A graphical representation of the problem-solution approach (PSA) - a powerful tool facilitating the assessment of inventive step of patents

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Who am I?

- **Joachim Stellmach** (DE), directorate advisor, EPO Munich

- Studied Organic Chemistry in Münster/Westf. and Freiburg/Brsg.
- At the EPO since 4/1986 (Munich)
- BEST examiner since 2/1994 (Munich)
Total European patent filings\(^1\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Filings</th>
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<tbody>
<tr>
<td>2008</td>
<td>225,977</td>
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<tr>
<td>2009</td>
<td>211,356</td>
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<td>2010</td>
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<td>2012</td>
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\(^1\) Direct European filings under the EPC and International filings under the PCT
• Some general Remarks on patentability; the difference between novelty and inventive step
• The different steps of the problem and solution approach - the text
• A graphical representation as visual supplement using the PSA during search and examination
• SAR/SRR and PSA as expert assessment of inventive step
• Examples from the Technical Boards of Appeal of the EPO
• Generalisation and further concrete Examples (quantitative effects, evidence of inventive step, deviation, use claims)
Implicit features or well-known equivalents

- A document takes away the **novelty** of any claimed subject-matter derivable **directly** and **unambiguously** from that document including any **features** implicit to a person skilled in the art in what is expressly mentioned in the document, e.g. a disclosure of the use of rubber in circumstances where clearly its elastic properties are used even if this is not explicitly stated takes away the **novelty** of the use of an elastic material. The limitation to subject-matter "derivable directly and unambiguously" from the document is important. Thus, when considering **novelty**, it is not correct to interpret the teaching of a document as embracing well-known **equivalents** which are not disclosed in the documents; this is a matter of **obviousness**.
An invention is considered as involving an **inventive step** if, having regard to the state of the art, it is not **obvious** to a person skilled in the Art. **Novelty** (see G-IV, 5) and **inventive step** are **different criteria**. The question – "is there inventive step?" – only arises if the invention is novel.

**Light of Later Knowledge**

13.04 In considering **inventive step**, as distinct from **novelty** (see paragraph 12.02 and the appendix to chapter 12), it is fair to construe any published document in the light of subsequent knowledge and to have regard to all the knowledge generally available to the person skilled in the art at the relevant date of the claim.
Basic Definitions

- **Novelty**: construe the claim in order to determine its technical (structural, functional) features

- **Inventive step**: investigating (technical) effects (activities, properties, functions) or (technical) problems underlying the application and the closest prior art and **eventually**
  - construct a logical chain connecting the prior art and the claimed subject-matter

- **Novelty**: direct disclosure

- **Inventive Step**: indirect disclosure

- **PSA**: correlation/separation of technical features/effects
Agenda Structure

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In accordance with the "problem-solution approach" (Rule 42 (1) c, Guidelines C-II, 4.5, 4.6 and C-IV, 11.7 EPC 2000; Guidelines 2012 F-II, 4.5, 4.6 and G-VII, 5), which is established jurisprudence of the Boards of Appeal, to assess inventive step on an objective basis it is in particular necessary to establish the closest state of the art forming the starting point, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures assessing inventive step on an objective basis and avoids an ex post facto. (DG3 decision)

• Problem-Solution-Approach

• The problem-solution-approach comprises three steps

  – I identifying the nearest prior art

  – II formulating an objective technical problem to be solved when considering the nearest prior art

  – III deciding whether there is an inventive step
The problem is the problem

- actual technical problem in a field
- artificial problem created by the Applicant (subjective problem)
- patent related technical problem
- since the problem is directly related to the closest prior art it is a **parameter** of the PSA (more/less ambitious/further/alternative)
- the problem has **not** to be **new**!
• Some general Remarks on patentability; the difference between novelty and inventive step
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Graphical representation of novelty (rendering structural/technical features)

**Replacement**

**F1, F2** (red): distinguishing structural/technical features; (green) triangles **A**: activity, effect, property, function, (blue) rectangles: common technical features

**closest prior art (similar purpose, most technical features in common)**

**claimed subject-matter**

08/04/2013
Graphical representation of novelty (rendering structural/technical features)

F1, F2 (red) : distinguishing structural/technical features; (green) triangles A: activity, effect, property, function, (blue) rectangles: common technical features
Graphical representation of novelty (rendering structural/technical features)

- **Replacement**
  - Closest prior art (similar purpose, most technical features in common)
  - Activity, effect, property, function
  - Distinguishing structural/technical features: F1 (red), F2 (red)
  - Common technical features: A (blue)

- **Addition (combination)**
  - Activity, effect, property, function
  - Distinguishing structural/technical features: F1 (red), F2 (red)
  - Common technical features: A (blue)

- **Deletion**
  - Activity, effect, property, function
  - Distinguishing structural/technical features: F1 (red)
  - Common technical features: A (blue)

\[ F1, F2 \text{ (red)} : \text{distinguishing structural/technical features}; \text{ (green) triangles A: activity, effect, property, function, (blue) rectangles: common technical features} \]
**Graphical representation of novelty (rendering structural/technical features)**

- **Closest prior art (similar purpose, most technical features in common)**
- **Replacement**
- **Addition (combination)**
- **Deletion**
- **Selection, Overlap**

**F1, F2 (red)**: Distinguishing structural/technical features; (green) triangles A: activity, effect, property, function; (blue) rectangles: common technical features.

08/04/2013
Most general abstraction of the PSA using novelty rendering features

closest prior art (similar purpose, effect, use, property; most technical features in common)

Teaching/combination from the prior art, common general knowledge

F1,F2: characterizing portion; distinguishing technical features; A: activity, effect, property, function; M,M',M'': equivalents, analogues, synonyms (in the same or similar technical field); prior art features
• Some general Remarks on patentability; the difference between novelty and inventive step
• The different steps of the problem and solution approach - the text
• A graphical representation as visual supplement using the PSA during search and examination
• **SAR/SRR and PSA as expert assessment of inventive step**
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• Generalisation and further concrete Examples (quantitative effects, evidence of inventive step, deviation, use claims)
Graphical representation of the 'empiric rule' "Structure-activity-relationship"

prior art

**Patents**

**Research Laboratory**

Str, Str': chemical basic structures; green A, A': activity, property; effect; function;
Definition: SAR: if Str ~ Str' => then A ~ A', red: **novelty** (by: replacement, addition, deletion, selection)
Structure-activity-relationships (SAR), Analogisation of lead compounds

closest prior art (similar purpose, effect, use, property; most technical features in common)

claimed subject-matter

R, R':
- replacement
- addition
- deletion
- selection (overlap)

Teaching/combination from the prior art, common general knowledge; reaction mechanism; pharmacophoric group; known lead compound

R, R': common substituents; M, M': (analogous) families of compounds; A: activity, property; novelty
R => R' (distinguishing features)
Simple concrete example of the analogisation of substituents of a basic skeleton

Teaching/combination from the prior art, common general knowledge (SAR)

A: (biological) activity, property; substituents Cl, CF₃; similar basic skeletons: phenyl, naphthyl; novelty: Cl => CF₃
Analogisation of the Basic Skeleton

closest prior art (similar purpose, effect, use, property; most technical features in common)

claimed subject-matter

Teaching/combination from the prior art

Rx, Rx': Substituent pattern; S, S': (analogous) families of compounds, A: activity, property; novelty S => S' (e.g. bioisosterism)
Structure-reactivity-relationships for organic-chemical reactions, LFER

closest prior art

M1 + M2 => M3
F1 + F2 = F3

reaction mechanism

F1 + F2 => F3

claimed subject-matter

M1' + M2' => M3'
F1 + F2 = F3

combination from the prior art, common general knowledge

F1,F2,F3: functional groups; M1,M2,M3: molecular basic skeletons; novelty: M=>M'

08/04/2013
Example of a structure-reactivity-relationship

Reaction of (carboxylic) \textit{acid} with \textit{alcohol} yielding \textit{ester}

\[
R^1\ CO_2H + R^2\ OH \rightarrow R^3\ CO_2R^2
\]

\[
R^{1'}\ CO_2H + R^{2'}\ OH \rightarrow R^{3'}\ CO_2R^{2'}
\]

combination from the prior art
reaction mechanism
acid + alcohol $\rightarrow$ ester

R-CO$_2$H + R'-OH = R-CO$_2$R'

Simple example for the reaction of functional groups
Agenda Structure

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Teaching/combination from the prior art, common general knowledge

Strobilurin Analogues, (Aza-)Bioisosterism C → N, Fungicides
Applying PSA to reactions of functional groups

closest prior art (similar purpose, most technical features in common)

DE-A-2313261

\[
\text{Oxynitril} \quad \text{+} \quad \text{Guanidin} \quad \rightarrow \quad \text{DE-A-2010166}
\]

\[
\text{Acrylnitril} \quad \text{+} \quad \text{Guanidin}
\]

claimed subject-matter

EP-A-0 065705

Novelty: \(-N=\) => \(-O-\); \(R\) => \(R';\) analogisation \(-OCH_3\) => \(-O-(CH_2)_2-CH_3\)
• Some general Remarks on patentability; the difference between novelty and inventive step
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Variations of substituents, **deviation** from structure-activity-relationships

**Acknowledgement of inventive step**

problem: inventive provision of a further/alternative subject-matter

claimed subject-matter

Novelty R => R': Substituents; M,M': (analogous) families of compounds;
A not B: different activity;

closest prior art
(similar purpose, effect, use, property; most technical features in common)

no possible combination from the prior art

08/04/2013
Quantitative effects, beneficial/advantageous effects

Closest prior art (similar purpose, effect, use, property; most technical features in common)

Claimed subject-matter

Obvious?

Teaching/combination from the prior art

F1, F2: Novelty, distinguishing technical features; green triangles A => AA: (improved) activity, effect, here: double activity; blue: similar prior art;
Use claims, second (non-) medical indication

closest prior art (similar purpose, most technical features in common)

Novelty = replacement of use/activity \( A \rightarrow B; \ M', Str, Str' \): families of compounds, e.g. Isosteres, Analogues

Teaching/combination from the prior art, common mechanism

claimed subject-matter

obvious?

no limitation to RN !!!

08/04/2013
Graphical Decision T 913/94

closest prior art (most similar use, most common technical features), Drug Des. 31, 799 (1981)

treatment of (experimentally induced) ulcer

GGA, prennyl ketone, geranylgeranyl acetone

claimed subject-matter (EP-A-0 207 505)
treatment of gastritis resulting from inflammatory lesions

GGA

protection function => ulcer
reaction mechanism

A B

GGA

A B

anti-ulcer mechanism due to maintaining the integrity of the mucosal barrier and prophylactic and curative treatment of ulcer

textbook: same drugs can generate/predispose => gastritis and formation of ulcer

Novelty: Different diseases, A=> B,
Inventive step: prior art: common aspects in relation to the causative factors, same origin
close prior art (JP-63,121,260)

claimed subject-matter (EP-A0 482 287)

problem(s):
- prevention of decomposing
- improved life cycle capabilities
- improved discharge performance and low temperature performance

A,B: no equivalents; A: anode: carbon; cathode: LiCo2; B: anode: Li (alloy); cathode: org. polymer; different electrode systems/ different, electrochemical processes of the different electrode systems, though similar effects => different problems

problem(s):
- reduced ionic conductivity at low temperatures
- desintegration of the electrode

A, B: no equivalents; A: non-aqueous sec. battery; B: non-aqueous sec. battery

obvious?

solvent: carbonate ester, e.g. PC/EC

mixed solvent: cyclic + non-cyclic carbonates

mixed solvent: cyclic ester + chain ester e.g. DEC, DMC, MC + mixing ratio

D4: US-A4 957833


A,B

F1

F2

F3

neither combination from the prior art nor from common general knowledge
(Non-chemical) Process claims and PSA

**Problem:**
Further/alternative process

1. step A
2. step B
3. step C

**Complementary information:**
Common general knowledge

**Problem:**
Unexpected effect (qualitative/quantitative)
US-A-4 079 741: closest prior art (similar purpose, most technical features in common)
linear spring, feminine cosmetics hair plucking device, similar concept

EP-A-0 101 656 claimed subject-matter: Apparatus for hair removal

US-A-2 496 223, linear spring, poultry plucker, similar concept

CH-A-268 696; rotating spring; no motor means

Teaching/combination from the prior art, common general knowledge

F1, F2: characterizing portion; distinguishing technical features; A: (qualitative/quantitative) activity, effect, property, function; M: preamble; prior art features in the same or similar technical field;
**Graphical Decision T 754/89 (Epilady # 2 problem)**

**US-A-4 079 741**: closest prior art (similar purpose, most technical features in common)

**EP-A-0 101 656 claimed subject-matter**: Apparatus for hair removal

**CH-A-268 696**: rotating spring; no motor means

**US-A-2 496 223**: linear spring, poultry plucker, similar concept

**Teaching/combination from the prior art**

**F1, F2**: characterizing portion; distinguishing technical features; **A**: (qualitative/quantitative) activity, effect, property, function; **M**: preamble; prior art features in the same or similar technical field;
Graphical representation of novelty (rendering structural/technical features)

Closest prior art (similar purpose, most technical features in common)

Replacement

Addition (combination)

Deletion

Selection, Overlap

F1, F2 (red) : distinguishing structural/technical features; (green) triangles A: activity, effect, property, function, (blue) rectangles: common technical features
Some **consequences** to keep in mind or what did we learn?

- **Novelty**: - *direct* disclosure, technical **features**
- **Inventive step**: - *indirect* disclosure, equivalents/analogues/modifications; technical **effects/activities/properties/functions**

- correlation/separation of (technical) **features** (novelty) <=> (technical) **effects** (inventive step)
- technical problem is a **parameter** of the PSA (e.g. more/less) ambitious, further/alternative)
- **PSA: mandatory** for search and examination => limitation of the number of documents
- PSA opens a **dialogue** with the Applicant inviting him to take position (parameter: problem)
- being too **generous** for inventive step will lead to an increase in the **number** of trivial patents
- granting too minor developments (**trivial patents**) might lead to a lack of credibility of the patent system
Some conclusions

A graphical representation of the PSA allows

• standardisation (independent from any personal knowledge)
• reproducible, expert, quick, reliable assessment
• being abstract the visual formalism allows a nearly objective and expert assessment of inventive step (in chemistry (SAR/LFER is PSA))
• graphical verification/representation as visual supplement of the text
• generalisation of structural/functional => technical features => general application in all fields meeting the graphical novelty approach
• quick visual check for identification of a trivial patent possible
Publications:

- J. Stellmach, CIPA Journal 38 (10), 674 (2009)
- J. Stellmach, Prop. Ind. 8, 21 (2009)
- J. Stellmach, Mitt. 98, 542 (2007)
- J. Stellmach, Prop. Ind. 4, 26 (2006)
- J. Stellmach, GRUR Int. 54, 665 (2005)
- J. Stellmach, Mitt. 98, 5 (2007)
Thank you for your attention!

- Questions ????