HOFFMANN EITLE

The EPO Referral G1/19, software simulations and going beyond the physical world

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JIPA 東西部会
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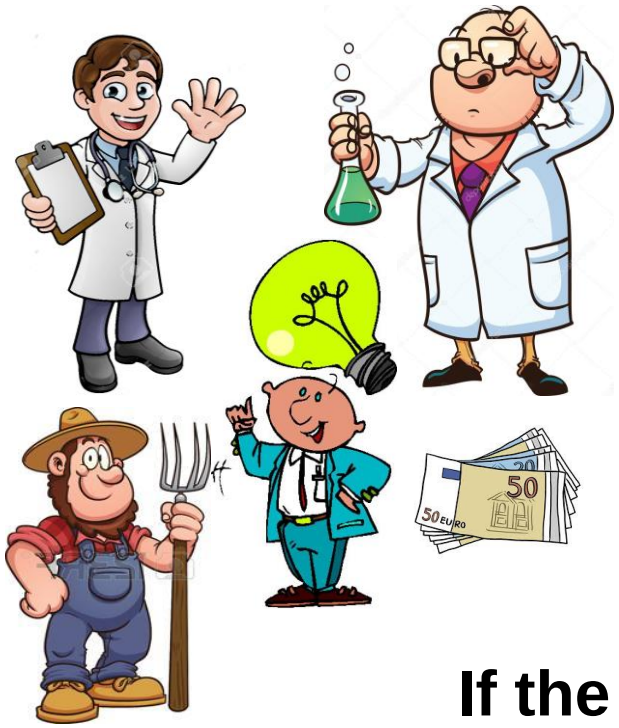
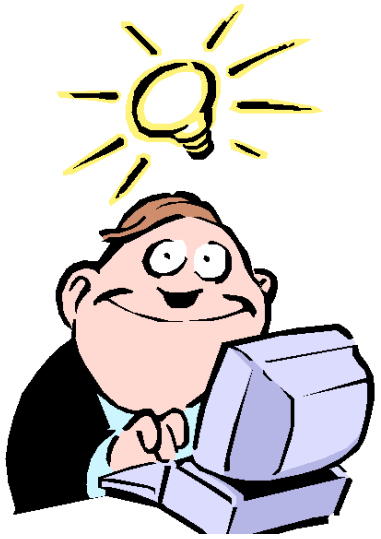
- Software patentability and new technologies
- Software simulators: Case development over time
- The “Infineon Condition” (I.C.)
- Criticism of the I.C.
- G1/19: Invention and main issues
- Oral proceedings of 15 July: Summary of arguments
- Possible outcome(s) of G1/19

WHERE IS THE INVENTION? TECHNICAL CONSIDERATIONS





If the <u>software</u> implementation goes beyond the mere coding: The feature may be technical and contribute to inventive step

EPO grants patents to technical inventions

$$(x+a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}$$

Level of abstraction increases,
inventions go beyond the physical world

Question:

Must an advantageous effect be produced within a physical object?

Patents are granted not only to tangible and physical inventions:

Clipboard formats facilitating exchange of data amongst programs

Claim 1 (simplified): Method in a computer system for performing data transfer

i) **selecting data** that is not a file for a data transfer operation

ii) converting selected data and **storing** it as a **data object**,

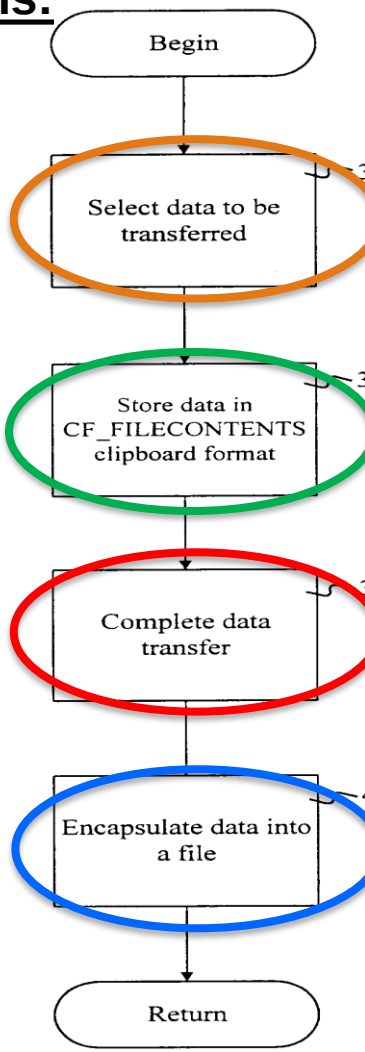
iii) using clipboard formats to hold both the **data** and a file descriptor holding descriptive information about the data,

iv) **completing data transfer** by pasting the data of the data object to a data sink,

vi) encapsulating the data object into a file.

Invention allows transferring data in a non-file format like other files

--- No operations on physical objects! ---



→ **Invention is technical!**

→ **Effect is not necessarily achieved by modifying a real or physical object**

→ **But, technical considerations about functioning of computer data necessary to conceive the invention.**

GOING BEYOND PHYSICAL OBJECTS: SIMULATIONS AND AI

Let us consider inventions going further beyond physical objects:

- Simulating and modeling reality
  e.g. electronic circuits, train stations, biotech processes, weather, etc.

- Using AI to automate human activities
  e.g. autonomous driving, manufacturing, etc.

Can a patent be obtained?

Case law development on SW simulations

T1227/05, Infineon: patentable if the „Infineon condition“ is met

Some Boards casted doubts the „Infineon condition“

G1/19: The Enlarged BoA is asked to clarify the matter

Note: The Enlarged Board of Appeal (EBoA) is the EPO highest instance, entrusted with ensuring uniform application of the law and responding to questions relating to points of law of fundamental importance

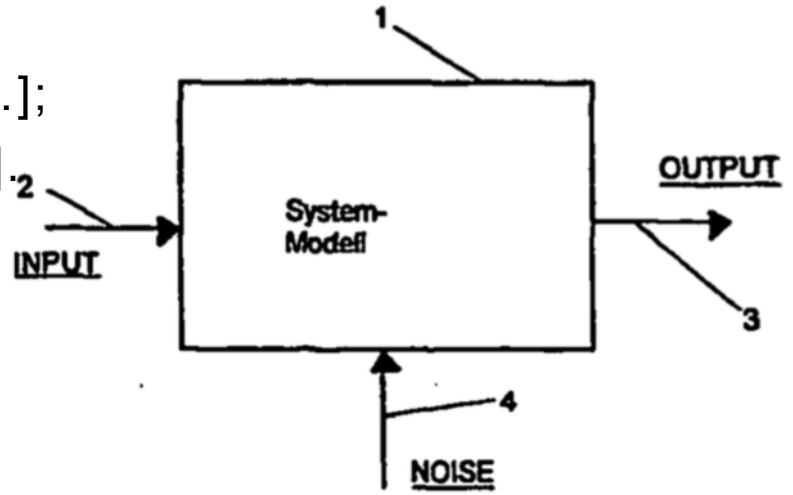
T1227/05, Infineon:

Simulating electronic circuits,
a tool for the electronic engineer
to design (and then produce) new circuits

Claim 1 of T1227/05 (Infineon)

Computer-implemented method for the **numerical simulation of a circuit** with a step size δ which is subject to 1/f noise, wherein:

- the **circuit is described by a model** (1) featuring input channels (2), noise input channels (4) and output channels (3);
- […] input channels (2) and the output channels (3) […] described by […] equations;
- an output vector (OUTPUT) is calculated for an input vector (INPUT) […] and for a noise vector (NOISE) […];
- [steps for generating the noise vector].



In *Infineon*, the Board found that:

- „Simulation **of a circuit subject to 1/f noise**“ **limits the claim to a technical purpose**; thus, claim is technical.

- Situation is **different** from:

  (i) „Method **for simulating, the method comprising**…“, or
  [it can be executed also **mentally**, thus not eligible]

  (ii) „Method for simulation of **a technical system**…“
  [it is **not clearly limited** to a technical purpose]

[continued, *Infineon*]

- „Simulation performs technical functions typical of **modern engineering work**. It provides for **realistic prediction** of the **performance of a designed circuit** and thereby ideally allows it to be **developed so accurately** that a prototype's chances of success can be assessed before it is built.”

- **Thus, computer assisted simulation of a circuit is technical.**

- Mathematical formulae in claim are not „as-such“: they serve the technical purpose of improving the simulation

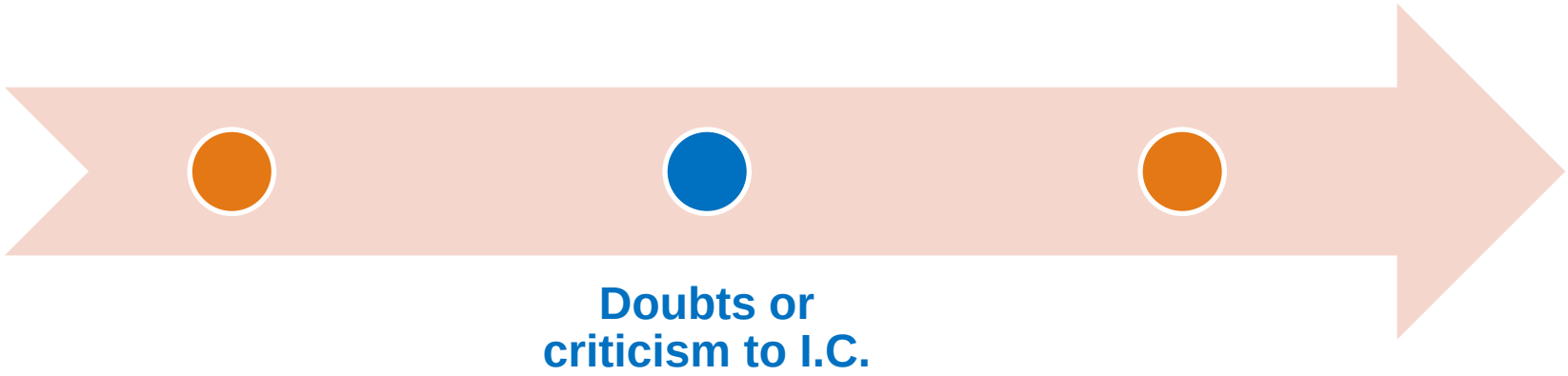
[continued, *Infineon*]

So far, widely accepted condition for being technical:

Claims eligible to protection
if limited to the simulation of
“an adequately defined class of technical items”.

This is a necessary condition for being technical, and we call it the “**Infineon condition**”.

Some Boards criticized the Infineon approach



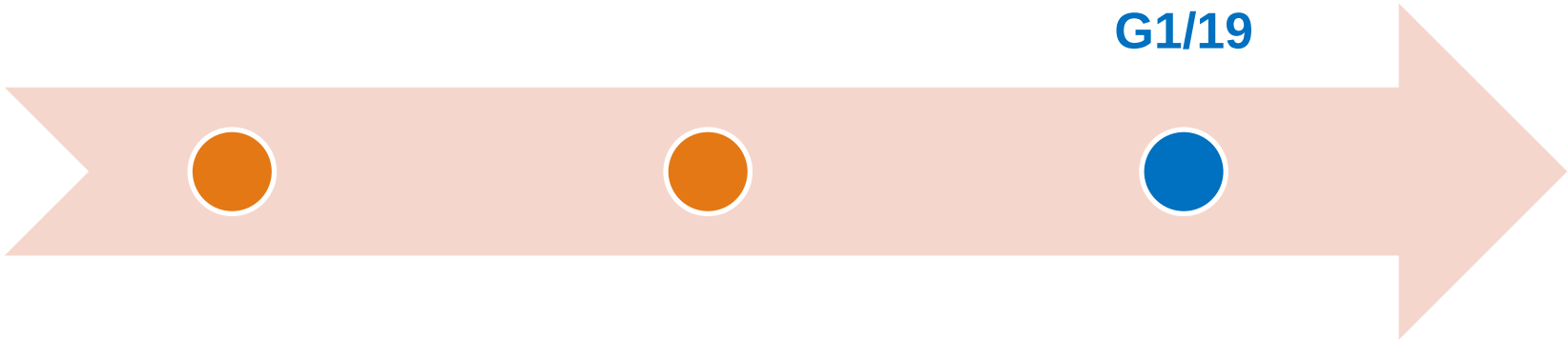
Under Infineon, things looks (quite) good… but:

- Certain Boards agree that the Infineon Condition is **necessary** to have technical character, but seem to **doubt** that this is also a **sufficient condition** (T1265/09, T53/09, T1630/11)).

- In particular, such decisions hint that a control or influence on a physical entity is required

- Additional conditions apply?

Case law development on SW simulations

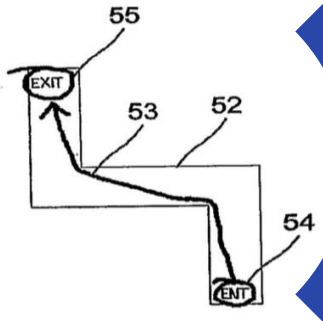


- *In January 2019, one Board of Appeal disagreed with the Infineon Condition*
- *G1/19 is pending, outcome expected in 2020*

THE INVENTION UNDERLYING THE G1/19 REFERRAL

The invention underlying the G1/19 case:

- A mathematical model of individual pedestrians and an algorithm for simulating their movement through an environment;
- A design system which performs the simulation.



MAIN PURPOSE:
Designing a venue such as a railway station or a stadium;

NO DETAILS!

OTHER PURPOSES
troubleshooting flow problems, operational management, setting and implementing safety standards and quality control

新宿駅
Shinjuku Station

For example:
simulating the operation of a new Shinjuku station before building it!

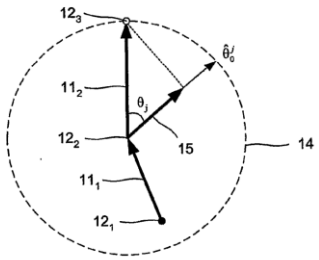
The invention underlying the G1/19 case:

- A mathematical model of individual pedestrians and an algorithm for simulating their movement through an environment;
- A design system which performs the simulation.

3-stage model and algorithm

1st micro-navigation stage

Attempt to determine preferred step/position



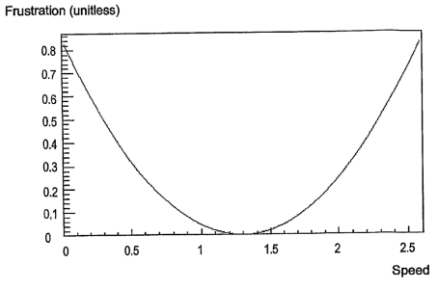
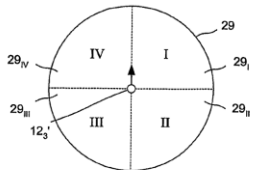
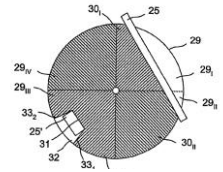


Fig. 5

2nd micro navigation stage

Determine subspace of movement





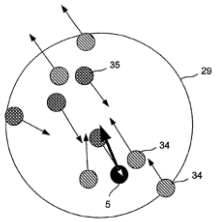


Fig. 17

Execute pedestrian step

Execute step based on sub-space

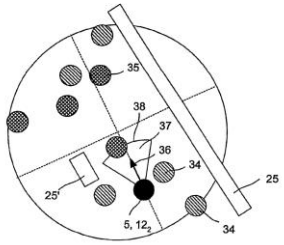


Fig. 18

CLAIMS COMPARISON: INFINEON VS REFERRALCASE

Infineon, claim 1:

Computer-implemented method for the **numerical simulation of a circuit** [...] wherein:

- the **circuit is described by a model** (1) featuring input (2), noise input (4) and output **channels** [...]
- an output vector is calculated for an input vector and for a noise vector.

Simulation

Circuit output is calculated

G1/19 Referral, claim 1 of MR

A computer-implemented method of **modelling** pedestrian **crowd movement** in an environment, the method comprising:
simulating movement of a plurali ty of pedestrians through the environment, wherein simulating [...] comprises:

[simulating steps]

Modeling

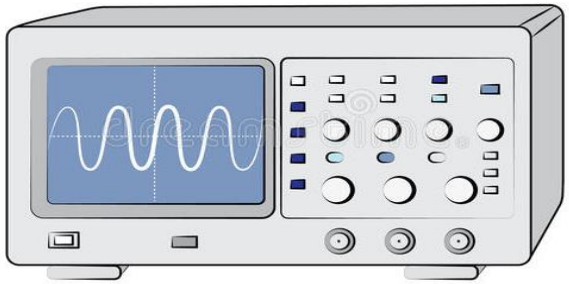
Steps simulating crowd movement

Strong similarities exist: In order to avoid case law divergences, questions referred to EBoA

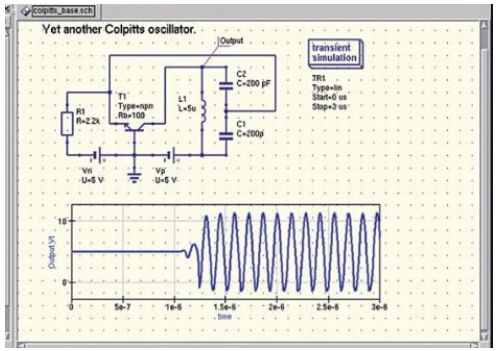
One criticism to the Infineon condition:

Although a computer simulation of a circuit or environment is an engineering (useful) modern tool, "it assists the engineer only in the cognitive process of verifying the design of the circuit [...] the cognitive process of theoretically verifying its design appears to be fundamentally non-technical".

A modern tool aimed at assisting man in cognitive/abstract activities would not be technical.



← Ok Not Ok? →



G1/19 THE DIRECT LINK WITH PHYSICAL REALITY, r. 11

- „In the Board's view, a technical effect requires, at a minimum, **a direct link with physical reality**, **such as a change in or a measurement of a physical entity**.”, r. 11.

- “decision G 2/07, reasons 6.4.2.1, stated that "[h]uman intervention, to bring about a result by utilizing the forces of nature, pertains to the core of what an invention is understood to be".”, r. 11.

- However, the Board seems to believe that a computer calculating trajectories of hypothetical pedestrians does not utilize the forces of nature in any way different from a computer performing any other calculations.

- In other words, **the “forces operating the computer” seem not sufficient to confer technicality to a simulator**.

QUESTIONS OF REFERRAL (SUMMARISED):

- Q1: can a computer-implemented simulation (CIS) *as such* solve a technical problem (i.e. produce a technical effect going beyond the implementation of the simulation on a computer)?

  [*Is it Ok to omit a link to physical reality?*]

- Q2a: If the answer to Q1 is YES, what are the relevant criteria for assessing whether CIS solves a technical problem?

- Q2b: Is it a sufficient condition that the simulation is based, at least in part, on technical principles underlying the simulated system or process?

  [*would this hypothetical hurdle, being lower than Infineon, suffice?*]

- Q3: What are the answers to Q1 and Q2 if the CIS is claimed as part of a design process?

Note: In [], our interpretation when simplifying the matter, at the risk of loosing accuracy

WHERE DID WE STAND BEFORE THE HEARING?

HIGHER HURDLE?

Additional requirements?
E.g. direct influence on physical entity.

CURRENT EPO GUIDELINES

Infineon condition (I.C.):
Claims eligible to protection if limited to the simulation of "an adequately defined class of technical items".

LOWER HURDLE?

Not necessary to fulfil I.C. In fact, simulators can be useful also
(i) to accurately approximate a real system
(ii) Simulate a non-technical systems (e.g. weather)
What are the min requirements? In particular:

- **Virtual technical effect (vTE) vs. real technical effect (rTE)**

THE HEARING

- Oral proceedings held on July 15, 2020 at the EPO main building in Munich; approx. 5h
- In person: EBoA, 3 representatives of Appellant, 3 representatives of the EPO President, few members of the public
- Streaming: more than 1,600 registrations
- Intranet EPO streaming
- Extensive and well-reasoned arguments by EPO

MAIN ARGUMENTS SUBMITTED TO THE EBoA

- No need to increase the Infineon hurdle
- Infineon is suitable to cover multiple fields
  [*but all these should be disclosed when drafting!*]
- Applying the test of intended technical purpose
  [*e.g. as a minimum requirement lower than the Infineon condition*]
- A Virtual Technical Effect (vTE) shall be treated like a real TE (rTE)

In [] our impressions and summary

- “Technical principles underlying the invention” should not be required, see e.g. Machine Learning (one may not know yet why the invention works)

- Simulation of Human behaviour or natural phenomena can lead to a technical contribution (e.g. training of autonomous cars based on human driven cars is based on human behaviour)

[*examples and explanations as to why the hurdle should **not** be as high as the Infineon condition*]

MAIN ARGUMENTS SUBMITTED TO THE EBoA

Possible criteria for confirming technical character of a Computer-Implemented Simulation (CIS):

1. CIS provides directly technical information about the simulated system/process
   (directly = not as a result of a user reading the output of the simulation and deriving the technical information)

2. CIS is limited to a technical purpose

3. Simulated system/process is adequately reflected in the claim

If not, the simulation is non-technical, but could become technical if the steps of calculating the technical information are added or if the simulation is embedded into the design process

THE EBoA PRELIMINARY VIEWS

- Q1: positive answer
- Q2a: not admissible
- Q2b: negative answer
- Q3: no influence, i.e. the presence of a design process does not change the answers to Q1 & Q2.

- For confirmation, it is needed to wait for the written opinion by the EBoA

WHERE DO WE STAND AFTER THE HEARING?

Our fresh impressions and personal views! To be confirmed by the written opinion!

~~HIGHER HURDLE?~~

~~Additional requirements?~~
~~E.g. direct influence on physical entity.~~

CURRENT EPO GUIDELINES

The I.C. should remain valid

Claims eligible to protection if limited to the simulation of "an adequately defined class of technical items".

LOWER HURDLE?

Probably, a lower hurdle may be accepted.

If so, it is likely that the EBoA will not define specific criteria and leave this to further development of case law

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