

How Intelligence feeds Innovation. Merchants of Light of the Elizabethan Renaissance.

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The foundations of the Renaissance in England

At the beginning of the Elizabethan era, England was a poor country. It had 3 times fewer inhabitants than Spain and 5 times fewer than France. It was technologically backward and had barely no standing army². The state debt represented one year of its budget, whereas England's rivals were extremely rich. Portugal controlled the sea routes to Asia and earned huge revenues from the spice trade^{3 4}. Spain controlled the maritime routes to the Americas and imported tons of gold from Peru. Pope Pius V had excommunicated Queen Elizabeth and encouraged plots to assassinate her. England was a pariah state on the periphery of a Catholic Europe.

It was during the reign of Elizabeth I (1558-1603) that were laid the foundations of the Industrial Revolution and of the British Empire. Sir Francis Bacon was a key figure of this renewal:

- As an epistemologist, he was the father of the empirical approach to science. He influenced Descartes⁵ and inspired *the Encyclopédie* of Diderot and d'Alembert⁶. Kant dedicated his *Critique of Pure Reason* to him.
- As a jurist, he inspired the Napoleonic Code⁷ and he is considered the father of modern jurisprudence⁸.
- He influenced Rosicrucians and Freemasons⁹, particularly with light as a symbol of knowledge. He is the inventor of the expression "*Merchants of Light*".
- And he was the first to formalize the Intelligence Cycle¹⁰ and orient it towards scientific and technical innovation.

¹ In Memoriam. I wish to honor here Professor Stevan Dedijer (1911-2004), pioneer of Competitive Intelligence, for his science which he shared with kindness and generosity. It was he who aroused my curiosity for Francis Bacon and for the rainbow portrait of Queen Elizabeth.

² Stephen Budiansky. "Her majesty's spymaster. Elizabeth I, Francis Walsingham and the birth of modern espionage". Plume Books. 2006.

³ Eric H. Ash. "Power, Knowledge and Expertise in Elizabethan England". John Hopkins U. Press. 2005.

⁴ Jerry Brotton. "This orient Isle. Elizabethan England and the Islamic World". Penguin Books. 2017.

⁵ Robert Arnăutu, "Early Modern Philosophy of Technology: Bacon and Descartes". PhD. Thesis, Central European University, Hungary 2013. p. 155.

⁶ "At the head of these illustrious figures must be placed the immortal Chancellor of England, François Bacon ... one would be tempted to regard him as the greatest, most universal, and most eloquent of philosophers". Jean d'Alembert. "Discours préliminaire à l'Encyclopédie". 1751.

⁷ https://en.wikipedia.org/wiki/Francis_Bacon#Influence

⁸ *Ibid.*

⁹ https://en.wikipedia.org/wiki/New_Atlantis

¹⁰ https://en.wikipedia.org/wiki/Intelligence_cycle

Francis Bacon lived several lives. He was a courtier, lawyer, politician, counsellor and minister of Elizabeth I and her successor James I. Then he was also a philosopher, scientific researcher and writer of genius.

Our thesis is that not enough attention has been paid to a third life of Francis Bacon where he practiced, used or observed intelligence. We believe this led him to:

- Focus on the purpose of acquiring knowledge, as opposed to Aristotelian philosophy, for whom ideas are worthwhile on their own.
- Develop his induction method, starting from the facts to arrive at "mental models" useful for decision making.
- Investigate cognitive biases, which cause errors in reasoning and judgment.
- Define a Taylorian approach to the production of knowledge and strategic information in his book *New Atlantis*¹¹.

Thus, to fully understand Francis Bacon's work, we must also consider the intelligence angle.

Intelligence according to Francis Bacon

For the Bacons, intelligence was a family affair, indeed:

- He was the son of Sir Nicholas Bacon, Queen Elizabeth's Keeper of the Seals, a position that signified the Queen's complete trust.
- His uncle was William Cecil, Baron Burghley, the first of Elizabeth I's intelligence chiefs.
- His elder brother, Anthony Bacon, to whom he was very close, was an agent of Sir Francis Walsingham and then Robert Devereux, Earl of Essex, both of whom headed intelligence services¹².

Francis Bacon was exposed at a very young age to the highest decision-makers. At Cambridge University, his personal tutor was John Whitgift, the future Archbishop of Canterbury. Queen Elizabeth herself congratulated Francis on his precociousness and brilliant studies.

Following a very English tradition, his father sent him at the age of 16 to live in Paris with the family of Sir Amias Paulet, the English ambassador to France. There he carried out various diplomatic works and was exposed to the political stakes in Henri III's France. He also carried out some intelligence missions for Sir Walsingham, Baron Burghley, for the Queen herself, and for her favorite Robert Dudley.

The instructions¹³ he was given were not to seek intelligence, but to build mental models¹⁴ of the functioning of the places of power in the foreign countries he visited. *"Lastly, for the Government, your end must not be like an Intelligencer, to spend all your time in fishing after the present News, Humours, Graces, or Disgraces Of Court, which happily may change before you come home; but your better and more constant ground*

¹¹ Francis Bacon. "New Atlantis". 1626.

¹² Oxford Dictionary of National Biography.

¹³ William T. Smedley. "The Mystery of Francis Bacon". Editors Robert Banks & Son. 1912. Chapter XI.

¹⁴ https://en.wikipedia.org/wiki/Mental_model

will be, to know the Consanguinities, Alliances, and Estates of their Princes; Proportion between the Nobility and Magistracy; the Constitutions of their Courts of Justice; the state of the Laws, as well for the making as the execution thereof; How the Sovereignty of the King infuseth itself into all Acts and Ordinances; how many ways they lay Impositions and Taxations, and gather Revenues to the Crown." The result was a monograph, *Notes on the State of Christiendom*.

His brother Anthony Bacon performed field intelligence and shared his information with Francis. Anthony travelled all over Europe and built a valuable network of friends and agents. He became a personal friend of Henri of Navarre, the future King of France Henri IV, the philosopher Michel de Montaigne, the Protestant theologian Theodore Beza, and the Spanish Secretary of State Antonio Perez. The latter later defected to England, bringing with him valuable information and documents¹⁵ ¹⁶. Recruited and managed by Anthony, the spy Standen succeeded in placing an agent in the close entourage of Admiral Santa Cruz commanding the Spanish Armada. The plans of the Armada were read by Walsingham just a few days after King Philip II of Spain had access to them¹⁷!

These aspects of intelligence enriched Francis Bacon's thinking. He expressed them in quotations describing the stages of a modern Intelligence Cycle¹⁸:

- The need for intelligence : *"Knowledge is power", "Intelligence is the light of the state", "The glory of God is to conceal a thing, but the glory of the king is to find it out"*.
- Asking the right questions : *"A prudent question is one-half of wisdom", "Who questions much, shall learn much, and retain much"*.
- Interview techniques : *"Scientiam dissimulando simulavit"* (feigning ignorance), *"Tell a lie and find a truth"*.
- The need for analysis ... and disinformation : *"It is an immense ocean that surrounds the island of Truth"*.

Francis Bacon's texts contain numerous references to intelligence processes. For example, he describes how to do a personality profile¹⁹ : *"to procure good informations of particulars touching persons, their natures, their desires and ends, their customs and fashions, their helps and advantages, and whereby they chiefly stand, so again their weaknesses and disadvantages, and where they lie most open and obnoxious, their friends, factions, dependences; and again their opposites, enviers, competitors, their moods and times, Sola viri molles aditus et tempora noras; their principles, rules, and observations, and the like: and this not only of persons but of actions; what are on foot from time to time, and how they are conducted, favoured, opposed, and how they import, and the like. For the knowledge of present actions is not only material in itself, but without it also the knowledge of persons is very erroneous: for men change with the actions; and whilst they are in pursuit they are one, and when they return to their nature*

¹⁵ Geoffroy d'Aumale et Jean-Pierre Faure. "Guide de l'espionnage et contre-espionnage. Histoire et techniques". Editions Le Cherche Midi, 1998.

¹⁶ Alan Haynes. "The Elizabethan Secret Services". The History Press, 2009.

¹⁷ John Cooper. "The Queen's Agent: Francis Walsingham at the Court of Elizabeth". Faber & Faber. Kindle Edition. p. 268.

¹⁸ https://en.wikipedia.org/wiki/Intelligence_cycle

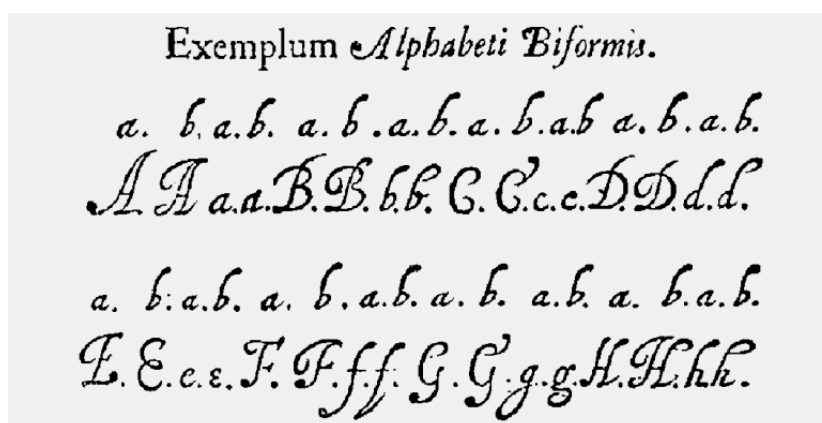
¹⁹ Francis Bacon. "The Advancement of Learning" (Kindle Locations 2982-2991). Kindle Edition.

they are another. These informations of particulars, touching persons and actions, are as the minor propositions in every active syllogism; for no excellency of observations (which are as the major propositions) can suffice to ground a conclusion, if there be error and mistaking in the minors”.

He even orients us to the right sources for getting the information: “As for the knowing of men which is at second hand from reports: men’s weaknesses and faults are best known from their enemies, their virtues and abilities from their friends, their customs and times from their servants, their conceits and opinions from their familiar friends, with whom they discourse most. General fame is light, and the opinions conceived by superiors or equals are deceitful”.

Francis Bacon also distinguishes 3 levels of secrecy: secrecy, concealment and simulation²⁰. He warned us in his *Essays* on concealment because it can damage trust²¹. It was Francis Bacon who invented the term “mole” to designate an undercover intelligence agent²².

In addition, Francis Bacon had a passion for cryptology. He thought it was a legitimate science because it ensures the security of sensitive information for governments ... and also for scientists²³. He invented an original encryption system based on a binary coding of letters of the alphabet, just like today’s computers. The same letter could be written in two very similar but slightly different typographies so as not to attract attention. See for example on the picture below²⁴. Sometimes the typography is so subtle that it takes a magnifying glass to spot the differences. One typography represented a binary “0” and the other a “1”. Francis Bacon is therefore one of the precursors of Morse code for transmissions and the binary coding of computers²⁵!



Francis Bacon. "The works of Francis Bacon". Ed. Baynes and son. 1824. Tome 7, p. 288

²⁰ Francis Bacon. "Of Simulation And Dissimulation" in "The Essays & Counsels, Civil and Moral". 1597.

²¹ *Ibid.*

²² Jean-Paul Brunet. "Le langage du secret, des mots pour (ne pas) le dire" in "Les cahiers de la sécurité intérieure". Editors IHESI 1997. p. 92.

²³ Gerhard Strasser. "The rise of cryptology in the European renaissance". In "The History of Information Security: A Comprehensive Handbook". Elsevier 2007.

²⁴ Gerhard Strasser. Op. cit.

²⁵ <https://www.fbrt.org.uk/bacon/baconian-history/>

Francis Bacon was the first to define the characteristics of a quality cryptographic cypher²⁶. It must: be easy to read and write; be difficult to detect; and not generate suspicion in case the interceptor is looking for a secret message.

A message to the Queen: The Rainbow Portrait

This famous portrait was offered to Queen Elizabeth by Robert Cecil, chief of intelligence, and probably inspired by Francis Bacon²⁷. It contains many symbols and allegories that at the time everyone could understand, even the illiterate. Indeed, Elizabeth was a master communicator and controlled the messages she wanted to convey to her people, her courtiers, and abroad²⁸. Professor Stevan Dedijer wrote a detailed analysis of this portrait²⁹. Here are the key messages:



The Rainbow Portrait of Queen Elizabeth I, attributed to Isaac Oliver, between 1600 and 1602
© Collection of Marquis of Salisbury, Hatfield House, Hertfordshire / Wikimedia Commons

²⁶ Richard Deacon. "John Dee. Scientist, geographer, astrologer & secret agent to Elizabeth I". Editions Frederick Muller 1968. p. 240.

²⁷ Stevan Dedijer. "The Rainbow Scheme. British Secret Service and Pax Britannica". In "Clio goes spying. Eight essays on History of Intelligence". Editors Wilhelm Agnell and Bo Hultdt. Edition University of Lund, Sweden, 1983.

²⁸ Susan Frye. "Elizabeth I, The competition for Representation". Oxford University Press, 1993.

²⁹ Stevan Dedijer. Op. cit.

Symbols of authority:

- Divine authority. "*Non sine sole iris*" (No rainbow without the sun). Elizabeth holds in her hand the rainbow symbolizing divine authority. This refers to the biblical story of God showing the rainbow to Noah after the flood.
- Spiritual authority. The rainbow is an allusion to the colors representing the stages of the alchemists' transmutation: purification, enlightenment and perfection.

Symbols of power and strength:

- The iron gauntlet to the right of her neck represents strength. It indicates that Elizabeth is ready to fight if necessary.
- A cross made of circles. It is a representation of the cosmos, the natural terrain for England's economic expansion. It expresses Elizabeth's expansionist strategy.
- The golden color of the dress symbolizes wealth. It is adorned with pansies, flowers that only bloom in spring and are symbols of renewal.
- The portrait was done when she was 67 years old. On the portrait, she is represented as a young person. It is a symbol of invincibility.

Symbols of information and intelligence:

- Many eyes and ears (allegorical symbols of intelligence) are embroidered on her coat (symbol of protection and prosperity).
- The eyes and ears are numerous and the gauntlet is small. This means that a benefit of intelligence is to minimize the use of force.
- The folds of the coat represent closed mouths (symbol of secrecy). Here we have the graphic expression of Elizabeth's famous motto "*Video Et Taceo*" (I see and I say nothing).
- She is wearing a veil. This means that she can see without being seen.
- The veil is adorned with pearls, symbol of purity. It means that she exercises her surveillance with pure intentions. Elizabeth famously said "*I have no desire to make windows into men's souls*".
- An egret on the head is a symbol of vigilance.
- The large snake on her left sleeve is Lucifer's symbol of practical intelligence. The serpent is coiled upon itself, a symbol of complexity.
- No matter from which angle you look at the painting, we get the impression that the queen is looking at us (impression of omniscience).

This portrait expresses in a single image a set of concepts that it takes a page to enumerate. What strength and conciseness in this beautiful communication! It is not that often that decision-makers display so forcefully their interest in intelligence.

Intelligence inspired Francis Bacon's Philosophy of Science

Francis Bacon has argued on many occasions that knowledge must have practical applications, and that it must be oriented towards the common good. We believe that this attitude is the consequence of the first three stages of his life:

1. He underwent a medieval and scholastic education during his student years at Cambridge University. The academic curriculum was the study of Aristotle's

texts, dialectics, grammar and rhetoric. Debates (disputations) started with sophisms and concluded in demonstrations of truths (Aristotle's propositions) thanks to a series of syllogisms³⁰. Francis Bacon's criticism was fierce. First, for Aristotle, ideas took precedence over the observation of facts. Aristotle, for example, argued that women have fewer teeth than men. "*He married twice, but it never occurred to him to open his wives' mouths and count their teeth*"³¹! Second, these debates had no practical interest³². Francis Bacon had such passion for experimental verification that he died of pneumonia while conducting a chicken freezing experiment³³!

2. His practical experience of intelligence. The core of intelligence is answering questions from decision-makers, based on the observation of facts, analyzing while avoiding cognitive bias and proposing recommendations for action.
3. His legal experience as a lawyer and prosecutor: starting from facts and building evidence through reasoning. See for example his report on the betrayal of Dr. Roderigo Lopez³⁴. We believe that this experience had the least impact since Francis Bacon did very few pleadings and was mainly interested in the theoretical aspects of Law³⁵.

In his book *Novum Organum*³⁶ Francis Bacon presents his new method of scientific analysis. The intelligence professionals can only observe that this is how we transform raw information into intelligence. Here are the main elements:

- Start by observing nature. Bacon recommends also observing people and their productions, especially the humble craftsmen.
- Reason by induction. Well-observed facts must be organized in presence and absence tables³⁷. It is a method similar to the analysis of competing hypotheses invented by CIA analysts³⁸. Both Francis Bacon's method and that of the CIA aim to reduce cognitive biases (see below).
- Experiment. Go from prediction to observation. In science, experimentation confirms or disproves theory. In business, *Plan-Do-Check-Act*³⁹ processes are used. In intelligence, the *Intelligence Cycle*⁴⁰ involves the implementation of recommendations by decision-makers, sometimes going as far as disinformation or influence.

³⁰ Daniel Boorstin. "The Seekers" (Knowledge Series). Knopf Doubleday Publishing Group. Kindle Edition. p.176.

³¹ Bertrand Russell. "The impact of Science on Society". Editions Routledge, 2016.

³² "*Instead of a fruitful womb for the use and benefit of man's life, they end in monstrous altercations and barking questions*". Francis Bacon. "The Advancement of Learning". Kindle Edition. Location 458.

³³ https://en.wikipedia.org/wiki/Francis_Bacon#Death

³⁴ Francis Bacon. "A True Report of the Detestable Treason intended by Dr Roderigo Lopez". 1594.

³⁵ James Spedding. "The Life and Letters of Francis Bacon". 1858.

³⁶ Francis Bacon. "Novum Organum, sive Indicia Vera de Interpretatione Naturae". 1620.

³⁷ "*In an example he gives on the examination of the nature of heat, Bacon creates two tables, the first of which he names "Table of Essence and Presence", enumerating the many various circumstances under which we find heat. In the other table, labelled "Table of Deviation, or of Absence in Proximity".* https://en.wikipedia.org/wiki/History_of_scientific_method#Francis_Bacon's_eliminator_induction

³⁸ https://en.wikipedia.org/wiki/Analysis_of_competing_hypotheses

³⁹ <https://en.wikipedia.org/wiki/PDCA>

⁴⁰ https://en.wikipedia.org/wiki/Intelligence_cycle

Francis Bacon was one of the precursors of the analysis of cognitive biases⁴¹, which has taken off remarkably in recent years. He calls them *idols* because they distort judgement, and he identifies 4 kinds of them:

1. *Idols of the tribe* that are specific to humanity, for example being excessively influenced by very rare events that are not representative.
2. The *idols of the den* that are specific to the individual. For example, some focus on the differences between things while others focus on what is common.
3. The *idols of the market* (the forum) which are specific to the misuse of language. These are communication errors.
4. The *idols of the theater*, which stem from dogmas of thought or prejudices.

For example, the ambassador of King Philip II of Spain in London, Bernardino de Mendoza, was so aggressive that he attempted to have Queen Elizabeth assassinated during the Throckmorton plot⁴². He was only interested in negative information about England⁴³, with the result that English forces were seriously underestimated. This is an example of the cognitive confirmation bias⁴⁴. Francis Bacon could have said that Mendoza was a victim of the idol of the den or the theatre!

The New Atlantis: intelligence at the heart of R&D and innovation

The *New Atlantis*⁴⁵ is a utopian novel by Francis Bacon. Written in 1624 but published after his death, it is a kind of testament, a synthesis of his ideas on innovation and intelligence. It describes an island governed by an organization called the House of Solomon. This society is focuses on scientific research and development. However, it is also a center for intelligence and espionage^{46 47}.

This book had a considerable impact and was the inspiration for the creation of the Royal Society⁴⁸, the most prestigious scientific institution in the world, but also a formidable center of scientific and technological intelligence.

For the intelligence analyst, here are the key concepts:

- Intelligence is more important than money or trade, because it is the basis for growth⁴⁹!
- Information is a raw material that needs to be processed in order to derive maximum practical added value.

⁴¹ https://en.wikipedia.org/wiki/Cognitive_bias

⁴² Carlos Carnicer & Javier Marcos. "Espias de Felipe II". La Esfera de los Libros. 2005.

⁴³ Charles River Editors. "Spies in Tudor England: The History and Legacy of English Spy Networks during the Tudor Period". Charles River Editors. Kindle Edition. 2017. Kindle Location 713.

⁴⁴ https://en.wikipedia.org/wiki/Confirmation_bias

⁴⁵ Francis Bacon. "New Atlantis". 1626.

⁴⁶ "to bring them news and intelligence of other countries.". Francis Bacon. "New Atlantis". Kindle Edition. 1626. Kindle Location 216.

⁴⁷ Stevan Dedijer. Op. cit.

⁴⁸ https://en.wikipedia.org/wiki/Royal_Society

⁴⁹ "We maintain a trade not for gold, silver, or jewels; nor for silks; nor for spices; nor any other commodity of matter; but only for God's first creature, which was Light: to have light (I say) of the growth of all parts of the world.". Francis Bacon. "New Atlantis". Kindle Edition. Location 317.

- The information processing is clearly defined, in an almost Taylorian way. It is comparable to an industrial process.
- The intelligence activity is integrated into the R&D and innovation processes.
- Its specialists constitute the nobility of the island.

The specialists involved in information processing are described as follows:

- *Merchants of light* are spies, sent abroad, under false nationalities, to bring back information, books and instruments. Today, they would be agents who collect information in the field.
- *Depredators* filter the information in books. Today we would use the term Open Source Intelligence⁵⁰.
- *Mystery-men* seek to unveil technical secrets. Today they would be called specialists in reverse-engineering⁵¹.
- *Compilers* organize and structure knowledge. Today they would be called Knowledge Management specialists⁵².
- *Lamps* that suggest new experiences.
- *Pioneers* try out the new experiences suggested by the lamps. Today we would call them inventors.
- *Inoculators* try to implement the new experiences and progress from invention to innovation.
- *Benefactors or dowry-men* seek to apply knowledge for the common good.
- *Interpreters of Nature* generalize the work of others.

An astute Russian researcher, Maxim Tsepkov⁵³, had the brilliant idea of describing the information processing process with process mapping software. It's breathtaking! See the diagram on the next page.

The audacity of Francis Bacon's thinking is incredible. For example, he describes a research center on disinformation, based on the illusion of the senses: *"We have also houses of deceits of the senses; where we represent all manner of feats of juggling, false apparitions, impostures, and illusions; and their fallacies. And surely you will easily believe that we that have so many things truly natural which induce admiration, could in a world of particulars deceive the senses, if we would disguise those things and labour to make them seem more miraculous"*⁵⁴. This disinformation can be based on:

- Images: *" We have (...) perspective-houses, where we make demonstration of all lights and radiations, and of all colours (...) Also all colourations of light, all delusions and deceits of the sight, in figures, magnitudes, motions, colours, all demonstrations of shadows (...) We procure means of seeing objects afar off, as in the heavens, and remote places; and represent things near as afar off, and things afar off as near, making feigned distances. (...) We make artificial rainbows, halos, and circles about light ».*

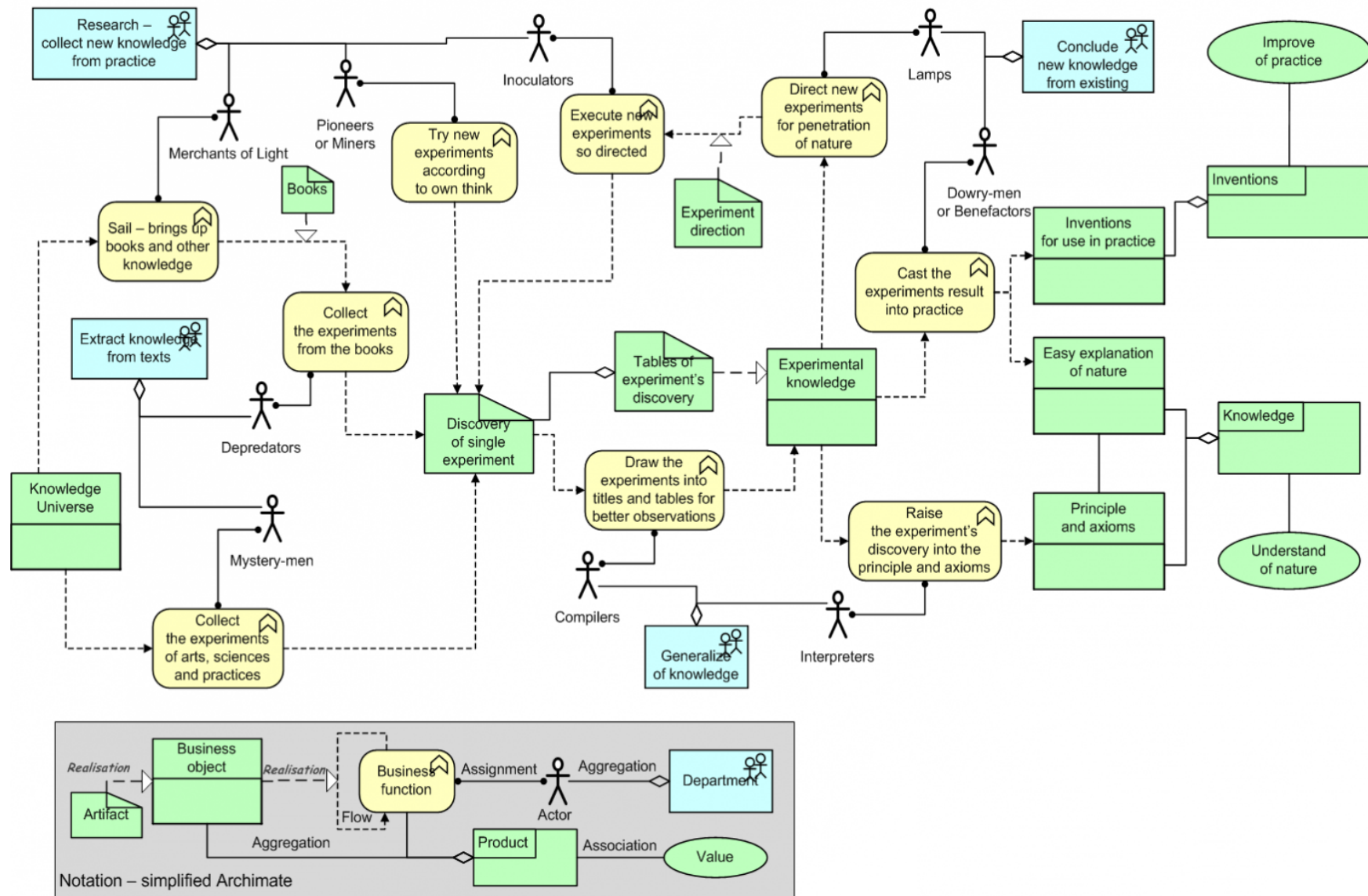
⁵⁰ David Steele. "Open Source Intelligence. Books LLC 2010.

⁵¹ https://en.wikipedia.org/wiki/Reverse_engineering

⁵² https://en.wikipedia.org/wiki/Knowledge_management

⁵³ https://mtsepkov.org/Specialization_of_scientists_by_Francis_Bacon

⁵⁴ Francis Bacon. "New Atlantis". 1620 Kindle Edition. Kindle location 550.



Maxim Tsepkov. Process of knowledge elaboration in Francis Bacon's New Atlantis.

- Sounds: " *We have (...) soundhouses, where we practise and demonstrate all sounds and their generation (...) We have also divers strange and artificial echoes reflecting the voice many times, and as it were tossing it; and some that give back the voice louder than it came, some shriller, and some deeper. Yea some rendering the voice differing in the letters or articulate sound from that they receive* ".
- Smell and taste: " *We have also perfume houses, wherewith we join also practices of taste (...) we imitate smells, making all smells to breathe out of other mixtures than those that give them. We make divers imitations of taste likewise, so that they will deceive any man's taste* ».

We can't help but think of image and video processing software, based on artificial intelligence that allows you to create a movie where you can see a US president saying silly things that he has never actually said ⁵⁵.

The Royal Society: a scientific intelligence center

Francis Bacon's influence was so strong that 32 years after his death, some scientists got together and created the Royal Society⁵⁶ inspired by the principles of *New Atlantis*⁵⁷. The Royal Society is probably the most prestigious learned society in the world. Being a *Fellow of the Royal Society* opens almost as many doors as being a Nobel Prize winner. It is hard to resist the vanity of joining such giants of science as Newton, Darwin and Einstein. And the relational network is very powerful!

One of the first missions of the Royal Society was to master the technology of marine chronometers. Indeed, the precise measurement of time was essential for the calculation of longitude. Without longitude measurement, there can be no long-distance navigation and no mastery of the oceans. Unable to estimate their longitude, whalers, merchant ships, warships and pirate ships clustered along busy routes at constant latitude. Thus in 1592 the English pirate Sir Walter Raleigh was able to ambush La Madre de Deus, a huge Portuguese galleon returning from India⁵⁸.

The Royal Society financed the sending of students to foreign universities, as well as scientific expeditions, such as Cook's expedition to the Pacific⁵⁹. The Dutch mathematician and astronomer Christiaan Huygens invented the spiral spring, which was far more reliable than the pendulum for marine chronometers. Although a foreigner, he was a member of the English Royal Society and chose to bequeath all of his research reports to it when he died⁶⁰.

⁵⁵ "Fake Obama created using AI tools to make phoney speeches", BBC News. 17 juillet 2017.

⁵⁶ https://en.wikipedia.org/wiki/Royal_Society

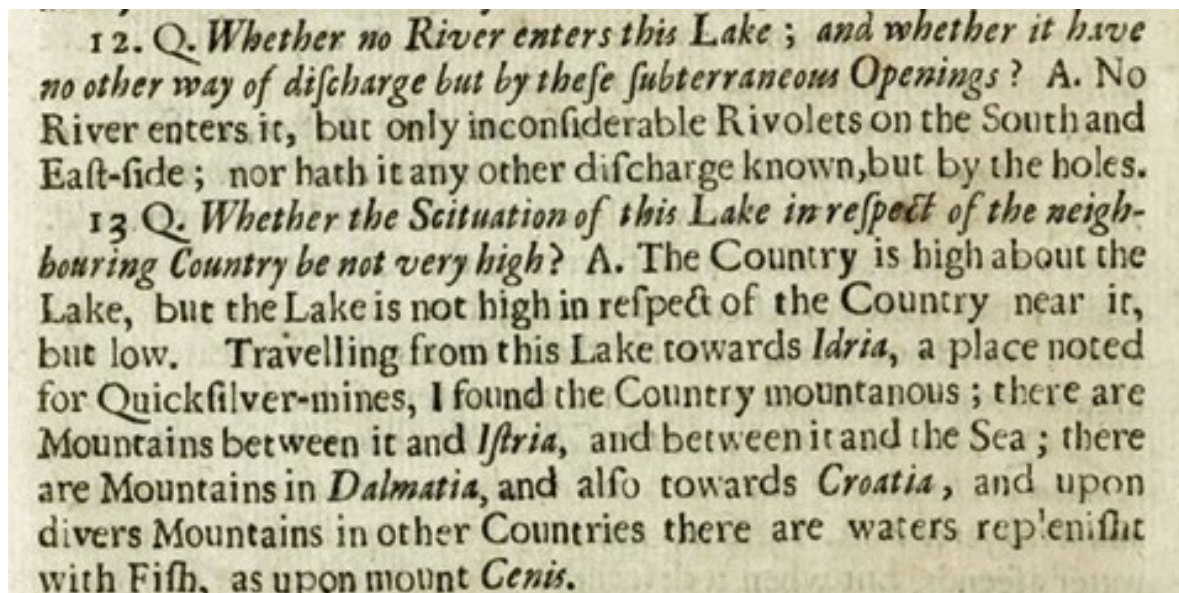
⁵⁷ "*Salomon's House was no romantic figment. It became real in England when royal charters were issued (1662-63) for the Royal Society*". Daniel Boorstin. *The Seekers (Knowledge Series)*. Knopf Doubleday Publishing Group. Kindle Edition. p. 179

⁵⁸ Sobel, Dava. *Longitude*. HarperCollins Publishers. Kindle Edition. p. 15.

⁵⁹ Michael R. Matthews. "Perfecting Mechanical Timekeeping and Solving the Longitude Problem". In *Innovations in Science Education and Technology book series* (ISET, volume 8). Ed. Springer 2000.

⁶⁰ https://en.wikipedia.org/wiki/Christiaan_Huygens

Like Francis Bacon's *New Atlantis*, the Royal Society is an R&D center with intelligence at the heart of its origins. One of its founders, Sir Robert Moray, was a Scottish spy in the pay of the French minister the Duke of Richelieu⁶¹! Intelligence is also at the heart of its processes. Thus, the *Queries* published in their journal *Philosophical Transactions* are an iterative Question/Answer process that is the very core of the intelligence cycle. The figure below is an example:



Philosophical Transactions of the Royal Society of London.
Editor The Royal Society, 1st January 1674

Information management was surprisingly modern. Information sharing was encouraged in order to maximize information collection. King Charles II in the second charter of the Royal Society granted it "full power and authority ... to enjoy mutual intelligence and affairs with all and all manner of strangers and foreigners, whether private or collegiate, corporate or politic, without any molestation, interruption, or disturbance whatsoever⁶²".

On the other hand, when the information had great value, then secrecy was imposed. For example, in 1671, Isaac Newton presented his reflecting telescope, which stunned the audience. In addition to avoiding chromatic aberration, the device obtained a better magnification, even though it was much smaller in size. The Royal Society's greatest concern was preventing foreigners from copying this telescope⁶³.

Conclusion

Have we fallen backward since the Elizabethan era? Elizabethan intelligence systems are 4 centuries old, but can still inspire us today. When we consider today's corporate or state intelligence systems, we cannot help but feel like inviting Francis Bacon to perform consulting and bring inspiration to our leaders! And what a

⁶¹ Robert Lomas. "The Invisible College". The Royal Society, Freemasonry and the birth of Modern Science". Headline Book Pub Ltd. 2002. p.138

⁶² Second Charter of the Royal Society 1663. <https://royalsociety.org/>

⁶³ https://fr.wikipedia.org/wiki/Isaac_Newton#Optique

beautiful way to inspire and motivate information seekers, scientists or intelligencers, by naming them Merchants of Light!

The key learning from Francis Bacon that we seem to have forgotten is that intelligence helps minimize the use of force. Thanks to intelligence, Queen Elizabeth I could transform a weak country with limited resources into an empire. The Chinese strategist Sun Tzu expressed this concept as *“One good spy is worth 10 000 soldiers”*. Today we would say that the Return On Investment of intelligence is over 10 000 to 1!