



The industry perspective

*ELIXIR Innovation and SME forum, Copenhagen,
24th November 2014*

Ulrik de Lichtenberg, LEO Pharma

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Agenda

LEO Pharma & my role

Industry Awareness of ELIXIR

Industry perspectives

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LEO Pharma & my role

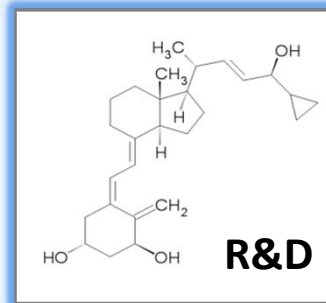
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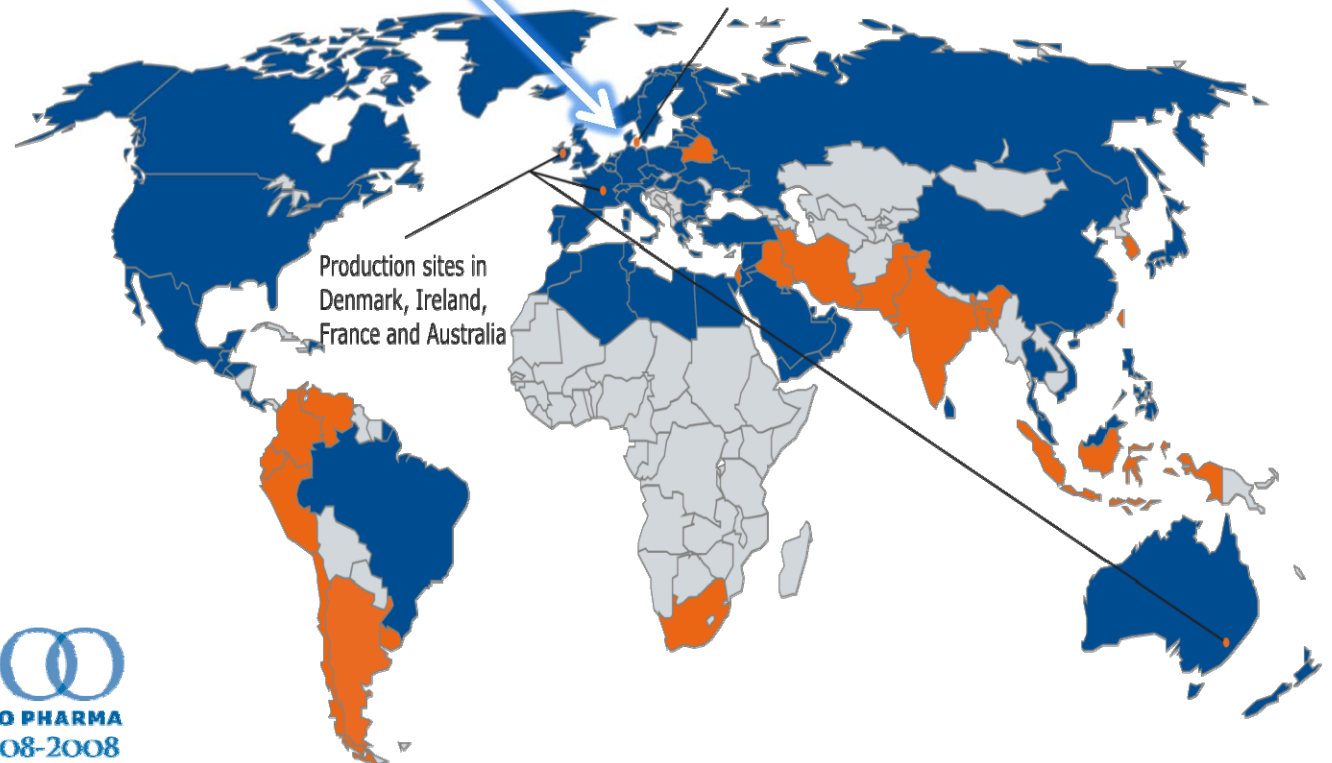
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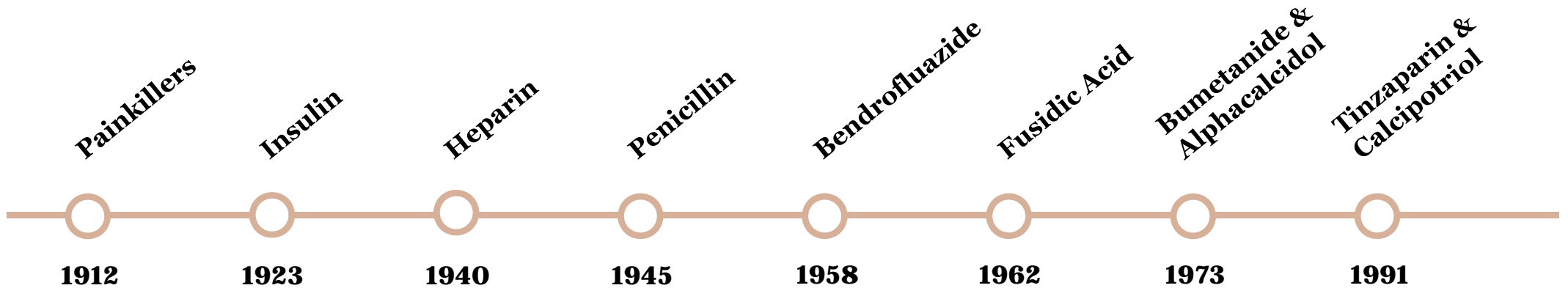
About LEO Pharma



Dermatology
Thrombosis
Antibiotics
Diuretics



For decades LEO Pharma was a very diversified business



Today, we focus on

Dermatology

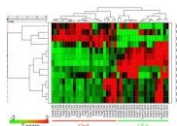
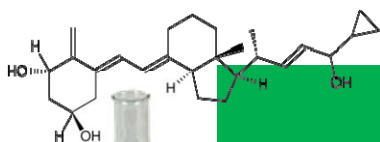


We help people
achieve healthy
skin

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LEO Research Informatics



Medicinal
Chemistry

In-vitro biology

In-vivo biology

ADME & Tox

Analytical

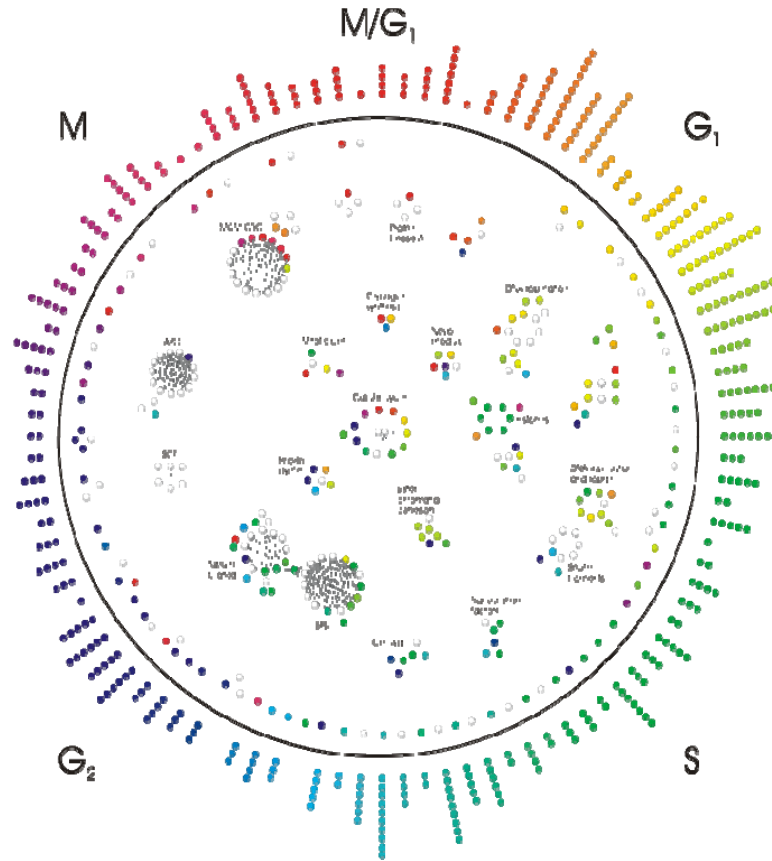
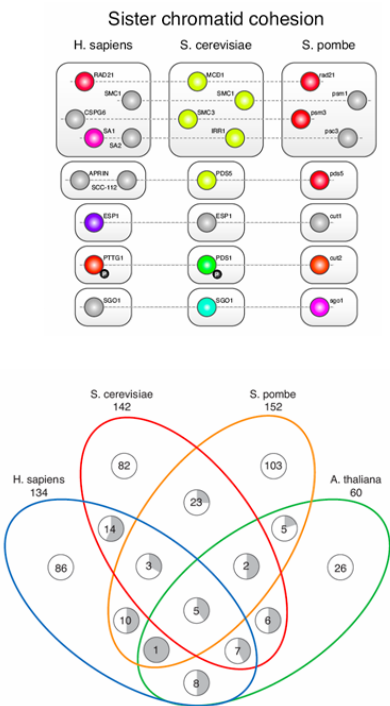
Formulations



We support the research division with...

- Bioinformatics & Cheminformatics
- Translational Research
- Biomarker strategy
- IT System and process development
- Data Management

Bioinformatician by training



DTU-forskere bag ny indsigt i celledelingens evolution

Søren Brunaks gruppe afslører overraskende store forskelle i hvordan beslægtede organismer regulerer celledelingen

En af de mest fundamentale biologiske processer er celledelingen. Hvor nye celler i kroppen dannes ved at en allerede eksisterende celle deler sig til to identiske kopier. Denne komplekse proces styres og afbalanceres af molekylære maskiner bestående af proteiner, RNA-strukturer og lipider, og er essentiel for alle levende organismer. Skader på disse maskiner og deres funktion fører til alvorlige sygdomme, og forståelsen af disse molekylære maskiner har celledelingsprocessen har derfor været en grundlæggende emne for biologer og molekylære biologer.

Søren Brunaks gruppe har forsket i disse molekylære maskiner bag celledelingsprocessen hos de fleste eukaryoter, herunder mennesket. De har identificeret nye proteiner og RNA-strukturer, der er involveret i celledelingen, og har undersøgt deres funktion og rolle i celledelingen. Dette arbejde har været støttet af DTU og det danske forskningsråd (DFRC).

En af de mest interessante fund er, at der er store forskelle i celledelingsprocessen mellem forskellige organismer. Disse forskelle kan skyldes forskellige evolutionære tilpasninger, der har udviklet sig over tid. For eksempel har nogle organismer udviklet nye proteiner og RNA-strukturer, der er involveret i celledelingen, og disse kan have forskellige funktioner og roller i celledelingen.

Disse forskelle kan også skyldes forskellige evolutionære tilpasninger, der har udviklet sig over tid. For eksempel har nogle organismer udviklet nye proteiner og RNA-strukturer, der er involveret i celledelingen, og disse kan have forskellige funktioner og roller i celledelingen.

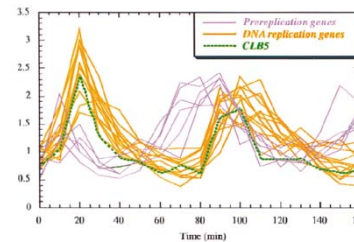
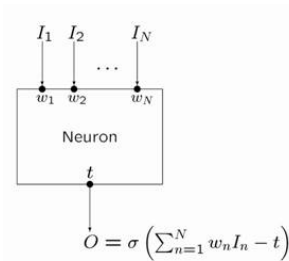
De store forskelle kan skyldes forskellige evolutionære tilpasninger, der har udviklet sig over tid. For eksempel har nogle organismer udviklet nye proteiner og RNA-strukturer, der er involveret i celledelingen, og disse kan have forskellige funktioner og roller i celledelingen.

”... men skal være varsom med at overføre det til andre organismer. Specielt fordi selv meget små forskelle kan have voldsomme konsekvenser for, om medicinen virker i mus eller aber vil fungere i mennesker.”

LEON DE LIECHTENBERG, BIOINFORMATIKER



Søren Brunak, DTU og Leon de Liechtenberg og Thomas Børner ved DTU. Søren Brunak og Leon de Liechtenberg er forskere i DTU's Center for Systems Biology.



- RRM2:
- Homo sapiens
 - Pan troglodytes
 - Macaca mulatta
 - Bos taurus
 - Canis familiaris
 - Mus musculus
 - Rattus norvegicus
 - Monodelphis domestica
 - Gallus gallus
 - Danio rerio
 - Takifugu rubripes
 - Tetraodon nigroviridis

- LQLSPLKG
- LQLSPLKG
- LQLSPLKG
- QQLSPLKG
- LQLSPLKG
- LQLSPLKR
- LHLSPLKR
- LRLSPLKS
- PLRSPLKN
- TISTKMNN
- TLISDVTK
- TLVSDVRQ



From playing music

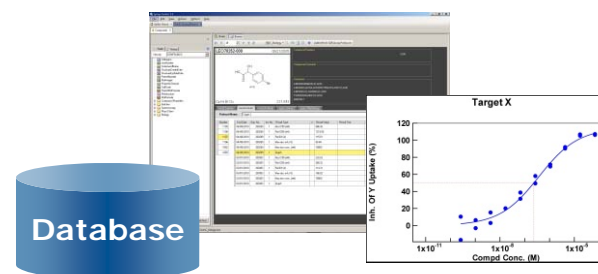
to building instruments



RRM2:

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LQLSPLKG
 LQLSPLKG
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 LQLSPLKR
 LHLSPLKR
 LRLSPLKS
 PRLSPLKN
 TISTKMNN
 TLISDVTK
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Industry awareness of ELIXIR?



Danish Industry awareness "Survey"

Materials and Methods

- A networking meeting was held among industry bioinformaticians @ Nuevolution, Oct 2014
- About 20 people attended, representing 9 companies

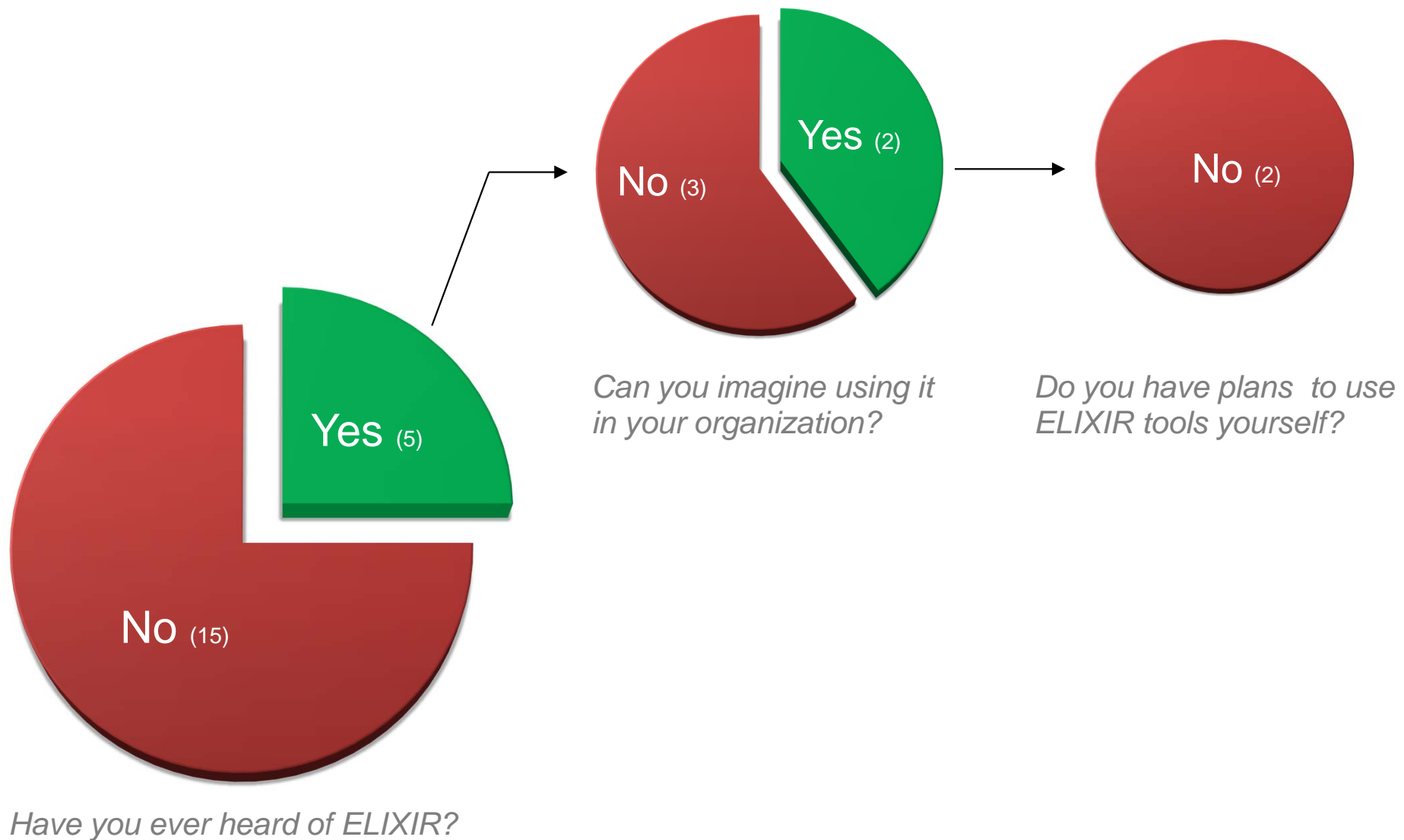


Danish Industry awareness "Survey"

Materials and Methods

- A networking meeting was held among industry bioinformaticians @ Nuevolution, Oct 2014
- About 20 people attended, representing 9 companies
- I was unable to participate myself (not the best start to my survey...)
- So, I asked Niels Tolstrup to ask the participants about ELIXIR
- Nobody took detailed notes, so it is not completely clear what the exact questions and answers were...
- To analyze the data set I tried various data mining techniques, including PCA, neural networks, SVMs, Bayesian statistics, full Smith-Waterman, etc.
- Much to my disappointment, the data was best summarized using pie-charts...

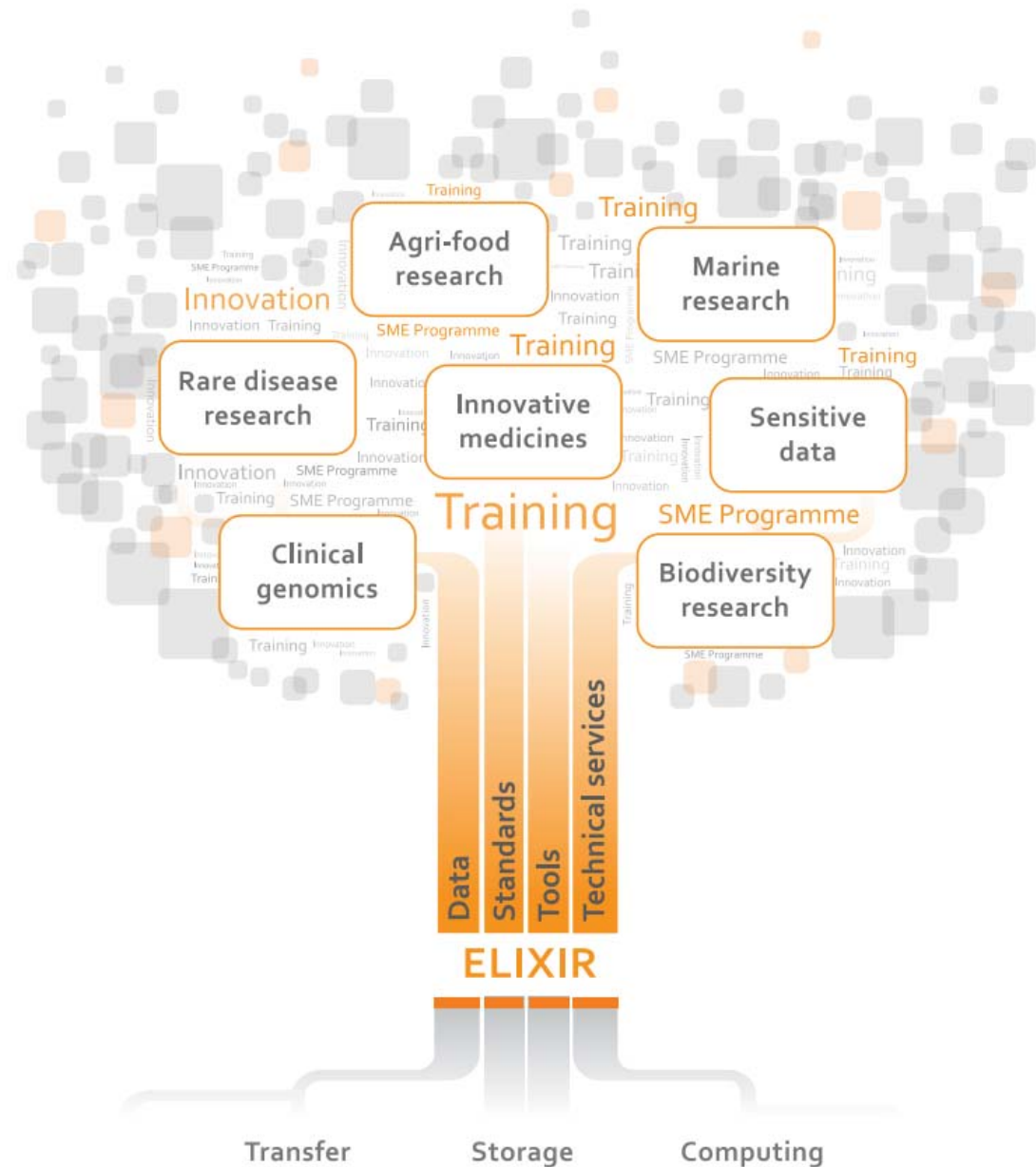
Danish Industry awareness "Survey"



What I first thought ELIXIR was..



...but it is much more than that!



Why is Industry awareness low?



banedanmark



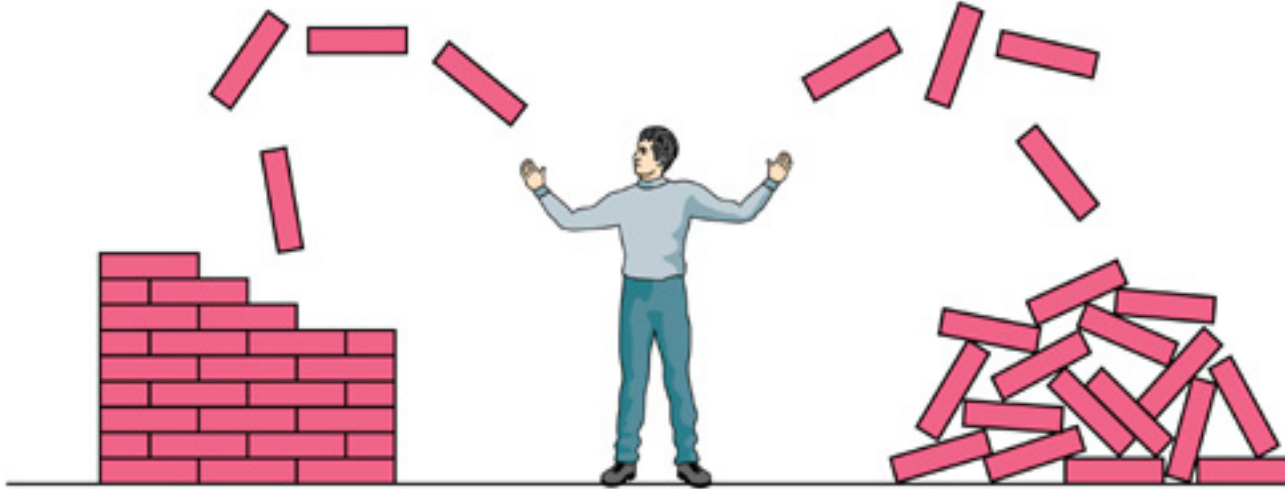
We take things for granted...



$$\frac{dS}{dt} \geq 0$$

Thermodynamics

$$\frac{dS}{dt} = \dot{S}_i$$

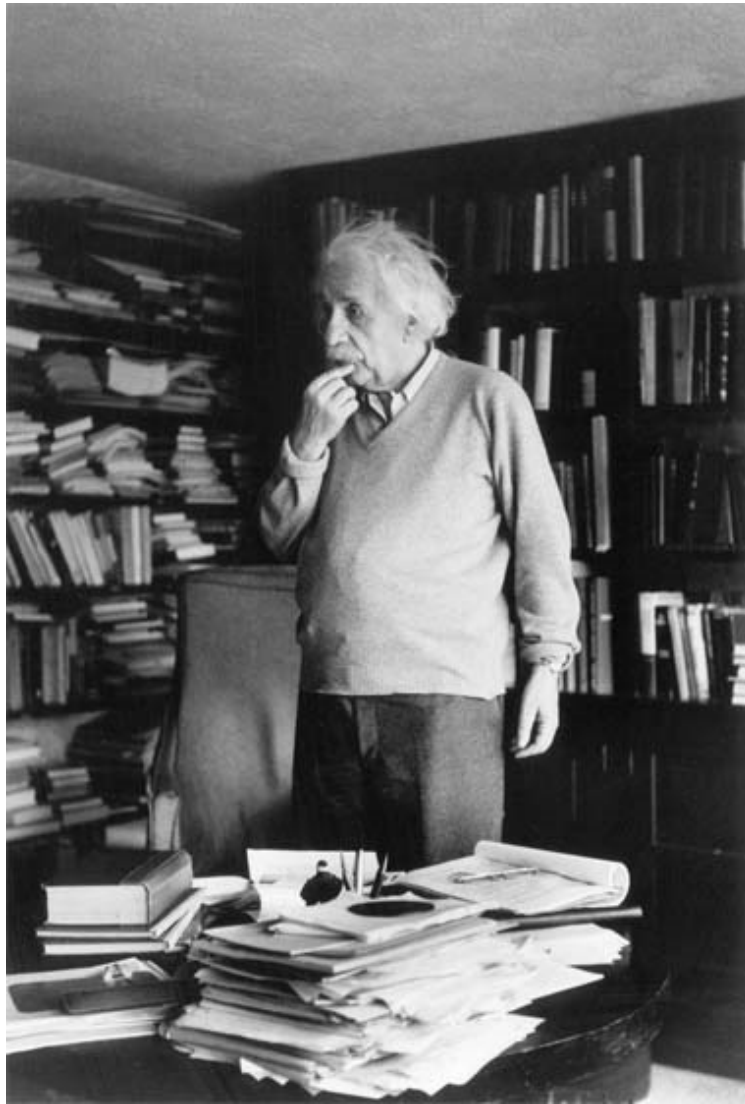


An improbable way for bricks to fall

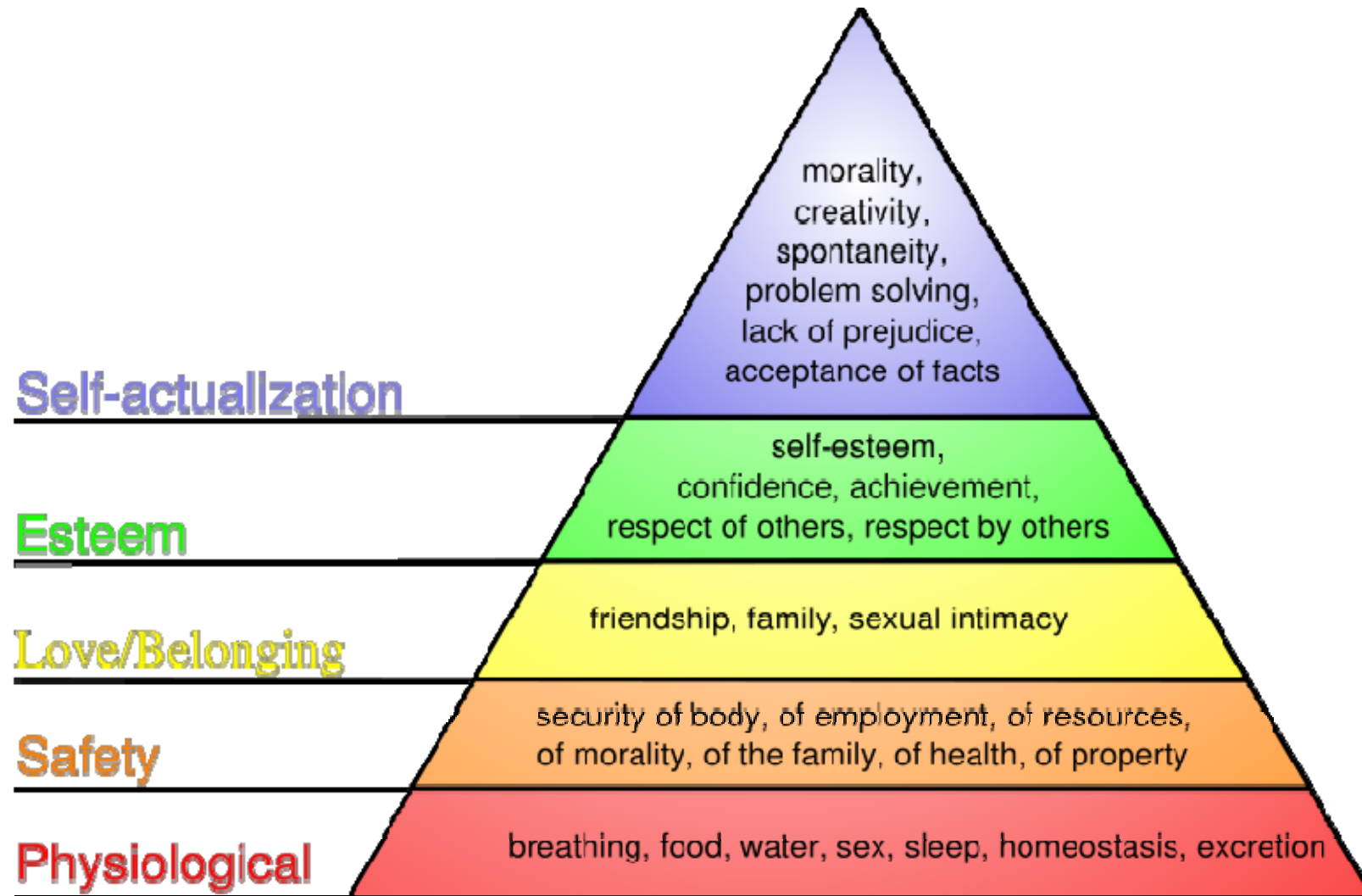
A more probable way for bricks to fall



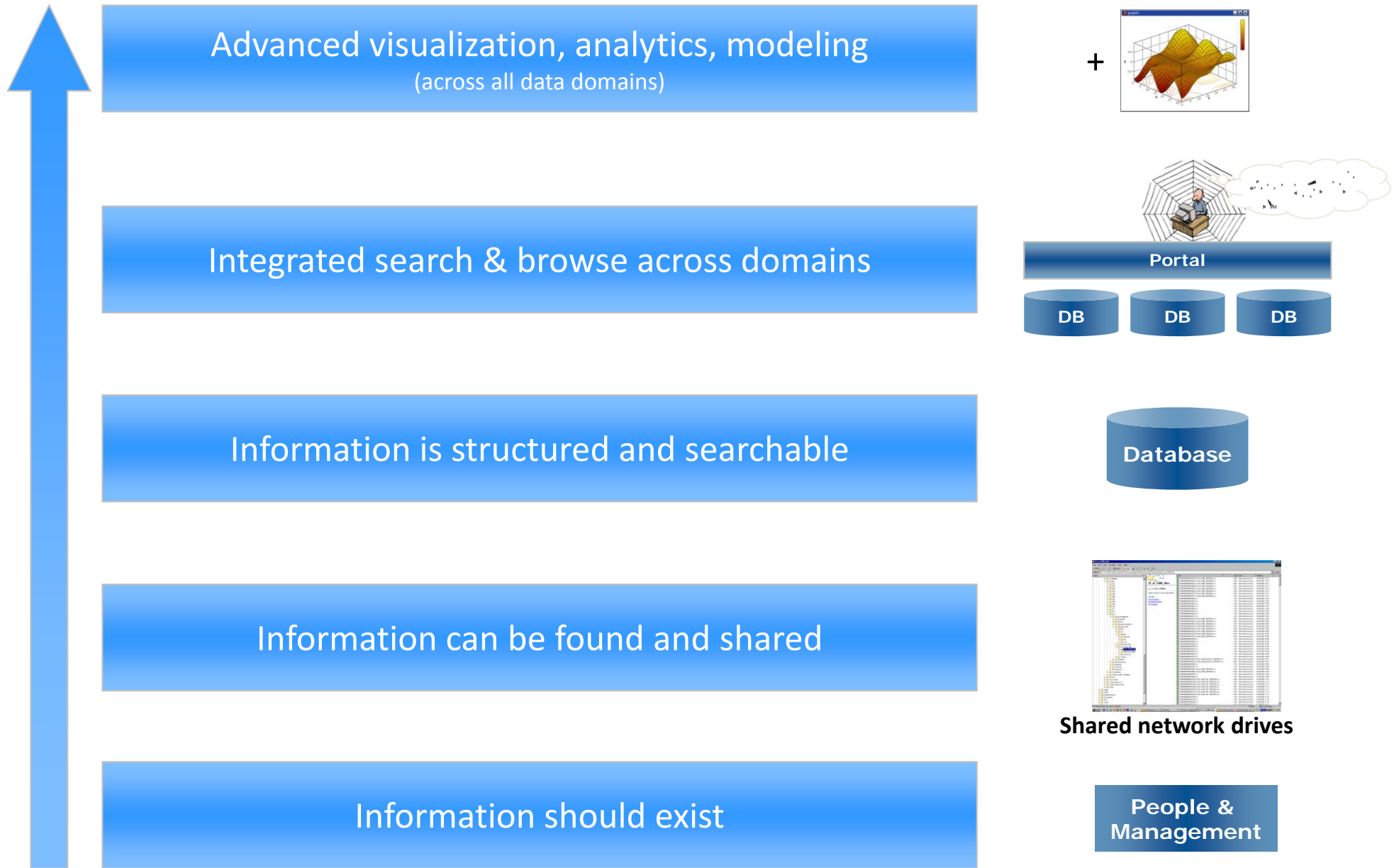
Storage VS storage+structure



Maslow's hierarchy of needs



Ulrik's hierarchy of Data Management needs





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What does Industry want (my guess)?



Value of ELIXIR to industry?

- Industry relies on a **stable infrastructure** of databases and tools
 - *...but take for granted that it exists*
- Industry struggles to get an **overview of tools and services** available
 - *We waste our time searching, or give up*
- We would all benefit greatly from **data standards** (formats)
 - *we waste our time converting data, or give up*
- Most of this stuff is **pre-competitive**
 - *No value for industry in duplicating basic technical efforts/investments*
- Connectedness to **expertise is valuable to industry**
 - *We rely on input from academia to advance our own science*
- **“Rent before you buy or build”** is the new black in Pharma
 - Investment in sequencers, computers, technology, etc. not viable for many companies
 - We would rather rent machines, time, people

15,000,000,000 DKK per new drug...



Cost to Develop a Drug More Than Doubles to \$2.56 Billion

By Anna Edney | Nov 18, 2014 4:30 PM GMT+0100 | [22 Comments](#) [Email](#) [Print](#)

It costs drugmakers \$2.56 billion to bring a new medicine to market, on average, more than double the price of 11 years ago, according to a study released today.

The higher cost comes from clinical trials that are larger and more complex, as well as more drugs that fail in development, according to the researchers. While the **Food and Drug Administration** is sometimes blamed for driving up costs because of the time it takes to review new drugs, that wasn't a factor, according to the study by the Tufts Center for the Study of Drug Development.



Challenge: Confidentiality & Security

Discoveries

- Unpatented discoveries
- Intellectual property

Business information

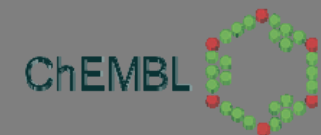
- Company strategy
- Trade secrets
- Other confidential material

Compliance

- Legal requirements
- Regulatory requirements
- Patient data privacy

What does industry want?

- Confidentiality and security around searches/queries in public data sources
- Confidentiality and security around data analyzed using publically available tools
- Free or cheap services (+ ease of payment)
- Easy ways of collaborating with partners



New trends, new opportunities

- **The pharmaceutical industry is opening up**
 - *Out-sourcing of tasks and services*
 - *In-licensing of technologies and new products*
 - *Partnering for research and innovation*
 - *Consortia to solve common – often pre-competitive - problems*
- **Industry is not good at sharing our own data and tools...**
 - *Reward structure is different: publications and citations are the “currency” of the academic world. In industry, it is new products and services that count.*
- **...but the future may be brighter**
 - *The rise in academic partnerships creates a push for publication*
 - *Funding agencies, regulators (FDA/EMA) and payers are starting to demand publication of clinical trial data (and other data)*
 - *The industry is under pressure to re-invent itself, and the fear-driven tendency to label everything CONFIDENTIAL must change*

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Questions?





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Back-up slides

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Why collect and manage information?

External drivers

Market exclusivity (IPR)
obtaining and defending patents



Market access
Product registration and maintenance



Insight

Disease
Patients
Needs
Market

Ideation

Concept validation

Drug Discovery

Hit-Lead-LO

PharmTech

Formulations,
repurposing,
combo's & devices

HuPoP

Phase 0

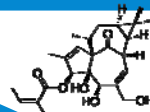
Clinical

Ph 1-2-3

Market



Innovation
Ability to get new
ideas/concepts



Innovation
Scientific capability to
transform ideas to products



Learning & insight
from clinical studies and
the markets

Internal drivers

Transforming data into knowledge

"Science is built up of facts, as a house is built of stones. But an accumulation of facts is no more science than a heap of stones is a house."

Henri Poincaré, Science and Hypothesis (1901)



Challenge: Confidentiality & Security

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Business secrets

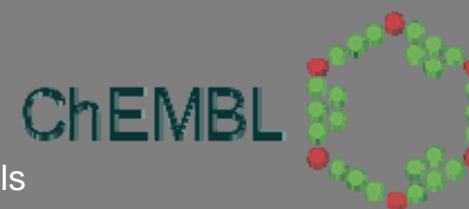
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Why pay for tools by Thomson Reuters? ...*Because they understand our needs!*

- They promise to keep data, searches, etc. confidential (perception is reality!)
- They do not have a reputation of being "sloppy" as the academic world sometimes have...
- There is someone to file a lawsuit against in cases of a disaster
- Simple model for paying for services



Tower of Babel...still an issue 😊

