

Managing Technology

Managing Research Function

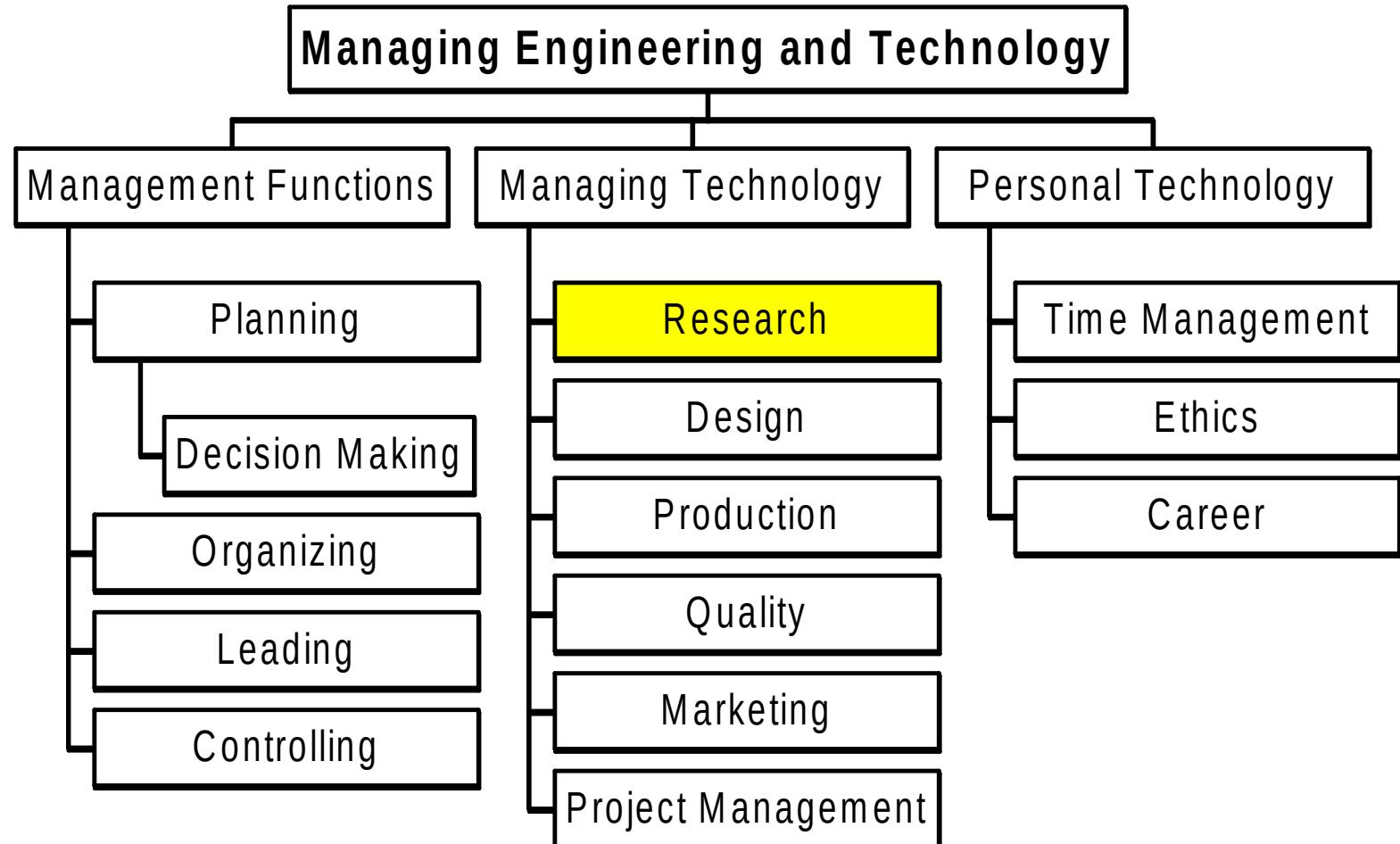
Chapter Objectives

Explain product and technology life cycles

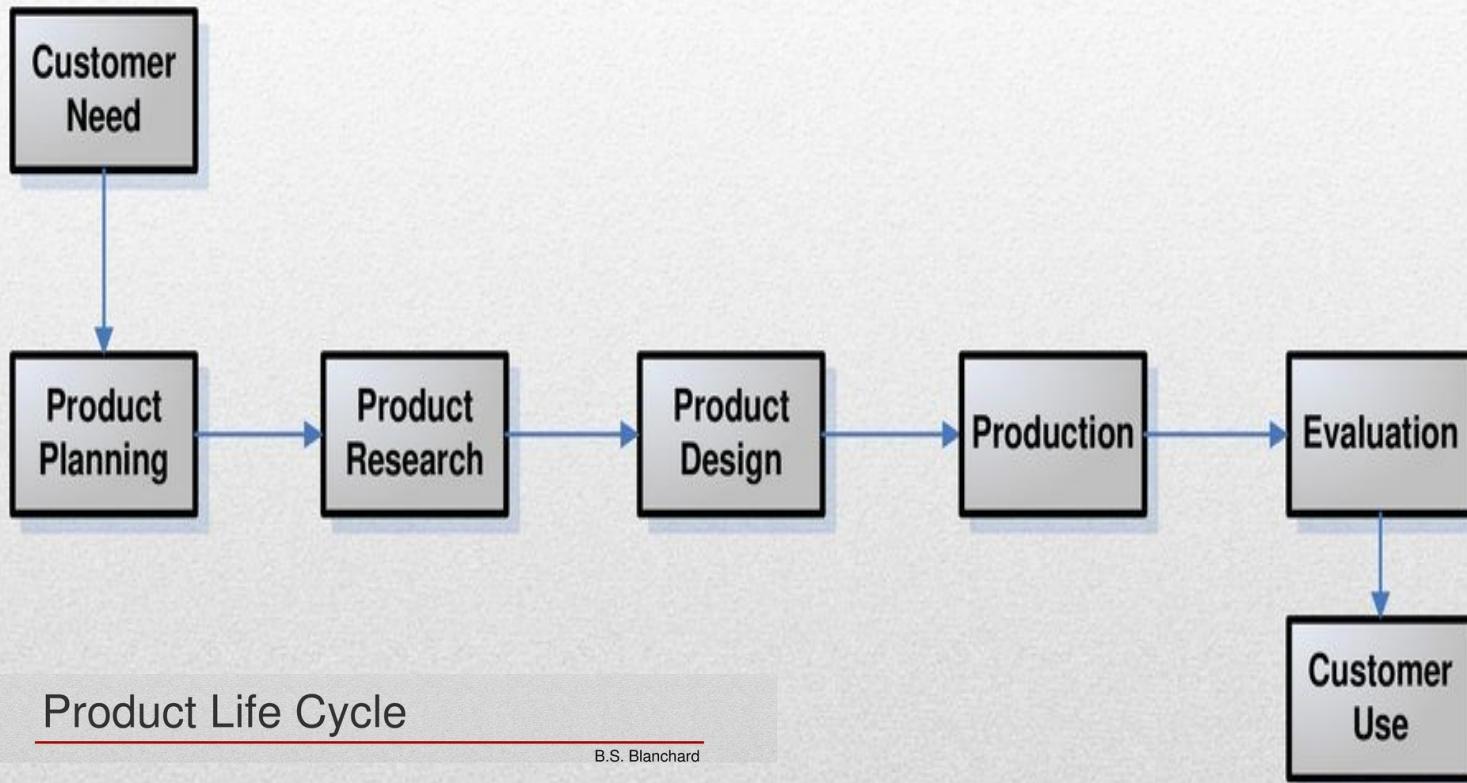
Describe the legal means to protect a person's ideas

Analyze the nature of creativity

Advanced Organizer



Product and Technology Life Cycles



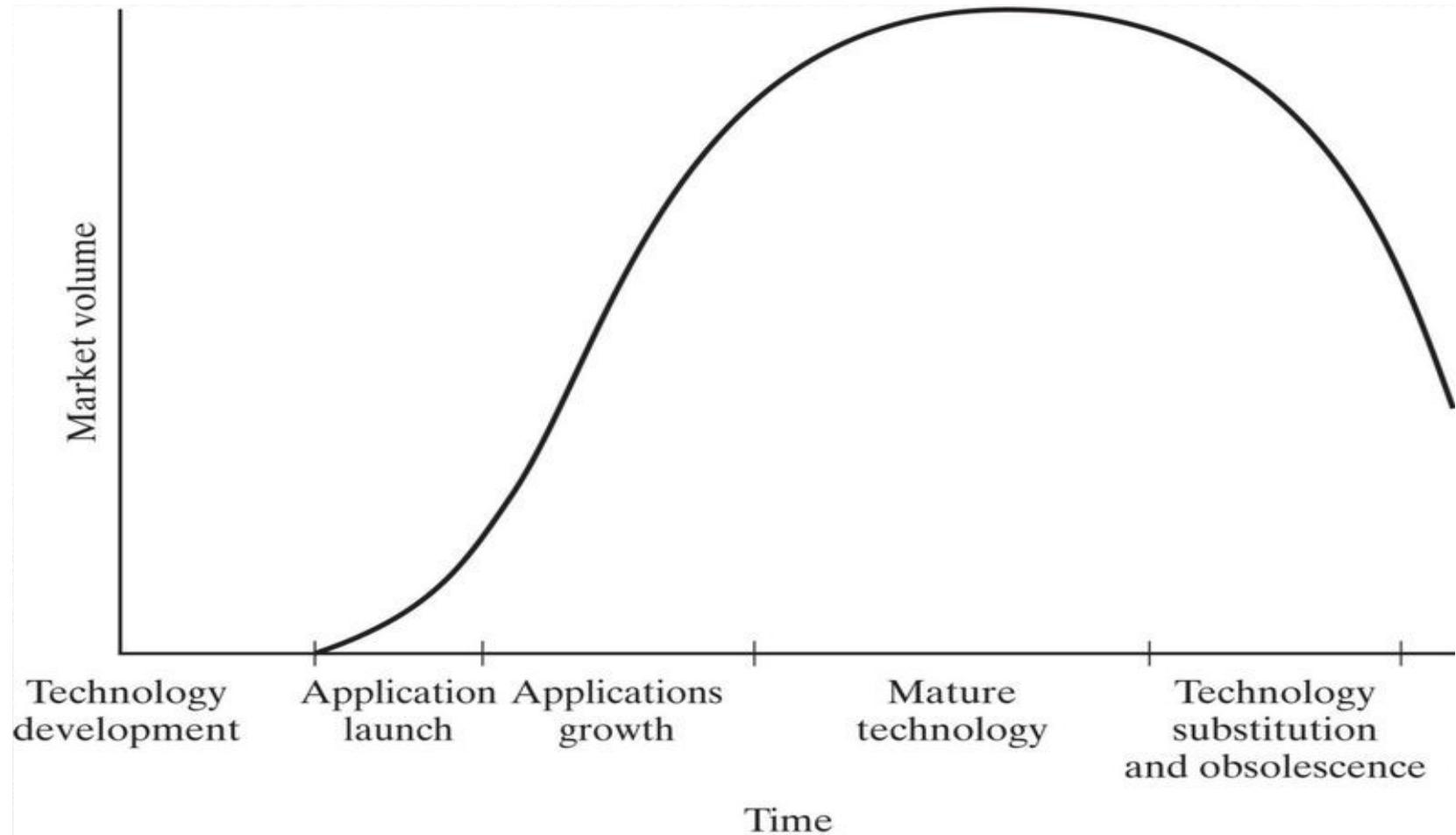
Product Life Cycle

Useful for the construction of a building, for a ship or the design and development of an aerospace system

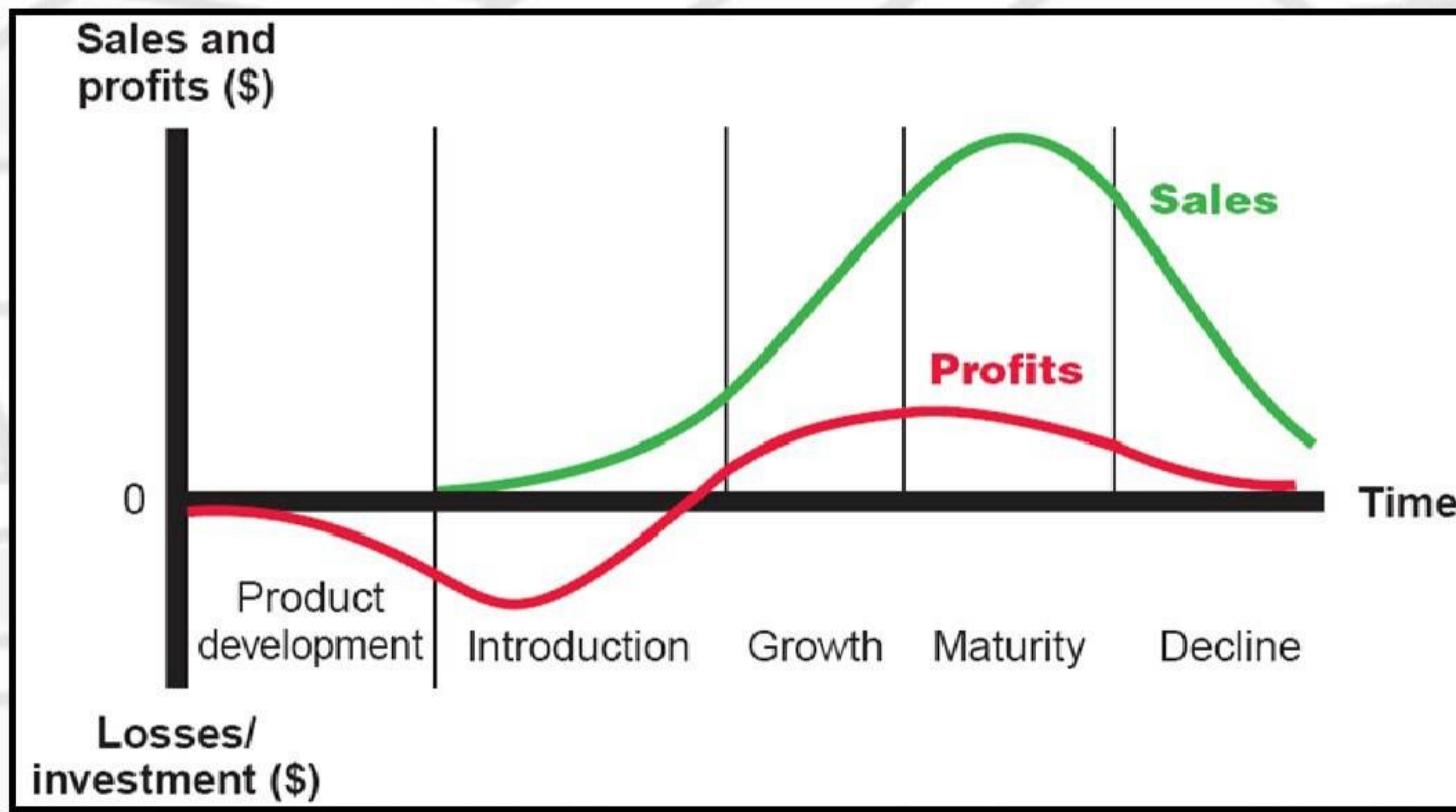
Consumer	Identification of need	"Want" or "desires" for product (deficiencies/problems are made evident through basic research)
Producer	Planning function	Marketing analysis, feasibility study, product selection, specification and plans, evaluation plan, logistic support plan, planning review and proposal
	Research function	Basic research, applied research, evolution from basic research to product design and development
	Design function	Design requirements, conceptual design, preliminary system development to production
	Production and/or construction	Production and construction requirement, industrial engineering, plant engineering, manufacturing, production and quality control.
	Product evaluation	Evaluation requirements, categories of test and evaluation, formal test and evaluation, data collection, analysis, reporting and correction, retesting
Consumer	Product use and logistic support	Product distribution, operational use, maintenance support, product evaluation and modification, product phase-out, material disposal, reclamation and re-cycling

Technology Life Cycle

For a product line based on a technology that is developed and improved over a period of years of product manufacture



Sales and Profits Over the Product's Life From Inception to Decline



Nature of Research and Development

Research

- Systematic, intensive study directed towards scientific knowledge of the subject studied.
- Basic Research
 - Devoted to achieving a fuller knowledge or understanding rather than practical application of it.
- Applied Research
 - Directed towards *practical application* of knowledge – especially for industry culminating into products

Development

- Systematic use of scientific knowledge directed towards the production of useful materials, devices, methods, products etc.

List of countries by research and development spending (2019) , Source Wikipedia

◆	Country/Region	Expenditures on R&D (billions of US\$, PPP)	% of GDP PPP	Expenditures on R&D per capita (US\$ PPP)	Year
1	🇺🇸 United States	612.714	3.1	1,866	2019
2	🇨🇳 China	514.798	2.2	368	2019
3	🇯🇵 Japan	172.614	3.2	1,375	2019
4	🇩🇪 Germany	131.932	3.2	1,586	2019
5	🇮🇳 India	125.5	1.2	91	2019
6	🇰🇷 South Korea	100.055	4.6	1,935	2019
7	🇫🇷 France	63.658	2.2	944	2019
8	🇬🇧 United Kingdom	51.702	1.8	762	2019
9	🇹🇼 Taiwan	42.945	3.5	1,822	2019
10	🇷🇺 Russia	38.549	1.0	263	2019

2018 top 50 [\[edit\]](#)

The 50 companies with the highest research and development expenses in 2018.^[1]

Rank	Company	Country	Sector	Expenditures on R&D (billions of US\$)
1	Amazon	United States	Software and Internet	22.62
2	Alphabet Inc.	United States	Software and Internet	16.23
3	Volkswagen Group	Germany	Automotive	15.77
4	Samsung Electronics	South Korea	Computing and Electronics	15.31
5	Microsoft	United States	Software and Internet	14.74
6	Huawei	China	Computing and Electronics	13.60
7	Intel	United States	Computing and Electronics	13.10
8	Apple Inc.	United States	Computing and Electronics	11.58
9	Roche Holding	Switzerland	Health Care	10.80
10	Johnson & Johnson	United States	Health Care	10.55

The Top 20 R&D Spenders

Amazon moved from the number three position in 2016 to become the largest R&D spender in 2017. On the top 20 list, it is one of nine high-tech companies and one of 13 companies headquartered in the United States.

Companies in **RED** have been among the top 20 R&D spenders every year since 2005.

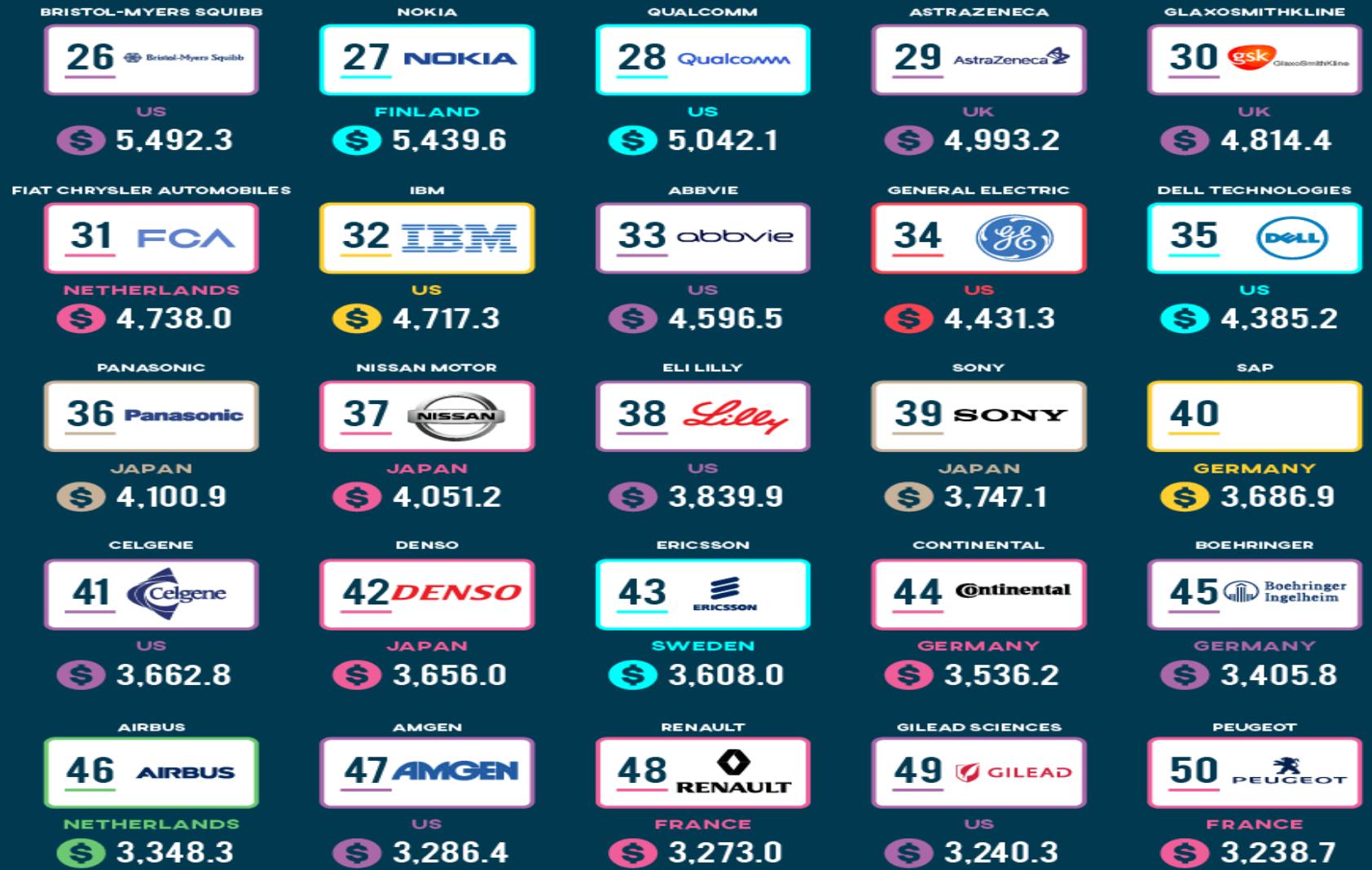
Rank			R&D Spending				
2017	2016	Company	2017 US\$ Billions	Change from 2016	% of Revenue	Headquarters	Industry
1	3	Amazon	\$16.1	28.3%	11.8%	North America	Software and Internet
2	4	Alphabet	\$13.9	13.6%	15.5%	North America	Software and Internet
3	5	Intel	\$12.7	5.0%	21.5%	North America	Computing and Electronics
4	2	Samsung	\$12.7	-0.1%	7.6%	South Korea	Computing and Electronics
5	1	Volkswagen	\$12.1	-7.7%	5.3%	Europe	Auto
6	6	Microsoft	\$12.0	-0.5%	14.1%	North America	Software and Internet
7	7	Roche Holding	\$11.4	14.0%	21.9%	Europe	Healthcare
8	14	Merck	\$10.1	51.0%	25.4%	North America	Healthcare
9	11	Apple	\$10.0	24.5%	4.7%	North America	Computing and Electronics
10	8	Novartis	\$9.6	0.6%	19.4%	Europe	Healthcare
11	10	Toyota	\$9.3	5.7%	3.8%	Japan	Auto
12	9	Johnson & Johnson	\$9.1	0.5%	12.7%	North America	Healthcare
13	13	General Motors	\$8.1	8.0%	4.9%	North America	Auto
14	12	Pfizer	\$7.9	2.4%	14.9%	North America	Healthcare
15	15	Ford	\$7.3	9.0%	4.8%	North America	Auto
16	16	Daimler	\$6.9	3.3%	4.2%	Europe	Auto
17	20	Oracle	\$6.8	17.8%	18.1%	North America	Software and Internet
18	17	Cisco	\$6.3	1.4%	12.8%	North America	Computing and Electronics
19	23	Honda	\$6.2	13.3%	4.9%	Japan	Auto
20	27	Facebook	\$5.9	22.9%	21.4%	North America	Software and Internet
TOP 20 TOTAL			\$194.5	9.4%	8.8%		

Note: Sums may not equal totals shown due to rounding.

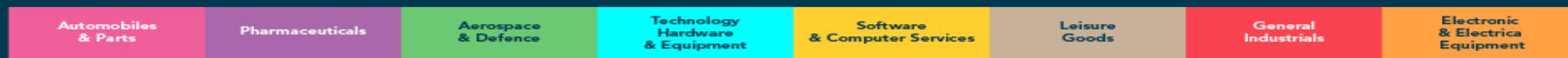
Source: Bloomberg data, Capital IQ data, Strategy& analysis

50 BIGGEST R&D INVESTORS AMONG COMPANIES

SAMSUNG 1  SOUTH KOREA \$ 14,867.7	ALPHABET 2  US \$ 14,813.6	VOLKSWAGEN 3  GERMANY \$ 14,533.9	MICROSOFT 4  US \$ 13,586.5	HUAWEI 5  CHINA \$ 12,541.2
INTEL 6  US \$ 12,084.5	APPLE 7  US \$ 10,684.9	ROCHE 8  SWITZERLAND \$ 9,830.7	JOHNSON & JOHNSON 9  US \$ 9,737.3	DAIMLER 10  GERMANY \$ 9,585.6
MERCK US 11  US \$ 9,376.6	TOYOTA MOTOR 12  JAPAN \$ 8,696.6	NOVARTIS 13  SWITZERLAND \$ 8,111.6	FORD MOTOR 14  US \$ 7,381.0	FACEBOOK 15  US \$ 7,154.0
PFIZER 16  US \$ 6,824.7	BMW 17  GERMANY \$ 6,758.5	GENERAL MOTORS 18  US \$ 6,735.2	ROBERT BOSCH 19  GERMANY \$ 6,566.0	SIEMENS 20  GERMANY \$ 6,127.8
SANOFI 21  FRANCE \$ 6,030.4	HONDA MOTOR 22  JAPAN \$ 5,971.6	BAYER 23  GERMANY \$ 5,711.8	ORACLE 24  US \$ 5,619.7	CISCO SYSTEMS 25  US \$ 5,590.1
BRISTOL-MYERS SQUIBB NOKIA QUALCOMM ASTRAZENECA GLAXOSMITHKLINE				



VALUE IN R&D 2017/18 (\$MN)



New Product Strategies as suggested by Ansoff and Stewart

First to Market

- High expenditure before there is guarantee of success. Heavy development expenditure and a large marketing effort - **the rewards are immense**

Follow the leader

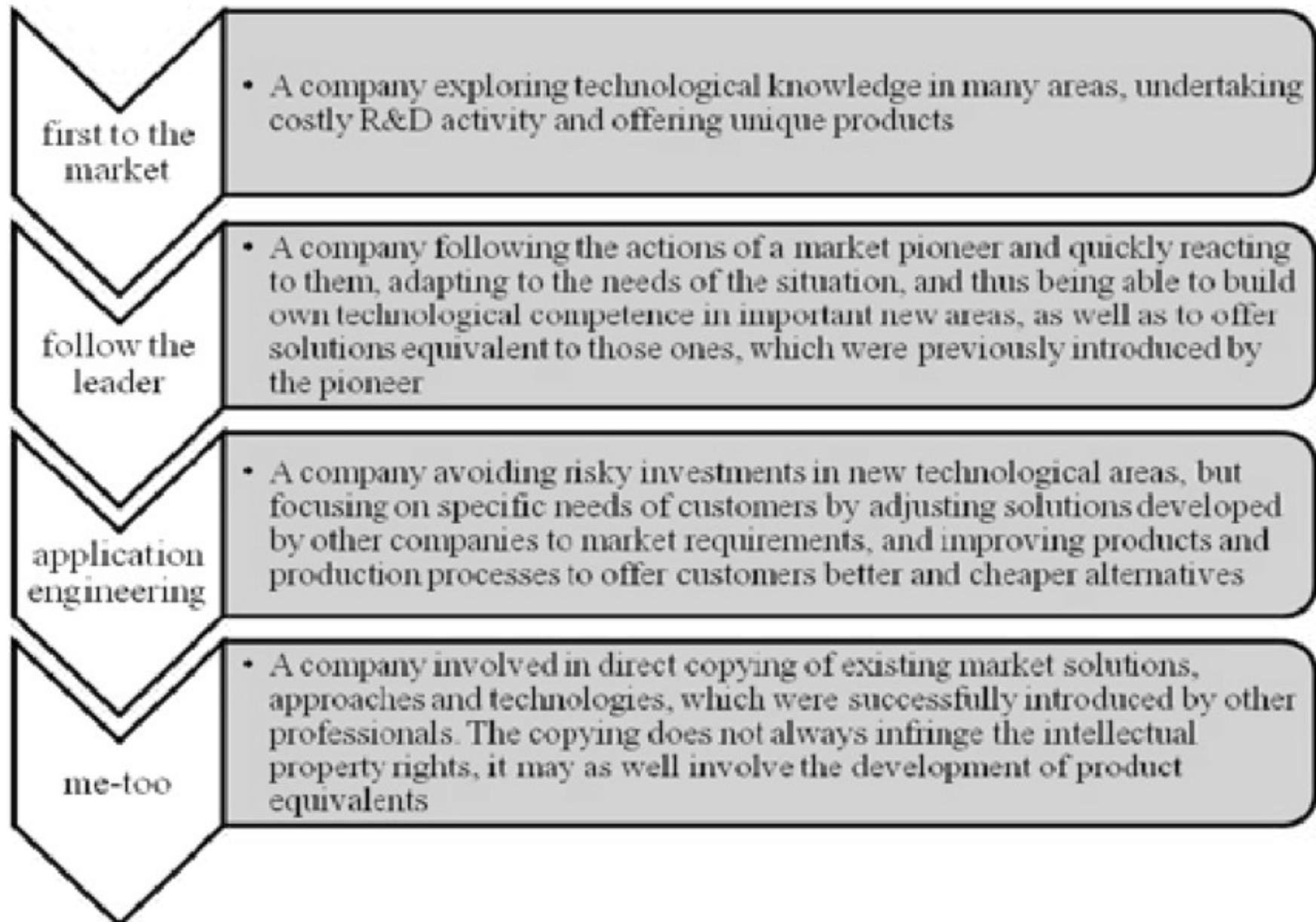
- Strong development engineering but less on research – follows the competitor's research success – brings product with innovator –

Me too

- No research and development – simply copying the design from others, buying and leasing necessary technology

Application engineering

- Taking established product and produce in customer's desired design and need - **needs high flexibility in production**



Selecting R&D Projects

60 untested new product ideas are screened for

- Technical feasibility
- Financial feasibility
- Suitability to corporate resources and objectives

to obtain

12 ideas worthy of further evaluation through

- Preliminary engineering design
- Market research and cost/benefit analysis

to find

6 potential products worthy of

- Further design development and analysis

resulting in

3 prototypes for physical and market test

2 products launched

1 profitable product

Selecting R&D Projects - Initial Screening

- In 'simple checklist', project is given simple judgemental rating (poor/ fair /good/excellent or -2/ -1/ +1/ +2) for each of characteristics and in 'weighted checklist' or 'scoring model', each characteristics is provided with weight showing importance of that factor.

Selecting R&D Projects - Initial Screening

1. **Technical factors**: availability of needed skills and facilities; probability of technical success
2. **Research direction and balance**: compatibility with research goals and desired research balance
3. **Timing** : Is R&D and market development relative to the competition?
4. **Stability** : Potential market and economic condition
5. **Position factor** : How are other products faring
6. **Market growth**: Will there be a viable demand?
7. **Production**: can the items be produced with current manpower and set-up?
8. **Marketability**: Marketing organization, distribution methods and customer makeup.
9. **Patentability**: Can the product be patented?
10. **Financial factors**: expected investment need and rate of return

Table 9-3 Example of a Weighted Scoring Model

PRODUCT CONCEPT EVALUATION SHEET				Weighted Score
Criteria	Weight	Score		
Technical factors				
Compatibility with research objectives	1	9		9
Compatibility with production facilities and capabilities	2	8		16
Probability of technical success	2	9		18
Marketing factors				
Compatibility with marketing goals, distribution, customers	4	4		16
Probability of marketing success	4	2		8
Potential profitability	2		4	8
Totals			36	75

Quantitative Approaches

Payback Period For short term investment

- Ignores time value of money and profit beyond the point of pay back
- Payback period (T_{pb}) = Investment (I) / Annual Gross profit (A)

Present Worth Method

$$\circ P = \sum_{j=1}^n A_j (1+i)^j \quad \text{where,} \quad P = \text{Present worth of future cash flow}$$

A = cash flow in j^{th} year
 i = minimum attractive rate of return
 n = number of year of future cash flow

Maximum expenditure justified

$$E_{mj} = F_c \quad | \quad F_t \quad | \quad P$$
$$= P_{\text{commercial success}} \quad | \quad P_{\text{tech. success}} \quad | \quad \text{NPW}$$

Example

Suppose it was proposed to invest ($I =$) \$400,000 today with the certainty of a return of ($A_1 =$) \$209,000 in one year and ($A_2 =$) \$242,000 in two years. On the surface, the return of \$451,000 for an investment of only \$400,000 seems attractive, and the payback time is under two years. However, if the rate of return on corporate investment must be at least 10 percent ($i = 0.1$), the overall net present worth (NPW) of the proposal would be

$$\begin{aligned} \text{NPW} &= -\$400,000 + \frac{\$209,000}{1.1} + \frac{\$242,000}{(1.1)^2} \\ &= -\$400,000 + \$190,000 + \$200,000 \\ &= -\$10,000 \end{aligned}$$

This negative net present worth shows that the project would not earn the required return on investment, and the research proposal would be rejected.

Making R&D Organizations Successful

R&D Business Strategy

- Carefully planned technology strategy must be considered to support the overall strategy of the enterprise.
- Erickson et al. identify “three broad classes of technologies” a typical firm must consider:
 - **Base Technologies** – a firm must master these technologies to be effective in the chosen market
 - **Key Technologies** – provide competitive advantage by embedding differentiating features or functions
 - **Pacing Technologies** – may become key technologies later, these differentiate leader from follower

Pacing Technologies

- Technologies that have the potential to change the entire basis of competition but have not yet been embodied in a product or process.
- These technologies often develop into key technologies

Key Technologies

- Technologies that are most critical to competitive success because they offer the opportunity for meaningful process or product differentiation
- These technologies yield competitive advantage

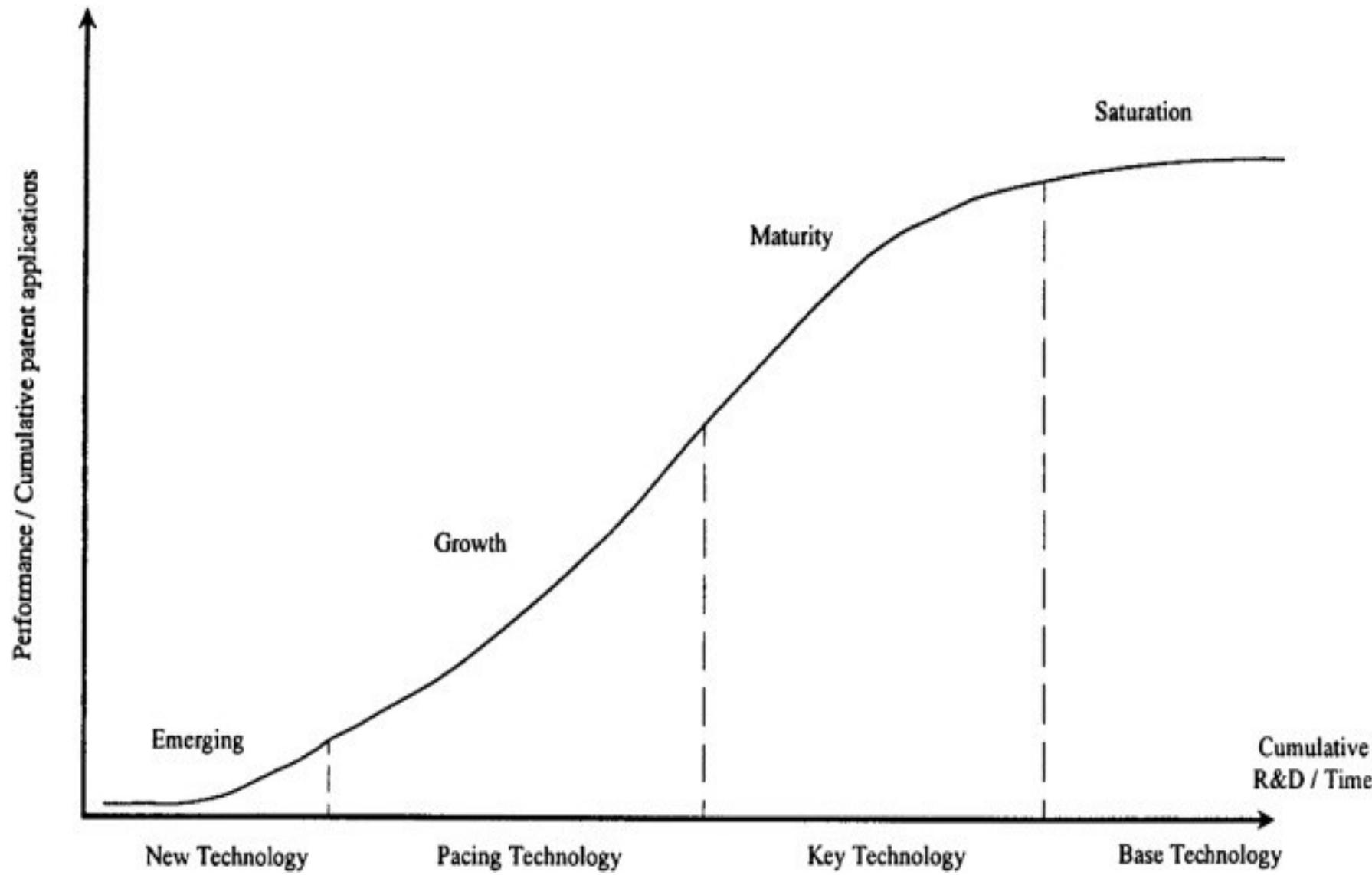
Base Technologies

- Technologies that, although necessary and essential to practice well, offer little potential for competitive advantage
- These technologies are typically widespread and shared

Technology Life Cycle

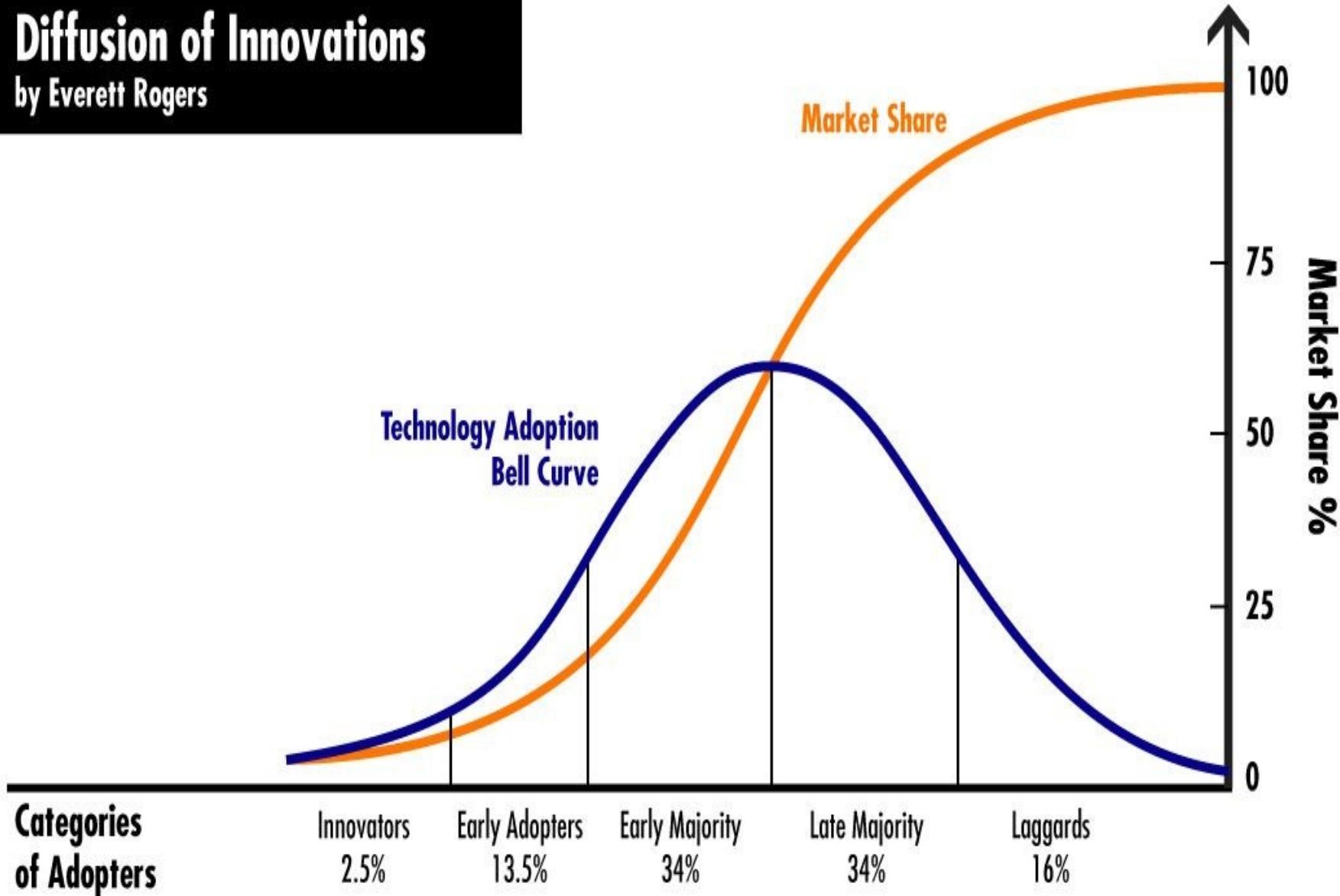
Stages in Technology

Life Cycle		Importance of Technologies for Competitive Advantage
I	Emerging Technologies	Have not yet demonstrated potential for changing the basis of competition.
II	Pacing Technologies	Have demonstrated their potential for changing the basis of competition.
III	Key Technologies	Are embedded in and enable product/process. Have major impact on value-added stream (Cost, performance, quality) Allow proprietary/patented positions
IV	Base Technologies	Minor impact on value-added stream; common to all competitors; commodity.

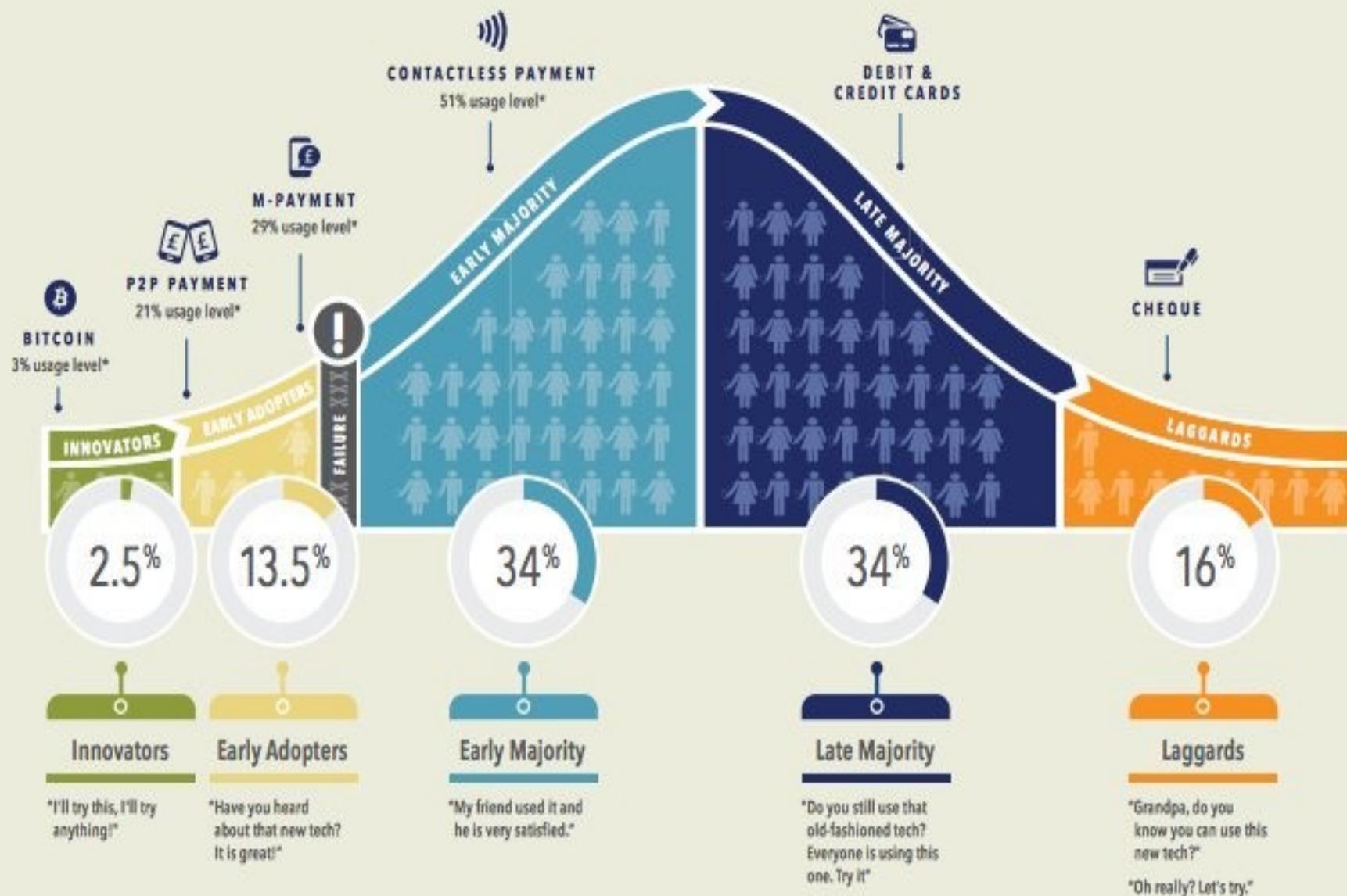


Diffusion of Innovations

by Everett Rogers



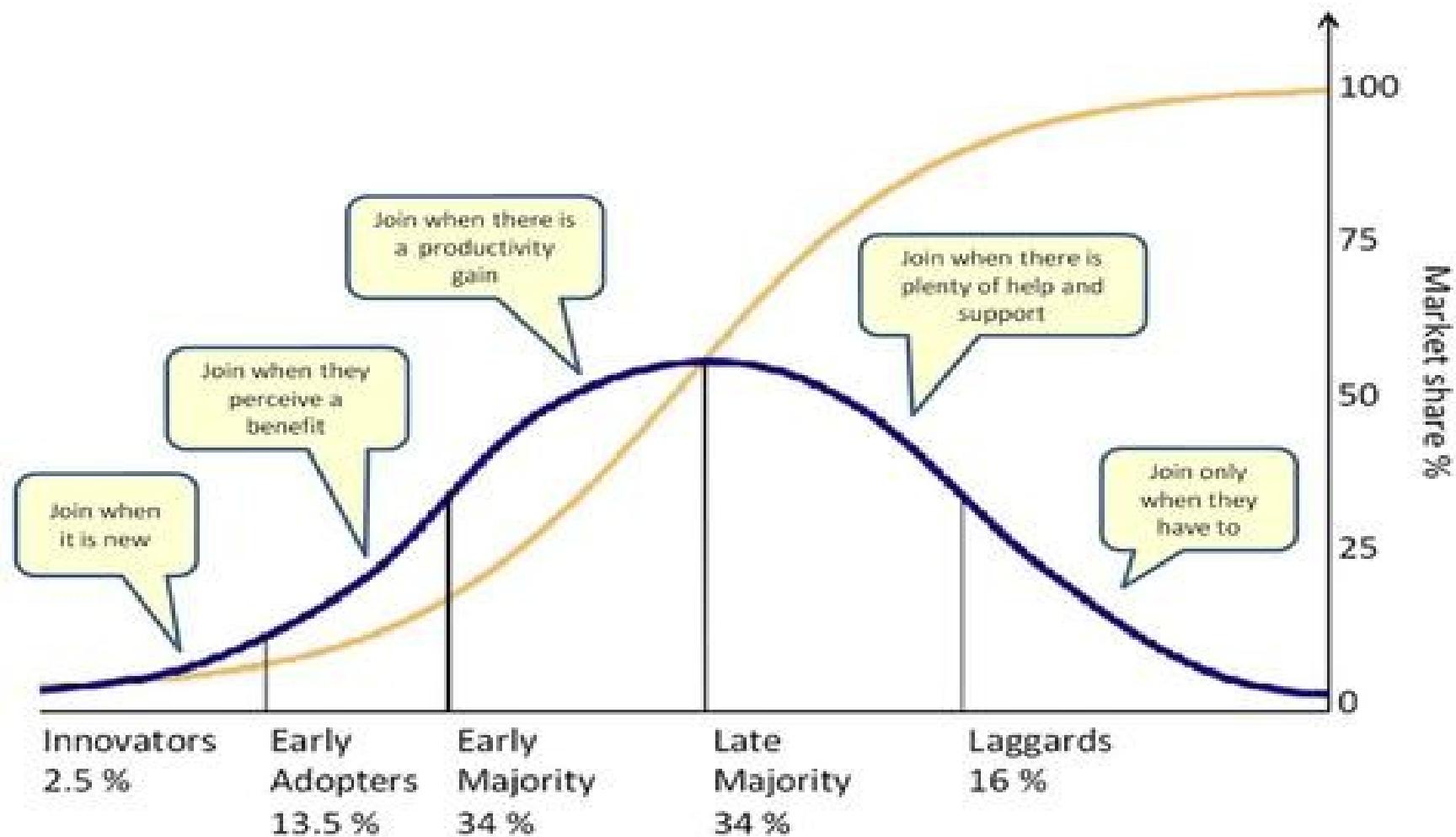
Rogers Diffusion of Innovation: Adopter Categories



Types of Technology Adopters

Category	% of market	Behaviours and Characteristics
Innovators	2.5	The first Individuals to adopt an innovation, take risks, are the youngest, have closest contact to scientific resources and interaction with other innovators.
Early Adopters	13.5	Second fastest category of adoption. They have the highest degree of opinion leadership among the other adopter categories, have advanced education, are more socially forward and more selective with their choice of adoption.
Early Majority	34	Adopt an innovation after a varying degree of time (generally significant). They will wait to see how the innovators and early adopters behave before taking action.
Late Majority	34	Will adopt after an average member of society does so. Generally have a higher degree of scepticism and will not consider adopting until the majority of society have already adopted it.
Laggards	16	Businesses that show little to no opinion leadership usually fall here. Typically tend to be focused on tradition.

Technology Adoption Curve



Evaluating R&D Effectiveness

◦ Organizational Effectiveness

1. Ratio of research costs to profits
2. Percentage of total earnings due to new products
3. Share of market due to new products (usually computed as the volume of sales from a firm's new products in a specific product market to the total sales available from that market, which confounds the measure by including marketing proficiency as well)
4. Research costs related to increases in sales
5. Research costs to ratio of new and old sales
6. Research costs per employee
7. Ratio of research costs to overhead expenses such as administrative and selling costs
8. Cash flows (continuing evaluation of the pattern of outflows for research expense and actual and projected inflows from resulting revenue)
9. Research audits, including indicators of administrative and technical objectives such as costs, time, completion dates, probability of technical success, probability of commercial success, expected market share, expected profits, expected return on investment, design, and development. Blake provides a checklist of questions to ask in such an audit.
10. Weighted averages of costs and objectives (a measure of the extent the average R&D dollar contributed toward objectives with weights on a scale, such as 0.0 equals project badly missed objectives to 3.0 equals project

- Individual Effectiveness
 - Evaluated by the normal techniques of performance appraisal, especially management by objectives (MBO), emphasizing research goals.
 - Quantitative measures – the number of patents and publications, and citation by others of those publications, etc.

Making R&D Organizations Successful

Support for R&D. Quality supporting services need to be supplied to make the work of the highly trained scientist and engineer more efficient and productive.

- Technical support to carry repetitive testing and other functions – low skilled level manpower
- Support of mechanics, glassblowers, carpenters to produce test and research equipment
- A technical library with the field of research
- Technical publication support including typing, editing, graphical support for report production
- A flexible system for procuring researcher's equipment and materials
- Computer facilities and programming assistance
- A strong internal commercialization process in place to take research to product

Protection of Ideas

Strategic planning for competition requires protecting innovation

Development of organizational goodwill also is for competitive advantage

There are four legal means to protect individual or organizational ideas and rights

- Patents
- Copyrights
- Trade secrets
- Trade marks and other marks

The law associated with these protection is called **intellectual property law**

FORMS OF INTELLECTUAL PROPERTY PROTECTION



PATENT

A set of exclusive rights granted to an inventor by the government in exchange for a public disclosure of the invention. The invention must be useful, novel, and nonobvious.

Length of Protection: 15–20 years

Percentage of startups surveyed that had at least one patent: 2.6% [\(source\)](#)

Companies with most patents issued in 2014 (as of Dec 1): IBM, Samsung, Canon, Sony, Microsoft [\(source\)](#)



COPYRIGHT

A set of legal rights designated by the government to the creator of an original work. Allows creator to use, reproduce, and display work and receive compensation.

Length of Protection: Life of creator + 70 years

Percentage of startups surveyed that had at least one copyright: 7.4% [\(source\)](#)

Copyright industries contribution to GDP (2012): \$1.765 trillion (10.9%) [\(source\)](#)



TRADEMARK

A word, name, symbol, or device used with a good or brand to distinguish from other goods or brands.

Length of Protection: Indefinite as long as mark is still in use and owner renews mark every ten years

Percentage of startups surveyed that had at least one trademark: 13.7% [\(source\)](#)

Top trademark applicants in 2014 (as of Dec 1): Mattel, Novartis, GlaxoSmithKline, Samsung, King.com [\(source\)](#)

	WHAT'S PROTECTED	EXAMPLES	TERM OF PROTECTION
Utility Patent	Inventions, including machines, compositions, processes, articles of manufacture, and improvements on inventions	iPod, chemical fertilizer, process of manipulating genetic traits in mice, ironing board	20 years from the date of filing regular patent application
Design Patent	Ornamental (non functional) designs for useful objects	Unique shape of electric guitar, design for floor lamp	14 years
Copyright	Books, photos, music, recordings, fine art, graphic images, videos, films, architecture, computer programs	The DaVinci Code, (book and movie), Andy Warhol prints, Michael Jackson's Thriller (music recording, artwork and video), architectural plans for trump tower, Microsoft Windows operating system	The life of the author plus 70 years (or for some works, 95 years from first publication)
Trademark	Words, symbols, logos, designs, slogans or devices that identify and distinguish products or services	Coca-Cola name and distinctive "wave" logo, Good Housekeeping seal, Pillsbury doughboy character	As long as business continuously uses trademark in connection with goods or services
Trade Secret	Formulas, methods, devices or compilations of facts or any information which is confidential and gives a business an advantage	Coca-Cola formula, survey methods used by professional pollster, buying habits of ethnic groups, new invention for which patent application has not been filed	As long as information remains confidential and functions as a trade secret

NO.	TYPE OF IP	SUBJECT MATTERS PROTECTED	PROTECTION PERIOD	PROTECTION METHOD
1.	Trade Mark	Brand name; Logo; Symbol; Labels and Slogan	Forever, subject to renewal every 10 years	Registration
2.	Patent	Invention which permits in practice the solution to a specific problem in the field of technology	20 years, subject to annual renewal	Registration
3.	Copyright	Literary works; Musical works; Artistic works; Films; Sound recordings; Broadcasts	50 years from death of author or 50 years from the beginning of the year next following the year in which the work was first published.	Voluntary Notification or automatic subsistence, depending on the designated country
4.	Industrial Design	An article / product, where its <i>shape and configuration</i> or <i>pattern and ornamentation</i> are new	15 years or 25 years, depending on the designated country.	Registration







Patent

- Any invention which is novel and useful can be patented.
- Should be applied before launching the product.

Copyright

- Any literary object namely artwork, poetry, books, music can be copyrighted.
- Can be applied anytime.

Trademark

- Any name, symbol, mark to describe the product or services can be protected.
- Can be done before or after the launching of the mark.

Design

- Novel ornamental or appearance of any product.
- Should be applied before launching the product.

Copyrights	Protect works of authorship, such as writings, music, and works of art that have been tangibly expressed.
Patents	Protect a broad range of inventions and designs, including but not limited to: processes, machines, articles of manufacture, and compositions of matter; and new, original, and ornamental designs for articles of manufacture
Trademarks	Protect words, names, symbols, sounds, or colors that distinguish goods and services.
Trade secrets	Protects information that companies keep secret to give them an advantage over their competitors

Types of Patents

Type	Type of Invention Covered	Duration
Utility	New or useful process, machine, manufacturer, or composition of material or any new and useful improvement thereof.	20 years from the date of the original application.
Design	Invention of new, original, and ornamental design for manufactured products.	14 years from the date of the original application.
Plant	Any new varieties of plants that can be reproduced asexually.	20 years from the date of the original application.

Figure 1: The Gillette Fusion razor – electric version. (a) view from top, (b) cartridge, (c) cross-section of cartridge and cartridge connection.

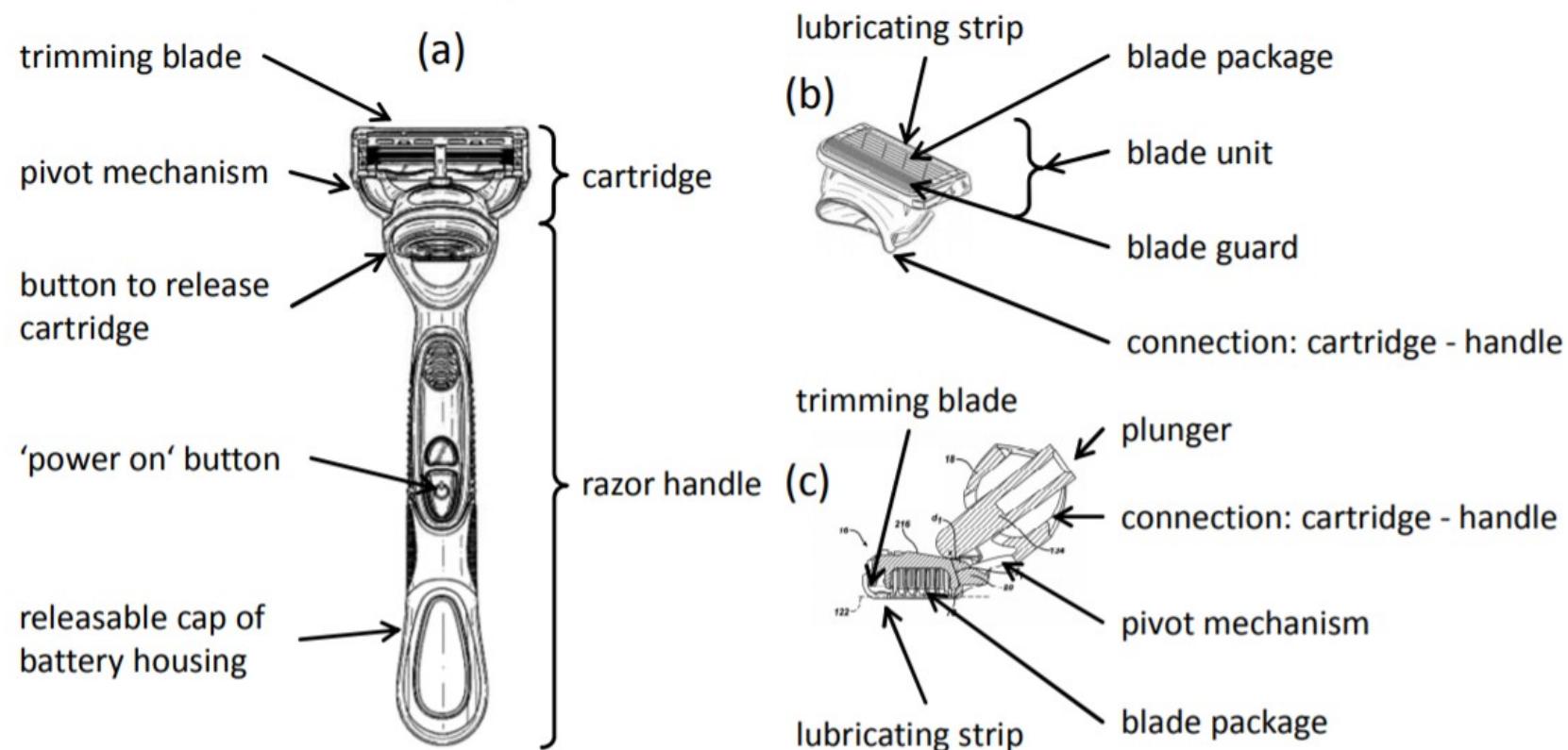


Figure 2: Network of overlaps between patent families. Tie strength is proportional to the number of joint detailed technological constructs. Family IDs plus concepts are indicated.

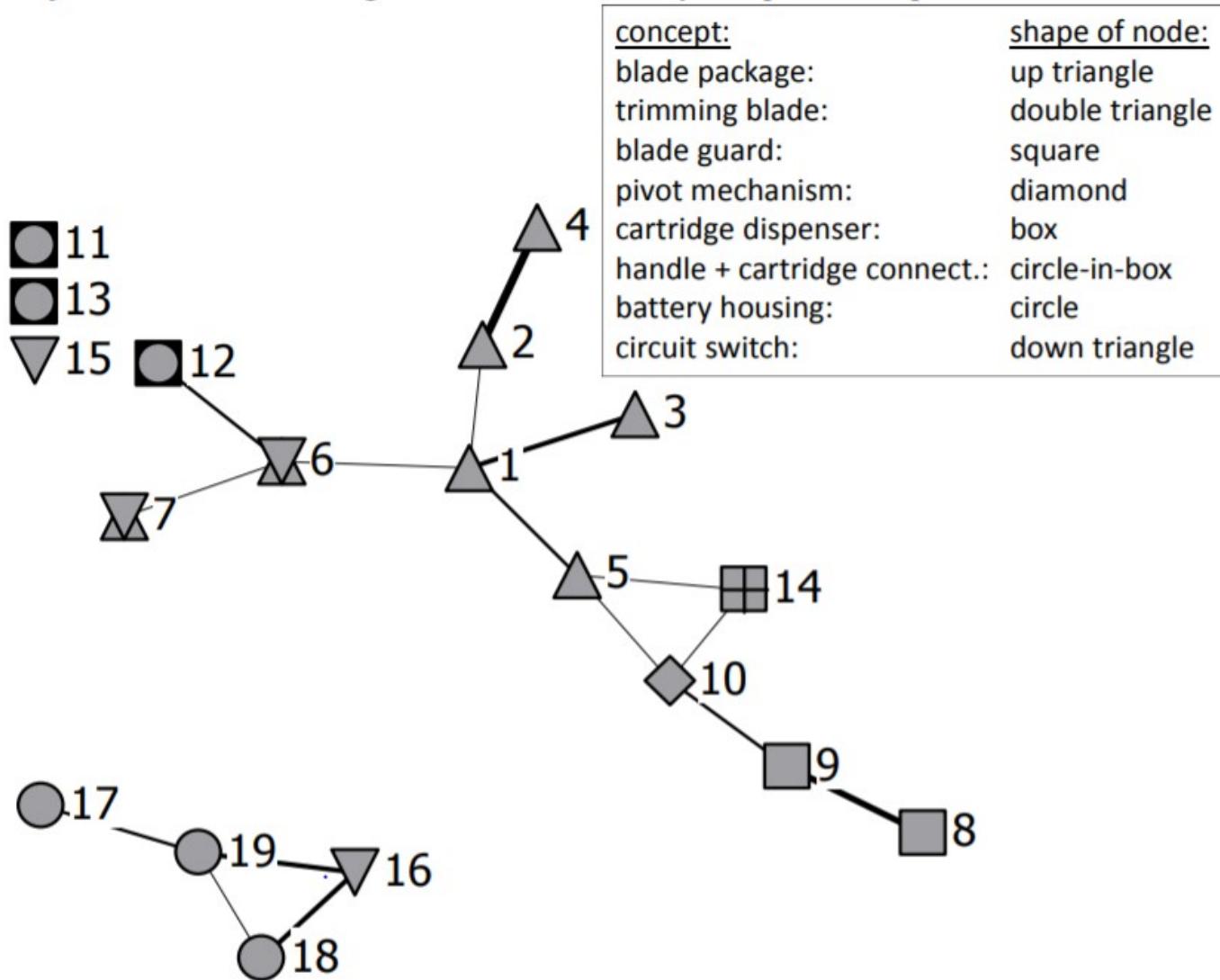


Figure 3: Function analysis of the Gillette Fusion razor, following Pahl et al. (2007).

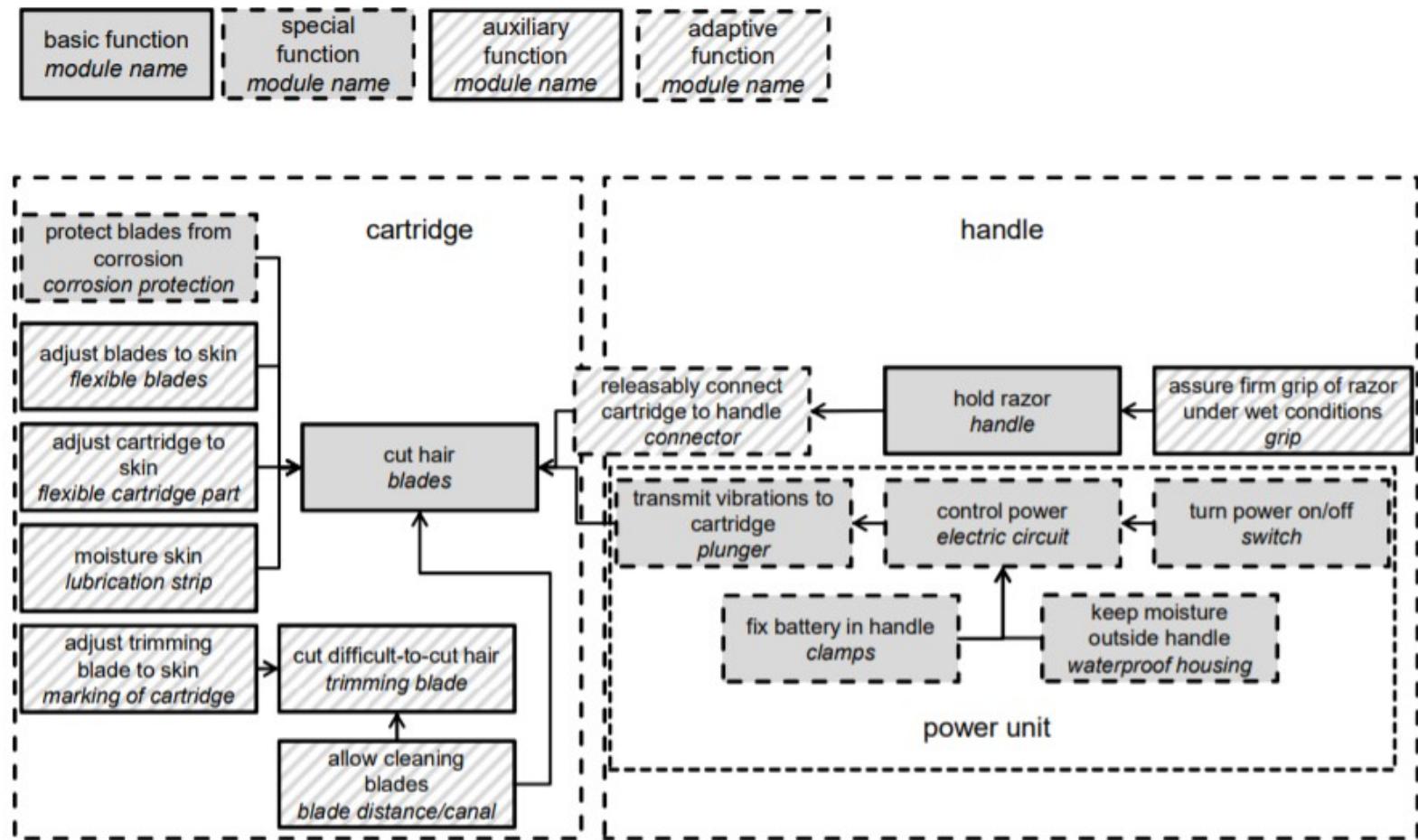
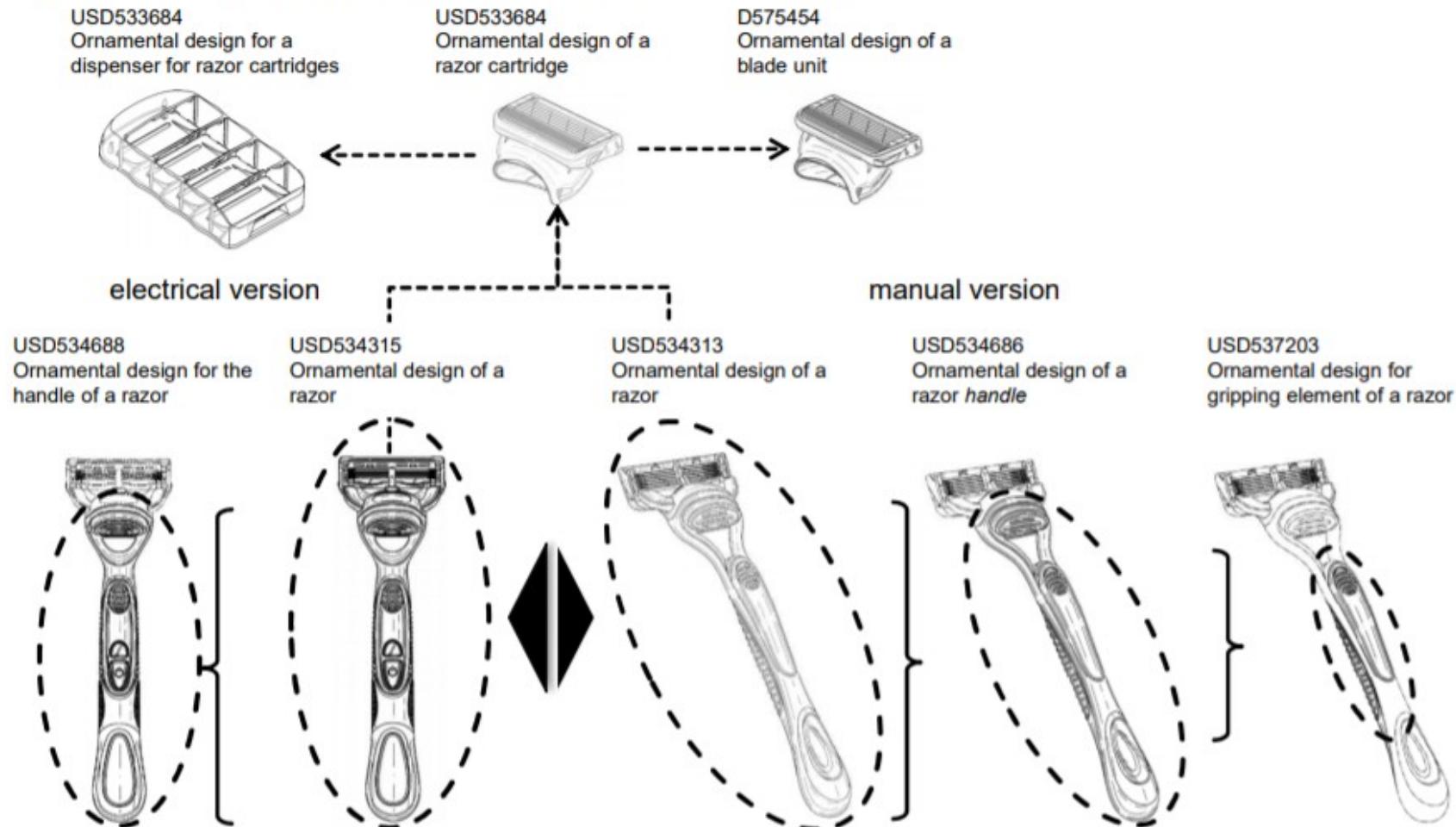


Figure 2: Design patents claimed for the Fusion design.



United States Design Patent

Kulla et al.

(10) Patent No.:

US D623,557 S

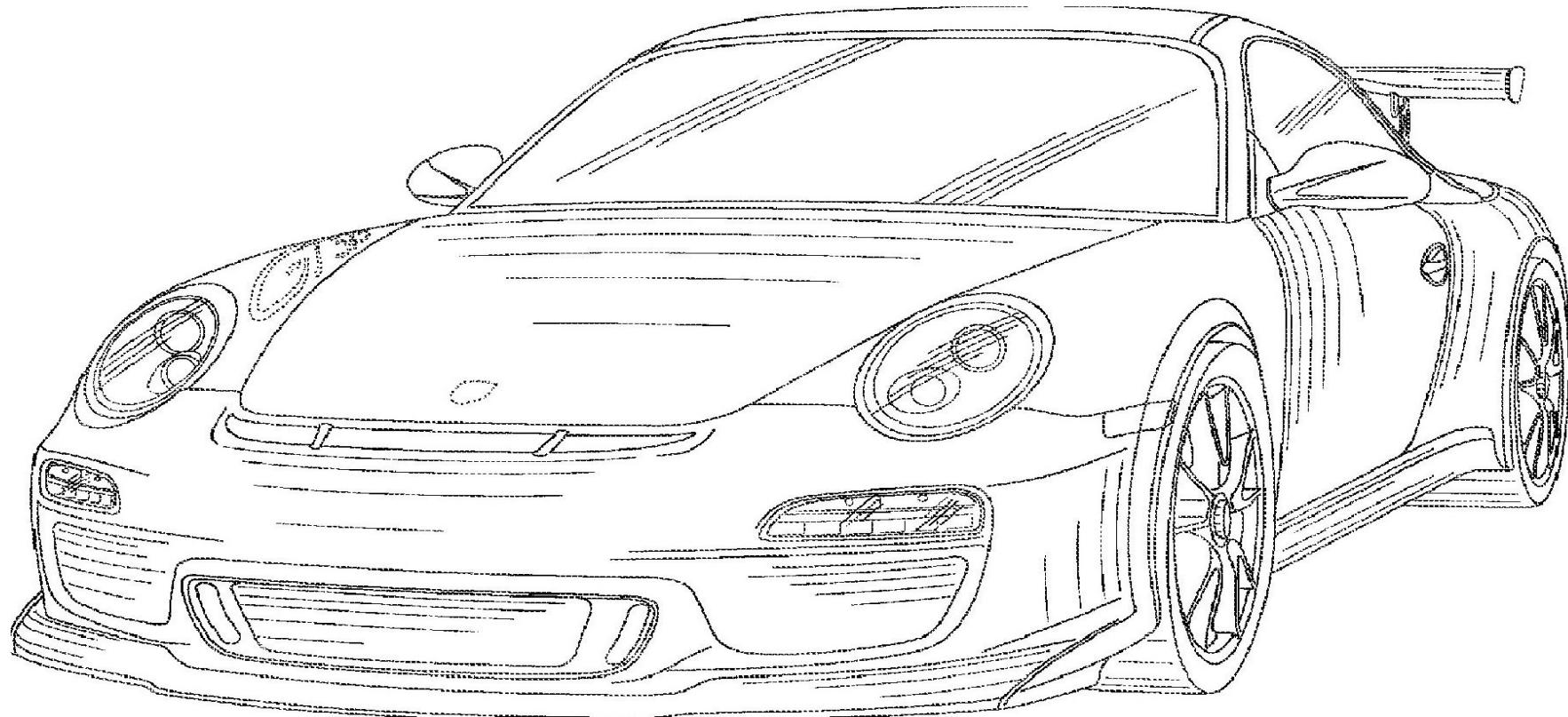
(45) Date of Patent:

** Sep. 14, 2010

AUTOMOBILE

Inventors: **Matthias Kulla**, Renningen (DE);
Andreas Preuninger, Weissach-Flacht
(DE)

Assignee: **Dr. Ing. h.c. F. Porsche AG**, Stuttgart



United States Patent [19]
Fioravanti

[11] **Patent Number:** Des. 306,274
[45] **Date of Patent:** ** Feb. 27, 1990
[73] **Assignee:** Ferrari Societa per Azioni Esercizio
Fabbriche Automobili e Corse,
Modena, Italy

FIG. 1

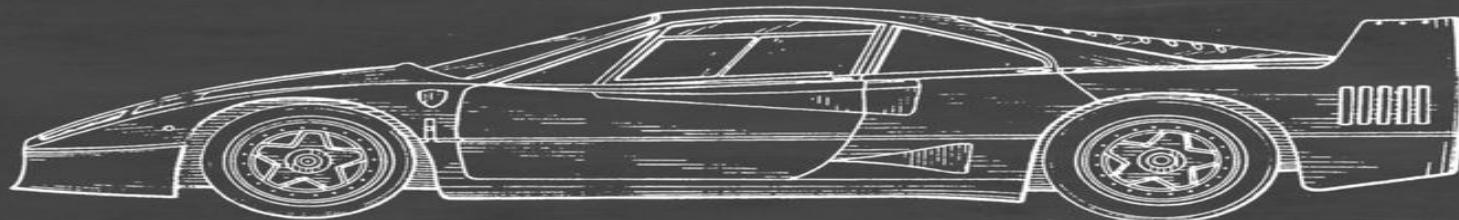


FIG. 6

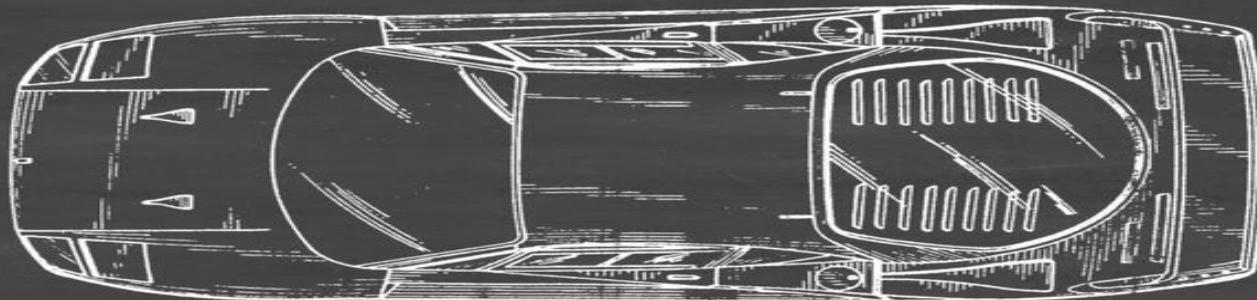


FIG. 2

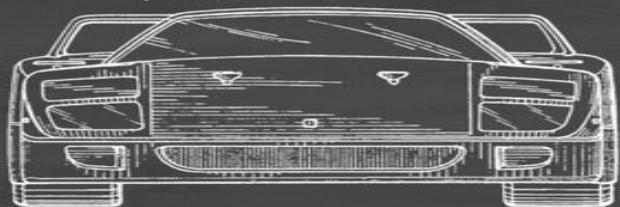
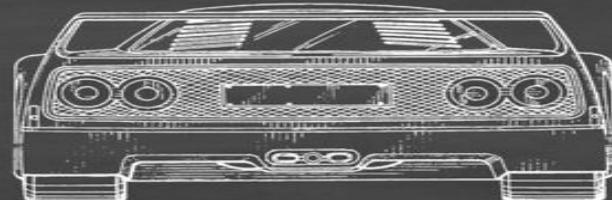


FIG. 3



IP Ownership

Trade Marks – The applicant is the owner.

Patents – Inventor owns the IP, **unless** the invention was made as part of his/her job, in which case his/her employer will own the invention.

Designs – The designer is the owner, **unless** the design was made as part of his/her job, in which case his/her employer will own the invention. A commissioned design is owned by the designer and not the commissioner (unless a contract states otherwise)

Copyright – The creator of the work is the owner, **except** where made in the course of employment.

Summary of Intellectual Property

- IP = intangible assets associated with a company's technological innovation, "brainpower" and goodwill.
- If a company's "intangible assets" meet certain criteria, the law gives the company legal protection.

- 3 attributes: 1) intangible; 2) a "right to exclude" not affirmative right; and 3) personal property.

		Trade Secrets	Copyrights	Trademarks	Patents
Gov't	Nothing	Registration (Copyright Office)	Prosecution (US PTO)	Prosecution (US PTO)	
Increasing Protection and Increasing Cost					
Overview	<ul style="list-style-type: none"> • Best example is "secret formula for Coca-Cola." • Most technology companies rely on trade secrets as primary means of protecting IP. • Most fragile form of intellectual property. 	<p>© is internationally recognized symbol for copyright.</p> <ul style="list-style-type: none"> • Easier and cheaper to obtain than patent and lasts longer. • However, no infringement if work is created independently (without copying). 	<ul style="list-style-type: none"> • Word, name or symbol to identify goods or service. • More expensive and time consuming than copyright, but less so than for patents. • Does not protect expression in product (copyright) or underlying invention (patent). 	<ul style="list-style-type: none"> • One may obtain a patent on "anything under the sun that is made by man." – US Sup. Ct. • Strongest form of IP because original creation is not a defense. • Most time-consuming and expensive form of IP to obtain. 	
Requirements	<ul style="list-style-type: none"> • Requires that reasonable steps must be taken to protect secret, such as limiting access and signing NDAs. • No state or federal filings or registrations required. 	<ul style="list-style-type: none"> • Work need not be novel, but must be "original" (ie not copied). • Some copyright protection when work is created, but for maximum protection, should place copyright notice and register with US Copyright Office. 	<ul style="list-style-type: none"> • TM generally must be distinctive of product and not the generic name for that type of product. • "Suggestive" or "distinctive" marks are stronger than "descriptive" or "generic" marks (no protection). 	<ul style="list-style-type: none"> • <i>Useful</i> (generally assumed unless reason to believe it won't work). • <i>Novel</i> (must be first person to have invented idea). • <i>Nonobvious</i> (but need not be pioneering breakthrough). 	
Protection	<ul style="list-style-type: none"> • Federal and state law protects trade secrets by allowing criminal prosecution and civil penalties of individuals and organizations involved in the theft of trade secrets. 	<ul style="list-style-type: none"> • Protects writings and other forms of expression from unauthorized duplication, modification and distribution. • Copyright protects the expression of an idea, not the idea itself. 	<ul style="list-style-type: none"> • TM may be protected under both state and federal law. • To obtain the strongest protection, trademarks should be filed in the US Patent and Trademark Office. 	<ul style="list-style-type: none"> • Issued US patent gives owner right to exclude others from making, using, selling, offering to sell or importing the claimed invention in the US without a license. 	
Duration	<ul style="list-style-type: none"> • Lasts forever but will be lost when the information becomes generally known to the public. 	<ul style="list-style-type: none"> • For individuals, copyright lasts for life of author + 70 years. • Copyright for "works made for hire" last 95 yrs. from publication or 120 yrs. from creation. 	<ul style="list-style-type: none"> • Some TM protection is established as soon as mark is used and rights will last as long as mark remains distinctive and is not abandoned. 	<ul style="list-style-type: none"> • Utility patents filed after 6/8/95 last 20 years from date of filing (otherwise 17 years from date of issue). • Design patents last 14 years from date of issue. 	

TRADEMARK



Copyright



Copyleft



**Creative
Commons**

Case of Nepal

Industrial Property (IP)

The Patent, Design and Trademark Act has authorized the Department to protect the industrial property like patent, design and trademark; Patents shall include new invention; principles and formulae; Design shall include physical shape and appearance whereas Trademark shall include the word, sign, picture or all three or combination between them to differentiate the product from the others.

The Department shall act as semi-judiciary unit in case of protection of industrial property as well as in the settlement of disputes and other administrative procedure.

The Department shall also act as a focal point of all the international organization/institution including World Intellectual Property Organization (WIPO). Besides the membership of WIPO, Nepal has received a membership for Paris Convention for Industrial Property.



Government of Nepal

Ministry of Industry

Department of Industries



Case of Nepal

Fee Structure of Patent, Design & Trademark

All amount in Nepalese Currency

Effective Date : 2062/06/01 B.S. (17 September, 2005 A.D.)

Particular	Patent	Design	Trademarks
Application	2,000	1,000	1,000
Application amendment	500	500	500
Registration	10,000	7,000	5,000
Transfer of ownership	5,000	3,000	2,000
Changes in records	2,000	1,000	1,000
Search of registration	750	750	500
Complain and opposition	1,000	1,000	1,000
Copy of the registration certificate	1,000	1,000	2,000
Renewal of Patent & Design	-	-	-
<input checked="" type="radio"/> For 1st term	5,000	1,000	-
<input checked="" type="radio"/> For 2nd term	7,500	2,000	-
Renewal of trademark per year			500

Case of Nepal: Patents

RIGHT OVER THE PATENT

- Any person, willing to have rights on any patent, has to register such patent under the Patent Design and Trademark Act.
- Any patent registered in the name of any person shall not be copied used or utilized without the patentee's written consent .
- Ownership of a patent can be transferred in any way to any person as movable property.
- If any body does or attempt to do so or encourage to do any work against these rights of patentee may be punished with a fine by the order of Department and all the materials related with such offence shall be confiscated.

APPLY FOR ACQUIRING PATENT RIGHT:

- Person willing to patent registered in his own name shall have to apply to the Department with following information including all other evidence
- Name, address and profession of inventor.
- In the case of the invention not invented by the applicant himself, the conditions acquiring such right from inventor by the applicant,
- Method of operation or utilization of such invention
- Principle or formula, if such patent is based on any principle or formula
- Drawings and sketch of invention (if necessary)
- Prescribed application fee as mention in schedule

UN-PATENTABLE INVENTION

- If it has already been registered in the name of other
- If the patent asked to be registered is not invented by the applicant himself and he has not acquired the right from the inventor
- If the patent asked to be registered is found to cause adverse effect in health , conduct or morale or people in general or in the national interest
- If it violates any prevailing laws of Nepal.

Case of Nepal

EXAMINATION OF PATENT APPLICATION

- Department upon submission of an patent application examine the invention whether it is new or not, it is useful to the people in general or not
- If it deems necessary, Department takes the advice of experts of related field
- Basically, Department fallow the principle of Novelty, Industrial applicability, and Inventive step to examine

CERTIFICATES OF REGISTRATION

- If Department found the patent application is patentable after examination provide certificates to the applicant
- Applicant shall pay a registration fee as prescribed in schedule.

PUBLICATION OF REGISTERED PATENT

- Department shall publish all patents, except those to be kept secret for national interest in journal
- Anybody willing to see or take a copy of the statement, drawing or sketch of a patent published in journal may see or take a copy of such patent document on payment of a fee as prescribed.

OPPOSITION

- If any body has any complain upon any patent he may lodge such complains to the Department within thirty-five days from the date on which the patent is seen or a copy of such patent document is taken.
- Upon receipt of the complain Department take necessary action through an investigation.

TERM AND RENEWAL

- Patentee shall have his right on the patent for a period of seven years from the date of registration.
- The patentee shall renew the patent within 35 days from date of expiry having paid the fee mention in schedule.
- Renewal of a patent may be made for two times of seven years.

Case of Nepal

RIGHT ON DESIGN

- Any body may have a right on a design of any goods under the act, which is made or caused to be made by him, and has been registered in Department.
- Ownership of a design can be transferred.
- No body shall make any goods by using other's design or in a way to manipulate the people in general and copying such design without written consent of the person in whose name design is registered.

APPLICATION FOR REGISTRATION OF DESIGN

- Person willing to get registered a design of any goods made or caused to be made by him shall apply to the department along with a description, drawings and sketch of design and four copies of its model.
- Applicant shall submit prescribed application fee.

REGISTRATION OF DESIGN

- The Department after examination of any application shall register the in name of applicant
- The applicant shall pay prescribed registration fee to the Department to obtain the certificate of registration.

Case of Nepal

UN-REGISTRABLE DESIGN

The design shall not be registered;

- If, it is deemed to make adverse affect in the dignity of any individual or institution or,
- It makes bad affect in the well being and morale of the people in general or in the national interest, or
- If such design has already been registered to the name of other person
- Department also looks whether the design to be registered is new and original. Department may cancel the registration of any design in case if it deems that there is a situation of above.

TERMS AND RENEWAL OF DESIGN

- The design holder shall have his right on the design for a period of five years from the date of its registration.
- The design holder shall renew the registration of design within 35 days from the date of expiry.

PENALTY TO THE VIOLATOR

- If any body violates the rights of registered design holder may be punished with a fine by the order of the Department and all the goods related with such offence shall be confiscated.

Case of Nepal

RIGHT ON TRADEMARK

- Any body may have a right on any trademark of his trade or business under the act having it registered in the Department.
- Nobody shall use or copy any trademark in a way of manipulating the people in general without a written consent of person in whose name the trademark is registered.
- Ownership of a trademark can be transferred to other with a permission of the department.

APPLICATION FOR THE REGISTRATION OF TRADEMARK

One who is willing to get registered any trademark of his trade or business under the act shall apply to the Department in a prescribe format along with:

- Copy of registration or license of the business for product or service in which trademark is used or intend to use.
- Four copies of model of trademark.
- Authorizations letter if somebody has been authorized to act on behalf of the owner to register the trademark.
- If the applicant is a foreigner, certified copy of any foreign registration certificate and address for service in Nepal must be submitted with application.
- Receipt of payment of prescribe application fee.

Separate application shall be submitted for the registration of trademark of different categories goods or services.

Case of Nepal

CONDITION FOR REFUSAL TO REGISTER THE TRADEMARK

- If such trademark is deemed to make adverse effect in the dignity of any individual or institution,
- If such trademark make bad effect in the well being and morale of people in general or in the national interest,
- If such trademark effects in the goodwill of trademark of any other person , or
- If such trademark has been already been registered in the name of the other person.
- The trademark, which is contrary to the principle, norms and international conventions of industrial property.

CLASSIFICATION OF GOODS AND SERVICES

- Government of Nepal, for the purpose of registration of trademark relating to any goods and any types of services may classify such goods and services.
- International Classification of Goods and Services for the purpose of the registration of Marks (Nice Classification) is applied to this effect.

REGISTRATION OF TRADEMARK

- After examination if it is found registrable, The Department register the trademark in the name of applicant and issue a certificate.
- The applicant shall pay a registration fee of the trademark as prescribed in schedule.

TERM AND RENEWAL OF TRADEMARK

- The registered trademark holder shall have his right on the trademark for a period of seven years from the date of registration.
- The registered trademark holder shall renew the trademark within 35 days from the date of expiry.

Case of Nepal

CANCELLATION OF TRADEMARK

- The Department may cancel the registration of a trademark in case of that there is a condition of refusal to register.
- The Department may cancel the registration of trademark in case if it is not put into use within one year from the date of registration.

PUBLICATION OF TRADEMARK

The department may publish the registered design and trademark and a statement in regard to their renewal and cancellation of registration for the information of the people in general.

OPPOSITION AND COMPLAIN

Any person if he has any complain on the statement publish by the department concerning the design and trademark may lodge a complain to the department within 35 days of such publication. The department shall take necessary action through examination of such complain.

PENALTY AND COMPENSATION

- If anybody violates right of registered trademark owner and use the trademark which is cancelled by the department he may be punished with a fine by order of the Department and all the goods related with such offence shall be confiscated.
- In relation to the patent, design or trademark registered under the act, the Department may cause to pay a reasonable amount of the loss, incurred through the violation of the act by any body, to the person who had really been suffered from such loss, and whose name the patent, design and trademark was registered, from the person of such violation, as a compensation.

Case of Nepal

Schedule -1

(Relating to sub-rule (1) of Rule 3)

Application to be submitted for Registration of the Work, Sound recording, Performance or Broadcasting



Government of Nepal
Ministry of Culture, Tourism and Civil Aviation
Nepal Copyright Registrar's Office

CONTACT INFO

Nepal Copyright Registrar's Office

 Shanti Nagar, Bhimsengola, Kathmandu, Nepal

 Phone: 4117718, 4117719

 Audio Notice Board: 1618014431155

 Fax: 977-1-4431144

 E-mail: info@nepalcopyright.gov.np

 WEB: nepalcopyright.gov.np

To
The Registrar,
Nepal Copyright Registrar's Office.

In order to get registration of the following work, sound recording, performance or broadcasting under Copyright Rules, 2004, I hereby submit this application specifying the details as follows:

1. Name of the author or owner of the sound recording, performance or broadcasting:
2. Address:
3. Citizenship:
4. Date of birth:
5. In case of a work:
 - (a) Name and pages:
 - (b) Language:
 - (c) Date of completion of the work:
 - (d) Country and date where the work was published for the first time.
 - (e) Number of copies published:
 - (f) Other matters:
6. In case of sound recording, performance or broadcasting, details thereof:
7. Documents or evidence substantiating the ownership of the work, sound recording, performance or broadcasting.
8. Other details:
 - (a)
 - (b)
 - (c)
 - (d)

Applicant's

Signature:-

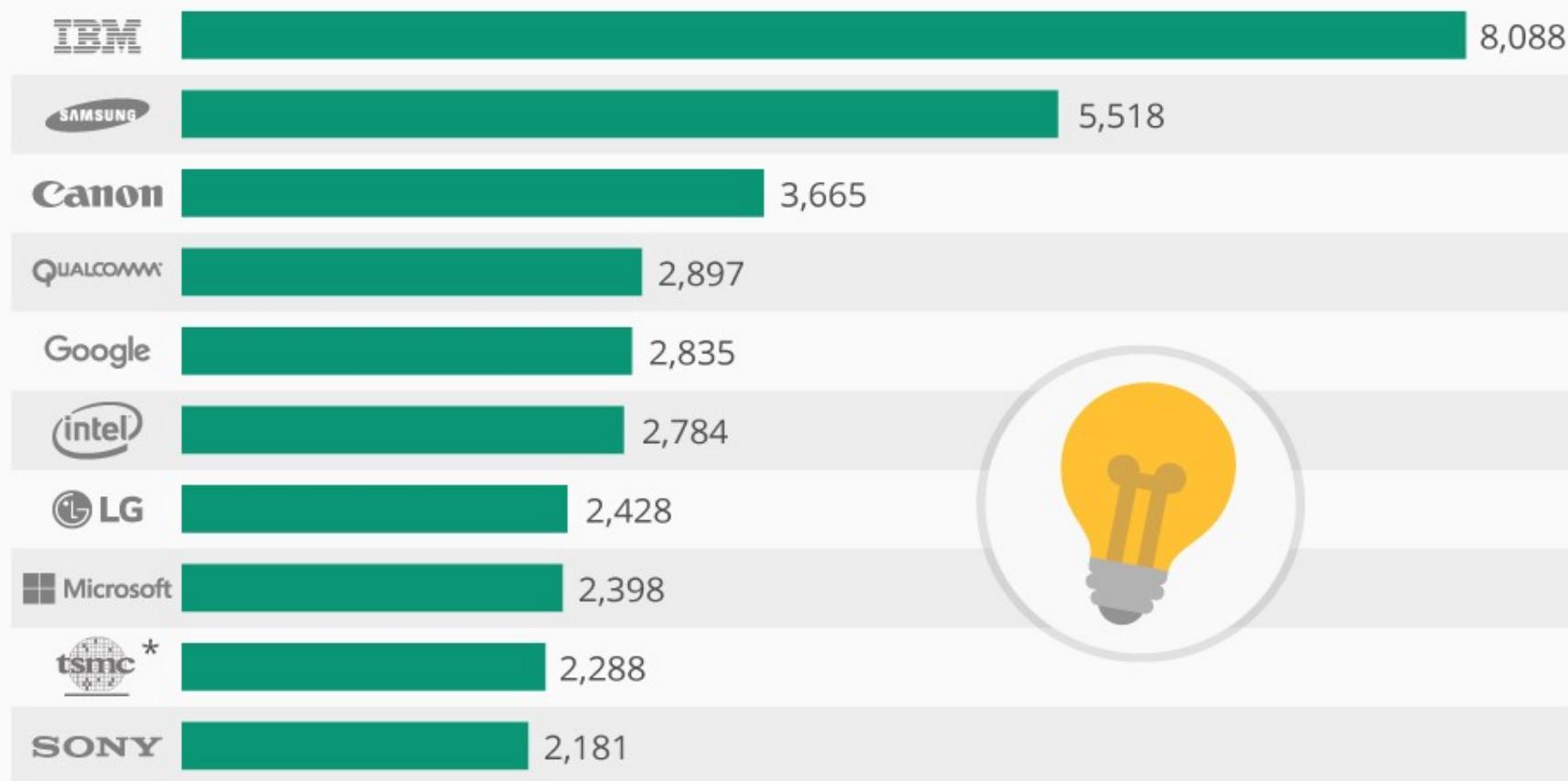
Name:

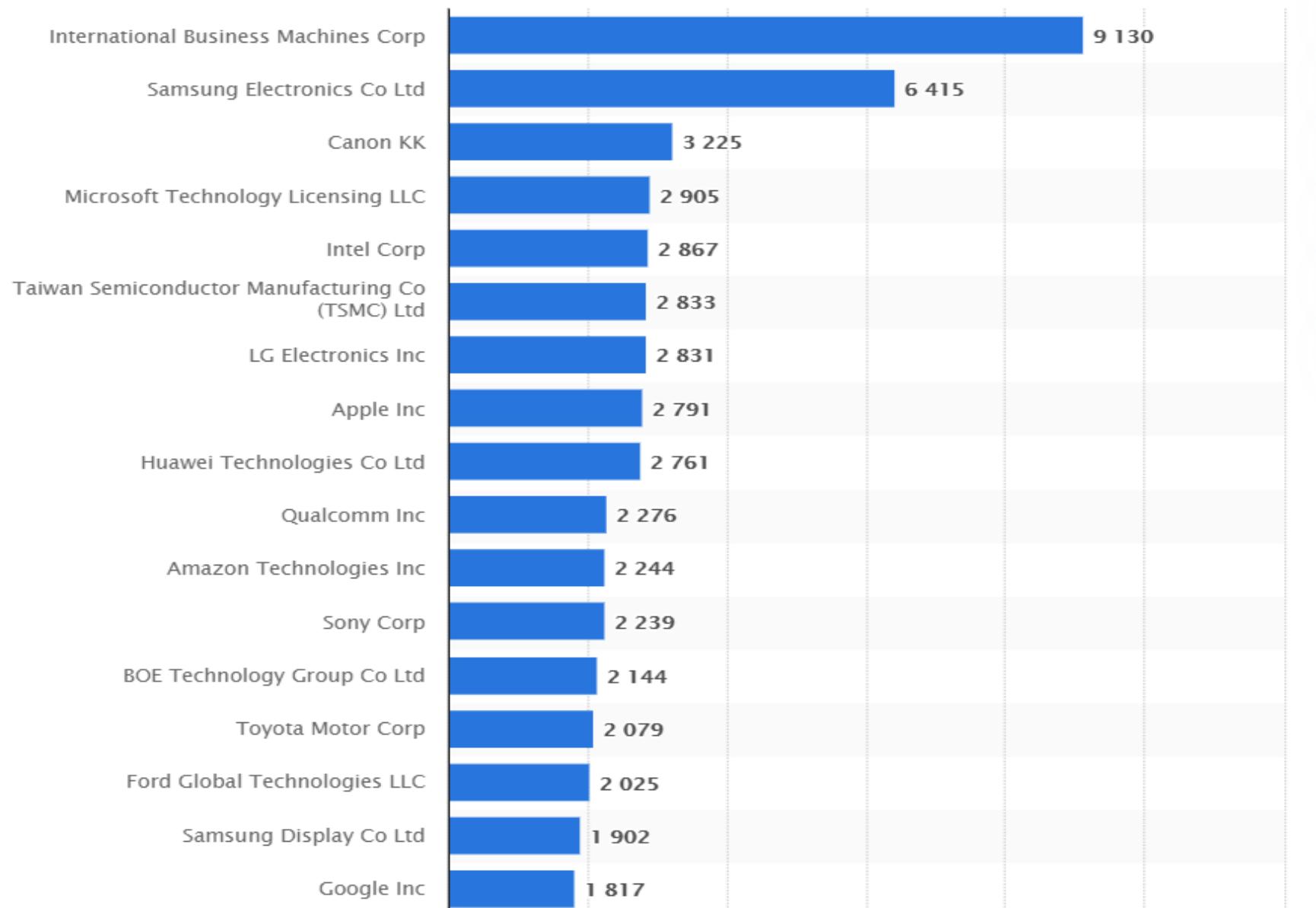
Address:

Date:

Top 10 U.S. Patent Recipients in 2016

Number of U.S. patents granted to the following companies in 2016





Creativity

Nature of Creativity

Creativity is the ability to produce new and useful ideas

Playing with imagination and possibilities – leading to a new and meaningful connections and outcomes

Creativity comes out of imagination by interacting with ideas, people and environment

Creativity is largely independent of age, sex and education

Creativity may be out of proportion of number so more people does not mean more creativity

The Creative Process

Preparation

- Structure the problem, collect information, understand relations and effect, solve sub-problems and explore all possible combinations and solutions

Frustration and Incubation

- Failure to solve analytically leads to frustration and wants to leave it but subconsciously it incubates within

Inspiration or illumination

- Possible solution to a problems occurs spontaneously - Isaac Newton

Verification

- Solutions reveled or found must be verified - intuitions and insights may not always be correct

1. Prepare

Start with a precise problem formulation. Doing this well will pave the way for a successful process. The act of information gathering, benchmarking and inspiration seeking are essential – and make up



2. Incubate

Next you need period when you let your brain relaxes. Step away from the problem and take up a pleasant form of activity - like daydreaming, walking, or meditating

3. Illuminate

The illumination often like a flash, a brilliant idea shoots across the mind. The timing is hard to predict, usually it hits you while you least expect it - after a long day at work, or while having a shower.

4. Verify

The idea needs to be tested to determine its validity - a crucial moment of truth. However, looking at your own ideas with too much scrutiny might dampen the originality - so try to aim for balance here as well.

Brainstorming for Creativity

Brainstorming process

Brainstorming is “organized ideation”

It is a creative conference, ideally of 8 to 12 people

Requires about an hour for generating 50 or more ideas

No discussion during the brainstorming

No criticism is allowed for any idea

Ideas are recorded as stated

Other techniques

Nominal Group Technique

Tear Down approach

- “And also” method – suggesting improvements

Collective Notebook method

Attribute listing approach

Mind mapping – a very powerful and widely used technique by Tony Burzan

Nominal Group Technique Structured Brainstorming

Silent generation

Round robin phase

Clarification

Voting and ranking

Tabulation

Nominal Group Technique

Structured method for group brainstorming that encourages contributions from everyone.

NGT is used when

- Some group members are much more vocal than others.
- Some group members think better in silence.
- When there is concern about some members not participating.
- When the group does not easily generate quantities of ideas.
- When all or some group members are new to the team.
- When the issue is controversial or there is heated conflict.

NGT - Procedure

State the subject of the brainstorming and clarify the statement as needed until everyone understands it.

Each team member silently thinks of and writes down as many ideas as possible in a set period of time (5 to 10 minutes).

Each member in turn states aloud one idea. Facilitator records it on the flipchart.

Continue around the group until all members pass or for an agreed-upon length of time.

Discuss each idea in turn. Wording may be changed only when the idea's originator agrees. Ideas may be stricken from the list only by unanimous agreement. Discussion may clarify meaning, explain logic or analysis, raise and answer questions, or state agreement or disagreement.

Prioritize the ideas using voting or list reduction.

NGT – Rules and Consideration

No discussion is allowed, not even questions for clarification.

Ideas given do not need to be from the team member's written list. Indeed, as time goes on, many ideas will not be.

A member may “pass” his or her turn, and may then add an idea on a subsequent turn.

Discussion should be equally balanced among all ideas. The facilitator should not allow discussion to turn into argument. The primary purpose of the discussion is clarification. It is not to resolve differences of opinion.

Keep all ideas visible. When ideas overflow to additional flipchart pages, post previous pages around the room so all ideas are still visible to everyone.

"Tear-down" Approach

Used by two people.

The first person (person A) must disagree with the existing solution to a problem and suggest another approach;

Next, person B must disagree with both ideas and suggest a third;

Then person A must suggest yet another solution
This "cycle continues until a useful idea clicks."

"And-also" Method

Person A suggests an improvement on the subject under study; person B agrees, but suggests a further improvement; this sequential improvement "continues until a sound solution is reached."

Collective Notebook method

- Each member of a team is given a notebook with a problem statement and supporting material a month in advance.
- Each day during that month, the team member writes one or more ideas in the notebook,
- At the end of the month he/she selects the best idea along with suggestions for further exploration.
- A problem coordinator collects and studies notebooks and prepares a detailed summary for distribution;
 - if necessary, all team members then

Attribute listing approach

- A person lists attributes of an idea or item
- Then concentrates on one attribute at a time to make improvements in the original idea or item.

Forced relation approach

It tries to generate new ideas by creating a "forced relationship" between two or more usually unrelated ideas or items.

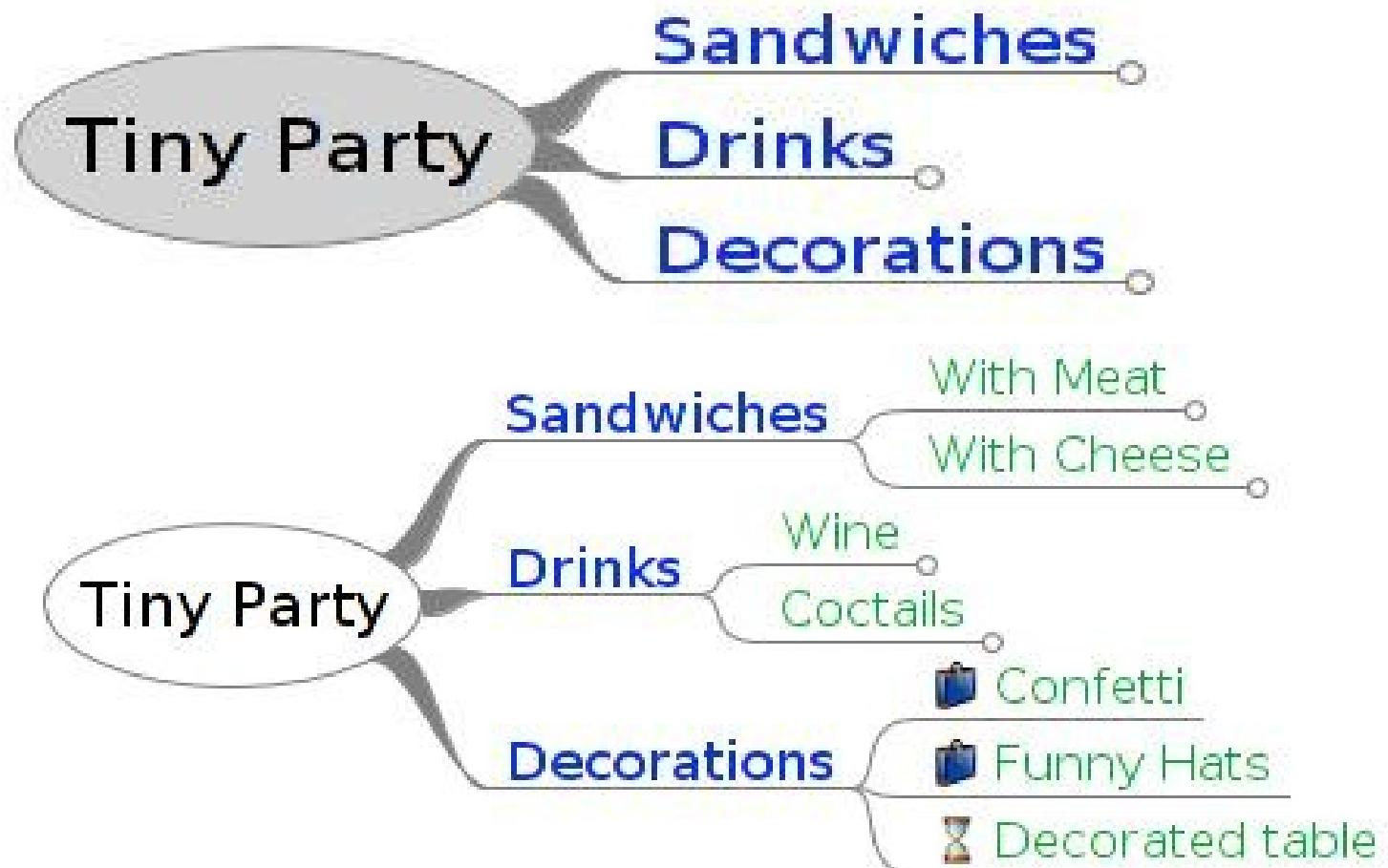
Mind Mapping

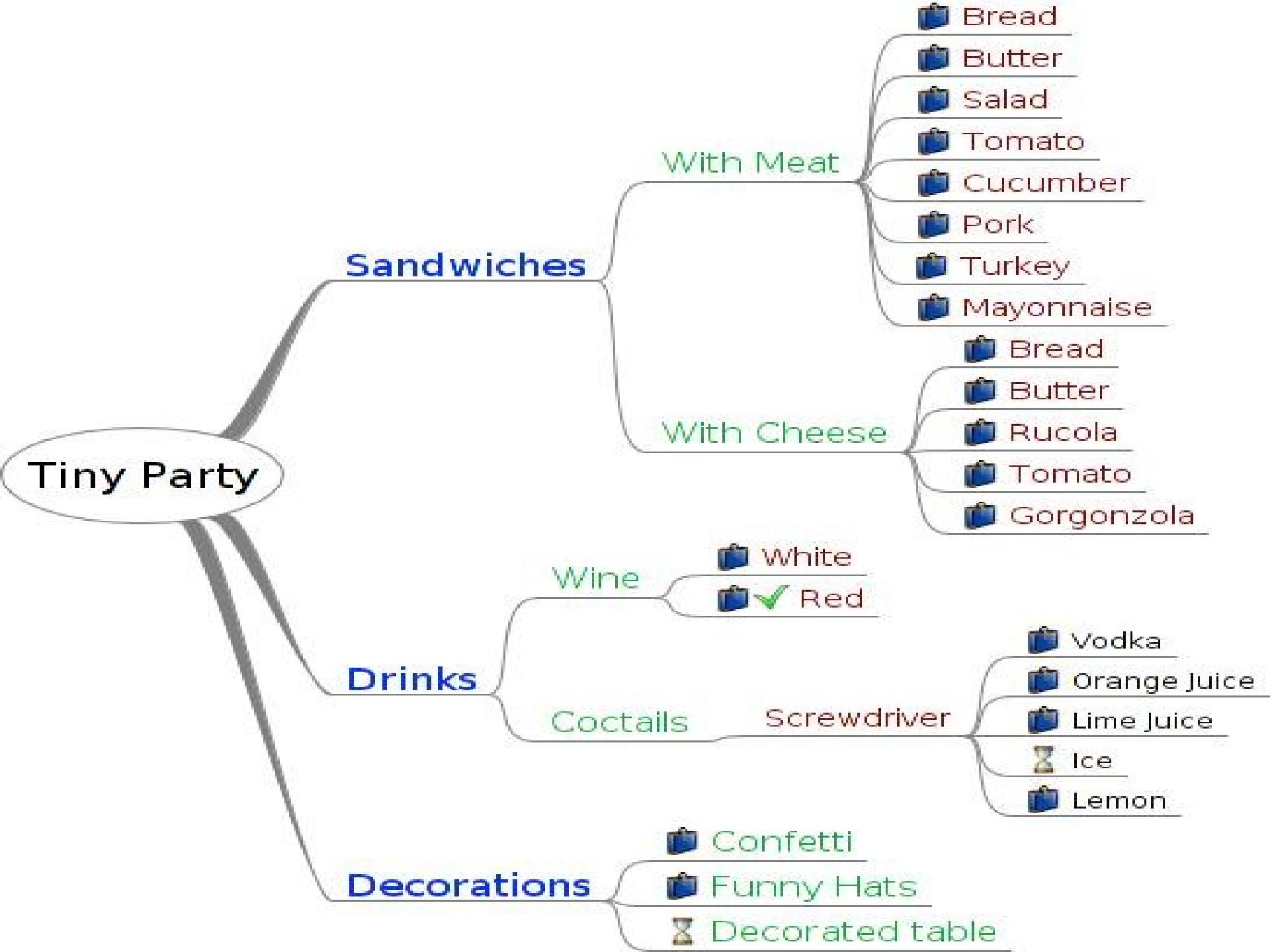
Tony Burzan invented Mind Maps in 1970

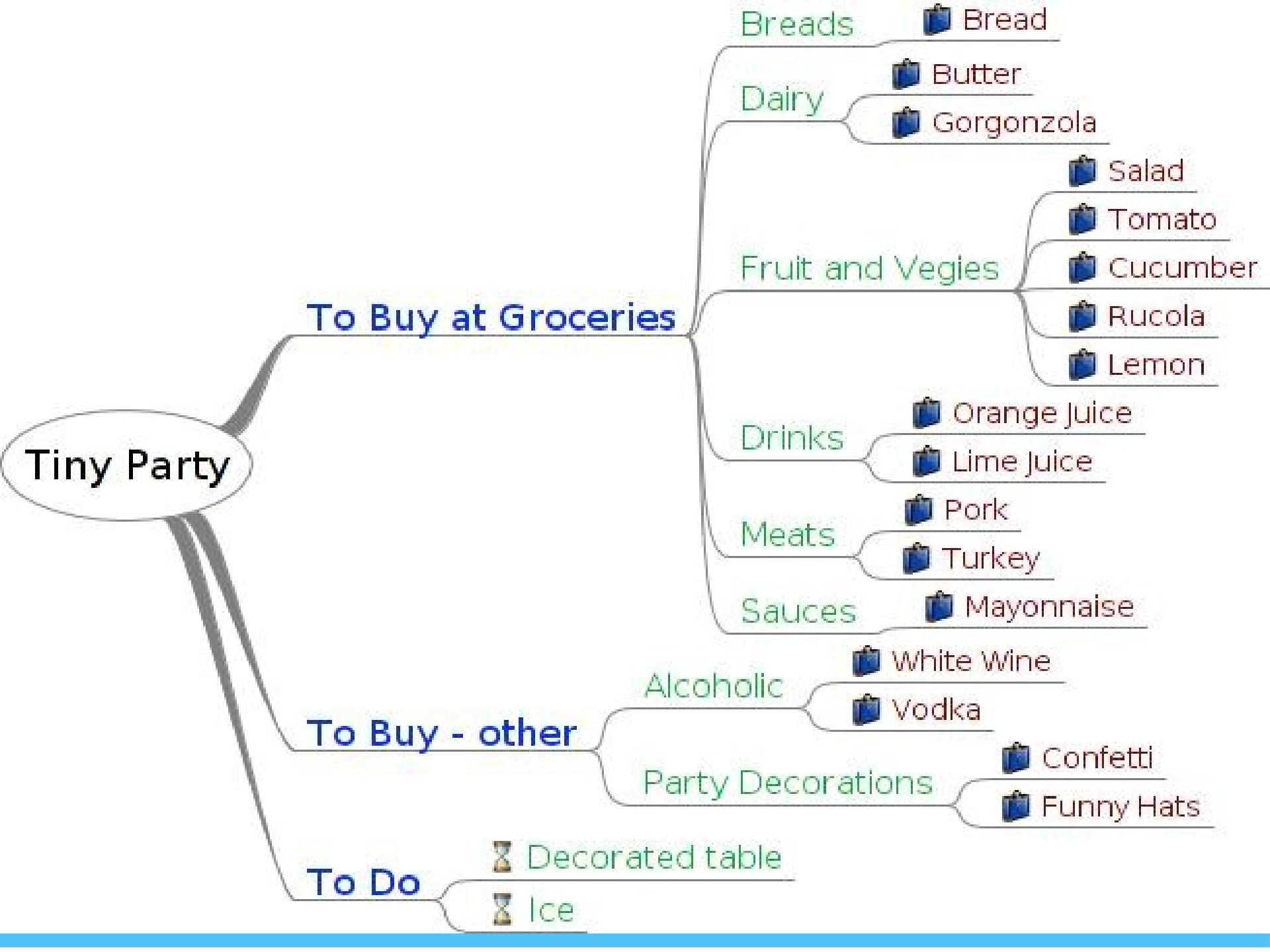
Uses brainstorming, sketching and diagramming

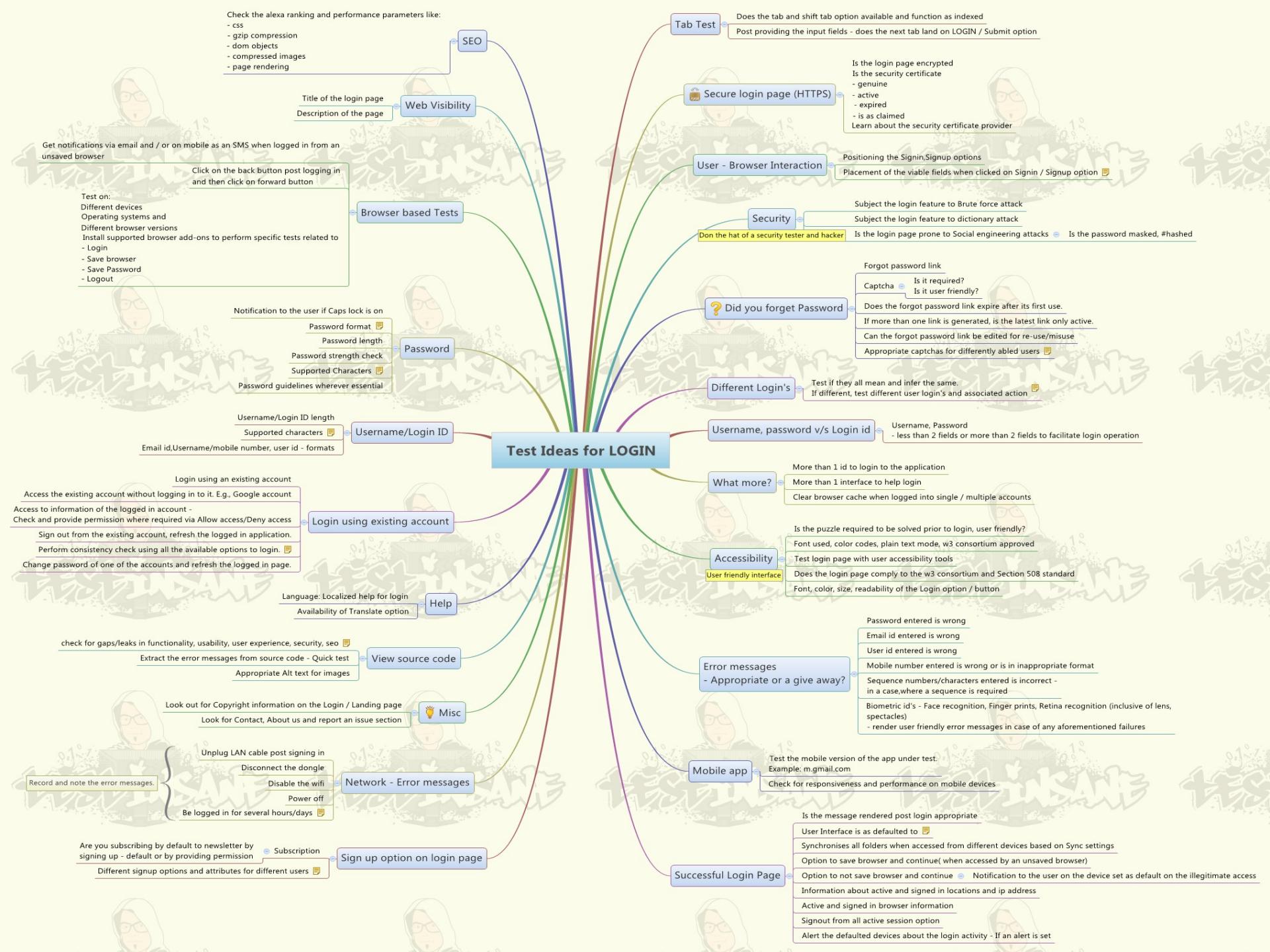
- Start mind-map by writing the main topic in the center
- Think about main factors, ideas, concepts or components directly related
- Concentrate on these headings and main ideas
- Repeat the process for all main ideas
- Organize, analyze - connect the related ideas and concept
- Review, annotate, organize and revise
- Start writing to make it a final product of mindmapping

Mind Mapping: Example









Characteristics of Creative People

Self confidence and independence – emotionally stable

Tend to reduce group pressure and conformity on rules

Curiosity – drive for knowledge on wide range of subjects

Approach to problems – open-minded, uncritical in the early stage

Personal attributes –

- more comfortable with “things” than “people”
- Not “joiners”
- Broad intellectual interest
- Enjoy intellectual games, practical jokes
- More attracted by complexity

Providing a Creative Environment

In our group was a man who was quite an oddball. He didn't like people, phones, or anyone using the computer when he was. To work normal hours unnerved him, so he was allowed to come in anytime he wanted to. Many people would have taken advantage of this, but he worked *longer* [and] more productive hours. Sometimes he would work 5 P.M. until 7 A.M. nonstop. They put a computer in his home and hooked it to the mainframe at work for those sudden brainstorms—the results were great!

Creative people are most effective in an organization that will

- tolerate idiosyncrasies,
- remove as much routine regulation and reporting as feasible,
- provide support personnel and equipment as required, and
- recognize and reward successes.

Creativity and Innovation

Invention (the creative process) only produces ideas.

Ideas are not useful until they are reduced to practice and use, which is the process of innovation.

Kind of people needed for technological innovation

- **Idea Generator** – the creative individual
- **Entrepreneur** – the person who “carries the ball”
- **Gatekeepers** – research staff members who bring information to table
- **Program Managers** – who manages without obstruction
- **Sponsors or champions** – who provides financial and moral support usually in senior management

- Idea Generators
 - Can sift through large quantities of technological and market data to identify 'innovations'
- Gatekeepers & Boundary Spanners
 - Conduits for knowledge from other firms and labs
- Champions (Entrepreneurs, Evangelists)
 - Sell the innovation to the firm
- Sponsors (Coach, Mentor)
 - Senior level manager who provides behind the scenes support, access to resources, and protection from political foes
- Project Managers
 - Planners with discipline; one-stop decision making shop

Technological Gatekeeper may be defined as expert both internal and external communication star having much higher incidence of exposure to the professional literatures, attend more conferences and has more professional affiliation.

Gatekeepers

- (1) are more likely to read the more sophisticated (refereed) journals,
- (2) are in contact with outside specialists, and
- (3) form a network with other gatekeepers.

They often are high technical performers, usually produce more than their share of conference papers and refereed articles, and are likely to be promoted to first- and second-line supervision ahead of their peers.