ENERGO

Innovative solutions for more sustainable energy in West Sweden

2024-07-01 – 2027-06-30

Network, Knowledge raising, Matchmaking, Demo support

For SME's, Start-ups and Researchers in West Sweden

Chalmers Industriteknik, Chalmers Ventures and GU Ventures

Financed by ERDF and VGR

Medfinansieras av Europeiska unionen

tillväxtverket

VÄSTRA GÖTALANDSREGIONEN

CHALMERS INDUSTRITEKNIK

CHALMERS VENTURES

GU Ventures

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EnerGo – a support on the way

Challenges

- Demand for electricity will increase in West Sweden due to electrification
- Production and distribution of renewable energy must enhance
- Large need of new innovations

Possibilities for small and medium sized companies (SMF) via EnerGo

- Access to test sites
- Support to test and demo new solutions
- New insights and knowledge
- Competence and networks

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Knowledge raising activities and matchmaking

A large number of seminars, workshops and networking acitivities with aim to:

- Strenghten internal competence
- Increase the understanding of potential customers and market
- Enhance capabilities in commercialization of innovations
- Raise awareness of avaiable financial support
- Expand networks with possibilites of creating new relations

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Test and demo

Preparation of demo

- Inventory need incl demo environments
- Process for creating, implementing and evaluating demo projects
- Matchmaking for and design of demo projects

Implementation of demo

- Support in risk analysis
- Analysis and verification of results
- Follow-up
- Supervision during implementation
- Consulting in the financing

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Speaker

David Henricson Briggs

- European Patent Attorney at Pine IPR AB
- 10+ years of experience assisting high-technology startups in protecting their inventions, with a particular focus on working with the typical constraints of small rapidly developing companies

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EnerGo workshop

Patent basics, lots of opinions, and some tips.

2025-03-11

Author: **David Henricson Briggs** | **European Patent Attorney**

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About me

Started Pine IPR in 2019 to work with (high-tech) start-ups.

European Patent Attorney (i.e., engineer, not a lawyer).

10+ years working with patents, mostly with smaller clients. Before that engineering companies (med-tech), startups (electricity consumption data collection).

B. Eng. Mechatronics, B. Eng. Computer Science & M Med Sci.

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What is a patent? (According to the law)

Allows doesn't mean anything is automatic. You have to take an action to enforce a patent.

What is not allowed is defined (almost) only by the granted claims.

A national/regional registration which allows the owner to stop others from selling/marketing/importing/doing what is defined in the patent claims.

Granted patents are a country specific right, even if "International Application" exists.

Your own granted patents don't mean you can sell/produce.

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What is a patent? (According to me)

How else will you prove that you own technologies?

Hard to keep things secret if you have customers/partners who want to know how things work.

An effective way to define ownership and control technologies you won't keep secret and build value for investors/acquirers.

Costly, but less costly than complex legal agreements with customers/suppliers/partners.

"Control" is doing some heavy lifting here. Means everything from stopping others, to simply creating uncertainty for competitors, or employees.

You've chosen the game. You'll have to play by the rules.

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Why patents?

83% of SMEs consider patents important for preventing imitation.

Maybe? Probably not, until you're successful.

70% of SMEs consider patents important for their reputation.

Maybe? Reputation amongst? A DSO will not care if you've filed 1/2/3 patents. Your investors will! ABB/Siemens will!

53% of SMEs consider patents important for contracts.

Yes. It's much easier to define a transaction when referring to a patent. Ownership of employee/shareholder/consultant inventions is also much easier to control if there's a patent application.

35% of SMEs consider patents important for financing.

Definitely. This is much more important for smaller companies. Packaging. For my clients, Boards with external Board members have generally been very positive towards patents and willing to prioritise patents over other expenses.

EPO's commercialisation scoreboard (2019)

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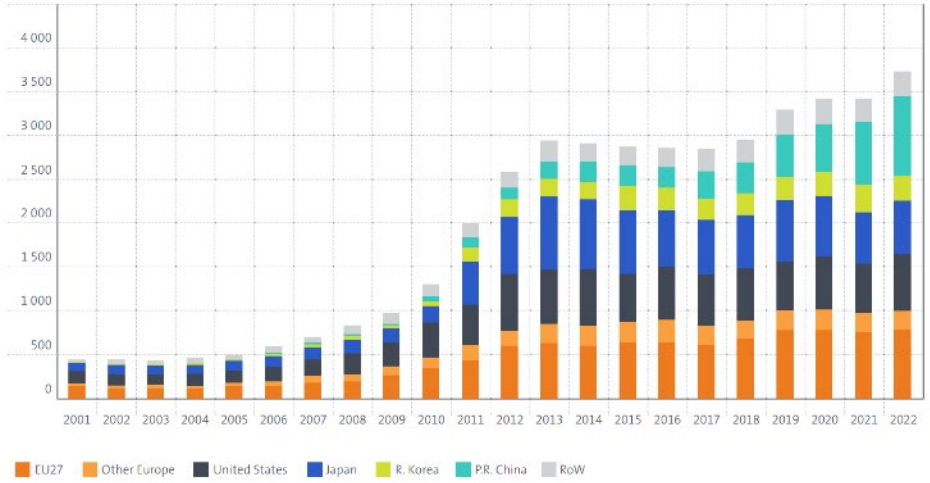
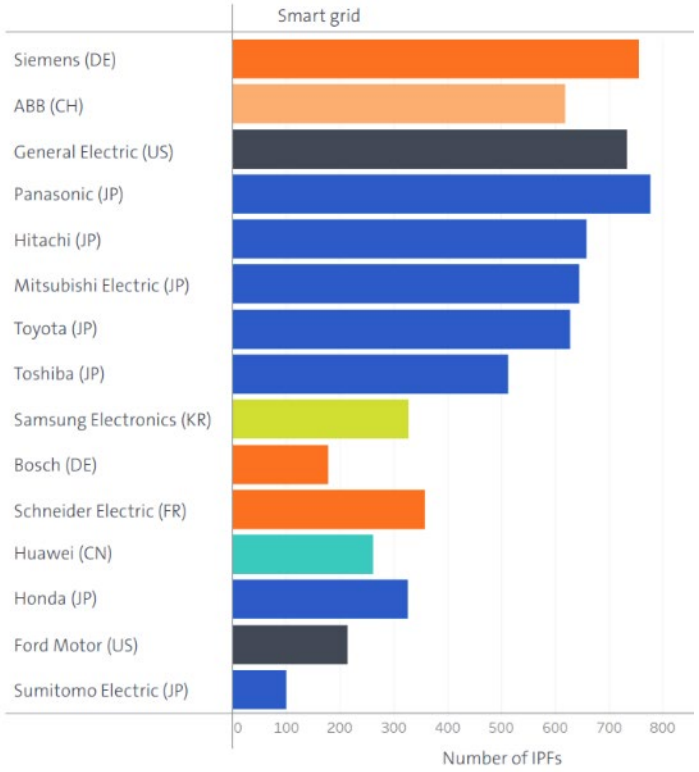
Patents within grid technologies



Grid-related patents grew at 30% annually between 2019-2023 (compared to 12% for low-carbon technologies).

50% more grid related patents in 2010-2022 compared to prior decade.

Europe, US, Japan and China.



You've chosen the game. You'll have to play by the rules.

Source: Patents for enhanced electricity grids, December 2024. EPO.

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What is patentable?

According to the law, everything. Except for:

- mathematical methods
- surgical methods
- methods of doing business.

But it must be new and inventive.

Everything really means technical solutions to technical problems. Easy with hardware, sometimes difficult with software if the processes aren't linked to the physical world, should be achievable with most energy technologies.

New compared to:

Everything that has been available to the public, in any form, that was unambiguously disclosed.

The public is any third person not bound by secrecy. Therefore, use at a factory where people who haven't signed a secrecy agreement may be present is disclosed. Be careful with pilot installations.

Inventive:

Starting at the (single) closest prior at:

- what are the differences?
- What effect do they have? What problem does the effect solve?
- If someone, skilled, was trying to solve that problem, would they have found the claimed solution? Must be logical.

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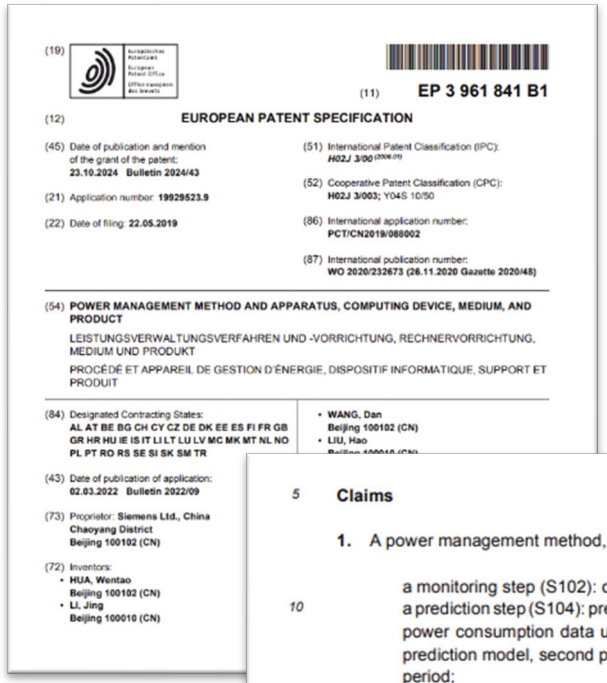
Example software patents



(19) (11) **EP 3 961 841 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent: **23.10.2024 Bulletin 2024/43**

(21) Application number: **19929523.9**

(22) Date of filing: **22.05.2019**

(51) International Patent Classification (IPC): *H02J 3/00*

(52) Cooperative Patent Classification (CPC): **H02J 3/003**; Y04S 10/50

(86) International application number: **PCT/CN2019/088002**

(87) International publication number: **WO 2020/232673 (26.11.2020 Gazette 2020/48)**

(54) **POWER MANAGEMENT METHOD AND APPARATUS, COMPUTING DEVICE, MEDIUM, AND PRODUCT**

LEISTUNGSVERWALTUNGSVERFAHREN UND -VORRICHTUNG, RECHNERVORRICHTUNG, MEDIUM UND PRODUKT

PROCÉDÉ ET APPAREIL DE GESTION D'ÉNERGIE, DISPOSITIF INFORMATIQUE, SUPPORT ET PRODUIT

(84) Designated Contracting States: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(43) Date of publication of application: **02.03.2022 Bulletin 2022/09**

(73) Proprietor: **Siemens Ltd., China**
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5 **Claims**

1. A power management method, comprising:

a monitoring step (S102): collecting and storing power consumption data of a user in real time;
a prediction step (S104): predicting first predicted power consumption of a first time period based on the collected power consumption data using a prestored first prediction model, and predicting, using a prestored second prediction model, second predicted power consumption of each second time period comprised in the first time period;
an error calculation step (S106): sequentially performing, based on the collected real-time power consumption data, the following processing for each second time period from a first second time period to a last second time period comprised in the first time period:

calculating a first error between actual power consumption of the second time period and the second predicted power consumption of the second time period, and calculating a second error between total actual power consumption from the first second time period to a current second time period and a sum of second predicted power consumption from the first second time period to the current second time period; real-time error tracking through the calculation of the first error and the second error an adjustment step (S108) : adjusting a power supply plan or a power requirement of the user when the first error is greater than a first predetermined threshold and/or the second error is greater than a second predetermined threshold, and
a closed-loop power management step based on the adjustment step.

Why? Will they know about anyone infringing this?

Doesn't make sense based on "normal" patent principles.

(19) (11) **EP 3 360 086 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent: **23.10.2024 Bulletin 2024/43**

(21) Application number: **16806345.1**

(22) Date of filing: **11.11.2016**

(51) International Patent Classification (IPC): **G06N 3/092** **G06N 3/047** **G06N 3/006** G06N 3/045

(52) Cooperative Patent Classification (CPC): **G06N 3/092**; **G06N 3/006**; **G06N 3/047**; G06N 3/045

(86) International application number: **PCT/US2016/061693**

(87) International publication number: **WO 2017/083767 (18.05.2017 Gazette 2017/20)**

(54) **TRAINING NEURAL NETWORKS USING A PRIORITIZED EXPERIENCE MEMORY**

TRAINIEREN VON NEURONALEN NETZEN UNTER VERWENDUNG EINES SPEICHERS MITPRIORISIERTEN ERFAHRUNGEN

APPRENTISSAGE DE RÉSEAUX NEURONAUX UTILISANT UNE MÉMOIRE D'EXPÉRIENCE HIÉRARCHISÉE

(84) Designated Contracting States: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **12.11.2015 US 201562254610 P**

(43) Date of publication of application: **15.08.2018 Bulletin 2018/33**

(73) Proprietor: **DeepMind Technologies Limited**
London EC4A 3TW (GB)

- **HARM VAN SEIJEN ET AL: "Postponed Updates for Temporal-Difference Reinforcement Learning", INTELLIGENT SYSTEMS DESIGN AND APPLICATIONS, 2009. ISDA '09. NINTH INTERNATIONAL CONFERENCE ON, IEEE, PISCATAWAY, NJ, USA, 30 November 2009 (2009-11-30), pages 665 - 672, XP031589525, ISBN: 978-1-4244-4735-0**
- **K. NARASIMHAN ET AL: "Language understanding for text-based games using deep reinforcement learning", PROCEEDINGS OF THE 2015 CONFERENCE ON EMPIRICAL METHODS**

Claims

1. A computer implemented method for training a neural network used to select actions performed by a reinforcement learning agent interacting with an environment by performing actions that cause the environment to transition states, wherein the agent is a mechanical agent interacting with a real-world environment, the method comprising:

maintaining a replay memory, the replay memory storing pieces of experience data generated as a result of the reinforcement learning agent interacting with the environment, wherein each piece of experience data is an experience tuple that comprises a respective current observation characterizing a respective current state of the environment, a respective current action performed by the agent in response to the current observation, a respective next state characterizing a respective next state of the environment, wherein the respective next state is a state that the environment transitioned into as a result of the agent performing the respective current action, and a reward received in response to the agent performing the current action, a plurality of the pieces of experience data each having a respective expected learning progress measure, the expected learning progress measure being based on a temporal difference learning error determined for the experience tuple at the preceding time the experience tuple was used in training the neural network, and being a measure of an expected amount of progress made in the training of the neural network if the neural network is trained on the piece of experience data, and wherein the replay memory further stores at least one piece of experience data that has not yet been used in training;
selecting a piece of experience data from the replay memory by prioritizing for selection pieces of experience data having relatively higher expected learning progress measures, wherein selecting the piece of experience data comprises:

determining a respective probability for each piece of experience data such that pieces of experience data having higher expected learning progress measures have higher probabilities than pieces of experience data having relatively lower expected learning progress measures, wherein the probability $P(i)$ for a piece of experience data i satisfies:

$$P(i) = \frac{p_i^\alpha}{\sum_k p_k^\alpha}$$

where α is a predetermined constant not equal to zero, k ranges across the pieces of experience data in the replay memory, and p_i is a priority for the piece of experience data i, the priority p_i derived from the expected learning progress measure for the piece of experience data i or, when the piece of experience data i has not yet been used in training, the priority p_i is set to a maximum value; and
sampling a piece of experience data in accordance with the determined probabilities; and

training the neural network on the selected piece of experience data, comprising determining a temporal difference learning error for the selected experience tuple and using the temporal difference learning error in adjusting values of the parameters of the neural network.

2. The method of claim 1, wherein the priority is the expected learning measure plus a constant value.

3. The method of claim 1, wherein the priority is a fraction having a predetermined positive value as a numerator and a rank of the piece of experience data i in a ranking of the pieces of experience data in the replay memory according to their expected learning progress measures as a denominator.

4. The method of any preceding claim, wherein using

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What should you patent?

A technical solution (method/device/system) that:

- you're pretty sure is new.
- solves a problem.
- will need to be disclosed to someone else.
    - customer, supplier, project partner, investor
- or, could be copied by an employee after leaving.

A patent attorney will define what can be protected by a patent. You describe what you would like to protect, and they should be able to define what will be protectable or say "no".

"Pretty sure" is new

Patent firms like to do novelty searches to identify the closest prior art. This is helpful for drafting good patent applications. However, we are unlikely to do as good a job as a patent office. If you're pretty sure it's new you can often skip this first step for little loss in value.

… but make sure your PCT application is improved after getting search results from e.g., PRV.

Disclosure or copying:

As soon as other parties are involved in your business you will struggle to keep technical solutions secret. Suppliers and customer will need technical info.

Employees can take what they've learnt elsewhere. It might be difficult to prove patent infringement, but it's more difficult to show someone stole a trade secret.

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When should you patent?

As late as possible i.e., when you've done as much development as possible. The more development you've done, the better the application will be.

Once filed, certain deadlines and costs are unavoidable to continue the process. The later you file, the further into the future these costs will occur.

Typical events for startups:

- Prior to collaborating on a project, to define what "you" brought into the project.
- Prior to submission to a journal attending a conference.
- Prior to an investment round.
- Prior to delivery to a customer.
- (… when an organisation offers grant financing)

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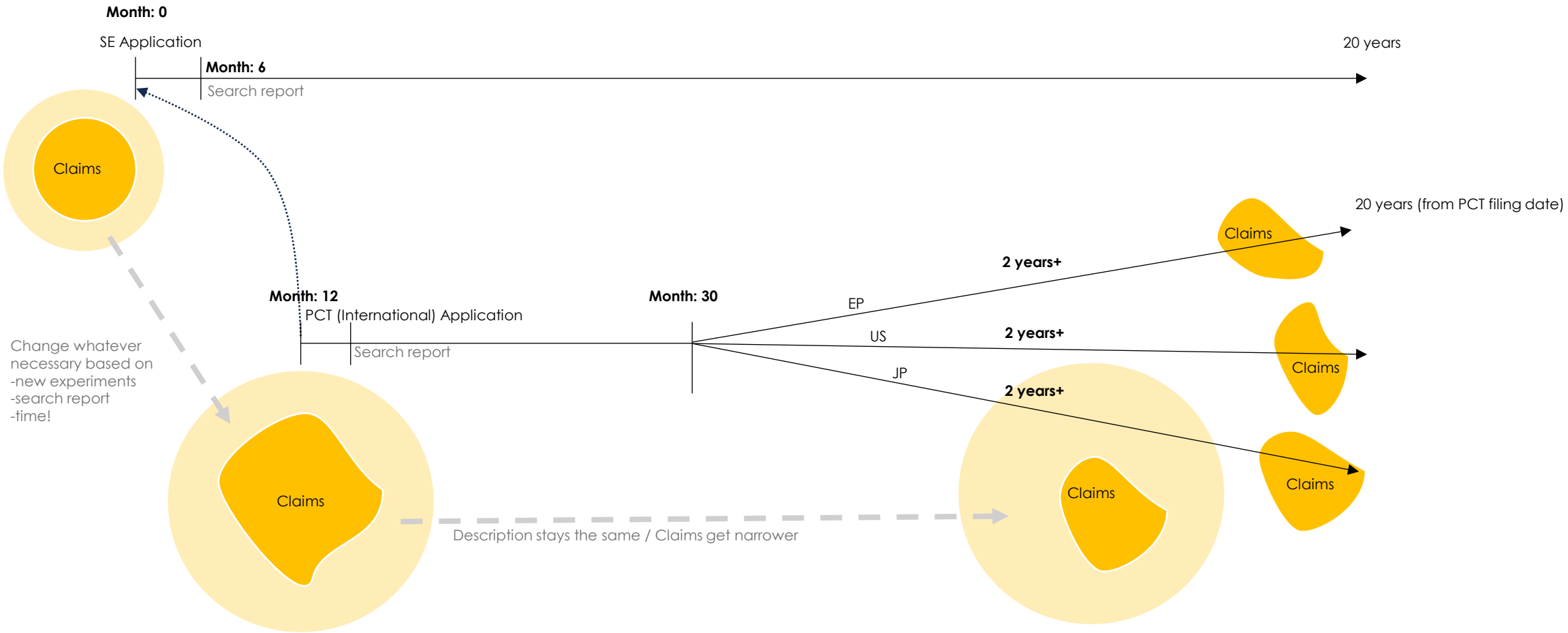
Typical patent process (for startups)



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Budget

Small company with 2 patent families. 1 filed in 2019 (EP/US/JP/CA), 1 filed in 2022 (PCT phase).
Total over 5 years: 500k sek

Small company with 1 patent family. Filed in 2018 (EP/US/CA/CN/AU).
Total over 6 years: 800k SEK.

Medium company with 4 patent families. Regular searches.
Total over 5 years: 2.7M SEK

Costs scale with each patent family and with countries. Better to file more applications in fewer countries.

Budget:

100k for preparing and filing a first application.

70k for preparing and filing PCT application.

50k/country at the PCT 30-month deadline.

50k/year/country thereafter until grant (2-4 years).

10-30k/country/year in renewal fees after grant.

(it might be less than this, but ensure financing is capable of paying the known fees)

Keep your attorney informed if you're running very low on cash. 50+k invoices can arrive with little warning.

Costs are un-predictable and lumpy. Look out for cash-flow issues.

Example:

USPTO issues an office action. It will cost about 40-50k to respond. (US agents charge ~400USD/hr). The next office action could be issued within 6 months. Another 40-50k to keep the application alive.

The annual fee in Europe is 10-20k/year (increases per year). You cannot miss the payment deadline.

However, if you say "we have no cash now, but will in 3 months" there may be the possibility for delaying responses, prioritising various countries etc.

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Who should you work with?

The two key factors in selecting a patent attorney:

- **Someone who understands your technology.** (Hard!)
- **Someone who you trust.**

(everything else: cost, experience, where they are employed etc. is secondary)

- Ask around for recommendations, I wouldn't google.
- Don't be afraid to switch it it's not going well e.g., if a first draft indicates a lack of understanding. You have no obligation to them.
- An expensive attorney is less costly than someone who didn't understand your technology.

It's an inherently technical and legal craft. Be careful of people with an overly strong "strategic" focus.

484 European Patent Attorneys in Sweden. 78 in Göteborg.

Large firms and smaller firms both have smart people, but don't work with a smaller firm without someone recommending them.

Examples:

- AWA
- Zacco
- Ström & Gulliksson
- Bergenstråhle & Partners
- Lind.Edlund.Kenamets
- Rouse
- ..etc.

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Workshop questions

Identify 2 technologies you are working on	Example
Describe in 1-3 sentences.	A device/system for identifying failures in an electrical grid. The device senses the electrical field and the magnetic field of powerlines and determines if a failure has occurred. The device may also have some kind of physical movement sensor on the tower.
Describe similar technologies that you know about.	Tesmec SpA sell a device, Pole Discoverer which does "phase-phase/phase-ground" detection. States no physical connection to wire necessary. Temporary and battery powered. No further details known about device.
What are the improvements (performance, cost, less complex etc.) compared to the similar technologies.	A fixed unit can be arranged in a remote network and provide improved details about where a failure is without maintenance personal going to the site and checking. Physical movement sensor is more accurate than phase detection alone.
Can you identify what provides the advantages?	The device has wireless communication with a back-end software system. The back-end software system "knows" the network topology. The physical sensor measures movement of the tower.
Who knows about the technology now? Are they bound by secrecy? **How much do they know?**	Our engineers, secrecy in employment agreement. We have a pilot agreement with one DSO (*elnätsbolag*), we think they signed an NDA a long time ago, they don't know what the device is measuring – only that it works. A contract manufacturer will produce the devices.
Who will need to know the details?	In 6 months we will raise financing, investors will need to know about the system and we expect our first investor to be a large customer with technical expertise. To market the technology, we will need to produce a white paper which explains what the device is measuring and how it works.
When will they need to know?	We are starting first non-pilot production after the investment ~6 months, sales within 12 months.
Where will you sell? Where will you produce?	We will sell in the Nordics. We will produce somewhere in Europe.

EnerGo is there for you as SME /researcher

Membership includes:

- Access to gworing networks
- Knowledge raising acitivities and matchmaking
- Demosupport
- Free of charge

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