ProxiTrak designs your ROI: RFID and IoT Predictive CAD

DESIGN YOUR ROI

CAD Design RFID - Why?

by Curtis Shull, Owner Proxigroup

Multiple industries who have deployed RFID in the past suggest that more than 98% of RFID design activity comprises recurring redundant configuration changes. However, despite the importance of RFID deployment, implementation, and change management design activities, researchers have estimated that 95% of companies have no systematic approaches to preventing RFID deployment procedures that facilitate indefinite repeat.

Problem Domain

Many companies have no idea where to start after deciding that an RFID solution is a technology they want to employ.

Even after companies accomplish comprehensive requirements assessments, many find out that their vendor's technology or product has limits. Requiring the vendor to accommodate your dynamic needs increases TCO (total cost of ownership), not just the initial buying price.

But you are most likely thinking, "I can seek guidance from independent experts to support my efforts in areas where I need assistance." But even acquiring experts will still cost you money and time (and possibly a few headaches) if you or your company is lacking knowledge of RFID

Unfortunately, with many RFID solutions on the market today, it's rare to find any with the ability to negotiate change. Whether it is changing infrastructure location and size, paradigms, tracking area footprint, transitory asset trends, employees (think knowledge management), and network topologies, to name a few.

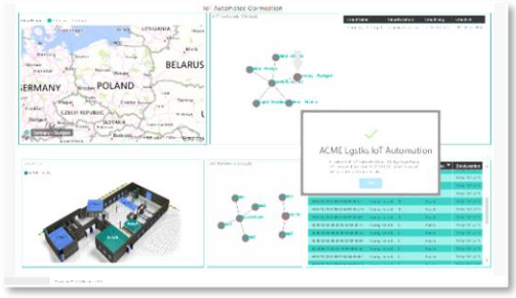
Sound predictions of RFID performance are now a necessity if companies are to cope with unforeseen changes. Still, they must understand the range of forecasting possibilities available from the RFID vendor or their products.

ProxiTrak has a unique functionality that can organize RFID data to align with a predictive model so companies can forecast RFID coverage performance and outputs for hypothesis tests (Motamedi, Setayeshgar, Soltani, & Hammad, 2013). The prediction designer is based upon the availability of historical data and degree of zone accuracy desirable, among other factors like antenna/tag RSSI strength.

PREDICTIVE MODELING IN RFID

Predictive Analytics

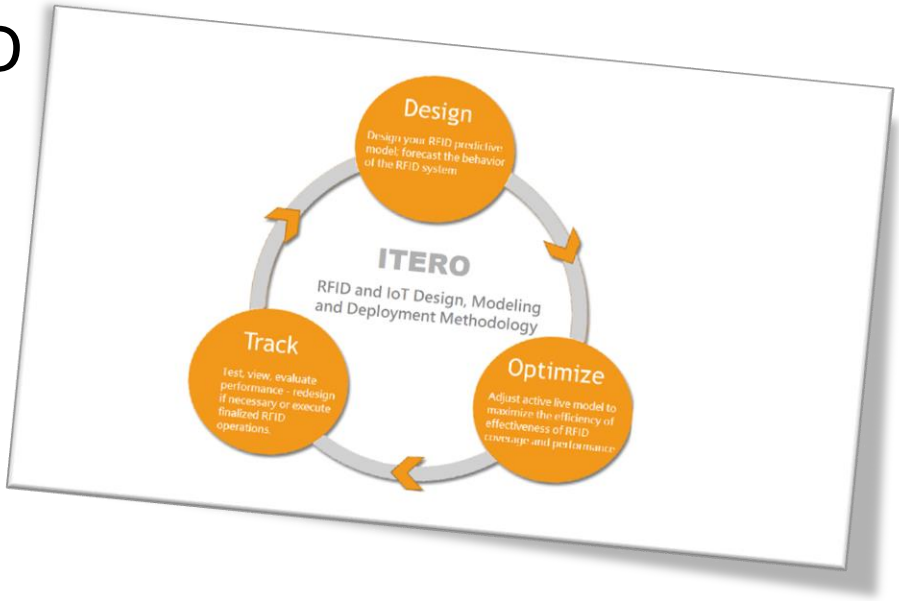
ProxiTrak uses historical data to predict future RFID events that affect health.



Plan, Predict, Act on Change

ProxiTrak utilizes historical data in concert with the CAD model that captures essential trends. That predictive model is then used to adjust the correlation of hardware functionality between the virtual and real-world.

Iterative RFID & CAD Design/Deployment



RFID Installations are rarely perfect on the initial deployment. Instead, numerous iterations incorporating multiple phases of site surveying feedback and sentiment are required to foster effective design and efficient performance that succeeds and meets real-world expectations.

Forecasting while Iterating

Prediction and forecasting are essential for all RFID deployment, installation, and implementation. However, very little research literature exists in the RFID arena. Many dummy simulations give you a static layout --a blueprint if you will without ever be having predicted the occurrence of events that occur. ProxiTrak uses iteration framework realization in which the Computer-Aided-Design or CAD model prediction and iterative processes are conducted in parallel. We call this paradigm *Itero,* which is Latin for *iterate*. RFID/IoT designs, optimizations, and implementations can occur as many times as necessary iteratively.

ProxiTrak uses machine learning to facilitate the "live" synchronization of the CAD design (site and zone virtual environment) with the real-world (hardware and its functionality) environment to predict what might happen next. It can never predict perfection, but it can look at the existing CAD design and data interacting with it to determine a likely, interaction, or performance outcome.

ITERATIVE METHODOLOGY AND PREDICTION ANALYSIS

ProxiTrak's CAD model adaptation process by iteration Itero can drastically reduce delays and budget overspending. However, nowadays, there are only a few types of research in this area. Most of the researches somehow benefited from the simulation in the conditions of demand uncertainty.

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Drastically Faster ROI

Companies that employ CAD-based RFID will benefit from a 65% increase in productivity and efficiency (Li et al., 2017). Because RFID employments and implementations are plagued by slow RFID infrastructure design iterations, various implementation errors, and extended time required to complete an RFID deployment.

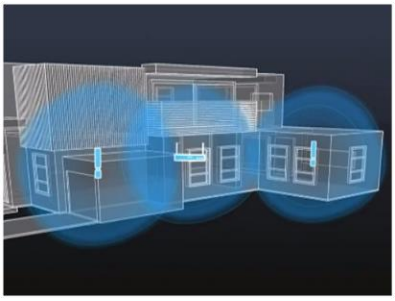
CAD-design RFID is instrumental in accelerating the RFID deployment process resulting in faster ROI. For example, reducing the amount of time allocated on a proposed change to an RFID design and the response to changes due to infrastructure scaling will impact time-to-value and result in a substantially faster return on investment.

CAD-RFID Early Error Detection

A CAD-based RFID system's primary goal is to identify abnormalities in RFID coverage and interrogation at an early stage. A CAD-based RFID system should identify low coverage areas, inaccurate reads based on obstacles, and architectural-based signal interference rectified through CAD-based prediction model and analysis in RFID deployment and implementation process.

RFID Surface Geometry

Various types of asset material data are associated with a reliable model for interpretation with ProxiTrak software to predict how the RFID infrastructure will react to glass, metal, liquid, and other signal stresses.



Recursive Optimization

The design process is facilitated when working with a 3D model. The RFID digital double holds all RFID hardware's actual geometry within the software's algorithm, allowing parametric constraints to be applied to the design, preventing specific critical devices from being modified. For example, if two antennas require 2-meter separation at all times, must always be at a specified angle and RSSI strength, 3D modeling ensures your RFID infrastructure can be re-designed over and over, without these predetermined constraints ever being violated.

REDUCTION IN DEPLOYMENT COSTS

68%

REDUCTION IN SCALING COSTS +/-

73%

SHORTEN PROJECT COMPLETION TIMES

Many companies deploying new RFID are the costly personnel and software and hardware installations required to establish an efficient tracking eco-system. By using design first RFID engineering of new RFID deployments, companies receive an accurate digital double of the real-world RFID layout, synchronized with precise hardware component geometry.

CAD DESIGN RFID. DOES IT REALLY WORK?

CAD-based software is used on a massive scale by various engineering professionals and firms for many different industries and applications. So, then why not use CAD for planning, deployment, installation, and maintenance of RFID infrastructures? Here are some of the benefits of implementing CAD systems in the companies and why it works.

Use Cases of CAD Design in RFID

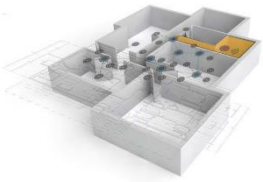
The very definition of computer-aided design (CAD), employing computers to create graphical representations of physical space, should be enough reason to warrant usage. CAD provides flexibility to draft and design an RFID campus in a digital sphere regardless of infrastructure type (A. M. Costin, Teizer, & Schoner, 2015).

Look at the following two use cases:

1. Polish national postal service **Poczta Polska (Polish Post)** piloted RFID from ProxiGroup to improve its distribution center (see Polish Post CAD RFID). **The pilot employed 5 fixed readers and 20 antennas**—each antenna representing a CAD zone providing a higher degree of accuracy and coverage precision. The CAD-based digital double was updated autonomously in real-time upon RFID Infrastructure error discovery.
2. Another use case for CAD-based RFID behavior (CAD Prediction RFID for Large Chemical Company), 1-2 week total deployment times gained.

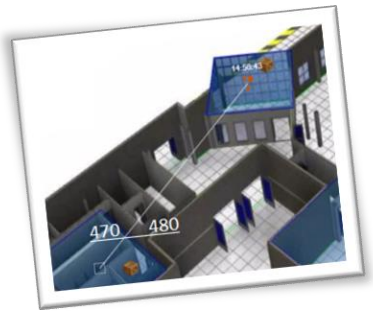
Below is **more information on how** CAD-based RFID can easily be incorporated into the supply chain to allow dynamic logistics changes.

See article CAD RFID in Supply Chain



CAD RFID is the future.

RFID INFRASTRUCTURE INFORMATION MODELING (RIIM)



RFID Infrastructure Information Modeling (RIIM) is an intelligent 3D model-based process that provides System Integrators, Asset Managers, System Architects, and RFID/IoT business professionals the paradigm for planning, designing, constructing, and managing RFID components, devices, and signal in it's encompassing infrastructure. RIIM combines BIM and RFID hardware devices synchronized digitally to provide generation and digital double management (Xie, Shi, & Issa, 2010). RIIM also represents the physical and functional characteristic relationships between CAD design, RFID, and IoT protocols. Throughout the world's supply chain's theater, RIIM is a necessary and crucial process to ensure collaboration and a high level of efficiency in the planning, designing, and modeling infrastructure-integrated RFID systems (A. Costin, Pradhananga, & Teizer, 2012).

RIIM is the paradigm deployed to create and manage RFID project information that results in a highly constructed low tolerance RFID or IoT Information Model that will consist of RFID physical devices' digital details and capabilities. RIIM enables efficient project planning and visualization of RFID solutions at the pre-deployment and pre-integration stage (A. Costin, Pradhananga, & Teizer, 2014). The 3D visualization of integrated live RFID system events enables clients to have a visual predictive platform that allows simple and seamless modifications. Changes can occur in production without a loss of service or before employing the system in a live commercial environment.

[RIIM is proven to reduce the overall RFID project duration and total cost of ownership (TCO) (A. M. Costin & Teizer, 2015). The alleviation of redundant adjustments, reiterations, erors, and exclusions drastically improve time to value which increases time to ROI.

RFID Infrastructure Information Modeling is a proven paradigm with a plethora of advantages for numerous vertical markets. RFID projects are conducted at maximum performance, efficiency and costs emplying RIIM prior to and after every RFID development lifecycle.]

CAD-RFID/IOT PREDICTION MODELING

CAD intelligent 3D modeling enables RFID/IoT infrastructure management, coordination, and prediction during the entire lifecycle of an RFID project (planning, designing, deploying, and modification).

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References

Costin, A., Pradhananga, N., & Teizer, J. (2012). *Integration of passive RFID location tracking in building information models (BIM).* Paper presented at the EG-ICE, Int. Workshop, Herrsching, Germany.

Costin, A., Pradhananga, N., & Teizer, J. (2014). *Passive RFID and BIM for real-time visualization and location tracking.* Paper presented at the Construction Research Congress 2014: Construction in a Global Network.

Costin, A. M., & Teizer, J. (2015). Fusing passive RFID and BIM for increased accuracy in indoor localization. *Visualization in Engineering, 3*(1), 17.

Costin, A. M., Teizer, J., & Schoner, B. (2015). RFID and BIM-enabled worker location tracking to support real-time building protocol and data visualization. *Journal of Information Technology in Construction (ITcon), 20*(29), 495-517.

Li, C. Z., Zhong, R. Y., Xue, F., Xu, G., Chen, K., Huang, G. G., & Shen, G. Q. (2017). Integrating RFID and BIM technologies for mitigating risks and improving schedule performance of prefabricated house construction. *Journal of Cleaner Production, 165*, 1048-1062.

Motamedi, A., Setayeshgar, S., Soltani, M., & Hammad, A. (2013). *Extending BIM to incorporate information of RFID tags attached to building assets.* Paper presented at the International Conference on Computing in Civil and Building Engineering, Montreal, Canada.

Xie, H., Shi, W., & Issa, R. R. (2010). *Implementation of BIM/RFID in computer-aided design-manufacturing-installation process.* Paper presented at the 2010 3rd International Conference on Computer Science and Information Technology.