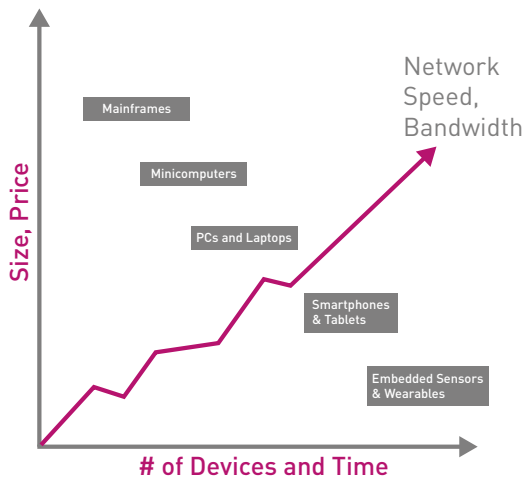


The trick today is not in inventing a new gadget or software app, but in coming up with ingenious ways to assemble all these technologies to unlock new ways to streamline businesses, better service customers and improve people's lives. Around these core values are many opportunities for new and innovative business models – business models that solve problems in new ways and provide new revenue streams. This puts a premium on solving the hard-core business issues; how to provide distinctive value, make money, and avoid being disrupted, disintermediated or out-innovated by competitors within your current industry or an adjacent sector.

Computing Megatrends Fuel the IoT Monetization Opportunity

For 50 years, computing costs have plummeted, and following Moore's law, computing capacity and density have doubled every 18 months. At the same time, Metcalfe's law suggests the value of a network grows in proportion to the square of its connections. These two driving forces have given us smaller, faster, more power efficient, cheaper devices connected with speedier, more ubiquitous networks.

Each Phase Created New Business Models



Most important for software and hardware companies are the new business model and revenue opportunities that were created with each new wave of technology over the last 50 years. As the industry expanded from mainframes to minicomputers, the entire software industry was born. With personal computers and client-server technology, entirely new retail distribution chains opened up and the shrink-wrap software industry was born. With the introduction of mobile tablets and smartphones, the subscription-based pricing model and the downloadable and streaming content markets were created. Each one yielding hundreds of billions of dollars in revenue.

Now with the current wave of smaller, connected IoT sensors and wearable devices, we see entirely new opportunities for pay-per-use, and recurring-revenue models that will once again spawn many 100 billion dollar business opportunities. Businesses or industries that miss these opportunities, do so at their own peril. As we'll see at the end of this whitepaper, this has major implications for flexibly building and managing your business models, pricing and licensing policies.

We can now cost-effectively monitor, analyze and manage more and more granular "things." In fact, we don't even have to be actively involved since machine-to-machine (M2M) technologies are beginning to apply artificial intelligence, machine learning, and predictive analytics to make decisions on our behalf. And, all the data 'exhaust' from these streams provide greater insights, better customer outcomes, new business models, and larger revenue streams.

For example, when my Smartphone's GPS alerts my connected home that I am nearby, a security webcam could use facial recognition to identify me and then my front door lock could use the Bluetooth signal on my phone for verification and securely open the front door. These types of solutions are here today.

Ecosystems Drive Greater Value

Although the Internet of Things embodies many areas, 10 broad sectors are spearheading adoption. As illustrated below, the key areas that are driving IoT ecosystems include smart cars, connected homes, wearables, ehealthcare, agriculture 2.0, the industrial internet, retail stores, smart buildings, utilities and energy grids, intelligent transportation systems, and smart cities.



To win in one of these sectors, you have to understand its ecosystem – in detail. That means understanding user behaviors, perceived value, use cases, underlying technologies, and market dynamics. And, you need to be able to partner with key players as well as compete with alternatives. Each one of these areas will have different business models, pricing, and monetization opportunities. Although these sectors are distinct, there is an additional set of overlapping industries that will be greatly impacted. They will provide new markets and targets of opportunity for monetization. They are also ripe for competitive disruption and business model innovation as you can see in just this one example:

Insurance. Smart homes can provide in-depth sensor data from security systems, smoke detectors, thermostats, videocams, people traffic, door locks, and so on. Insurance companies that leverage this information will be able to better segment their customers to develop entirely new types of property and casualty insurance. In the automotive insurance segment, driverless cars have demonstrated they are safer than human drivers. Will autonomous vehicles have less-expensive insurance? Will Ford, BMW, Tesla and other car companies with superior data on car usage and driver habits in smart cars bundle insurance with their self-driving cars and compete with insurance companies?

Aligning Monetization with Customer Outcomes

You should closely link your monetization strategy to customer value. Focus on identifying key benefits and outcomes around areas of cost reduction and revenue enhancement. Here are some examples to consider.

Cost Reduction

- > Reduce costs
- > Streamline operations
- > Improve efficiency
- > Enhance service levels for same cost
- > Shorten cycle times
- > Improve safety
- > Shorten supply chain
- > Reduce inventory costs
- > Eliminate wasted time, resources
- > Reduce labor costs
- > Remove 'friction'
- > Reengineer operations
- > Reduce customer acquisition costs (CAC)

Revenue Enhancement

- > Better satisfy customers
- > Improve brand image/loyalty
- > Sell more of existing products
- > Sell new products/services
- > Increase 'stickiness'
- > Reduce churn – increase lifetime value (LTV)
- > Reach new markets
- > Be more competitive
- > Create new business models
- > Incent referrals
- > Price differently
- > Increase margins
- > Find new revenue streams

All of the above benefits can translate into compelling value propositions, significant brand enhancement, strong use cases, and powerful ROIs. The key is to thoroughly analyze and identify which ones can help you monetize your IoT offering. Then focus on the ones that leverage your core strengths, unique capabilities, and your understanding of the customer. To accelerate your time to market and fill in gaps more rapidly, partner with other ecosystem players that have greater expertise than you and can rapidly provide more robust functionality.

Identifying Distinctive Customer Value Across the Ecosystem

It's very rare for one company or one product to be able to offer the 'whole solution'. This is why partnering with other players is so important in monetizing the IoT. The advantages of working with selected partners in the value chain are shared risk, lower costs, leveraged development, credibility, and easier access to markets. In some cases, a partner may be the only way to get into the market. In others, outsourcing non-core components of your solution may also accelerate time to market.

For example, if you are serving a particular vertical market or customer type, you need to focus on providing the functionality that provides the greatest value to that user/buyer/customer. Focusing scarce engineering resources on non-core capabilities is a fool's errand. Why try to reinvent another installation program, a unique metering or licensing system, or a new dashboard reporting system when you can license it from a third-party partner in your ecosystem? They most likely have more expertise than you do in that domain. You need to think through all the potential partnerships in the value chain that runs through your ecosystem. Use them to leverage your scarce resources and accelerate your time to market.

The diagram below shows a sample of the IoT value chain. It starts with the customer on the far right and works back all the way to the technologies employed on the left. No matter what type of IoT product or service you offer to individuals or companies, you should create a map that traces your value back through the value chain. This will also help you clearly identify with whom you should partner in the ecosystem(s).

Only by having an integrated value delivery system across the ecosystem's value chain can you be successful. It means you need to develop robust partner programs, integration expertise (think APIs and SDKs), shared visions, and coherent joint sales and marketing programs. In some cases, your integration efforts may need to be a higher priority than new product features.

For example, integration with a dominant platform that most customers use could easily trump all the work you have planned for new functionality. Engineering resources may need to be diverted to reflect these realities. Otherwise, customers may look at your offering and discover it doesn't work with one of their existing systems, platforms or critical software and simply won't use it. This is table stakes. Silos of functionality and stand-alone products may not be acceptable.

Six Key Considerations for Leveraging your Ecosystem and Monetizing the IoT

1. Plan deep integration with ecosystem partners to reduce friction, leverage scarce resources, speed adoption, and create competitive advantage.
2. Intimately understand and quantify the value you are creating for customers/users/partners.
3. Leverage your ecosystem partners to build to scale; this is a game of big numbers.
4. Collect data across the ecosystem, own data, analyze data, monetize data.
5. Identify alternate ways to deliver more value; for example, services instead of products.
6. Align your internal teams and partners to ensure delivery of a coherent, unified IoT offering.

A New World of Business Models for Hardware Vendors

In the world of hardware devices, software has become critically important. Devices from the tiniest of sensors to enormous machinery are now driven by software, and billions of these "intelligent" devices are expected to connect to the already-sprawling IoT ecosystem within the next few years.

The connectivity of these IoT devices creates new levels of risk for hardware manufacturers. Protecting intellectual property (IP) from theft, piracy, misuse, and reverse-engineering (cornerstones of software monetization) have become significant priorities for device manufacturers. The IoT has not only created new risks, it has also created new opportunities. Connectivity enables manufacturers to embrace new business models, enables customer self-service, and usage monitoring. Connected devices enable manufacturers to digitally deliver software and manage user entitlements – eliminating manual operational tasks and costs associated with licensing. And, in turn, helping device manufacturers to more quickly and easily introduce new products and features.

Intelligent device manufacturers can see that one-size-fits-all licensing is no longer enough to remain competitive and have started to look for ways to deliver rich customer experiences while creating new revenue opportunities. They can learn from the software vendors that have successfully implemented software monetization best practices to secure and drive revenue from their IP.

"The notion that there is huge difference between the industrial world and the software world is no longer valid....those days are over. In today's world, everything is software"

Jeffrey Immelt
Chief Executive Officer, General Electric

Ecosystems Partnerships Are Critical

| Technologies | Platforms | Organizations | Things | People/Activities |
|----------------------|----------------|-----------------------|------------------|-------------------|
| Semiconductors | Internet | Retail Stores | Appliances | Health |
| Chip sets | IP addressing | Factories | Homes | Convenience |
| Computers | Cisco | Farms | Buildings | Travel |
| Software | Microsoft | Transportation | Cars | Shopping |
| Apps | Google | Energy Utilities | Phones | Security |
| Networks | Intel | Hospitals | Machinery | Entertainment |
| Cloud Computing | Qualcomm | Military | Planes | Cooking |
| Big Data | ARM | Industry Associations | Buses | Sleep |
| Predictive Analytics | Samsung | Universities | Fitness trackers | Exercise |
| Machine Learning | Gemalto | Governments | Cameras | Work |
| Computer Vision | Citrix/Octoblu | NGOs | Wind Turbines | Planning |
| | Raspberry Pi | | Oil Rigs | Operations |
| | Arduino | | Locomotives | |
| | Alljoin | | | |

← BUSINESS MODELS - MONETIZATION →

IoT connectivity is a path to delivering new experiences via software and hardware that's already in the field. Feature-based licensing and entitlement management enables device manufacturers to ship the same product with different functionality to different customers at varying price points, and then upgrade those products remotely.

Also, field upgradeability replaces the one-and-done product mentality of the past and reduces the impact of obsolescence. With flexible software-based licensing solutions, customers can use only the features they want, turn them on and off themselves, and pay only for what they use.

By offering alternative models to new customers, many intelligent hardware manufacturers have found that they're able to tap into new markets. The rise of connected intelligent devices enables hardware manufacturers to deliver better user experiences by improving customer provisioning and onboarding, while allowing them to implement new business models including subscriptions and pay-per-use.

Now as the subscription economy gains traction, most business are leveraging these alternate business models to move from a large one-time CAPEX expense to smaller OPEX expenditures spread over months or years. At the same time, connectivity-enabled usage tracking provides increased transparency and business intelligence for the customer and the vendor alike.

Business models based on capital expenditure, in which manufacturers charge up front for expensive hardware (like an MRI machine) and give the software away free, are outdated and limit the marketability of their products.

The Tools to Get you There

Many hardware-turned-software companies have accepted this 'brave new world' and are embracing tools that enable them to maximize the potential for their IP. This also allows them to deliver the flexible packaging and pricing models that today's customers demand. As companies look to make the most of these tools, they need to be mindful of some specific challenges:

- > **Intellectual property monetization:** Protecting expertise and know-how within code from theft and reverse-engineering is critical for successful software monetization.
- > **Manufacturing control:** Manufacturers need to maintain the quality of their products when implemented by third parties by preventing even well-intended adjustments to the source code.
- > **Inventory management:** Vendors need to be able to track device models, reduce inventory costs, and ensure product availability.

- > **System integrity:** Vendors need to make sure their devices are ready for the IoT ecosystem, which exposes them to additional risk. They also need to make sure their systems can't be hacked or modified.
- > **Low-cost counterfeits:** Counterfeits are one of the biggest threats to monetization for many vendors and can have a significant negative impact on revenue streams. Vendors need to look for ways to effectively deter this threat.
- > **Device connectivity:** Manufacturers must ensure their hardware in the field can be updated and provide usage data collection remotely. These capabilities will go a long way towards improving the user experience and cutting costs for the device manufacturer through automation and self-service.

Intelligent device vendors must accept that software is now the key to differentiating their hardware solutions. They need to improve the monetization of their IP by protecting existing revenue streams, reaching new customers, and cutting back-end costs. Traditional software companies have achieved success through the use of licensing and entitlement management solutions to address marketplace challenges that intelligent device vendors now face.

As hardware manufacturers continue to watch the industry evolve and the IoT grow, they will realize the market is shifting away from traditional business models. They need to embrace new business models in order to remain competitive. Successful IoT monetization will occur via highly flexible business models, easy licensing and entitlement management, and reduced hardware manufacturing, testing, and storage costs. The most successful new models will align with customers' evolving needs and build on delivering great user experiences.

"By 2020, a failure to put in place a LEM (Licensing and Entitlement Management) system will result in a 20% drop in potential revenue generated from software for device manufacturers connecting to the IoT"

- Gartner

Key Considerations for Your IoT Monetization Journey

Although the IoT is on a very rapid growth trajectory, there are potential obstacles and challenges that will confront both customers and builders of IoT solutions. Whether you are a hardware, software, platform or device company, here are four key areas to consider as you develop your IoT offerings.

Security and Privacy: Although there have been a few minor incidents involving security breaches related to IoT devices, no major widespread failures with significant impacts have occurred. In the future you should be prepared for some major breaches simply due to the 'perfect storm' of more devices, passing more valuable data, that is more exposed – out in the home, the factory, the car, and so forth.

Consider working with third parties that have expertise in securing your systems, data, and IP with a flexible solution that will be extensible as security and privacy policies evolve. Make sure your efforts are 'future-proofed' by working with strong partners.

Big Data: Streaming from all of these billions of devices in the next five years will be enormous amounts of data. It will take the form not just of numbers, but also text, images, video, temperature data, real-time location data, biometric data, etc. This wealth of data will provide valuable insights for companies prepared to mine it.

These new insights will help in creating new customer value-creation opportunities, new business models, and new revenue streams. Think through how you can monetize the value of all this data with new subscriptions, recurring revenues, pay-per-use, and other monetization approaches.

Flexible/Scalable Product and Service Offerings: In building new IoT offerings it will be essential to consider extensibility for unanticipated market developments. You need to ensure you have systems that can scale to support millions of devices in ever-changing configurations with newly emerging requirements.

Make sure you design your systems or work with expert partners to ensure your IoT infrastructure can massively scale to support the automatic provisioning, updating, metering, and managing of the software that will be running in IoT devices – and do it all remotely with audit trails.

Integration with Existing Ecosystems: To ensure you have a completely integrated value delivery system, your IoT solutions need to tie into critical parts of the ecosystem. Most importantly, you need to make sure you can integrate them into core back-office systems that handle asset tracking, ordering, provisioning, billing, and support infrastructures. Although many companies are enamored with the IoT technology itself, these other areas are critical elements. They will ensure you have a scalable system that can provide the greatest value to customers through a complete value delivery system.

These alternate business models can move large one-time CAPEX expenses to smaller OPEX expenditures. At the same time, connectivity-enabled usage tracking provides increased transparency for the customer and the vendor alike.

Conclusion

No surprise: the key to developing a strong base for your IoT offerings is to start with a focus on genuine customer value, rather than just a technology that could become a 'solution in search of a problem.'

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Also, critically important, are the innovations you bring to your business model. These may be tied much more closely to customer habits and preferences than product and technology innovations. And, to accelerate your time to market, make sure to leverage the strengths of ecosystems and partners through their technologies and practices. Third party solutions can protect your IP while helping you manage security, licensing and entitlement management without having to build everything yourself.

If you are a small company building a device, make sure your product is not part of another company's seeding strategy. If you're a large company, consider that you may need to do some internal 'silo busting' to ensure all the functional areas of your company are focused on a value delivery system that puts the customer first.

Finally, be prepared for a "long and winding road" as there may be many bumps along the way. Make sure you have enough money and management support if it takes longer for your markets to mature and sales to materialize. As technology forecaster and futurist, Paul Saffo once said, "Never mistake a clear view for a short distance."

About Grey Heron

Chris Kocher is co-founder and managing director of Grey Heron (San Francisco, Calif.; www.greyheron.com), a management and marketing consulting firm that helps executives and investors turn technologies into substantive businesses.

Grey Heron has worked with over 100 companies through multiple innovation and investment cycles. The Grey Heron team brings a wealth of strategic and hands-on operating experience to help CEOs, executives and investors build revenues and shareholder value. They help build leaders by innovating with new business models, product strategies and monetization in established industries and markets that are being disrupted.

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About Gemalto Software Monetization Solutions

Gemalto is the market-leading provider of software licensing and entitlement management solutions for on-premise, embedded, and cloud-based software vendors. Gemalto Sentinel is the most trusted brand in the software industry for secure, flexible, and future-proof software monetization solutions. For more information, visit: www.gemalto.com/software-monetization


security to be free