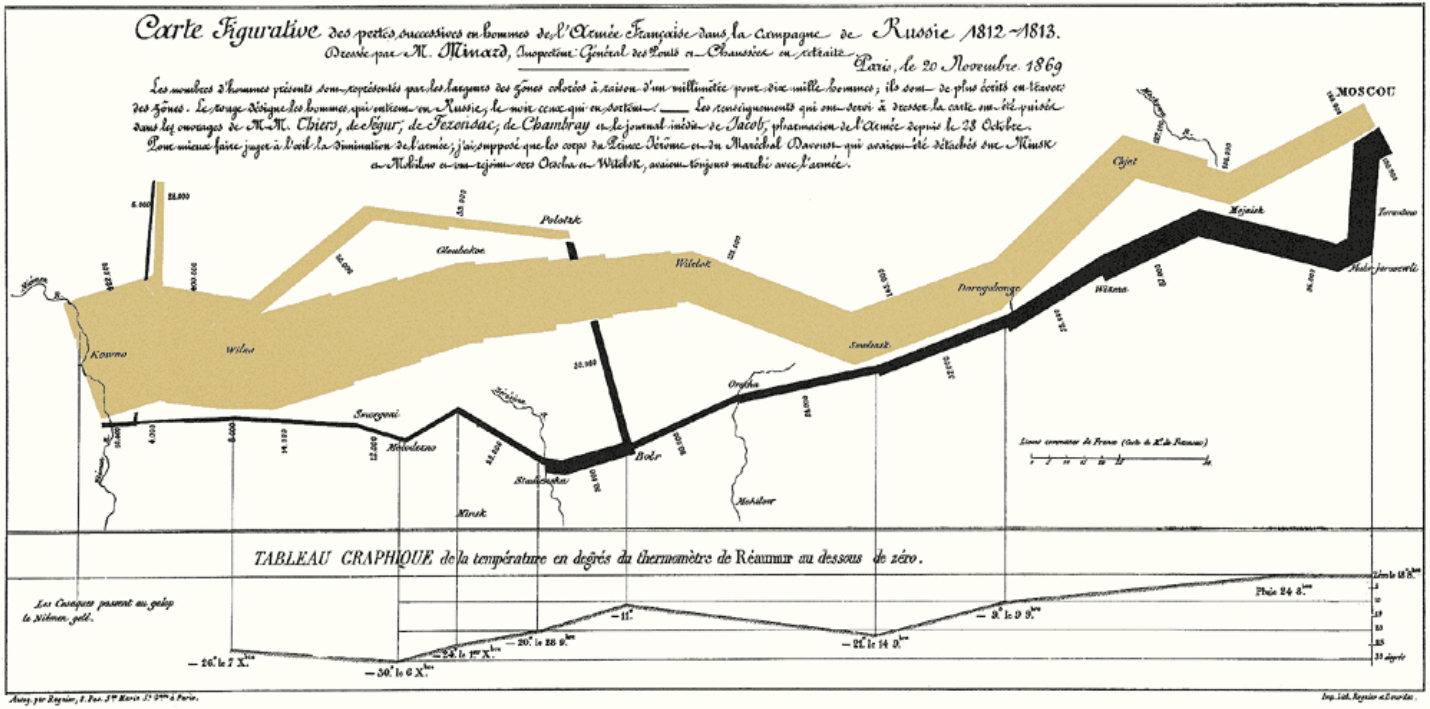
1. Analysis of the organization's environment and internal analysis of the organization.
2. Definition of target markets and products available on them.
3. Definition of technologies used in current and future products.
4. Definition of level of technology development (e.g. TRL and the technology's impact on the organization's competitive position).
5. Definition of the technology development plan.
6. Implementation of the technology development plan.

Technology strategy process

Technology type	Description	Strategic decisions
Base	Essential to be in the business, widely exploited by competitors, little competitive impact.	Selective withdrawal
Key	Well embodied in products and processes, high competitive impact. Usually very closely guarded.	Development and systemic control
Pacing	Under experimentation by some competitors, competitive impact likely to be high.	Selective investment
Emerging	At early stage of lifecycle (applied research or early development work). Competitive impact unknown, but promising.	Monitor

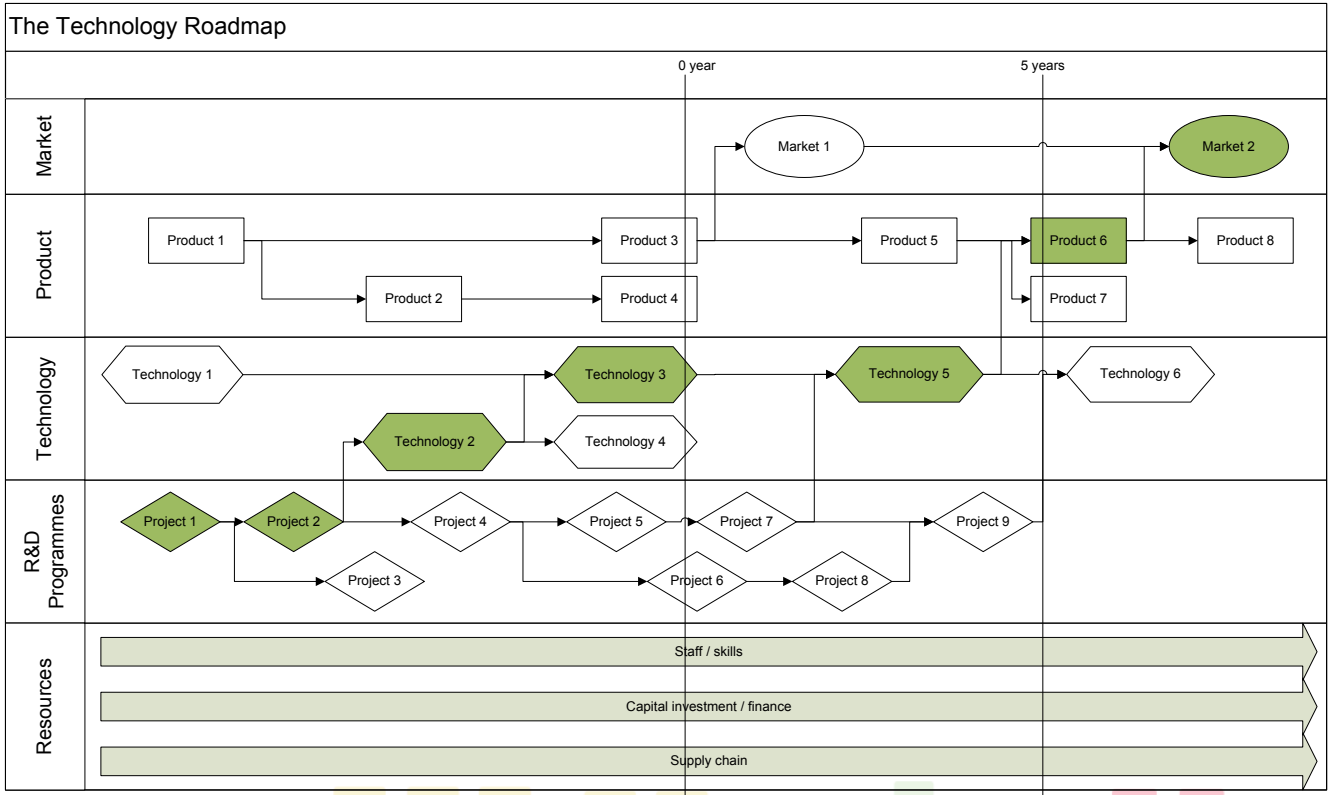
Based on: Floyd 1997

Technology roadmapping



Source: http://www.edwardtufte.com/

Technology roadmapping



Based on Phaal R., Technology Roadmapping, Guide UNIDO, pp. 129-153.

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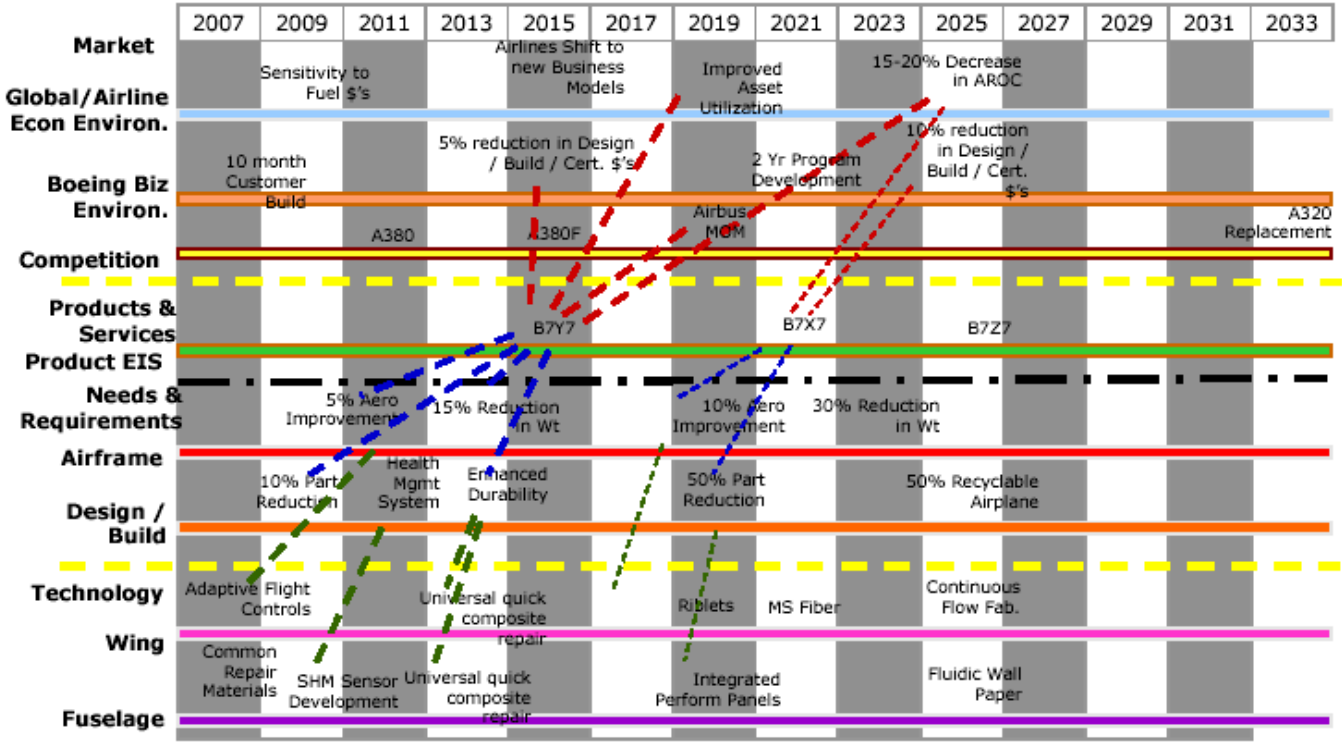
Technology roadmapping

The scope of Technology Roadmapping:

- Gap analysis of the future requirement and current capabilities;
- Time management;
- The analysis focused on potential products and processes accessible from the technology;
- Team working and communication.

Technology roadmapping



Source: Boeing, 2007

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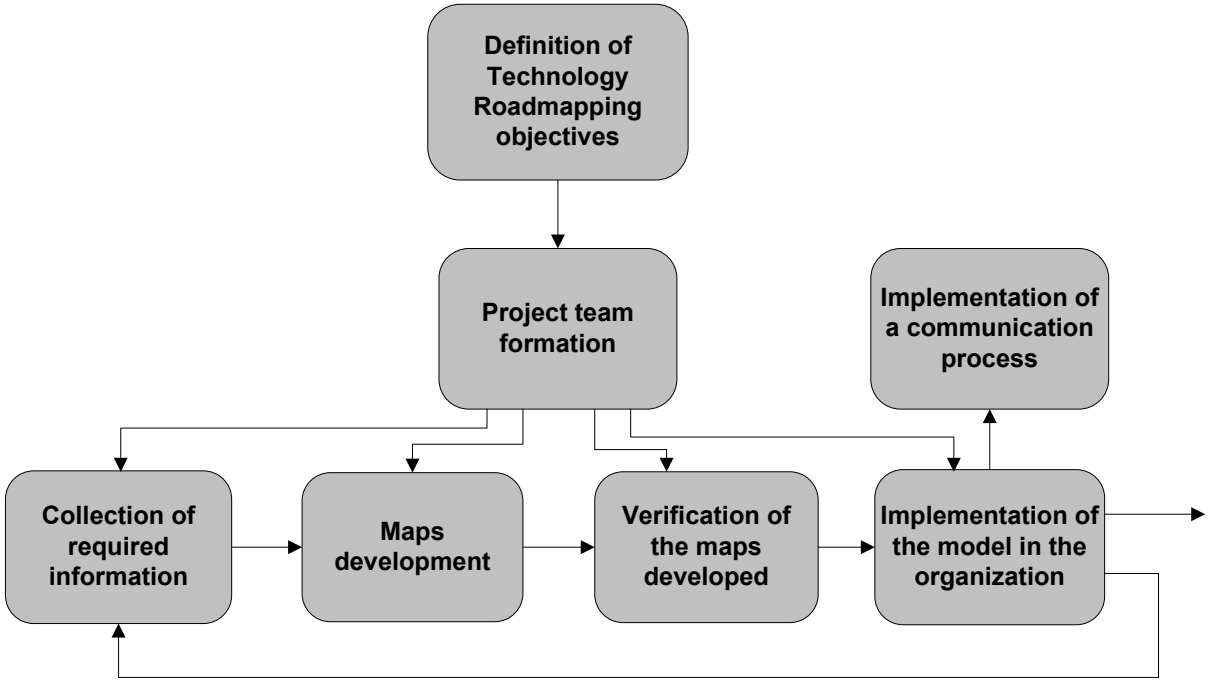
Technology roadmapping



Technology roadmapping

The Technology roadmapping process consists of the following stages (1/4):

1. Definition of the objectives of the technology roadmapping in the context of the requirements of the organization / project.

2. Formation of the project team and definition of its work program.

3. Collection of required information, including:
   - 3.1. Definition of the priority factors creating added value for the user, taking into account current and future user needs;
   - 3.2. Mapping key characteristic values on the time axis;
   - 3.3. Evaluation of the technology's availability;
   - 3.4. Definition of resource requirements.

Technology roadmapping

The Technology roadmapping process consists of the following stages (2/4):

4. Verification of the maps developed, involving external persons and taking into account the interests of all the stakeholders, including:
   - 4.1. Evaluation of interdependencies;
   - 4.2. Evaluation of alternative solutions/scenarios;
   - 4.3. Evaluation of own (organization, enterprise) strengths and competitive position.

5. Implementation of the model in the organization and adaptation of their method to the organization's particular needs to ensure, among others, technology roadmapping result repeatability, including:

Technology roadmapping

The Technology roadmapping process consists of the following stages (3/4):

5.1. Integration of the technology roadmapping process with the organization;

5.2. Assigning people, processes, resources to the actions initiated based on the maps;

5.3. Allocation of product life cycles to developed maps;

5.4. Confirming assumptions and business impacts;

5.5. Taking into consideration the organization's/undertaking's entire product and service portfolio;

5.6. Taking into account the proposed and agreed improvements to the maps.

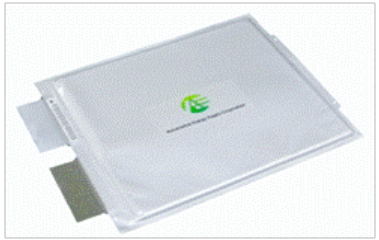
Technology roadmapping

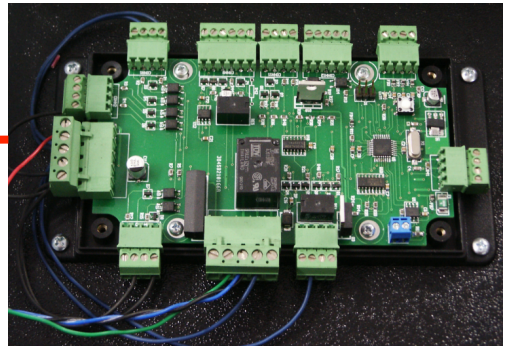
The Technology roadmapping process consists of the following stages (3/4):

6. Implementation of a communication process, including:

    6.1. Development of communication standards / patterns;
    6.2. Documentation of technology roadmapping results;
    6.3. Formulation of communication policy/strategy/mechanisms.

Example of Technology Roadmap (Context)





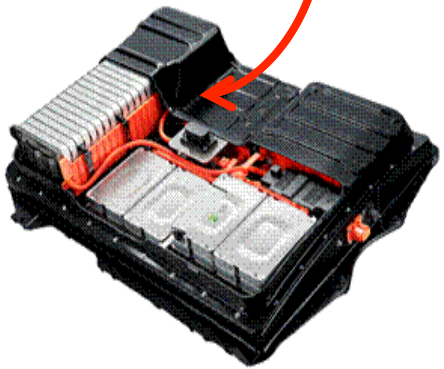


Photo: Nissan LEAF

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Example of Technology Roadmap (Context)

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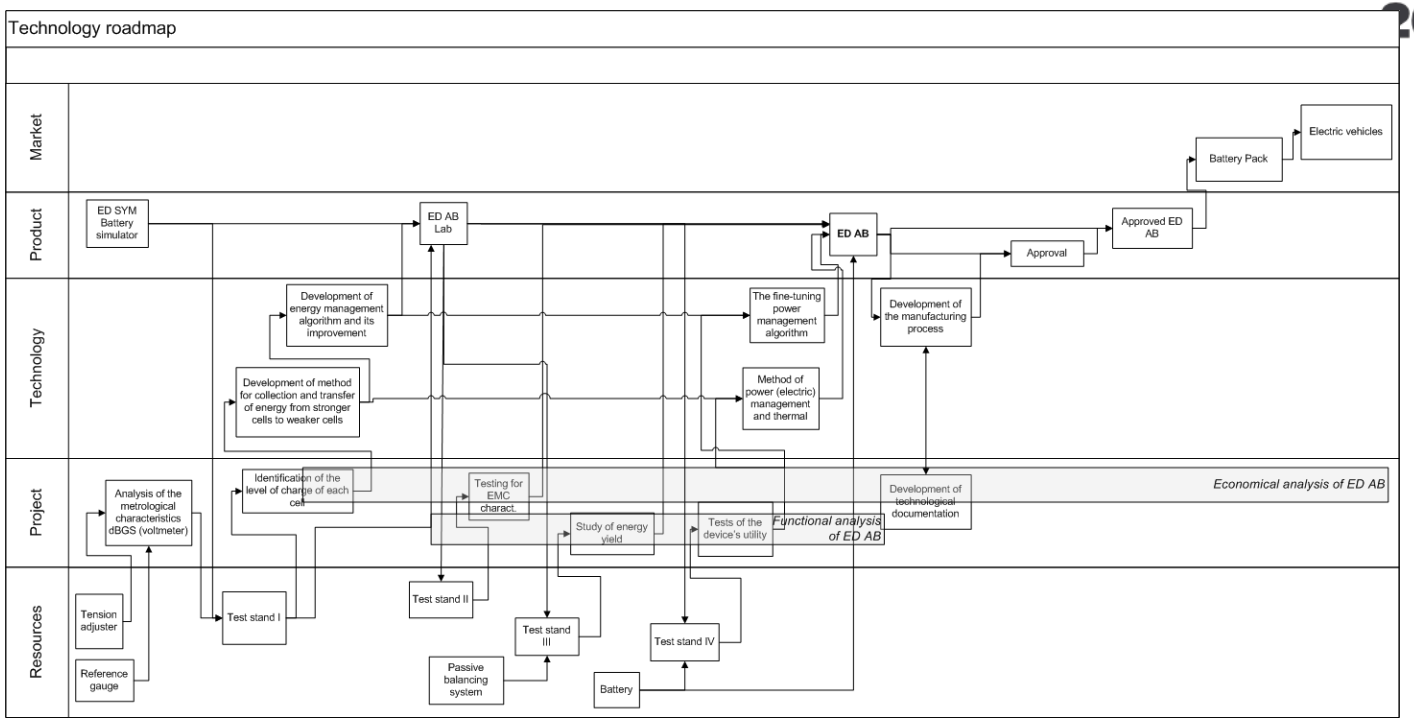
Consortium:

- 4 Small companies (Coordinator & 3 Partners);
- 2 Research institutions;
- 1 Certifation institution.

Example
of Technology Roadmap



Conclusions

1. The immediate surroundings have a large influence on the competitiveness of small organizations. An important role is played by organizations of the business environment such as:
   - Regional and national business chambers in individual sectors;
   - National and local government enterprise support agencies;
   - Industry associations of representatives of business, science and financial institutions (business angels, venture capital funds).

2. Main benefits from Technology Roadmapping:
   - Strong linkages between technology resources and business drivers;
   - Effective allocation of resources (in particular technology and manufacturing);
   - Easier evaluation of strategic decisions (transparency);
   - Fosucing on pro-active planning instead re-active.

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Questions?

Thank you!

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