DETERMINATION OF TECHNOLOGY FRONTS AND DYNAMICS OF CHANGE IN 3D PRINTING USING TECH MINING AND LDA ANALYSIS

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The «Technology fronts» are the physical points or new/improved applications where the main improvements of a complex device take place:

The **patent claims** are the part where the key technological advances proposed by an invention are more specifically described
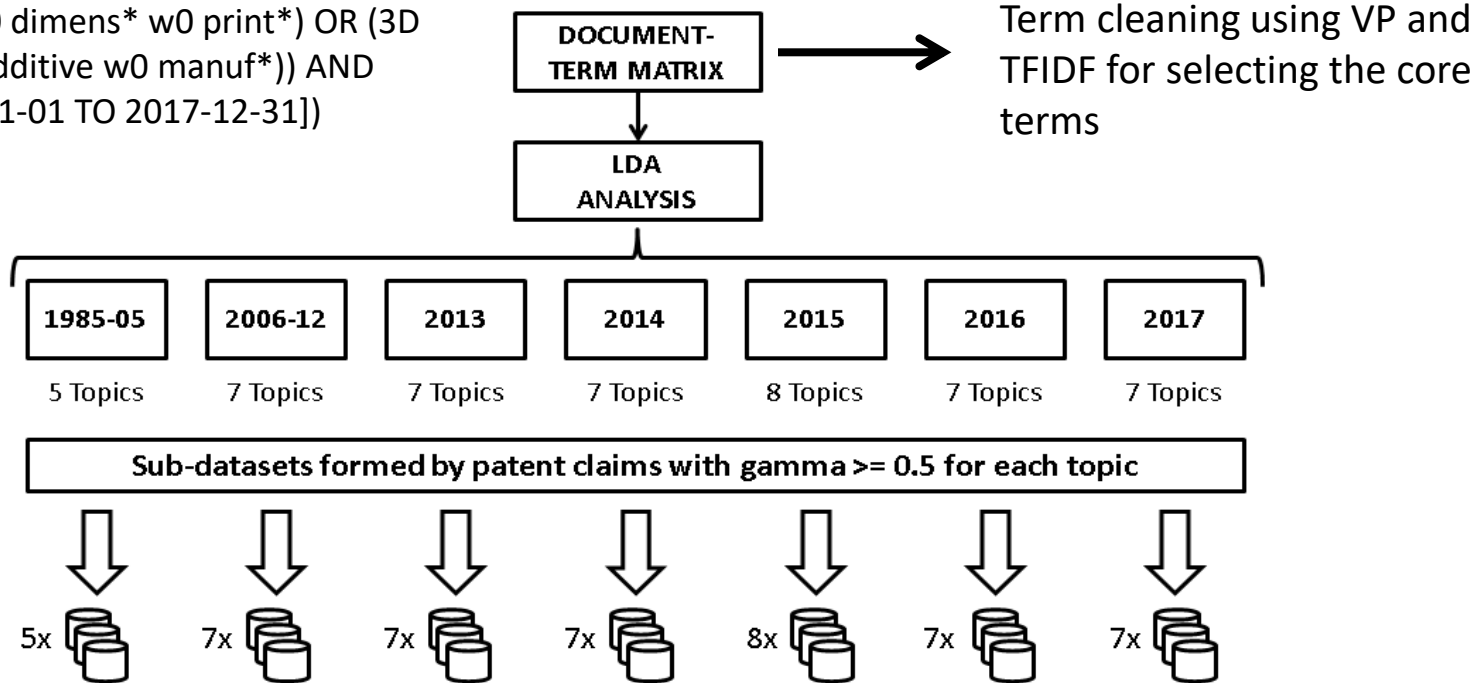

Such advances in complex machines can be the result of new **recombinations** of already existing elements, **adaptations**, or entirely new parts

The development of devices such as **3D printing machines** can be described in terms of the improvement of its parts, the way they are combined, or new technique/material combinations that evolve in order to generate a new and improved machine
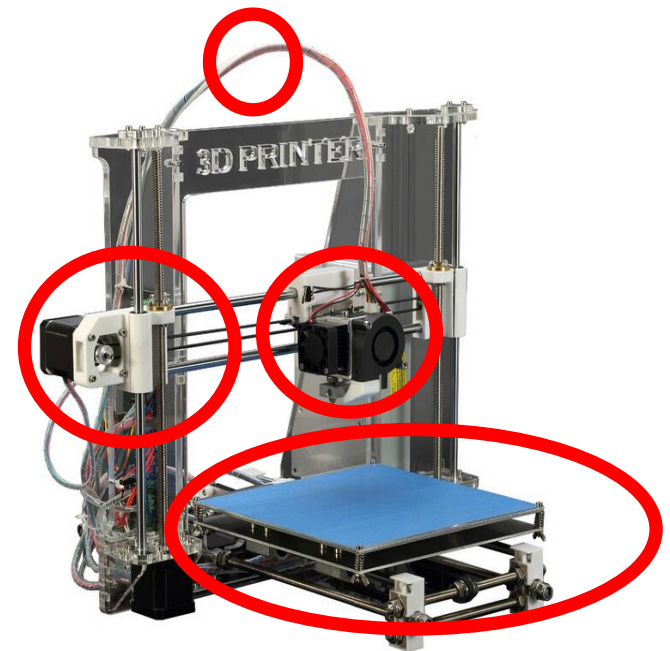
Topic modelling (LDA model) can be used not only for identifiying the main topics in 3D machine development, but also as a technique for **subsetting** the information that «more clearly» deals with each technology front.

TA:((three w0 dimens* w0 print*) OR (3D print*) OR (additive w0 manuf*)) AND PRD:([1985-01-01 TO 2017-12-31])

DOCUMENT-TERM MATRIX → Term cleaning using VP and TFIDF for selecting the core terms

LDA ANALYSIS

1985-05	2006-12	2013	2014	2015	2016	2017
5 Topics	7 Topics	7 Topics	7 Topics	8 Topics	7 Topics	7 Topics

Sub-datasets formed by patent claims with gamma >= 0.5 for each topic

5x   7x   7x   7x   8x   7x   7x

In this work we first detect the technology fronts that are determining the evolution of the 3D printing industry, in order to conduct further studies focused on each of these fronts.

Our approach uncovered some development fronts that could well go under the radar but deserve particular attention, such as the development of 3D printing file data feeding/transference/processing processes that have significant importance for the widespread adoption of such devices.

TOPIC	1985-05	2006-12	2013	2014	2015	2016	2017
Printing materials (PRINTMAT)							
Stereolithography (SLA)							
3D printing data (3D DATA)							
Printing head (PRINTHEAD)							
Multilayer printing (MULTILAYER)							
Mech. Transmission & Positioning (T&P)							
Laser/electron beam sintering &melting (LASERBEAM)							
Powdered materials							
Electronic control systems							
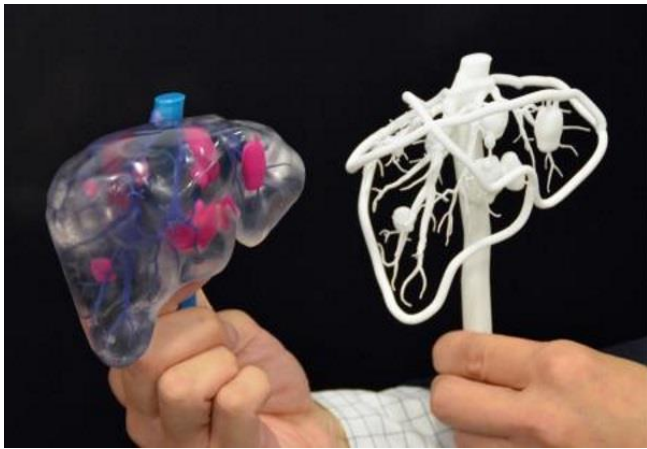
The approach based on technology fronts can be useful for **forecasting** purposes, and for the detection potential **technology transfer points** in complex devices that deploy technologies coming from diverse fields.