

The goal of all of Sleep Medicine is to help our patients achieve more/better quality sleep.

<http://time.com/55390/sleep-is-the-new-health-frontier>

History

The only benefit of getting better sleep has historically been the recuperative feeling(s) that good sleep provides, and the appeal to the overall sense of “better health” supposedly felt by the patient after achieving more/better sleep. Research has shown that when a sleep therapy only partially works (e.g. inadequate CPAP usage), the patient may actually experience subjective sleep improvement that does not correspond to the level of measured objective sleep improvement. A mismatch is typically observed, where the objective severity of sleep disruption remains, even though a lessening of subjective feelings occurs from the partial therapeutic action (e.g. OSA decreasing from an AHI of 60 to 30.) Subjectively the patient may feel “better,” but the objective data still reports a pathological disease state. This perceptual mismatch is rife with problems.

Sleep, being one of the opaquest bodily processes, is steadily being self-investigated by the public, as can be witnessed by the seeming flood of over the counter consumer products now offered that supposedly detect/track/monitor/record sleep. Consumer product manufacturers (vendors) including big electronic manufacturers such as Samsung, Sony, Apple, Nike, Fitbit, Jawbone, are making new technologies which enable consumers to self-monitor/quantify their “fitness” through the wearing, typically, of a wrist worn device that monitors motion/activity and records what the vendor advertises as “sleep.” Many of these devices are coupled with an internet-based interface allowing user entering of daily caloric intake, as well as other parameters, used in vendor specific fitness/sleep analyses. There is no consensus from vendors as to what technologies to use or how to gauge whether vendor A’s technology is as good as vendor B’s technology at detecting activity A or B. Nor are there qualified technologies, settings and analyses the vendors use to determine sleep. This brings the realization that a consumer-based model to help all parties involved; users, vendors and clinicians, would be a truly helpful



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undertaking. The following concept, it is felt, would revolutionize this consumer sleep market and the Sleep Medicine field.

Proposal - Step 1

FUNCTIONING

A consortium of authoritative knowledge providers create an authoritative body, Consumer Sleep Board (CSB.) The CSB would test and validate vendor supplied equipment that claims to determine/record sleep. The CSB would provide guidance, recommendations and validation levels to the vendors including topics such as; which are the best technologies, settings and analyses to actually/validly monitor/measure sleep. The CSB would license an imprimatur to use on the validated device, similar to Underwriter's Laboratory stamp of approval. Usage of said recommendations/measurements would also be useful in the clinical sleep realm, as a recognized yardstick of sleep that clinicians could trust when presented with patient's data in the office. This is beginning to be addressed with the National Sleep Foundation, and other electronic industry trade representatives at the Consumer Electronics Show in Las Vegas, NV.

<https://www.ces.tech/News/Press-Releases/CES-Press-Release.aspx?NodeID=ad61bdd0-1f92-4e2c-9c40-05533dedd17f>

Licensing of CSB by equipment vendors mandates access to the vendor provided user database by CSB to retrieve user information and retrieve recordings. Validation of these devices would carry sleep validation as compared to Gold standard sleep, and as such, their utility as full stand-alone replacements for Gold standard recordings would be un-true. Validation would be in the form of percent of "real sleep" captured, as compared to Gold Standard. It is recognized that some devices may be on the order of 50% valid against Gold Standard sleep. This validation is one of the values used in the formation of an objective value. Licensing of CSB would also enable the clinical sleep field to utilize these consumer devices for follow up of therapeutic interventions and/or investigation of an individual's sleep. As well, licensing of CSB would enable the sleep field to use the large pools of now validated consumer sleep recordings in the aggregate for large-scale, big data sleep research.

Proposal - Step 2**OBJECTIVE REWARD**

The purpose of consumers using these devices in the first place is to monitor their sleep, and hopefully, use said metrics to achieve better sleep. It is not thought that someone would use a device to obtain poorer quality sleep. This leads us to be able to think of the benefit of better sleep. Should we only look to the historical picture of “improved health” as the metric of better sleep? Is there possibly a way to incorporate a different, more tangible metric of sleeping better?

Using an objective measuring device to record one’s sleep, means that there should be presented with an objective metric as feedback.

A vendor who licenses CSB from Step-1, green-lights their product end user to partake in a unique system, provided by CSB, which objectively rewards the act of sleeping better. This objective reward is in the form of a cryptocurrency, created by CSB, specifically for this purpose. This cryptocurrency is called SLEEP COIN.

Currently, to produce cryptocurrency requires the running of computer software to produce a numeric value (“hash value.”) This act is called mining. The hash value is used as the basis for issuing the cryptocurrency. <http://www.techopedia.com/2/29806/trends/how-the-bitcoin-protocol-actually-works> It is a supposed analogy to the act of physically mining for gold that used to be the basis for the valuation of physical currency. This computer based virtual mining can be rigged, as faster and faster computers are built producing more hash values per day, allowing the creation of more cryptocurrency per computer.

SLEEP COIN would be mined via the action of sleeping better as compared to one’s own sleep profile; as shown through the recording of sleep via the CSB licensed equipment. It could not be rigged, since only a single recording can be used per day per user. It is time encapsulated

mining. The user mines by virtue of how well they slept. It is a simple construct; Sleep better, earn more.

SLEEP COIN's value is created when the licensed device is used to record sleep and the recording is uploaded to their vendor profile. CSB would access the recording on the vendor's database, and SLEEP COIN would calculate the SLEEP COIN hash from values that represent: the vendor, the specific serialized device, the date and time of the recording, the Geo-location (if available) of the recording, and the sleep efficiency of the recording as a comparison to their sleep profile in conformity with the objectives of their sleep improvement goals. These values would be concatenated and used as the hash value for calculation of level of SLEEP COIN mined for that 24-hour period. CSB would then multiply the SLEEP COIN mined by the validation value of the device and then issue the SLEEP COIN of that valuation to the user via the CSB network wallet. The user's SLEEP COIN wallet resides in the virtual SLEEP COIN cloud and makes SLEEP COIN available for trade on the SLEEP COIN exchange "SLEEP COINX." All aspects of SLEEP COIN would be controlled by CSB, but configured within the open source, distributed model of current cryptocurrencies.

<http://netforbeginners.about.com/od/Bitcoins-and-Cryptocurrency/tp/List-of-Cryptocurrencies.htm>

This hash value is a representative singular value representing the "work" performed in that location, on that day, at that time, at that efficiency, for that user, on that piece of equipment, made by that licensed vendor. This "mining" valuation now objectifies what has historically only been a subjective "value" of sleep improvement.

These hash values also provide the ability to cross check each value for consistency. Is the vendor's license paid for the month, is the user's license paid, is there another device being used in this location, is the user uploading more than one recording for this timeframe. These cross checks keep the system from being rigged.

The quality of the sleep for this user would be based on a user specific profile which would get established upon first use of the device, establishing an “expectation profile” of the user’s sleep; when the user typically sleeps, how long they typically sleep etc. This user sleep profile would be created in CSB during the pre-remuneration “learning period” of first usage of the licensed device, which sets the sleep profile of the new user on that equipment. This profile would set the construct for what is to be considered typical for that user, and with each successive recording the profile would be honed for the day of the week sleep and trends for that user. After the learning period, each hash created would be based on the improvements from this ongoing sleep profile according to what the predefined goals for that user are.

In this way people would now be rewarded with a virtual currency which will help gauge their sleep improvement; allowing them to attempt to seek the most efficient sleep possible, so as to attain the highest mining reward. Having a specific historic user profile determining the adequateness of sleep lends itself to being a way for the public to become more aware of their sleep and possibly seek clinical help, when/if they do not obtain the highest reward for their time spent sleeping (“inefficient sleep.”)

EQUIPMENT CONFIGURATIONS

Multiple renditions of equipment could be sanctioned.

A possible “A level” would be purely consumer level equipment for everyday monitoring, with specific device only contact with the patient.

Possibly also a “B level” construct could be available which connects (wired or wireless) to said A level equipment recorder, but has an increased contact profile which could offer greater clarity (higher validity), with possible documentation of EEG, EMG, EKG, breathing etc. (offering a more clinically valid view of sleep, though with Bronze level measurements/metrics.)

There could also be a “C “clinical” level (diagnostic), with Silver level sleep field recordings, similar to current HST devices, for in home use by clinicians using ancillary licensed vendor equipment for said documentation, with the user still reaping the remuneration for that night’s sleep.

VALUE PROPOSITION

The Vendor licenses CSB to sanction/validate their device which the user uses to record their sleep so they can be rewarded based on quality of their sleep as compared to their profile and goals. Clinicians will be able to accept CSB sanctioned recordings or follow their patient's progress with therapies, through CSB results. As the market for said validated sleep devices grows, more vendors would desire to gain access to this SLEEP COIN "benefit of use" for their equipment. This creates a self-propagating loop; Usage of the CSB system would drive selling of their products, which in turn drives more vendors into the CSB ecosystem desiring to enroll in the SLEEP COIN economy. SLEEP COIN, in effect, commoditizes sleep.

ENROLLMENT

Enrollment by a vendor into the SLEEP COIN economy might entail multiple licensing constructs:

- 1) An upfront fee to test and validate each device line a vendor wishes to enroll in CSB.
- 2) A global, ongoing monthly license, per vendor, per sanctioned device line to carry/advertise the moniker of CSB validation. This also brings inclusion into the SLEEP COIN ecosystem for users of that device line.
- 3) The second ongoing license would be an escrowed startup license/fee paid by the vendor per serialized unit being sold (typically \$3-\$5.) This escrowed fee would be held by CSB for the user as payment for performing the initial learning phase to one's sleep with the equipment. The licensing fees would help capitalize the currency by giving seed USD monetary value to SLEEP COIN, though cryptocurrencies require no real-world valuation, as they are only valuable to others based on the work required to produce/create said cryptocurrency and the agreed value of trade through SLEEP COINX.
- 4) The third ongoing license would be an ongoing license paid by the user through continued use of the serialized device and access their SLEEP COINX wallet. This nominal fee (\$3-5) per month could be payable in USD or SLEEP COIN. This wallet is used to house SLEEP COIN and SLEEP COINX is the exchange where it can be exchanged for other currencies, both crypto and physical (back into USD.) This fee should be the goal for this user based on their sleep profile.

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It should typically be neutral, based on adequate levels of sleep for the month. If the user gets better sleep for the month, then they will be positive (credit) in their SLEEP COIN production for the month. There would not be a negative (debit) for bad sleep for the month, though there could be, but we do not wish to place a true SLEEP DEBT on the user.

ACCOMPLISHMENT

Creating a Consumer Sleep Board establishes a comparative marketplace, where consumers can gain insight into the quality of the equipment they are purchasing to gauge their sleep. CSB validation becomes a means for comparing the validity of the different devices on the market; an objective “sleep score” for comparison.

Using a remuneration construct such as SLEEP COIN incentivizes obtaining efficient sleep, and its adoption fits the missing piece in the Sleep Medicine puzzle; provide an everyday objective feedback mechanism that encourages sleep and provides a method for people to validly gauge their sleep quality. The interest of tying sleep efficiency to remuneration will be the spur to action on the part of the users who will now seek ways to optimize SLEEP COIN production which can only be achieved with the highest level of proper/efficient sleep. If they are not getting the greatest “bang for their buck” they can then bring their concerns, along with their sanctioned sleep reports into a sleep clinician for consultation. The clinician will then see a validated historical view of the patient’s sleep. The clinician may even ask for a B Level or prescribe a C level recording for more in-depth analysis. In this regard, SLEEP COIN is a useful tool for outcomes measuring for clinical validation of all sleep therapies.

SLEEP COIN will drive interest in sleep and anything that can impact a user from getting the most sleepcoin. It is recognized that this model can also be used in the larger, total health picture with the creation of a “FIT COIN” which would be the objective reward for the maintaining of one’s health within objectively measureable levels; cardiac fitness with daily metrics, blood sugar control, daily exercise etc. This is yet another world to conquer, and one that would benefit the sleep field since metabolic syndrome (multi-system syndrome) is a growing disorder

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that now includes Obstructive Sleep Apnea as one of its co-morbidities.

<https://www.mayoclinic.org/diseases-conditions/metabolic-syndrome/symptoms-causes/syc-20351916>

In its simplest form I wish to...

Turn this...

Into this



<http://www.livescience.com/42710-fitness-trackers-sleep-monitoring-accuracy.html>

<https://www.pcmag.com/roundup/297910/the-best-fitness-trackers>

<http://www.movea.com/products/#tab-id-2> SDK

<https://www.linkedin.com/today/post/article/20140529225519-8451-how-your-company-and-your-job-will-soon-be-disrupted?trk=nus-cha-roll-art-title>

<http://www.wearable-technologies.com/2014/01/the-new-wave-of-wristbands/>

<http://www.engadget.com/2013/10/28/airo-wristband/>

[NB: Some of the included links are from 2014 when I first had this thought]

Thank you for reading my proposal.

Respectfully,

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