TECHNIQUES TO BUILD AN IPS

For indoor location you can use Bluetooth LE beacons since it's a very accessible technology nowadays, there are several methods:

* Trilateration: it uses 3 beacons, but with the noise and attenuation of Bluetooth signals, it gets quite difficult to determine the exact position and also it's not easy to use more than 3 beacons to increase accuracy.
* Levenberg Marquadt method: used to solve non-linear squares problems showed good results on indoor positioning.
* Dead Reckoning method: using the motion co-processor of the device, giving an initial position you can calculate the moving path of the device. Not that easy to implement anyway.
* standard iBeacons or Eddystone beacons

**Fingerprinting means take the electro magnetic field variations meter by meter. It's a long procedure that takes usually days and it's not an easy task.**It requires skilled people to be done properly and effectively and in addition every modification of the environment will require a remapping process. In Nextome it is not required.

It depends on the purpose of the navigation. If the accuracy is important you should pay attention to the iBeacon technology. If the cost and an easy installation is one of the most important elements for you, then you can use such a vendor type as IndoorAtlas.

if you are just looking for employee connectivity or location based analytics, you can go ahead with a location-enabled Wi-Fi infrastructure. On the other hand, if you are looking to engage consumers based on their location within the venue or provide an indoor navigation experience, then you might want to consider beacons.

at instances where you want to be highly certain of the location of the consumer within a venue, you can use beacons to handle those proximity-based interactions. Meanwhile, you can leverage Wi-Fi network to provide engaging navigational experiences within the venue and collect analytics based on those consumer movements.

1. Accessibility :
2. Range and Accuracy:Beacons being radio transmitters, stand the chance of interference, as radio signals can be absorbed by different media, such as water, air, human bodies or even metallic surfaces. The best way to deal with this, is to realign your beacons within the desired area of operation such that there is no proximity to metallic surfaces. H.gher accuracy in the range of centimeters is attainable by using GPS in combination with augmentation systems . But GPS cant be ued for IPS
3. Security: Beacons can be hacked and can be levaraged without our permission.

There is a very helpful overview of all the current indoor location-finding technologies by [Nick Such](https://www.quora.com/profile/Nick-Such) ( [https://docs.google.com/spreadsh...](https://docs.google.com/spreadsheet/ccc?key=0Atv7Kh0l7ItmdFRmR3VxX1ExWFVjaUhxelBlZHFnR2c" \l "gid=0) ). These are the options according to that overview for location-finding indoors, besides trilateration via the cell location of cell phones:

* Wi-Fi & Wi-Fi fingerprinting
* WPAN (Bluetooth, ZigBee & others)
* Radio & Radio fingerprinting
* Other Radio (like TV-band RF positioning)
* Optical (light)
* Audio (with external hardware)

and potentially in addition, smartphone sensors

* Geomagnetic sensors (compass)
* Inertial, motion sensors (acceleromater, gyroscope)
* Other sensors (altimeter)

And Bruce Krulwich, a mobile industry analyst at Grizzly Analytics , has tracked at least 40 startups focused on indoor positioning globally   
  
I personally find IndoorAtlas technology very ínteresting . They are using earth’s magnetic field . The advantage is the accuracy, but each place geomagnetic field has to be measured upfront.  
  
Positioning via sound waves is also worth mentioning. This audio tech is used by [shopkick](https://www.quora.com/topic/shopkick). They use audio transmitters to verify the shop location a user has entered via smartphone microphone. The advantage is that it should work with every smartphone, even if Bluetooth and Wifi are both turned off on the phone, but to work each place (store) has to be equipped with audio transmitters upfront.   
  
And older answers by me to this question is Nokia HAIP (High Accuracy Indoor Positioning) that uses Bluetooth 4.0 [5].  
  
And new LED light-based positioning technology was developed by ByteLight [6].  
  
Finally there is a new Wi-Fi fingerprinting solution that doesn't need GPS anymore for indoor location-finding. [7]  
  
Sources:  
[1] [http://grizzlyanalytics.com/abou...](http://grizzlyanalytics.com/about.html)  
[2] [http://www.technologyreview.com/...](http://www.technologyreview.com/news/428494/startup-uses-a-smartphone-compass-to-track-people/)  
[3] <http://www.indooratlas.com/>  
[4] [http://www.arcticstartup.com/201...](http://www.arcticstartup.com/2012/07/09/new-indoor-navigation-startup-uses-disruption-of-geomagnetic-field-from-buildings)  
[5] <http://research.nokia.com/news/9505>  
[6] [http://gigaom.com/cleantech/will...](http://gigaom.com/cleantech/will-the-future-of-shopping-be-guided-by-led-lights-and-smart-phones/)  
[7] [http://www.eurekalert.org/pub\_re...](http://www.eurekalert.org/pub_releases/2012-12/tkai-kaa121812.php)