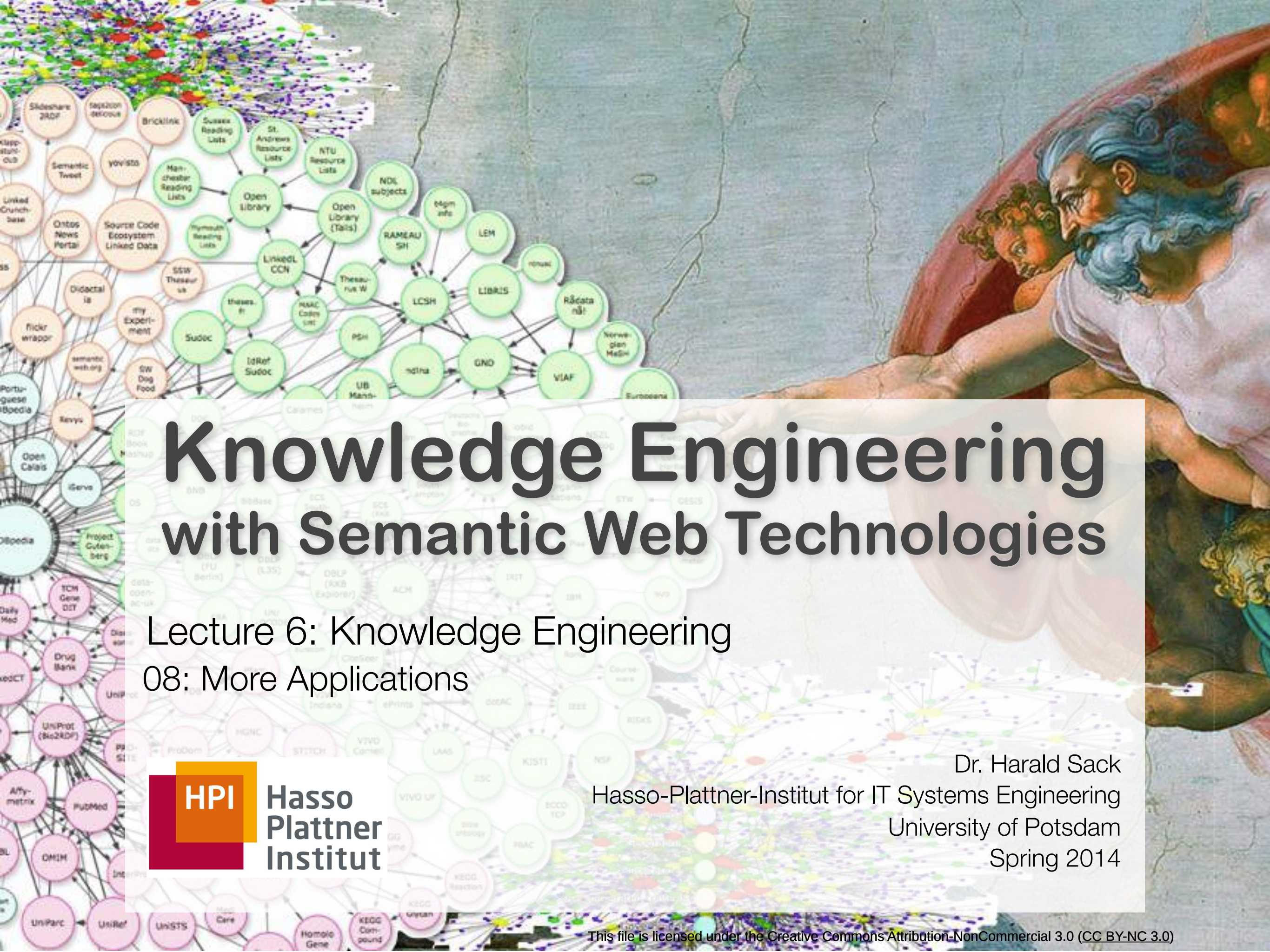




Knowledge Engineering with Semantic Web Technologies

Lecture 6: Knowledge Engineering
08: More Applications



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Spring 2014



Lecture 6: Knowledge Engineering

Open HPI Course: Knowledge Engineering with Semantic Web Technologies



08 - More Applications

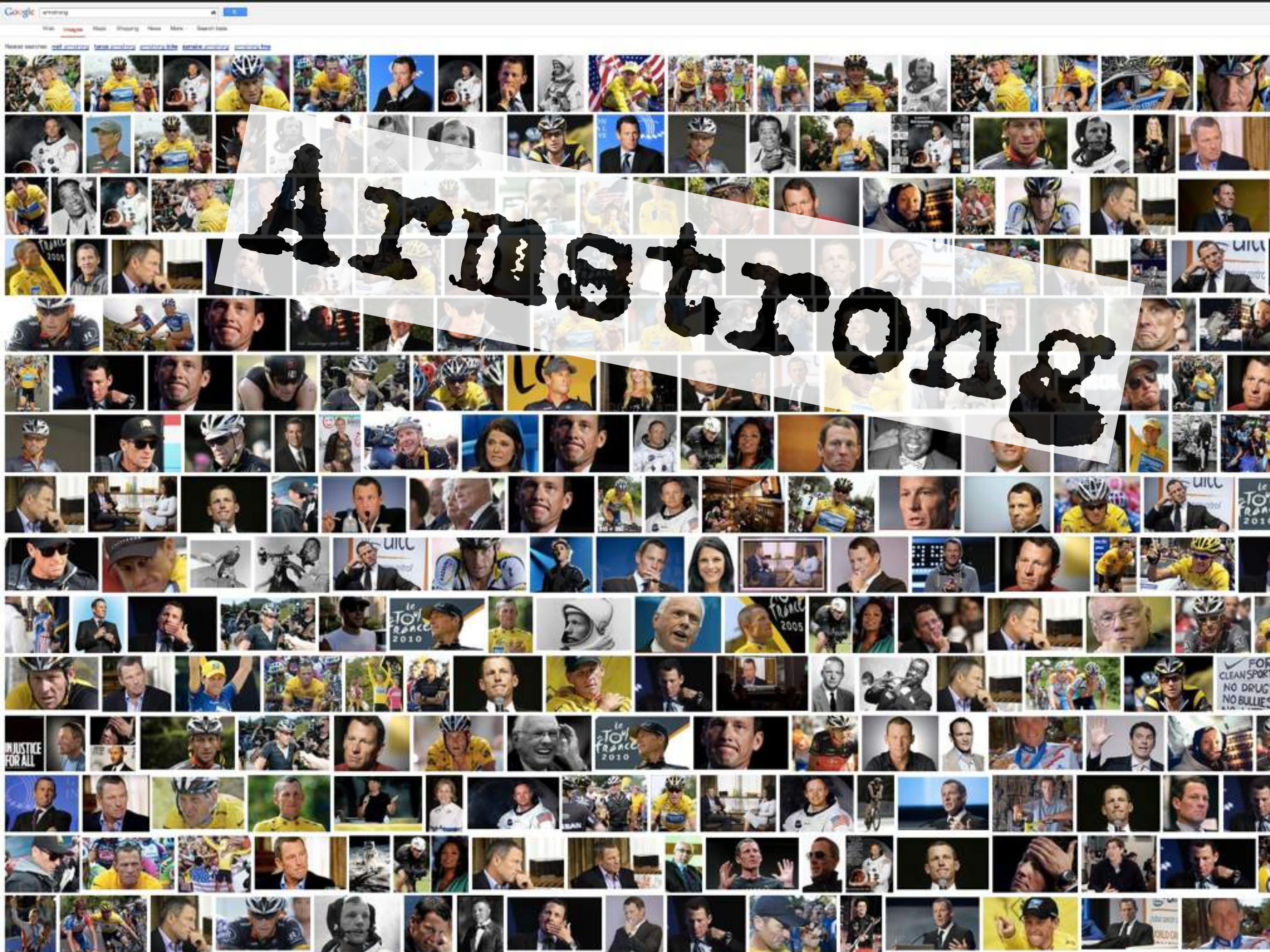
Open HPI - Course: Knowledge Engineering with Semantic Web Technologies
Lecture 6: Knowledge Engineering

How do we determine the semantics of a word?



"Now! *That* should clear up
a few things around here!"

Armstrong



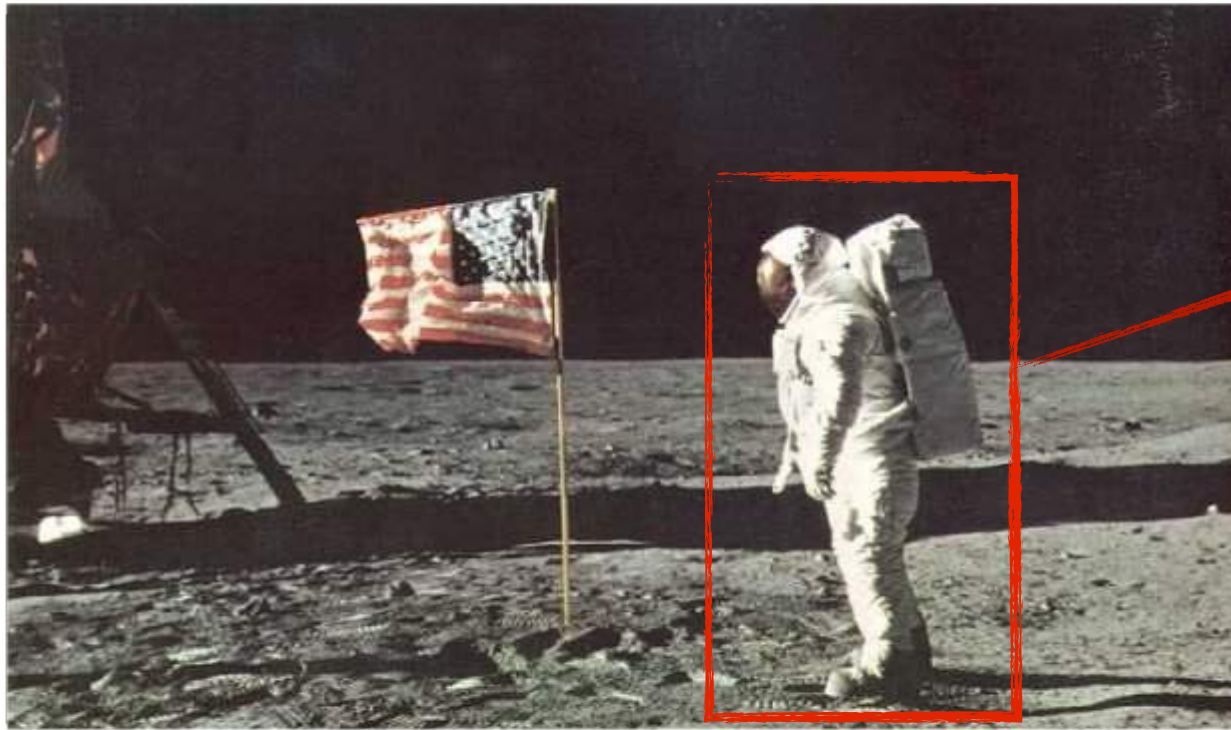
About: Neil Armstrong

An Entity of Type : NASA, from Named Graph : <http://dbpedia.org>, within Data Space : dbpedia.org

Neil Alden
Mensch der

Property
dbpedia-ov

dbpedia-ov



Neil Armstrong

mit Buzz Aldrin und Michael Collins zum Mond flog. Am 21. Juli 1969 betrat er als erster

Er war Kommandant von Apollo 11, die mit Buzz Aldrin und Michael Collins zum

American astronaut and the first person to walk on the Moon. He was also an aerospace becoming an astronaut, Armstrong was an officer in the U.S. Navy and served in the Korean ersity and served as a test pilot at the National Advisory Committee for Aeronautics High- enter, where he logged over 900 flights. He later completed graduate studies at the University pace Soonest and X-20 Dyna-Soar human spaceflight programs, Armstrong joined the NASA d pilot of Gemini 8, in 1966, becoming NASA's first civilian astronaut to fly in space. On this David Scott. Armstrong's second and last spaceflight was as mission commander of the nd Buzz Aldrin descended to the lunar surface and spent two and a half hours exploring, iple. Along with Collins and Aldrin, Armstrong was awarded the Presidential Medal of rter presented Armst e Medal of Hon Armstrong died in C 2012, at the ag

Astronaut

Person

humano en pisar la l en la misión Apo

et mort le 25 août 2012 à Columbus, est un astronaute américain, pilote d'essai, aviateur de

United States Navy et professeur. C'est le premier homme à avoir posé le pied sur la Lune le 21 juillet 1969 UTC, durant la mission Apollo 11. Armstrong

obtient une licence en aéronautique à l'Université Purdue. Ses études sont momentanément interrompues en 1950 par son service militaire dans la marine de

gr États-Unis. Il y suit une formation de pilote d'avion à réaction. Basé sur le porte-avions USS Essex, il participe à la guerre de Corée et réalise 78

F9F Panther. Après avoir obtenu son diplôme, il intègre, en 1955, le NACA, organisme de recherche aéronautique ancêtre de la

au point des bombardiers et des chasseurs ; il pilote également les avions-fusées

En 1962, il rentre dans le corps des astronautes de l'agence spatiale américaine, la NASA.

ini 8 et réalise le premier amarrage de deux engins spatiaux. Il est sélectionné comme

Le 20 avec son copilote Buzz Aldrin, tre corps céleste.

ronat aine aérospatial et sert de on de la mission Apollo 13

States Navy e partecipò alla Guerra di Corea. Dopo la guerra, conseguì una laurea di primo

presso il National Advisory Committee for Aeronautics, dove effettuò più di 900 voli.

ifornia. Partecipante ai programmi Man in Space e Mercury della U.S. Air Force, con il quale gli

ronti dei sovietici, e del Boeing X-20 Dyna-Soar, per lo sviluppo di uno spaziplano,

suo primo volo spaziale fu in qualità di comandante nella missione Gemini 8: uno dei primi

il pilota David Scott effettuarono il primo aggancio fra due navi spaziali in orbita. La sua

del 1969, dell'Apollo 11, che realizzò il primo allunaggio con uomini a bordo del Programma

esidenziale di ezza, mentre il terzo membro

del Congresso, nel 2003. È morto il 25 agosto 2012 a Cincinnati, all'età di 82 anni, a causa

ass. Come da suo desiderio, con una cerimonia privata, le sue ceneri sono state sparse

年8月5日 - 2012年8月25日) は、アメリカ合衆国の海軍飛行士、テスト・パイロット、宇

勲章を受賞。

eerste mens voet op de Maan zette. Hij was tevens gevechtspiloot, testpiloot,

11. Pierwszy człowiek, który stanął na Księżycu. Jest autorem słynnego zdania „To jest

estes e aviador naval que escreveu seu nome na história do século XX e da

te da missão Apollo 11, em 20 de julho de 1969. Antes de se tornar astronauta,

e serviu na Estação de Voo do Comitê Consultivo Nacional para a Aeronáutica (NACA) de alta velocidade, onde acumulou mais de 900 voos em uma

variedade de aeronaves. Entrou para a NASA em 1962, integrando o segundo grupo de astronautas da agência espacial, indo ao espaço pela primeira vez em

1965, como comandante da missão Gemini VIII, três anos antes do voo que o colocaria na História. Condecorado com a Medalha Presidencial da Liberdade, a

Named Entity Recognition

„locating and classifying atomic elements...into predefined categories such as **names, persons, organizations, locations, expressions of time, quantities, monetary values**, etc.“

C.J.Rijsbergen, Information Retrieval (1979)

Entity Resolution

„...**identifying** and linking/grouping **different manifestations of the same real world object**“
also Disambiguation, Record Linkage, Object Identification, etc

subClassOf

Science Occupation

subClassOf

Employment

Named Entity Resolution

Named Entity Recognition

<http://dbpedia.org/ontology/Person>

Class

8
„Armstrong was the first man on the Moon.“

Text

Named Entity Resolution

http://dbpedia.org/resource/Neil_Armstrong

Individual

How do I find the right entity?

Meaning

Hasso



sender

receiver

Experience

Concept

symbolizes

refers to



<http://commons.wikimedia.org/wiki/User:McSmit>

Experience

Symbol

stands for

Object

Armstrong



Pragmatics

Armstrong landed the Eagle on the Moon.

→ **Determine all possible Entity Mapping Candidates**

- linguistic analysis (POS tagging)
- normalization
- encoding and spelling
- special (language dependent) characters
- language dependent spellings
- abbreviations, acronyms
- type dependent spellings
- alternative names and synonyms
- fuzzy string mapping
- ...



Armstrong landed the Eagle on the Moon.

Determine all possible Entity Mapping Candidates



Anton Armstrong
Armstrong, Ontario
Armstrong, Ontario
Armstrong, Florida
Armstrong County, Texas
Armstrong Tunnel
Louis Armstrong
Lance Armstrong
Armstrong Tools
Armstrong (car)
Armstrong (moon crater)
The Armstrongs
Craig Armstrong
The Armstrong Twins
Ian Armstrong
Edward Armstrong
Neil Armstrong
Gary Armstrong
George Armstrong
Armstrong Bridge

+ 400 more...

Semantic Analysis

Named Entity Resolution

Consider all entities within the same context

„*Armstrong* landed the *Eagle* on the *Moon*.“

Armstrong

448 entities

- George Armstrong Custer
- Neil Armstrong
- The Armstrong Twins
- Armstrong, Florida
- Craig Armstrong
- Armstrong, Ontario
- Armstrong (Moon Crater)
- Armstrong Gun
- Armstrong's Theorem
- Louis Armstrong International Airport
- Armstrong County, Texas
- Joe Armstrong
- Ian Armstrong
- Armstrong Tunnel
- Armstrong Automobile
- Sir Thomas Armstrong
- Louis Armstrong
- Armstrong (British Columbia)
- Karen Armstrong
- Curtis Armstrong
- Hilary Armstrong
- Gillian Armstrong
- William L. Armstrong

Eagle

95 entities

- Eagle (Bird)
- Eagle (heraldry)
- USCGC Eagle
- The Eagle (2011 film)
- Eagle (comic)
- Eagle (song)
- Eagle (lunar module)
- The Eagle (newspaper)
- War Eagle
- Eagle (Moon Crater)
- The Eagle (Pub)
- Eagle TV
- Eagle Falls (Washington)
- Eagle (racehorse)
- Armstrong Tunnel
- John H. Eagle
- Eagle (typeface)
- Linda Eagle
- Angela Eagle
- James Philipp Eagle

Moon

156 entities

- Man on the Moon (film)
- Moon (song)
- Moon Son-Ri
- C Moon
- Moon 44
- The Moon (Tarot card)
- Man on the Moon (soundtrack)
- Man on the Moon (musical)
- Mr. Moon (song)
- Moon (Band)
- Moon OS
- Moon 83
- Lottie Moon
- Edgar Moon
- Darvin Moon
- Gary Moon
- William Moon
- Francis Moon
- Robert Charles Moon
- Allan Moon
- Fly me to the Moon (song)
- Black Moon
- Ban-Ki Moon

Select matching entities from all possible candidate entities:

- Popularity based strategies
 - Linguistical strategies
 - Statistical strategies
 - Semantic based strategies
- 
- reference text corpus (wikipedia)
 - link graph (wikipedia)
 - semantic graph (dbpedia)

General Approach

1. Make an assumption
2. Do the strategies support or contradict your assumption
3. Make decision according to logical and probabilistic rules/constraints

Armstrong landed the Eagle on the Moon

Consider all entities within the same context

The image displays three overlapping screenshots of Wikipedia article pages. The top-most snippet is for the article "Louis Armstrong", showing the title, a "Talk" tab, and the beginning of the text: "Louis Armstrong^[1] (August 4, 1901 – July 6, 1971),^[2] nicknamed S from New Orleans, Louisiana." Below the text is a "Contents" table of contents. The middle snippet is for the article "Eagle", showing the title, "Talk" and "Read" tabs, and the start of the text: "Eagle is a common name for some members of the bird family Accipitridae, and bel related to each other. Most of the more than sixty species occur in Eurasia and Afric two species (the Bald Eagle and Golden Eagle) in the United States and Canada, r three species in Australia." It also includes a "Contents" table of contents. The bottom snippet is for the article "Fly Me to the Moon", showing the title, "Talk" and "Read" tabs, and the start of the text: "Fly Me to the Moon" is a popular standard song written by Bart Howard in 1954. It was originally titled "In Other Words", and was introduced by Felicia Sanders in cabarets. The song became known popularly as "Fly Me to the Moon" from the first line of the B verse, and after a few years the publishers changed the title to that officially. To the right of the text is a table titled "Fly Me to the Moon" with details about the song, including the artist (Frank Sinatra), the album (It Might as Well Be Swing), the release date (June 9, 1964), the genre (Traditional pop), the length (2:30), the label (Reprise), the writer (Bart Howard), the composer (Bart Howard), and the producer (Sonny Burke). Below the table is a section titled "History of notable recordings" with a list of recordings by various artists, including Kaye Ballard, Chris Connor, Portia Nelson, Johnny Mathis, Eydie Gormé, Felicia Sanders, April Stevens, Nancy Wilson, Peggy Lee, Peter Nero, Nat King Cole, Sarah Vaughan, Mel Tormé, Petula Clark, Joe Harnell, and others.

Armstrong landed the Eagle on the Moon

Consider all entities within the same context

Neil Armstrong

From Wikipedia, the free encyclopedia
(Redirected from Neil armstrong)

For other people named Neil Armstrong, see [Neil Armstrong \(disambiguation\)](#).

Neil Alden Armstrong (August 5, 1930 – August 25, 2012) was an American astronaut and the **first person to walk on the Moon**. He was also an aerospace engineer, naval aviator, test pilot, and university professor. Before becoming an astronaut, Armstrong was an officer in the U.S. Navy and served in the Korean War. After the war, he earned a doctorate from the University of Michigan and worked for the National Advisory Committee for Aeronautics High-Speed Research Program, where he flew over 900 flights. He later completed graduate studies at the

A participant in the U.S. Air Force's **Man in Space Soonest Astronaut Corps** in 1962. He made his first space flight, as in space. On this mission, he performed the first **docking** of

Armstrong's second and last spaceflight was as mission commander of Apollo 17, where he and **Buzz Aldrin** descended to the lunar surface and spent two days there. He commanded the Command Module. Along with Collins and Aldrin, Armstrong was one of the three astronauts who were honored by President **Ronald Reagan** in 1969. In 1978, President **Jimmy Carter** presented Armstrong and his fellow Apollo 17 crewmates with the **Congressional Gold Medal** in 2009.

Armstrong died in Cincinnati, Ohio, on August 25, 2012, at

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 - 5.1.1 *Gemini 8*
 - 5.1.2 *Gemini 11*
 - 5.2 Apollo program
 - 5.2.1 Apollo 11
 - 5.2.1.1 Voyage to the Moon
 - 5.2.1.2 First Moon walk
 - 5.2.1.3 Return to Earth
- 6 Life after Apollo
 - 6.1 Teaching
 - 6.2 NASA accident investigations
 - 6.3 Business activities
 - 6.4 Voice actor
- 7 Personal life
- 8 Illness and death
- 9 Legacy
- 10 See also
- 11 References
- 12 Bibliography
- 13 Further reading
- 14 External links

Early years

Neil Armstrong was born on August 5, 1930, in Wapakone. He had Scottish, Irish, and German ancestry and had two younger

Apollo Lunar Module

From Wikipedia, the free encyclopedia

The **Apollo Lunar Module (LM)**, previously known as the **Lunar Excursion Module (LEM)**, was a spacecraft built for the US Apollo program by **Grumman** to carry a crew of two from lunar orbit and successfully landed on the **Moon** between 1969–1972.

The LM, consisting of an ascent stage and descent stage, was ferried to lunar orbit by its command module (CSM), a separate spacecraft of approximately twice its mass, which also took the astronaut. At the end of the mission, the LM was discarded. In one sense it was the world's first true spacecraft in that it was designed for space, structurally and aerodynamically incapable of flight through the Earth's atmosphere.

Its development was also plagued with several hurdles which delayed its first unmanned flight by about three months. Despite this, the LM eventually became the most reliable system, the only one never to suffer any failure that significantly impacted a mission,^[1] and *Aquarius* greatly exceeded its design requirements by maintaining life support for astronaut Service Module.

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- 1 Operational profile
- 2 History
 - 2.1 Design phase
 - 2.2 Astronaut training
 - 2.3 Development flights
 - 2.4 Production flights
 - 2.5 Extended J Class Missions
- 3 Specifications
 - 3.1 Ascent stage
 - 3.2 Descent stage
- 4 Lunar Modules produced
- 5 Proposed derivatives
 - 5.1 Apollo Telescope Mount
 - 5.2 LM truck (aka Lunar Payload Module)
- 6 Depiction in fiction
- 7 Media
- 8 See also
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Operational profile

At launch, the Lunar Module sat directly beneath the **Command/Service Module (CSM)** with **Adapter (SLA)** attached to the **S-IVB** third stage of the Saturn V rocket. There it remained through the **Lunar Injection (TLI)** rocket burn to send the craft toward the Moon.

Soon after TLI, the SLA opened and the CSM separated, turned around, came back to dock from the S-IVB. During the flight to the Moon, the docking hatches were opened and the LM up and test its systems (except for propulsion). Throughout the flight, he performed the role of monitoring the systems of both spacecraft.

After achieving a lunar parking orbit, the Commander and LM Pilot entered and powered up the docking equipment, unfolded and locked its landing legs, and separated from the CSM, flying the LM. The Commander operated the flight controls and engine throttle, while the Lunar Module Pilot operated other systems. The Commander informed on systems status and navigational information. After inspection of the LM, the LM was withdrawn to a safe distance, then the descent engine was pointed forward.

Moon

From Wikipedia, the free encyclopedia

This article is about Earth's Moon. For moons in general, see [Natural satellite](#). For other uses, see [Moon \(disambiguation\)](#).

The **Moon** is the only **natural satellite** of the **Earth**,^{[d][7]} and the **fifth largest** satellite in the **Solar System**. It is the largest natural satellite of a planet in the Solar System relative to the size of its **primary**,^[e] having 27% the diameter and 60% the density of Earth, resulting in $\frac{1}{81}$ its **mass**. The Moon is the second densest satellite after **Io**, a satellite of Jupiter.

The Moon is in **synchronous rotation** with Earth, always showing the same face with its **near side** marked by dark volcanic **maria** that fill between the bright ancient crustal highlands and the prominent **impact craters**. It is the brightest object in the sky after the **Sun**, although its surface is actually very dark, with a reflectance similar to that of coal. Its prominence in the sky and its regular cycle of **phases** have, since ancient times, made the Moon an important cultural influence on **language, calendars, art and mythology**. The Moon's gravitational influence produces the **ocean tides** and the **minute lengthening** of the day. The Moon's current orbital distance, about thirty times the diameter of the Earth, causes it to appear almost the same size in the sky as the Sun, allowing it to cover the Sun nearly precisely in total **solar eclipses**. This matching of apparent visual size is a coincidence. The Moon's linear distance from the Earth is currently increasing at a rate of 3.82 ± 0.07 cm per year, however this rate is not constant.^[8]

The Moon is thought to have formed nearly 4.5 billion years ago, not long after the Earth. Although there have been several hypotheses for its origin in the past, the current most widely accepted explanation is that the Moon formed from the debris left over after a **giant impact** between Earth and a **Mars-sized** body. The Moon is the only **celestial body** other than Earth on which **humans** have set foot. The **Soviet Union's Luna programme** was the first to reach the Moon with unmanned **spacecraft** in 1959; the **United States' NASA Apollo program** achieved the only manned missions to date, beginning with the first manned lunar orbiting mission by **Apollo 8** in 1968, and six manned lunar landings between 1969 and 1972, with the first being **Apollo 11**. These missions returned over 380 kg of **lunar rocks**, which have been used to develop a geological understanding of the Moon's origins, the formation of its internal structure, and its subsequent history.

After the [Apollo 17](#) mission in 1972, the Moon has been visited only by unmanned spacecraft, notably by the final [Soviet Lunokhod rover](#). Since 2004, Japan, China, India, the United States, and the [European Space Agency](#) have each sent lunar orbiters. These spacecraft have contributed to confirming the discovery of [lunar water ice](#) in permanently shadowed craters at the poles and bound to the lunar [regolith](#). Future manned missions to the Moon have been planned, including government as well as privately funded efforts. The Moon remains, under the [Outer Space Treaty](#), free to all nations to explore for peaceful purposes.

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 - 3.4 Magnetic field
 - 3.5 Atmosphere
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 - 4.1 Orbit
 - 4.2 Relative size
 - 4.3 Appearance from Earth
 - 4.4 Tidal effects
 - 4.5 Eclipses
- 5 Study and exploration
 - 5.1 Early studies

The Moon ☾



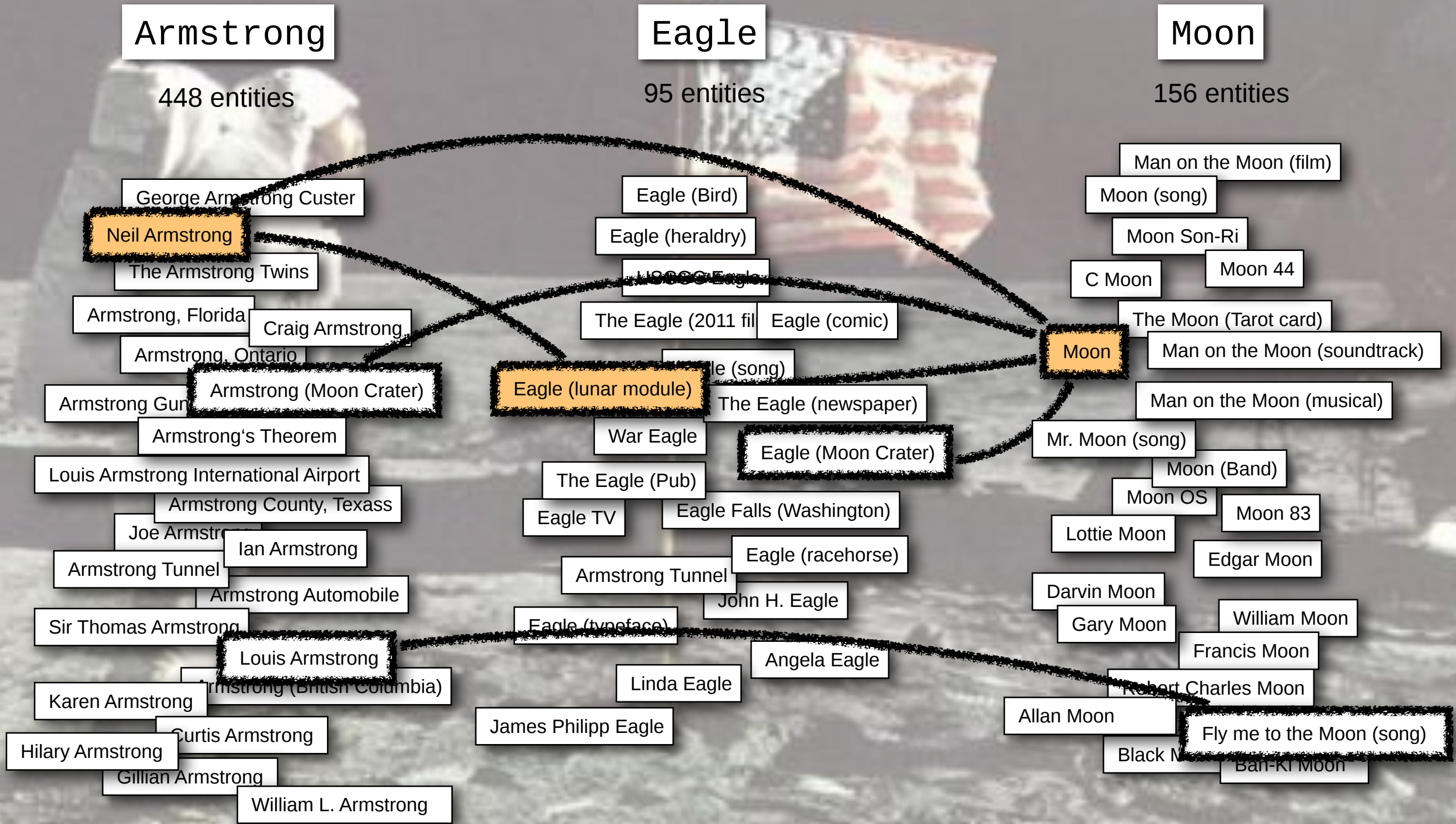
Full moon as seen from Earth's northern hemisphere

Designations

Adjective	lunar, selenic
	Orbital characteristics
Perigee	362,570 km (0.0024 AU)
Apogee	405,410 km (0.0027 AU)
Semi-major axis	384,399 km (0.002 57 AU) ^[1]
Eccentricity	0.0549 ^[1]
Orbital period	27.321 582 d (27 d 7 h 43.1 min ^[1])
Synodic period	29.530 589 d (29 d 12 h 44 min 2.9 s)
Average orbital speed	1.022 km/s
Inclination	5.145° to the ecliptic ^[2] (between 18.29° and 28.58° to Earth's equator) ^[1]
Longitude of ascending node	regressing by one revolution in 18.6 years
Argument of perigee	progressing by one revolution in 8.85 years
Satellite of	Earth
	Physical characteristics
Mean radius	1,737.10 km (0.273 Earths) ^{[1][3]}
Equatorial radius	1,738.14 km (0.273 Earths) ^[3]
Polar radius	1,735.97 km (0.273 Earths) ^[3]
Flattening	0.001 25
Circumference	10,921 km (equatorial)
Surface area	3.793×10^7 km ² (0.074 Earths)
Volume	2.1958×10^{10} km ³ (0.020 Earths)
Mass	7.3477×10^{22} kg (0.0123 Earths) ^[1]

Armstrong landed the Eagle on the Moon.

Entity Selection Process
(Semantic) Graph Analysis

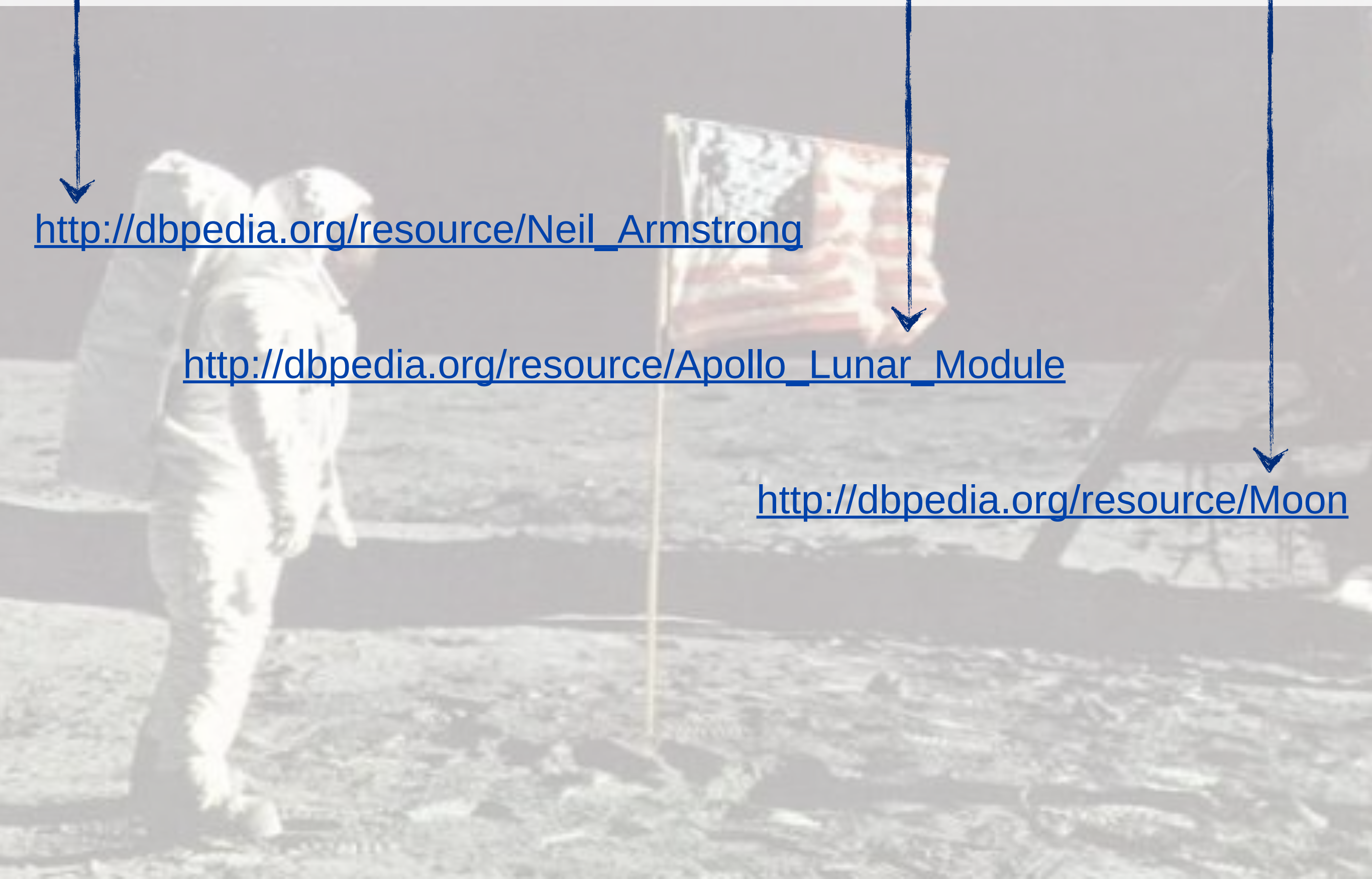


Armstrong landed the **Eagle** on the **Moon**.

http://dbpedia.org/resource/Neil_Armstrong

http://dbpedia.org/resource/Apollo_Lunar_Module

<http://dbpedia.org/resource/Moon>





09 - Even More Applications

Open HPI - Course: Knowledge Engineering with Semantic Web Technologies
Lecture 6: Knowledge Engineering

STEK