On Patentability of Inventions Facilitated by TRIZ Methodology

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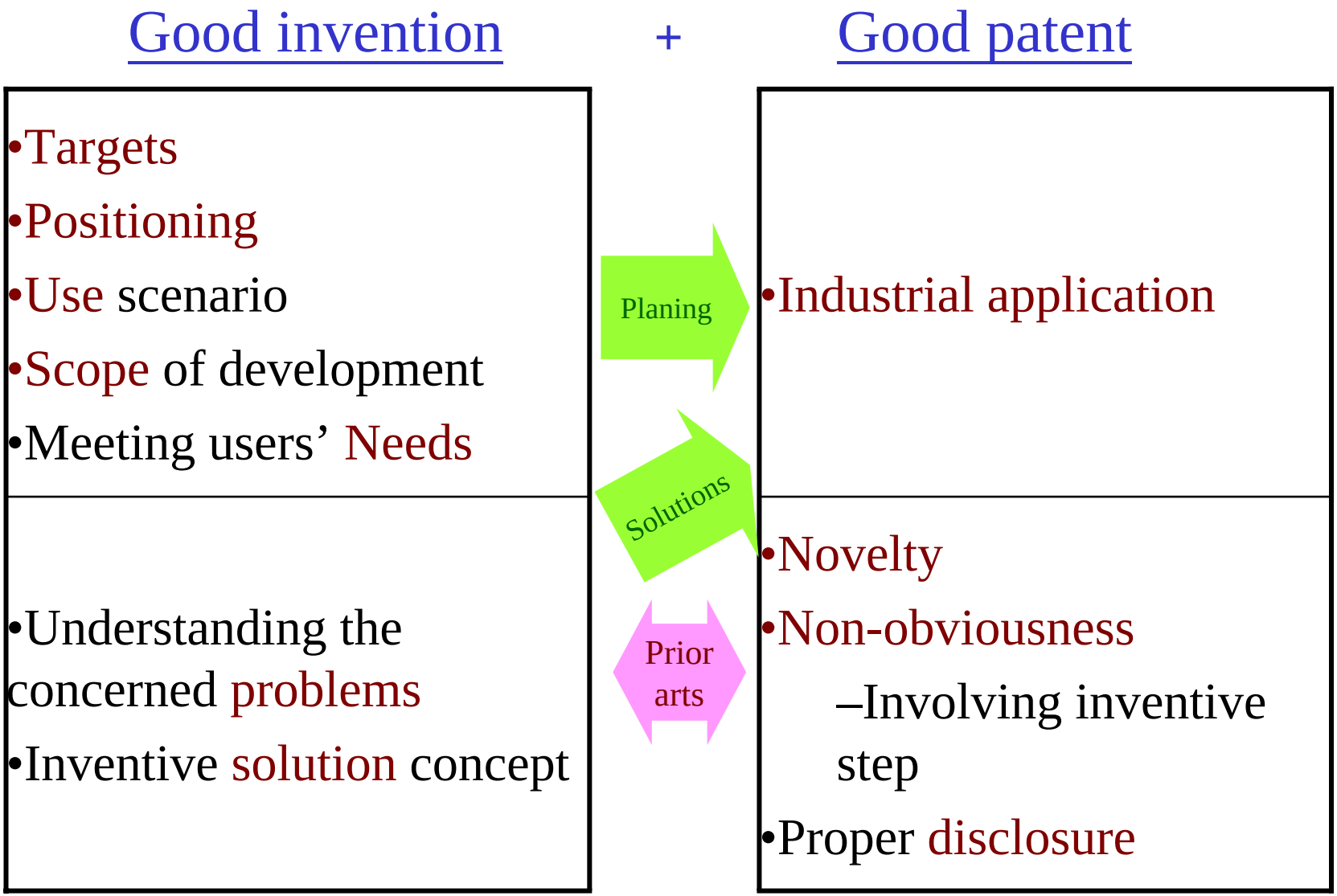
- Prior arts and Invention
  - A discrepancy between invention and patent application
  - Prior art practice and TRIZ thinking
  - Prior art issues in invention and prosecution process
  - Objective of this study
- Case study:
  - problems and existing solutions
  - examining the patentability of a similar concept
- Observation and suggestion

Failures in invention and prosecution

Seven deadly sins of the inventor	Invention Process	Prosecution Process
1. The invention is more complex than the problem merits.	Trivial invention	
2. The invention is not kept secret until the date of filing.		Disclosure
3. The invention isn't new.		Not novel, or too obvious
4. The inventor hasn't fully considered the problem.	Problem not solved	
5. No-one wants it.	No market	
6. An invention is safer if it's kept secret.	Know-how	No protection
7. The inventor has an unrealistic idea of the value of his invention.	Over-estimated value	

A discrepancy between invention and patent application



Prior art practice and TRIZ thinking

Prior arts

- While there are many different grounds on which a patent can be invalidated, the most common one is that the invention is found to be **not novel** or **obvious** in the light of the **prior art**.
- As the of protection granted by a patent, this can only occur if the patent's claims are not novel or obvious.
- So, to get a patent invalidated, the first step is to locate documents that can be considered "**prior art**" against the patent's claims.
- **Prior art** basically means any disclosure of the contents of a claim, prior to the application for patent.

When is something prior art against a patent? http://www.iusmentis.com/patents/priorart/

Types of Prior art

- Prior Invention:
  - 102(a)
- Accessible to the Public for a Year:
  - 102(b)
- Prior Application:
  - 102(e)
- **Obviousness**:
  - 103
- Double Patenting:
  - 101 and Obviousness-Type

*FINDING PRIOR ART FOR AN ISSUED PATENT - Daniel Ravicher (Pubpat)

An example: How to determine if an invention is non-obvious?

Closest prior art
A bicycle without a reflector

Technical problem:
enhance the visibility of the driver during dark weather conditions

Further prior arts
A car
An airplane
Signal towers

The common solution:
would be to add a headlight to signal the presence of the object.

PHOSITA
A bicycle With a headlight

PHOSITA:
Following the common approach, a skilled person would add a headlight to the bike.

Non-Obvious!

The Invention
A bicycle with a reflector

This solution:
by adding a reflector which allows other road participants to see the driver on his bike in the dark due to the light reflecting on it.

Differences between US and European
http://www.iusmentis.com/patents/uspto-epodiff/

An example: How to invalidate an invention with prior arts?

Closest prior art
A bicycle without a reflector

Technical problem:
enhance the visibility of the driver during dark weather conditions

Further prior arts
A traffic panel
A safety workwear
A jogging shoe

The common solution:
would be to add a reflective tape or panel to signal the presence of the object.

PHOSITA
A bicycle with a reflective panel

Obvious!

The Invention
A bicycle with a reflector

This solution:
by adding a reflector which allows other road participants to see the driver on his bike in the dark due to the light reflecting on it.

PHOSITA:
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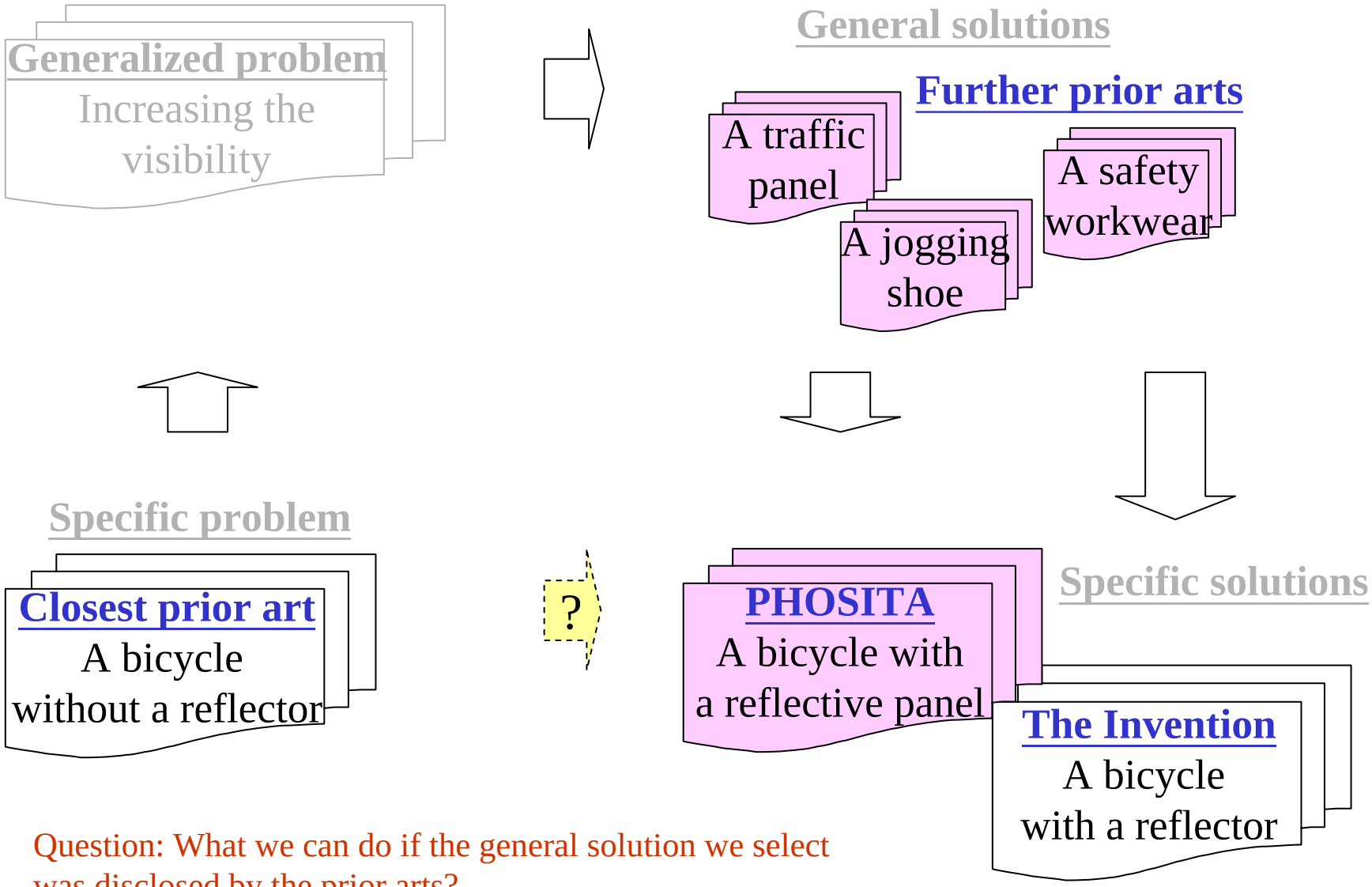
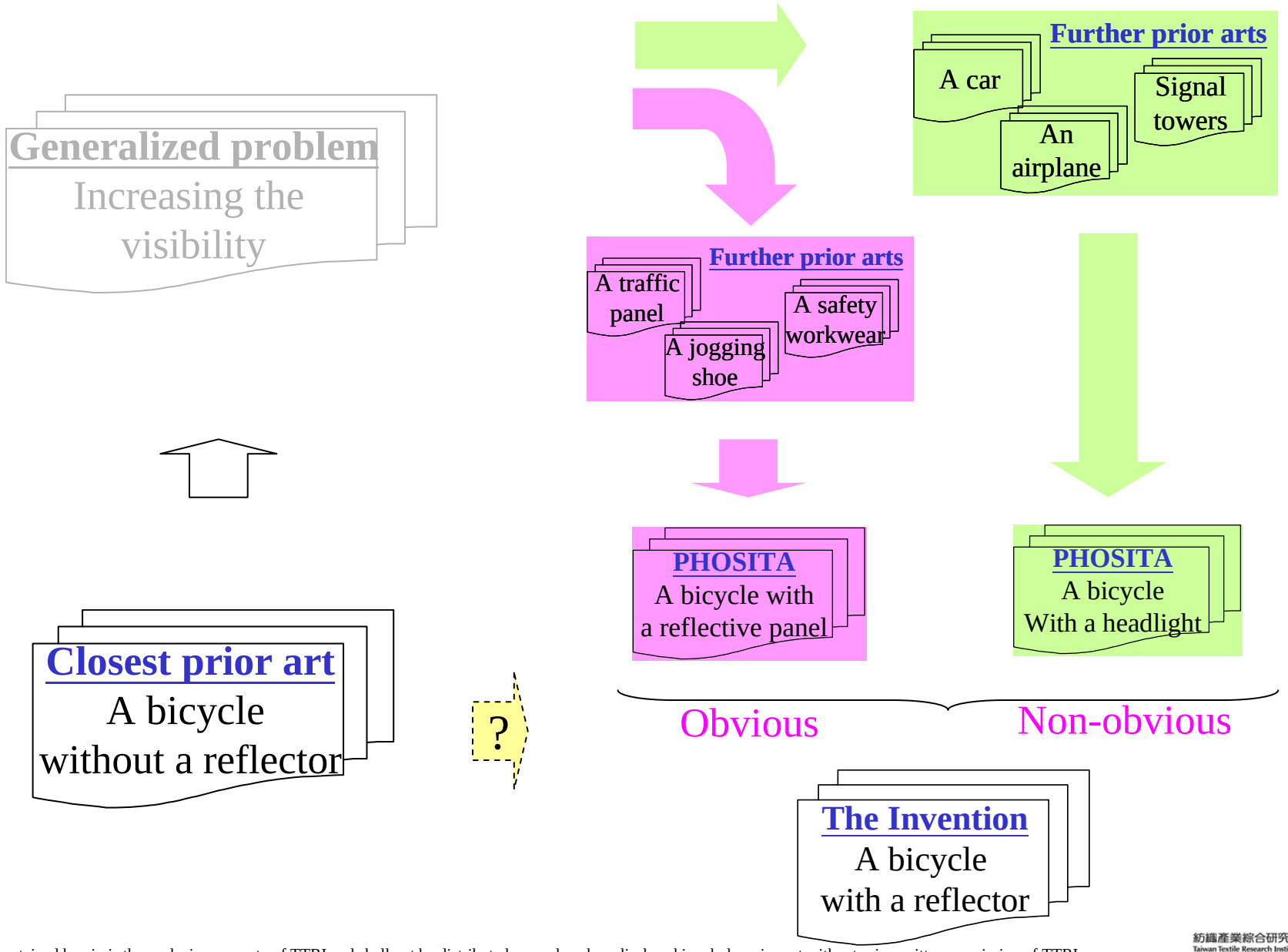
Then, have a look at TRIZ methodology!



Question: What we can do if the general solution we select was disclosed by the prior arts?

Question: How to avoid the prior arts in advance?

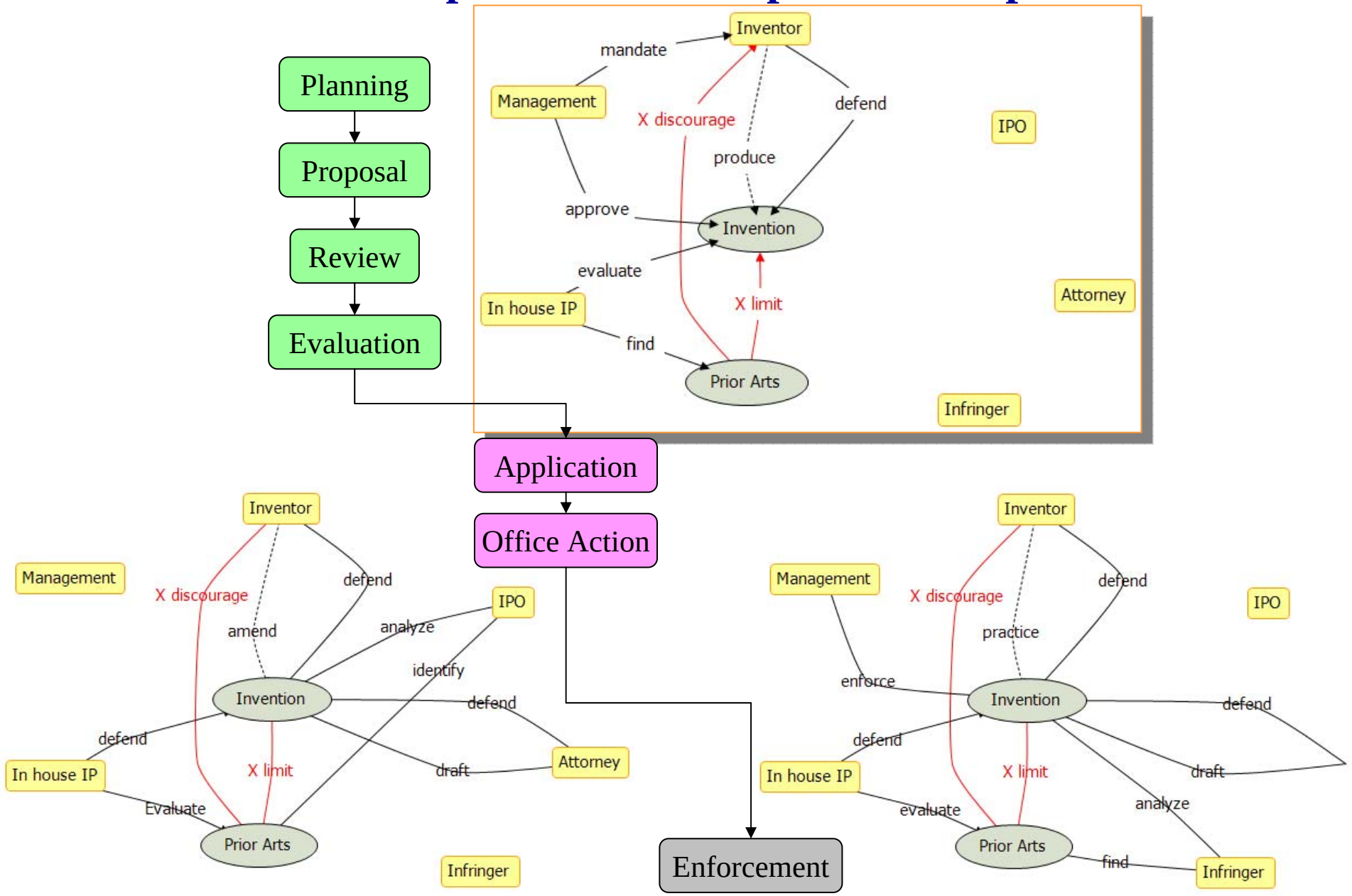


Prior art issues in invention and prosecution process

TRIZ viewpoints on Inventiveness

- Philosophy
  - Suggestions from other disciplines
    - Same problem, solved other place
  - Inventive principles
  - Ideality, resource, contradiction, functionality
  - Evolution
- Tools
  - Contradiction + Inventive principles
  - Functional analysis
  - Su-Field + Standard solutions
  - Su-Field + Scientific effects
  - Patterns of evolution
  - …
- Process
  - QFD + Matrix + IP
  - FA + Trimming
  - FA + Matrix
  - FA + Su-Field
  - Ariz
- Hints
  - TRIZ is very efficient to solve inventive problems which contain contradictions and not solved yet!
  - But, how to determine if a problem is solved somewhere else?

The roles of prior arts in the prosecution process



Objective of this study

Prevention/ Facilitation		Prosecution	
		Success	Failure
Invention	Success	1	2
	Failure	3	X

How to:

- get patentable ideas w/o (active) aid of IP engineers
- get patentable ideas w/ aid of TRIZ methods/ process

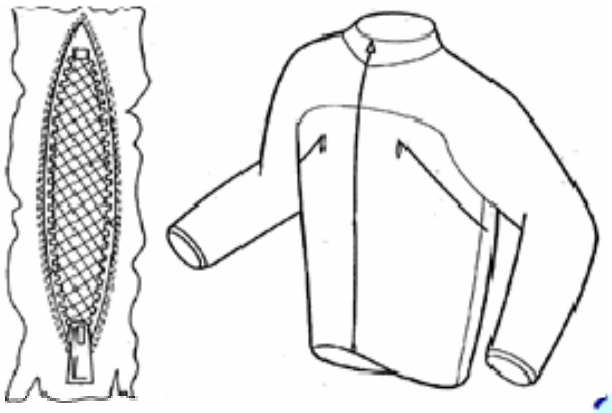
➔ Engineers could invent and get patents by themselves

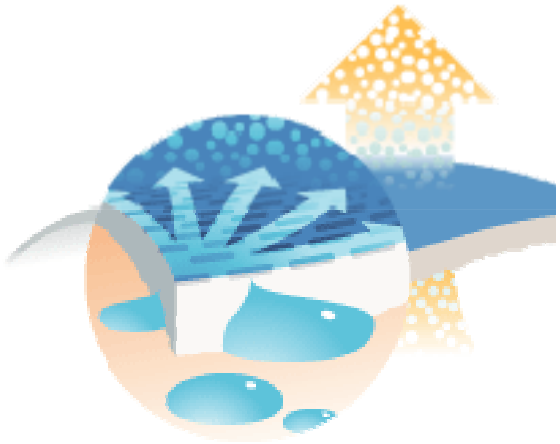
➔ Get patentable ideas w/o prior arts assessment

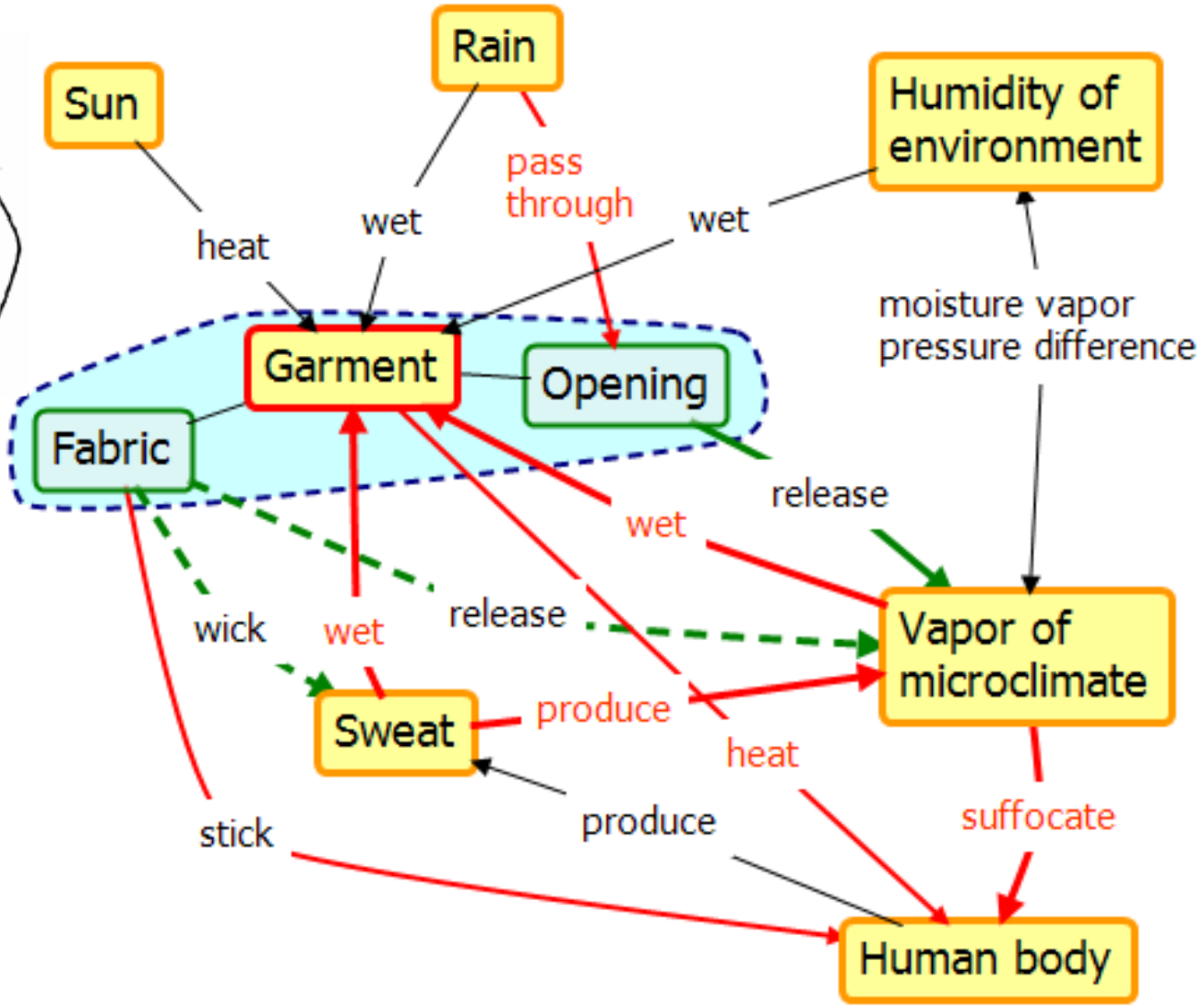
Garment design and environment

A case study

Effects of environment and microclimate on a clothing system







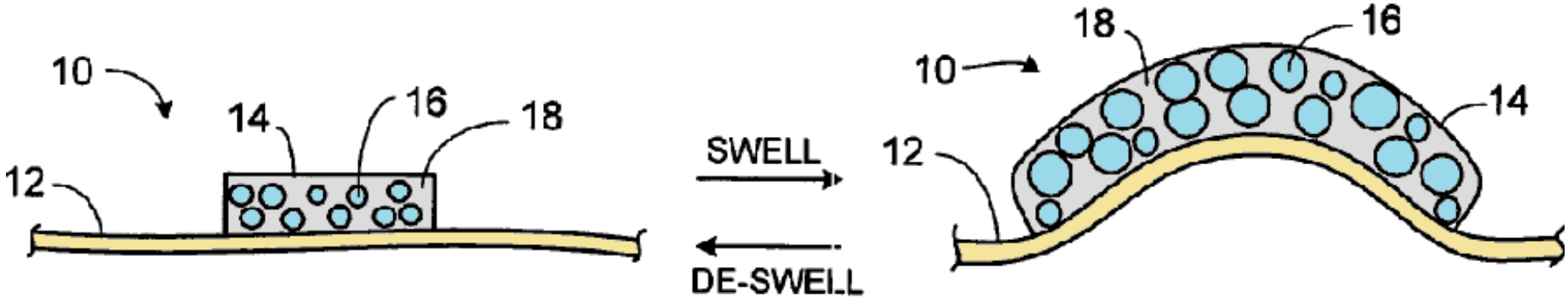
Problem Statement

- Technical Contradiction
  - The opening will release the moisture, but the rain will leak into the garment
  - The fabric could absorb the sweat, but the wetted inner surface will stick on the skin
  - The garment could protect the body from cold, but the enclosed system will suffocate the wearer
- Physical contradiction
  - We need opening while it's hot, but no opening while it's raining
  - We require a fiber that absorbs water and not absorbs on the skin
  - We want a garment that contacts and not contact the human body
- S-Field
  - The fabric wicks inefficiently the sweat
  - The fabric releases inefficiently the vapor of microclimate
- Trimming
  - Could we design a garment without opening, that could keep the human body from being wetted from outside, but still being kept dry and warm inside?
- …

Investigation on the patentability of a similar concept

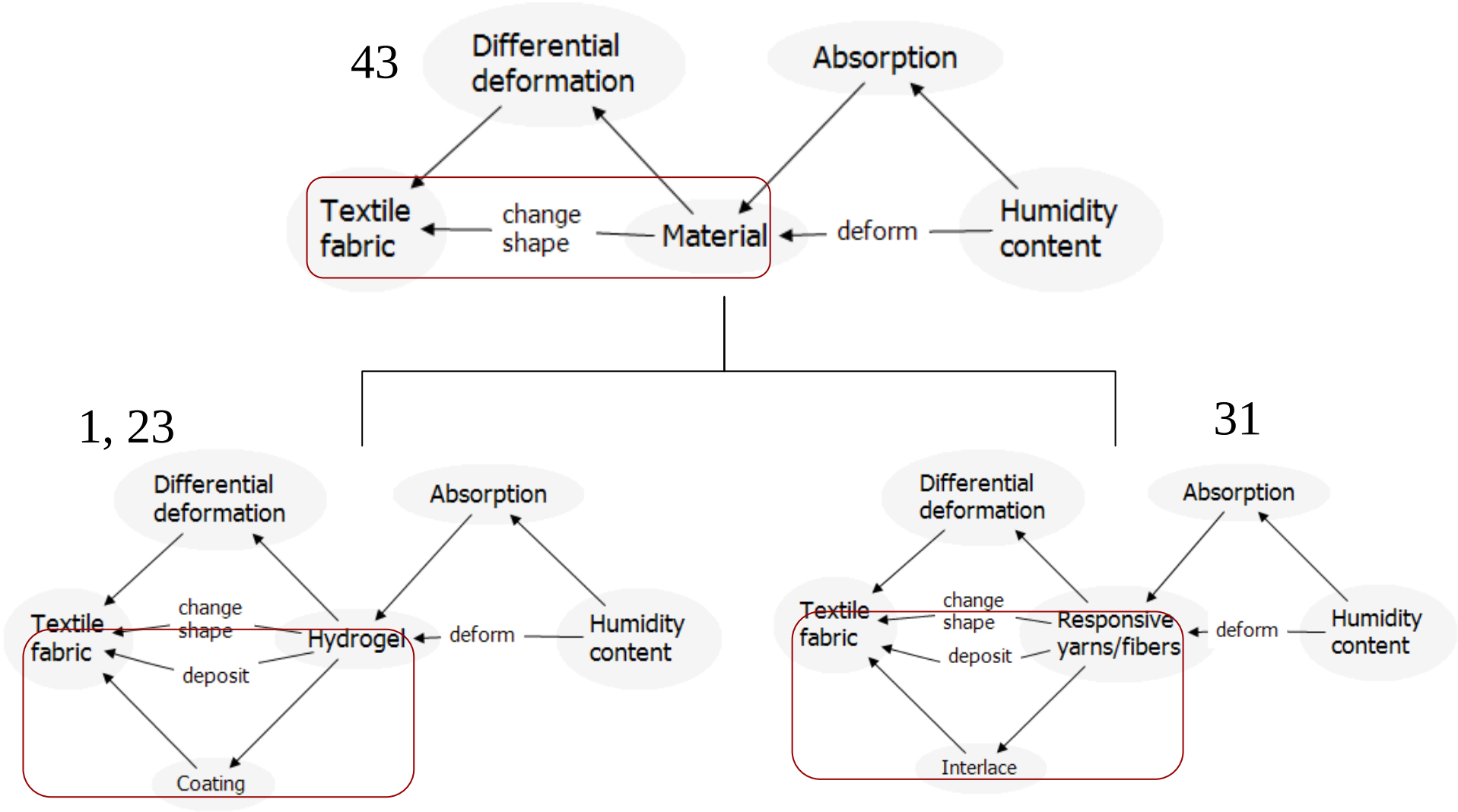
MMI's Patent

EP01894482A2 (MOSHE ROCK)
Temperature and moisture responsive smart textile

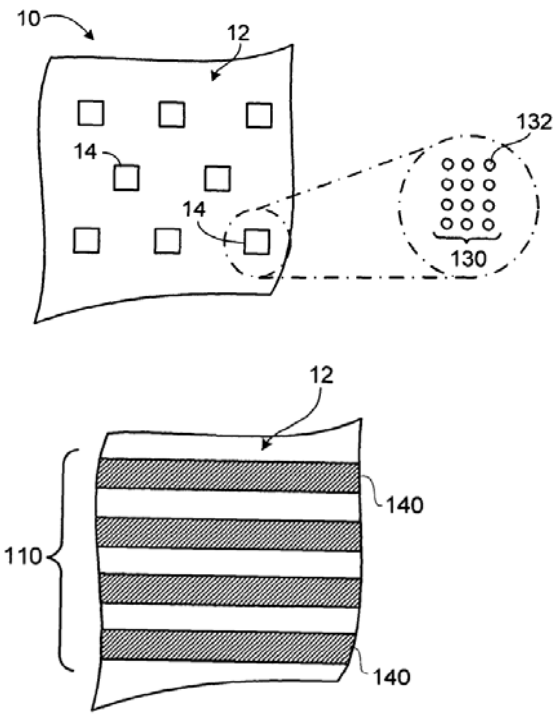


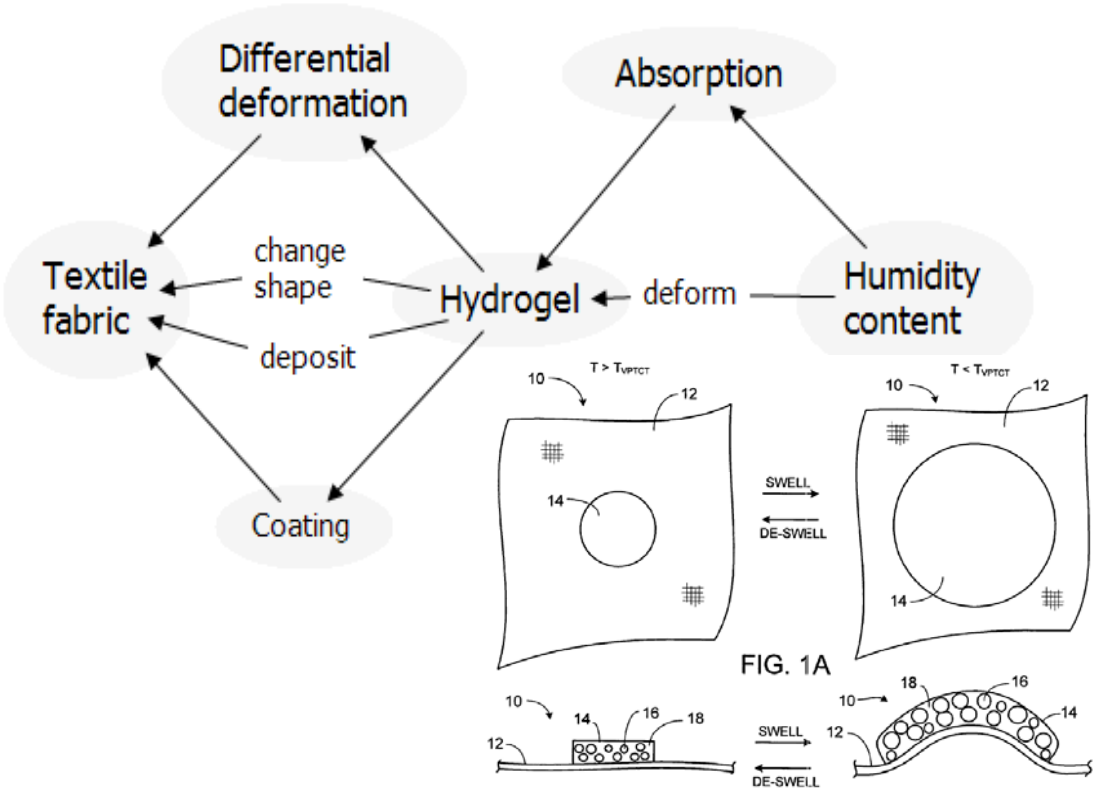
- A textile fabric (10) includes a smooth surface (12) with one or more regions having a bound coating of hydrogel (14) exhibiting expansion or contraction in response to change in relative humidity or exposure to liquid sweat or a combination thereof, adjusting insulation performance, air movement, and/or liquid management of the textile fabric 10) in response to ambient conditions.

Overview of claims structure



Independent claims (1, 23) & Su-Field analysis





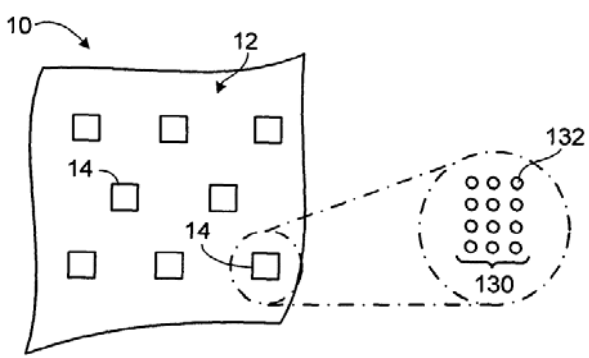
1. **A textile fabric** having a smooth surface with one or more regions having a bound coating of hydrogel exhibiting expansion or contraction in response to change in relative humidity or exposure to liquid sweat or a combination thereof, adjusting insulation performance, air movement, and/or liquid management of the textile fabric in response to ambient conditions.

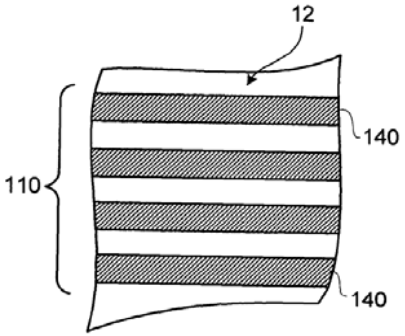
23. **A method of forming a temperature and moisture responsive textile fabric element** for use in an engineered thermal fabric garment, the method comprising: combining yarns and/or fibers to form a continuous web;

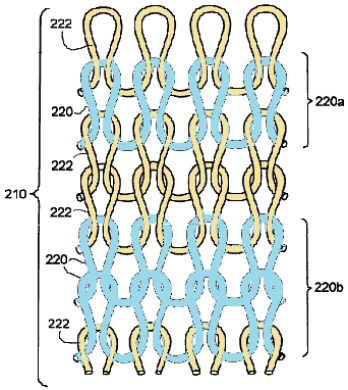
finishing the continuous web to form at least one smooth surface; and

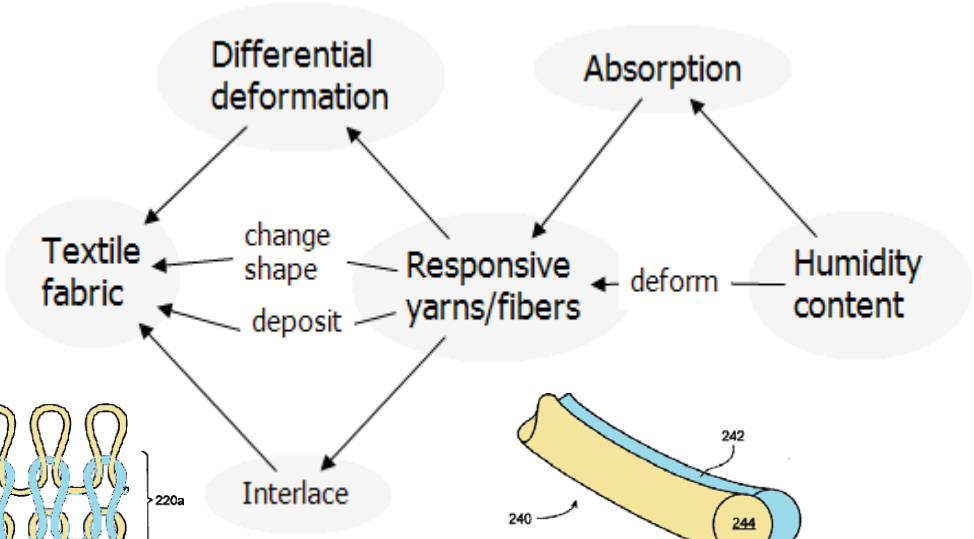
depositing a coating of hydrogel on the smooth surface of the continuous web, the hydrogel exhibiting expansion or contraction in response to change in relative humidity or exposure to liquid sweat or a combination thereof, adjusting insulation performance, air movements, and/or liquid management of the textile fabric in response to ambient conditions.

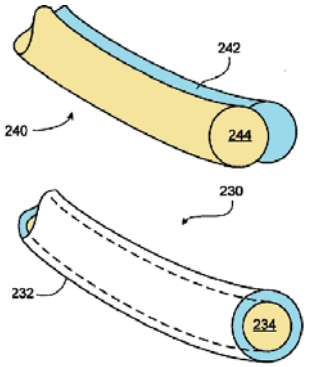
Independent claims (31) & Su-Field analysis





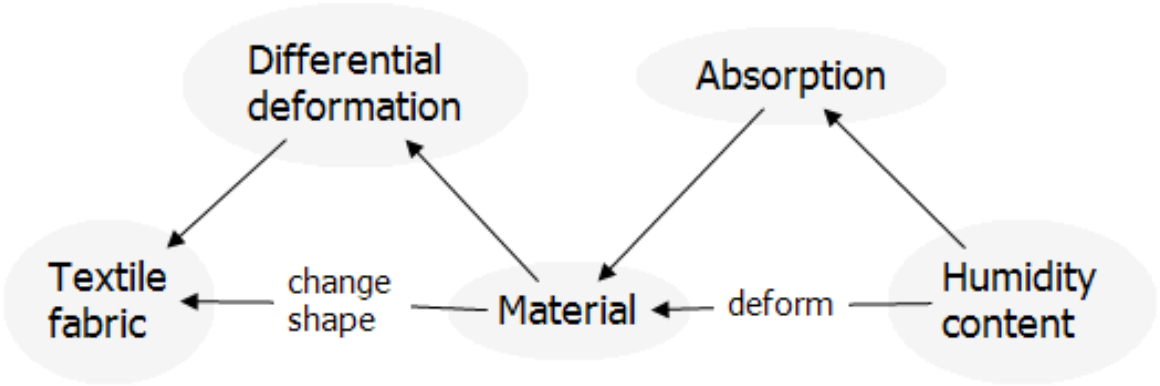






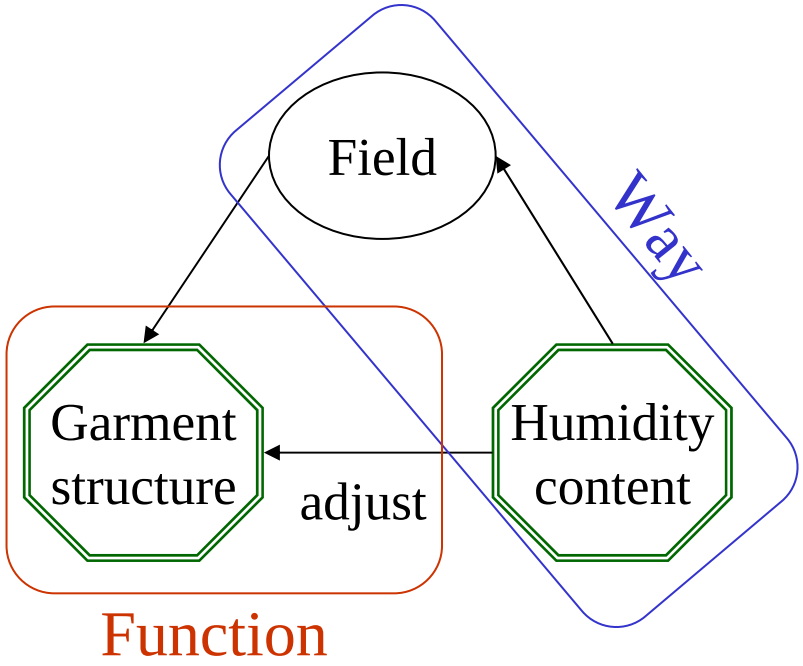
31. **A textile fabric** comprising: a plurality of interconnected yarns and/or fibers together forming a fabric body and including a plurality of responsive yarns and/or fibers integrated into the fabric body in spaced relation to each other, wherein the responsive yarns and/or fibers exhibit expansion or contraction in response to change in relative humidity or exposure to liquid sweat or a combination thereof, adjusting three dimensional geometry, insulation performance, air movement, and/or liquid management of the textile fabric in response to ambient conditions.

Independent claims (43) & Su-Field analysis



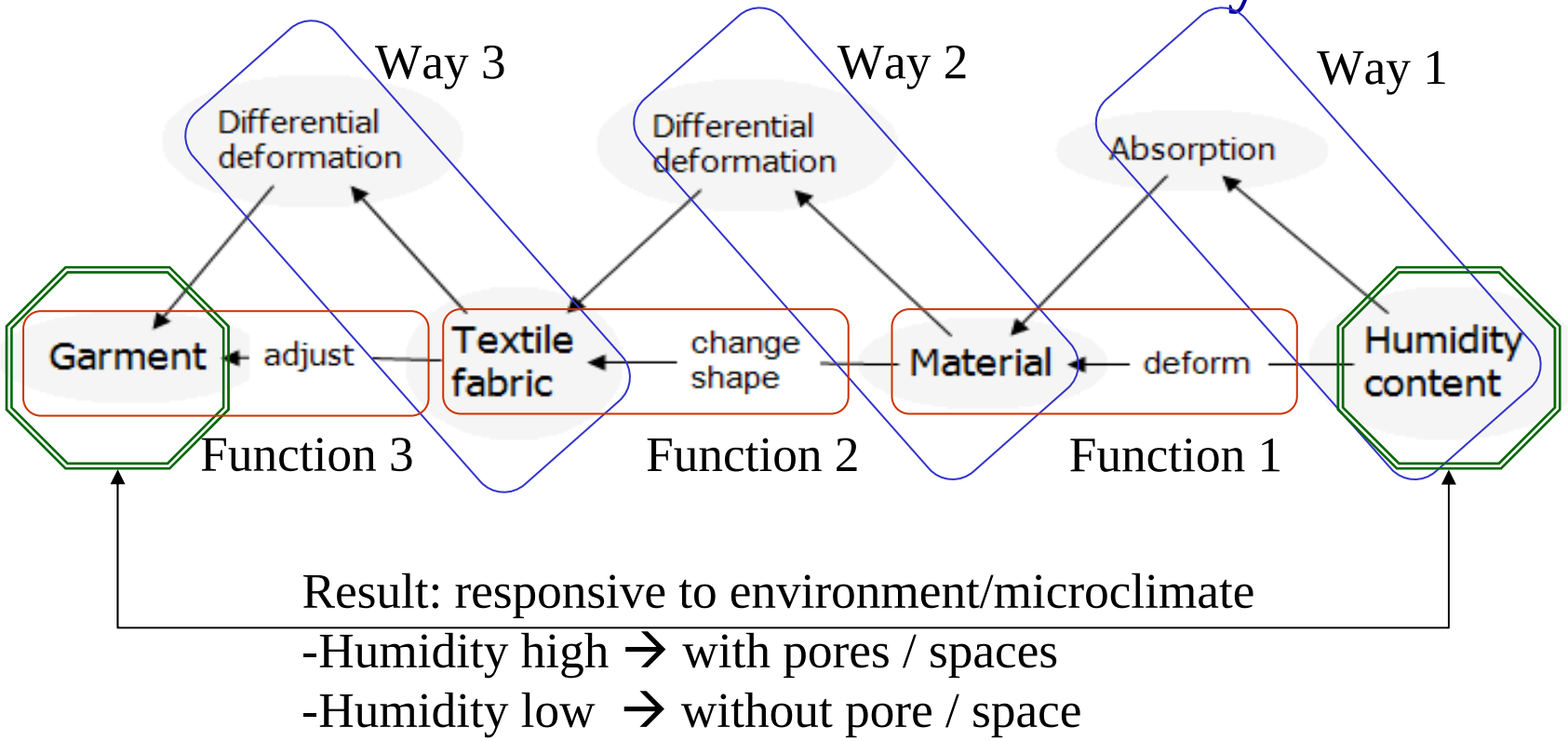
43.A textile fabric including a material adapted to expand and/or contract in response to a change in relative humidity and/or exposure to liquid sweat, the material being arranged in the fabric such that expansion and/or contraction of the material results in a change in one or more properties of the fabric, for example three dimensional geometry, insulation performance, air movement and/or liquid management.

Similarity between Way-Function-Result approach and Su-Field analysis

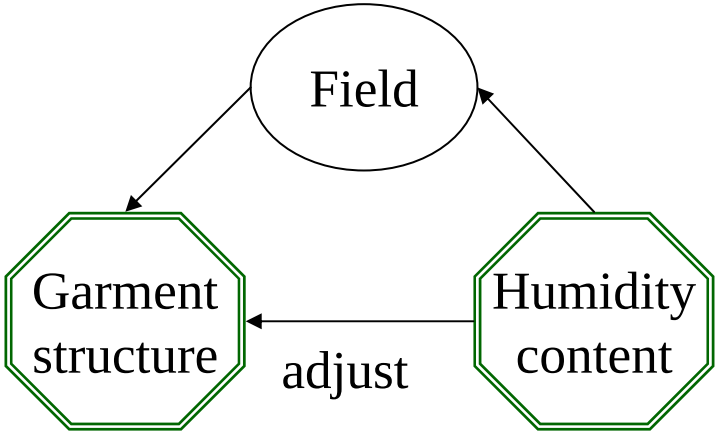


Way-Function-Result Approach	Su-Field Analysis
Way: providing a field	Humidity-induced swelling/contracting force
Function: performing a function	Adjust garment structure
Result: obtaining a wanted effect	A garment that responds to the environment/microclimate

An invention is the combination of many effects



Result: responsive to environment/microclimate
-Humidity high → with pores / spaces
-Humidity low → without pore / space



Search report provided by EPO

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 3370

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2002/132540 A1 (SOERENS DAVE [US] ET AL) 19 September 2002 (2002-09-19) * claims 21,25-27 * * paragraphs [0063], [0106], [0111], [0114], [0121] *	1,23,31, 43	INV. A41D31/00 A41D13/002 D04B1/00
X	WO 2004/011046 A (KIMBERLY CLARK CO [US]) 5 February 2004 (2004-02-05) * page 30, lines 11-31 * * page 31, lines 25-32; figures 4-8 *	1,23,43	
Y	US 2003/208831 A1 (LAZAR ROBERT P [US] ET AL) 13 November 2003 (2003-11-13) * claims 1,8,11,12; figures 1-5 *	1,23,43	
Y	US 6 241 713 B1 (GROSS JAMES R [US] ET AL) 5 June 2001 (2001-06-05) * column 2, line 38 - column 3, line 18 *	1,23,43	
Y	US 6 927 316 B1 (FARIES JR DURWARD I [US] ET AL) 9 August 2005 (2005-08-09) * column 1, lines 20-25 * * column 4, lines 24-36 * * figures 1-3 *	1	TECHNICAL FIELDS SEARCHED (IPC) A41D D04B
Y	GB 2 403 146 A (JOHNSON & JOHNSON MEDICAL LTD [GB]) 29 December 2004 (2004-12-29) * claims 1,2 *	1	
A	US 2003/010486 A1 (SERRA MARCO [US] ET AL SERRA MARCO [US] ET AL) 16 January 2003 (2003-01-16) * paragraphs [0017], [0032], [0033]; figures 2a,2b,2c *	1,23,43	
P,A	EP 1 803 844 A (TEIJIN FIBERS LTD [JP]) 4 July 2007 (2007-07-04) * the whole document *	1,23,31, 43	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 March 2008	Dreyer, Claude

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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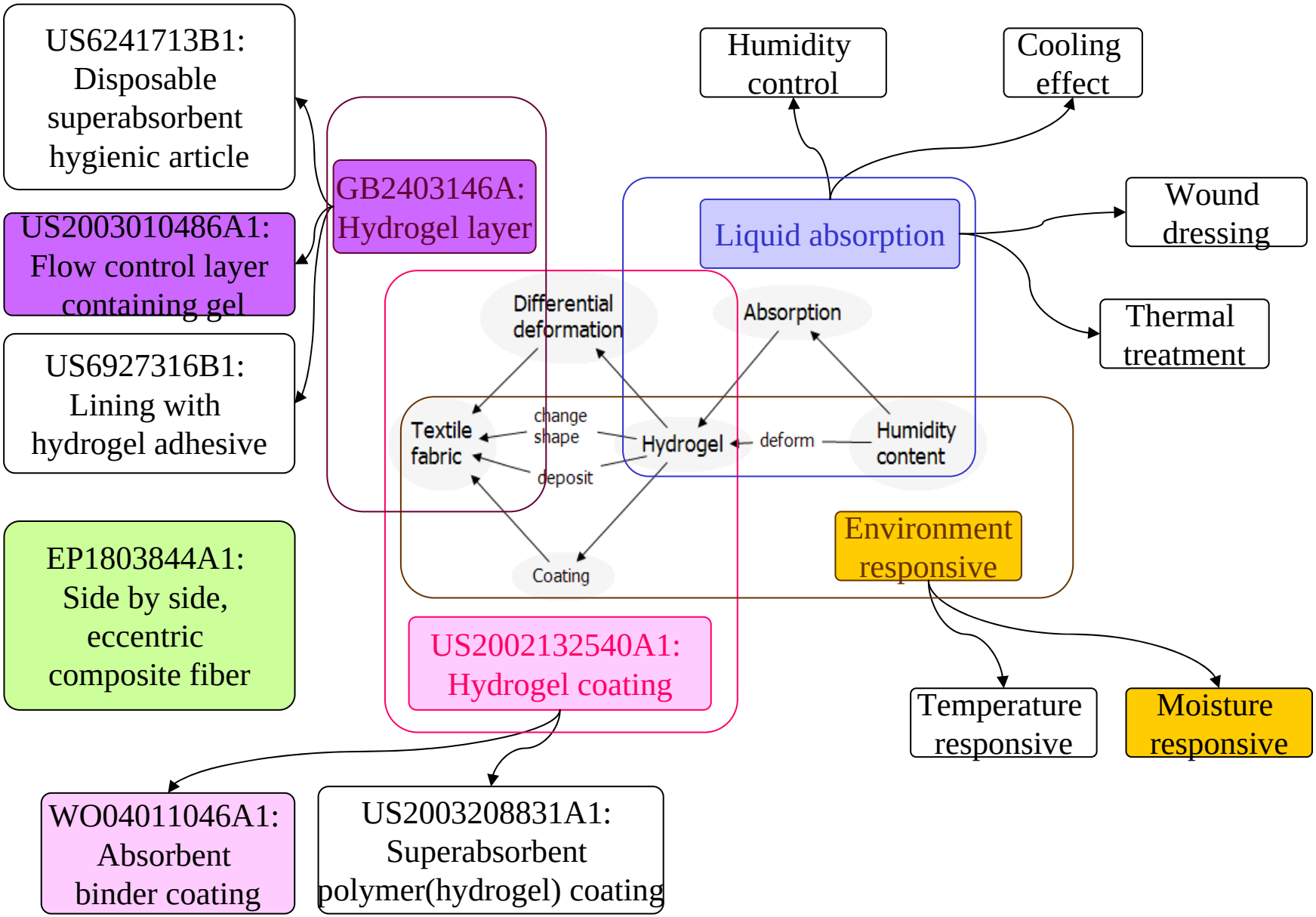
Selected prior arts

- US2002132540A1
- WO04011046A1
- US2003208831A1
- US6241713B1
- US6927316B1
- GB2403146A
- US2003010486A1
- EP1803844A1

Prior arts relevance of patent application EP01894482A2



Observation & suggestion

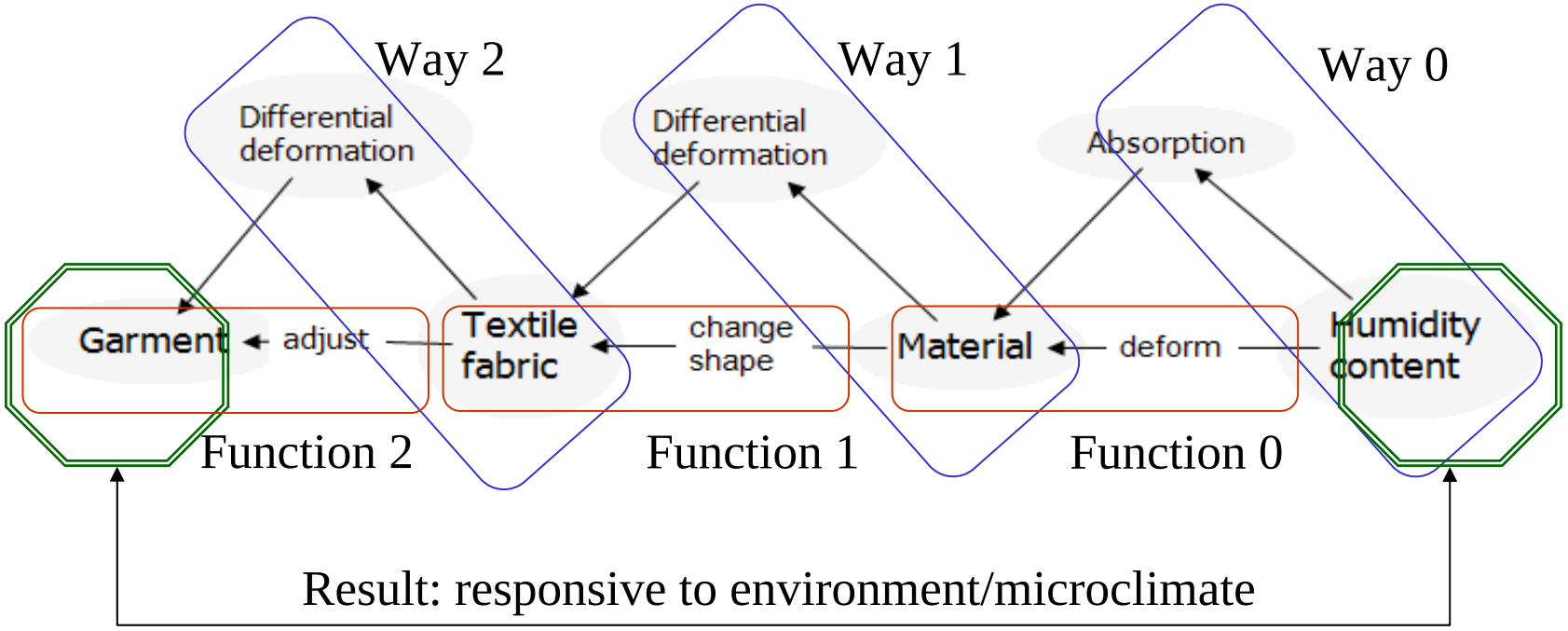
Observation on the patent application (1)

- As indicated in above slide, the claimed scope (claims 1, 23) of this invention will be limited by combination of the disclosed prior arts, which means
  - The idea of forming a hydrogel layer by coating on a textile substrate cannot be taken as patentable.
  - The adoption of humidity responsive material on a textile article cannot be taken as patentable.
- EP1803844A1 further discloses the characteristics of claims 31, which means
  - Even with the idea of forming a hydrogel layer by knitting/weaving a hydrogel yarns, it's taken as obvious.
- By examining the dependent claims, the patentable claims would be the deposition patterns of hydrogel on the textile, which will facilitate the adjustment of the garment.

Observation on the patent application (2)

- In summary
  - The concepts claimed in this invention are all disclosed by the cited prior arts, which will probably influence its patentability.
  - The cause of this conclusion may be due to
    - Simply adopting the existing principles/concepts
    - Simply combing the existing elements/systems
    - The limitations are from usual processes/materials (coating, binding, fabric forming, co-extrusion…) which cannot be taken as involving an inventive step
  - This patent application could be granted because of its further limitation of the design of hydrogel-deposited garment, which stands for a new way to adjust the garment structure in accordance to the environment/microclimate changes.

Observation/Suggestion



More design based | More principle based

Ⅰ Inventive step or Minor modification

No ←→ inventive step Ⅱ

Combination of > 2 prior arts vs. Ⅰ + Ⅱ → Ⅲ New way?

Suggestions & conclusion

- We can never predict if the prior arts exist until the invention appears, but
  - By understanding the mechanism of prior art in the prosecution process, we could always limit the claim scope then, and get the maximal protection by the patent.
- Using TRIZ for inventive solutions cannot assure a patentable application
  - Avoiding the simple combination or adoption of existing principles, effects and elements in your invention.
  - If necessary, non-trivial combination of more than two existing concepts will be allowable.
  - If the adopted functions and effects are already disclosed in the prior arts, try to get principle based designs and make it in TRIZ ways.
- Using TRIZ to decompose/analyze your invention, and execute the prior arts searches accordingly, of course, before your patent application.

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