WHITE PAPER

FUTURE PROOF COMPUTING

Fathym has developed an innovative application development framework to enable software developers, subject matter experts and business users to rapidly and collaboratively build diverse data applications. The framework utilizes open source tools and an open data architecture enabled by microservices that seamlessly integrate with technology stacks to future-proof innovations.

Harbor Research

Transforming the Future of Software Development

Fathym leapfrogs the current market's noise and clutter about digital innovation by viewing core application development and workflow automation and orchestration as a unified challenge that can be addressed by a single, scalable solution:

» Innovative platform aggressively leverages open source software tools and a flexible open data architecture, enabling developers to launch solutions faster, with fewer specialists, dramatically reducing the time and cost needed to build new cloud-native applications.

» Technology convergence and innovations allow users and customers to refocus on business challenges, not technology infrastructure management.

» Data application development tools and cloud microservices orchestration platform allow developers to focus on what they want to build, not how they build it.

» Competitive environment is in flux due to piecemeal outdated technologies, incomplete platforms, and vendor lock in.

» Market opportunity is tremendous, robust and growing rapidly – "core tools" sector is a $2 billion+ opportunity with data applications and related services driving an over $1 trillion opportunity.

» Fathym is well positioned to deliver on this growth opportunity; strong culture of innovation and distinct developments.

Fathym is re-defining the evolution of computing and software as a service radically changing the way data applications are developed and deployed, and creating a new market meta-category.

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There are millions of unfilled software development jobs at this moment, with no hope of training enough people to write all the code needed …

CROSSING SOME CHASM

Neil Gershenfeld, the long-time director of the Center for Bits and Atoms at MIT's Media Lab, complains in one of his books about the habit most people have of adding the word "technology" to almost anything related to computers. We'd laugh if someone called a printing press "newspaper technology," or a toothbrush "teeth brushing technology," but we're happy to call a router "communications technology" or a piece of software "Internet technology." Automatically adding the suffix keeps those inventions in a "special" realm, even a "magical" one, separate from real-life. In subtle ways it legitimizes tech-sector innovations and stifles arguments against them, making them seem almost as inevitable as nature.

One can imagine similar criticism coming from Alan Kay, who worked for years at Xerox's legendary Palo Alto Research Center (PARC). Kay himself personally invented object-oriented programming and designed the original laptop computer, and like Gershenfeld after him, he wanted computers to "disappear" from consciousness and simply become tools that people used without thinking about them as "technology" or anything else.

For decades we've been hearing that we'll eventually cross a chasm and computers will finally form-fit themselves to human beings, rather than humans form-fitting to computers. And yet, more than forty years after Xerox PARC, we still haven't made computing invisible. Computing and software development needs to be made more human-centric; software development needs to enable ordinary users and citizens to interact with computers at a deep level.

Alan Kay and Xerox PARC are important historical touchstones for the leaders of Fathym, Inc., a Boulder, Colorado company that has created a new and novel platform for building data applications. Fathym was originally started as a "no-code" vendor specializing, like Kay himself, in graphical software intended to make programming more accessible to young people.

Today Fathym provides an innovative application development and deployment platform focused on developer teams looking to rapidly build data applications for mission-critical industrial and business-critical commercial and enterprise domains.

FATHYM TRANSFORMS SOFTWARE DEVELOPMENT

Fathym's platform empowers developers and business users to quickly and collaboratively build data applications, machine learning solutions and Internet of Things (IoT) deployments by providing operational and technical staff with tools to organize their data, create applications and manage infrastructure without the need for "armies" of coders, developers, architects and specialists.

Enterprise software has undergone a dramatic evolution for 20 or more years. Today we have containerization, languages are less important, microservices are available everywhere, and it's all enabling very powerful software solutions. But, it's also creating a huge amount of complexity. Fathym wants to abstract all that complexity away.

Fathym's new development and deployment platform leverages the combined potential and convergence of two critical innovations:

» **OpenCore IDE for Data Application Development:** modular framework that utilizes open source and low code software development tools and decouples frontend and backend development enabling new workflow automation and innovation at the edge;

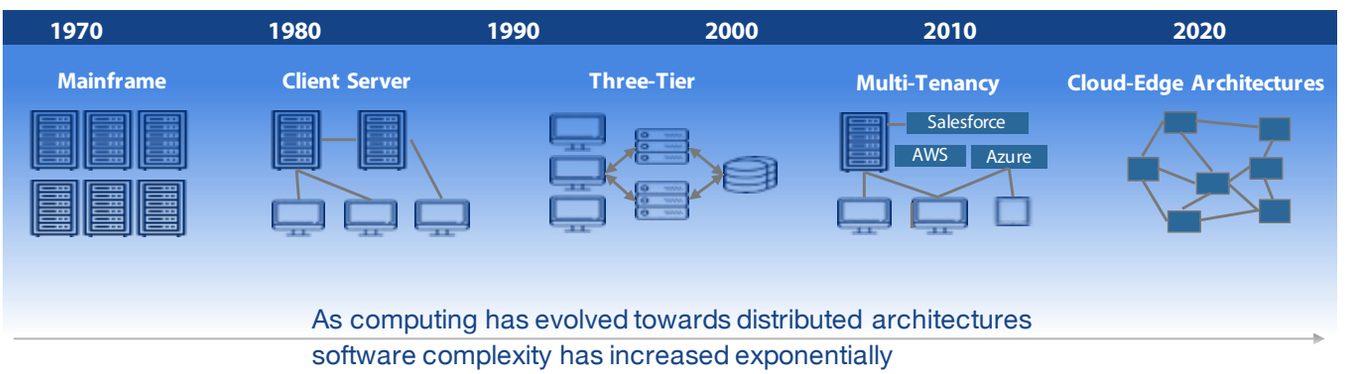
» **Microservices Orchestration:** microservices and cloud infrastructure automation enable a more modular, distributed and independently deployable approach to developing software systems compared to monolithic application architectures of the past.

Fathym understands that developers and users need a completely new approach to automating workflow – one where open source software development tools and libraries are modular and interchangeable and where automation of software development and re-use of software components can be realized across an ever-broader spectrum of development communities and domains.

>1M
DEVELOPERS REQUIRED IN 2020

THE SCALE OF DEVELOPMENT REQUIREMENTS FOR ENTERPRISE AND MOBILE APPLICATIONS IS ALREADY SIGNIFICANT, BUT WITH THE EMERGENCE OF NEW DOMAINS SUCH AS IOT AND AI, SOFTWARE NEEDS HAVE OUTPACED THE NUMBER OF AVAILABLE DEVELOPERS

Cloud Computing Has Driven Greater Complexity Into Software Development



SOURCE: HARBOR RESEARCH

Harbor Research

By combining multiple parallel innovations in cloud infrastructure management, workflow automation and data application development, Fathym is multiplying their impacts on developers, integrators, users and enterprises. Fathym understands the need for a common data application development framework that enables software developers, subject matter experts and business users to rapidly and collaboratively build diverse data applications enabled by microservices.

By aggressively leveraging open source software tools and a flexible open data architecture, Fathym's framework enables developers to launch applications faster, with fewer specialists, dramatically reducing the time and cost that it takes to build new solutions. This approach, in turn, allows diverse users and customers to refocus on their business challenges, not technology development or infrastructure management.

FATHYM'S NEW APPLICATION DEVELOPMENT FRAMEWORK AND ORCHESTRATION PLATFORM LEVERAGES THE COMBINED POTENTIAL AND CONVERGENCE OF OPEN SOURCE DEVELOPMENT TOOLS, WORKFLOW AUTOMATION AND MICROSERVCES

DEVELOPER and USER NEEDS

The modern business enterprise has been deconstructing for decades. Companies used to develop the logistics, tools, and processes they needed right inside their four walls. Today, no one thinks of a company as bound by the four walls of a building. Companies are ecosystems now, value-delivery networks consisting of a disassembled set of business functions and entities - some owned directly, many sub-contracted, but all requiring orchestrated data and information.

The days of monolithic applications are over. Microservices are the new way to develop, consume and manage applications. At the same time, because enterprises have diverse users, functions and entities, all with an overabundance of data flows and interactions, they need optimized tools to orchestrate the value presenting itself. Two critical forces are at work underlying this shift:

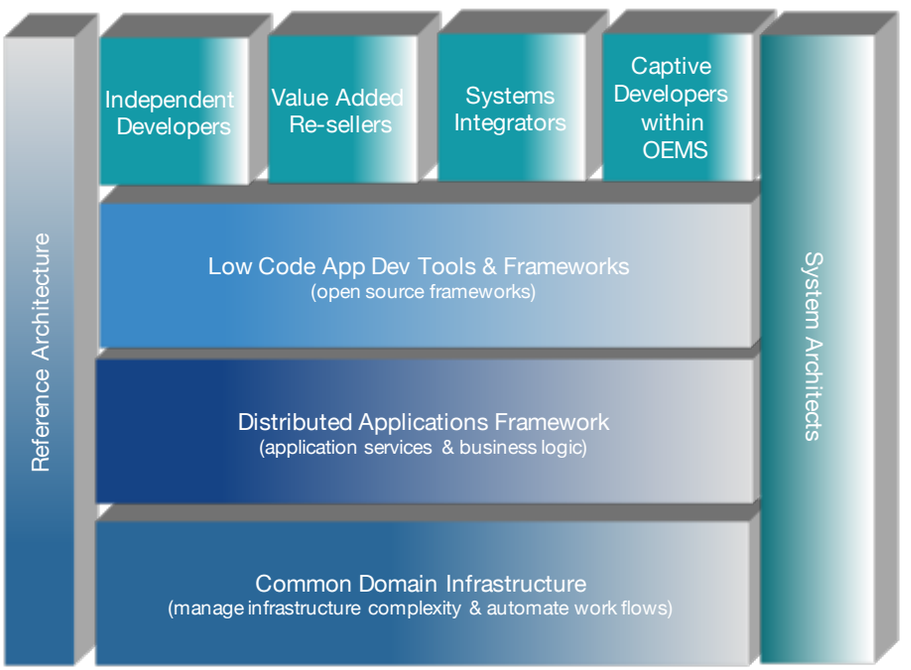
» the expanding number and diversity of new applications enterprises want to develop and the corresponding failure of software development organizations to keep up with the rapidly growing demand; and

» the advent of multiple new classes of data-driven applications, including AI, machine learning solutions and Internet of Things (IoT) applications.

Enterprises are struggling today to turn the operational data generated by their people, machines and fleets into tangible business value. Data is often trapped in machines, equipment and incompatible systems, or stored locally on workstations and drives. Extracting value from diverse data types and disparate data sources requires special skills that are in short supply -- cloud server provisioning, data science, multiple programming languages, and more. Most development organizations have become overwhelmed with the proliferation of new application requirements.

These forces are driving many enterprises to work with broader networks of external software developers and organizations including systems integrators (SIs), independent software vendors (ISVs), independent hardware vendors (IHVs) and more. However, the software tools developers are working with today to build new digital solutions were not designed to handle the diversity of data types, the scope of interactions and the massive volume of data points generated; each new application requires too much customization and development resources just to perform many of the same basic tasks efficiently and effectively.

FATHYM PLATFORM ARCHITECTURE



Data Application Development Tools

New generation of rapid development software tools for data applications development that leverages open source tools and can be used by diverse developer communities, existing value adders and users

Microservices Orchestration

Applications composed of microservices are platform agnostic, running on any device via distributed application services architecture where orchestration scales different functions automatically in response to demand, freeing developers to focus on app dev not server management

Ecosystem and Developer Support

New application domains (e.g. AI, ML, IoT) requires participation from diverse 3rd parties, which requires effective tools, a scalable platform and a marketplace for software libraries and components to enable these interactions

SOURCE: FATHYM

Fathym's data application development framework and microservices platform reduces the time needed to build new applications from months to weeks or often just days. Fathym's low-code tools minimize customers' over-reliance on specialized software engineers and data scientists. Operations staff access visual interfaces to view data from different silos and create cloud-based data applications through simplified user interfaces that lower the required expertise.

ORCHESTRATING INNOVATION

Multiple parallel technology developments are increasingly reinforcing and accelerating one another. Cloud infrastructure provides unprecedented computing scale; workflow automation increases developer efficiencies; mobile computing devices are extending the reach of computing; machine learning and artificial intelligence (AI) are embedding intelligence in diverse sensors and hardware; embedded systems and IoT technology are connecting and integrating a broad array of physical and digital applications. Each of these technologies is powerful on their own, but new players are creatively combining these capabilities to multiply their impacts.

$2B+

LOW CODE-NO CODE APPLICATION DEVELOPMENT TOOLS IS A $2 BILLION MARKET OPPORTUNITY

SOURCE: HARBOR RESEARCH

Open source software tools, cloud computing and microservice architectures are hardly new, but as the diversity, scale and nature of data interactions grows, the systems or "technology architecture" will need to become more closely coupled to the application logic or "business architecture" to inform and enable a new generation of data applications and services. These two "architectures" must be tightly interwoven and mutually supportive without inhibiting one or the other.

Aligning and leveraging the respective roles of technology architecture and business architecture often creates contention, but we are entering an era where success in either architecture dimension will increasingly go to the players that effectively utilize their combined potential. This is where Fathym's innovations are focused.

Data applications are at the heart of this convergence trend, enabling a whole new generation of digital solutions. Engineering and development organizations are reaching a critical juncture where they need a completely new approach – one where open source software development tools and libraries are modular and interchangeable and where automation of software development and re-use of software components can be realized across an ever-broader spectrum of development communities and domains.

Fathym's software tools and platform help enterprise IT organizations, systems integrators, third party developers and similar organizations augment and extend their skills to overcome staff shortages and launch data applications and solutions in a fraction of the time traditional tools and infrastructure solutions typically achieve.

HOW IS FATHYM DIFFERENT?

Fathym was created in 2015 to convert a low-code platform aimed at teenagers into a robust ecosystem to rapidly build enterprise IoT solutions. The founders and leadership knew that a strong abstraction-layer would allow them to orchestrate a company's operations while also liberating them from specific technologies. If their abstraction was well-thought-out, and simple enough, it would facilitate a better exchange of data without exposing users to the weeds of the platform the data was being exchanged over.

They accomplished this with the Low-Code Unit, an information container that bears a distinct resemblance to the packet with which the original Internet designers solved that other "impossible" orchestration problem—making the world's many diverse, proprietary computers talk to and share information with each other.

In the way that the Internet is a "network of networks," Fathym's Low-Code Unit is a "container of containers." Low-Code Units can contain or reference other Low-Code Units to any degree of complexity desired. This foundational concept is crucial because the world is not about to stop innovating now. There will be new languages and code-structures stretching out indefinitely into the future, and they'll need a simple common space where everything is guaranteed to work. Using Fathym's Low-Code Units, more people in an enterprise can focus much more of their valuable attention and efforts on new application value creation, not on how to organize and manage the tools and infrastructure.

>$1T

DATA APPLICATIONS MARKET WILL EXCEED $1 TRILLION BY 2023

SOURCE: HARBOR RESEARCH

FATHYM LEVERAGES THE CONVERGENCE OF MULTIPLE SOFTWARE INNOVATIONS

HashiCorp

Recent Series E drives $5.25B valuation

Hashicorp:
Cloud provisioning & infrastructure automation

Like Hashicorp, Fathym combines DevOps and automation workflows, along with open source compatibility. Also like Hashicorp, Fathym has been nominated a top Microsoft Partner of the Year. Fathym allows customers to go much further than infrastructure provisioning, giving them the tools to make use of their data and optimize businesses.

mx mendix

Acquired for $730M by Siemens Aug 2018

Mendix:
Low-code application development platform

Like Mendix, Fathym offers low-code app development structured for successful IoT deployments. However, Fathym doesn't lock customers into a platform because of its open data architecture and creating underlying infrastructure on the customer's cloud versus their own, giving them full and complete access to make changes. Fathym also focuses on the orchestration of the third party tools and technologies the customer chooses to use.

netlify

Recently completed a $53M Series C raise

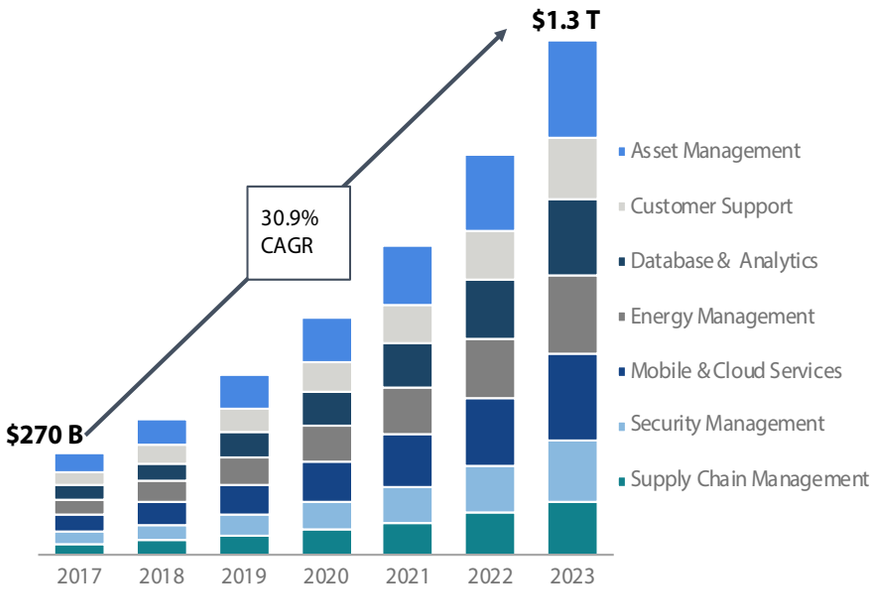
Netlify:
Cloud hosting & content delivery network on AWS

Like Netlify, Fathym addresses automated site hosting, dynamic application management and content delivery network (CDN). Unlike Netlify, Fathym is first focusing on enterprise-favored Microsoft Azure and later expanding to AWS as well as focusing on feature-rich Angular versus React. Also, Fathym focuses on enabling data-rich applications, versus single static web pages.

This means that a workplace scenario that used to take top-level engineers days or even weeks can literally become a two-hour foolproof process for a single junior-level engineer working inside the Fathym framework. Furthermore, every workflow provision across the business would be equally efficient because it uses the same toolset. Orchestrating with Low-Code Units essentially becomes a new environment for people who don't possess high-level coding skills to create sophisticated solutions of their own.

THE MARKET FOR FATHYM'S FRAMEWORK and PLATFORM IS RAPIDLY EXPANDING

Value-Added Data Applications Opportunity
Global Market 2018 - 2023



SOURCE: HARBOR RESEARCH

It also allows professional software developers—from ISVs and system integrators, to OEMs with internal development organizations—to modify the back end in any way they wish. Technology changes constantly, but good business problem-solving can last for many years. Fathym's architecture keeps a company's business logic separate from their specific enabling technologies.

Fathym's architecture is built as distinct containerized entities, so customers are free to delete certain aspects of it and the effects won't cascade through the rest of their digital world. If you don't like the way Fathym deals with domains, for example, you can use a different approach and nothing else about your structure is affected.

Customers can change their open-source repositories on GitHub, customize the infrastructure that lives under the tools, and none of that impacts the way the problem-solving building blocks are consumed. The business intent of the enterprise remains distinct from the specific tools and languages used to instantiate it.

EVOLVING MARKET and COMPETITIVE STRUCTURE

Fathym's innovations are evolving in a competitive environment that is in a state of rapid change. Fathym's application development and workflow automation innovations are competing with multiple segments of software players including:

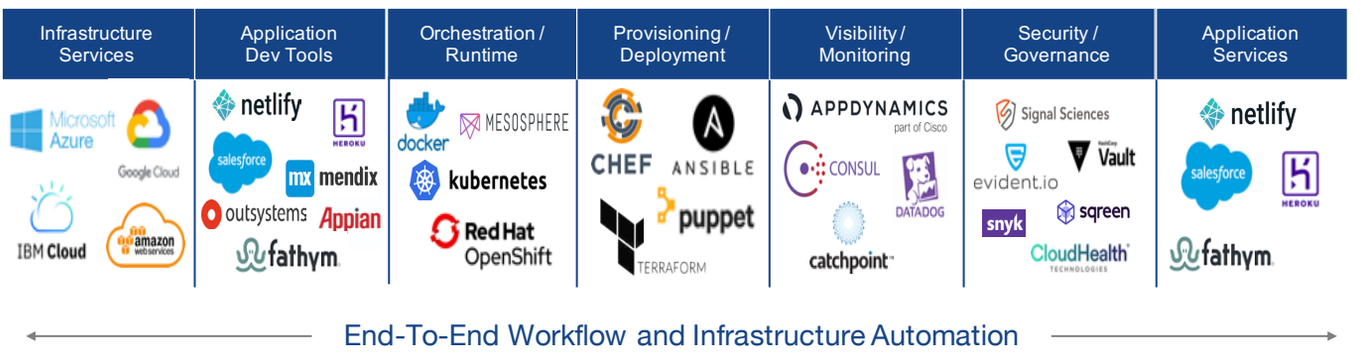
- Cloud computing infrastructure and automation players
- Low-code/no-code software development tools
- Diverse system and app development SaaS offerings
- IoT platforms
- Big data workflows and management

FATHYM'S APPLICATION AND MARKET GROWTH OPPORTUNITIES ARE IN DIVERSE MISSION AND BUSINESS CRITICAL ARENAS

The many diverse categories of players and software offerings are increasingly causing confusion among developers, users and customers. Negative feedback from developer communities often revolves around the myriad of fragmented tools and complex software infrastructure that need to be managed within developer workflows, as well as the degree to which many of these offerings tend to drive vendor lock-in for users and customers.

Existing web development platforms and so-called low-code frameworks offer a graphical UI to simplify the process of structuring a program, and then behind-the-scenes the system assembles the actual code that gives machines their instructions. The problem for the user of these tools comes when they—or more likely their developers—have a subtler problem and need to go deeper. Today's typical web development platforms and low-code frameworks all manipulate the same programming problems, but their

SOFTWARE DEVELOPMENT LANDSCAPE IS DIVERSE and VERY FRAGMENTED



SOURCE: HARBOR RESEARCH

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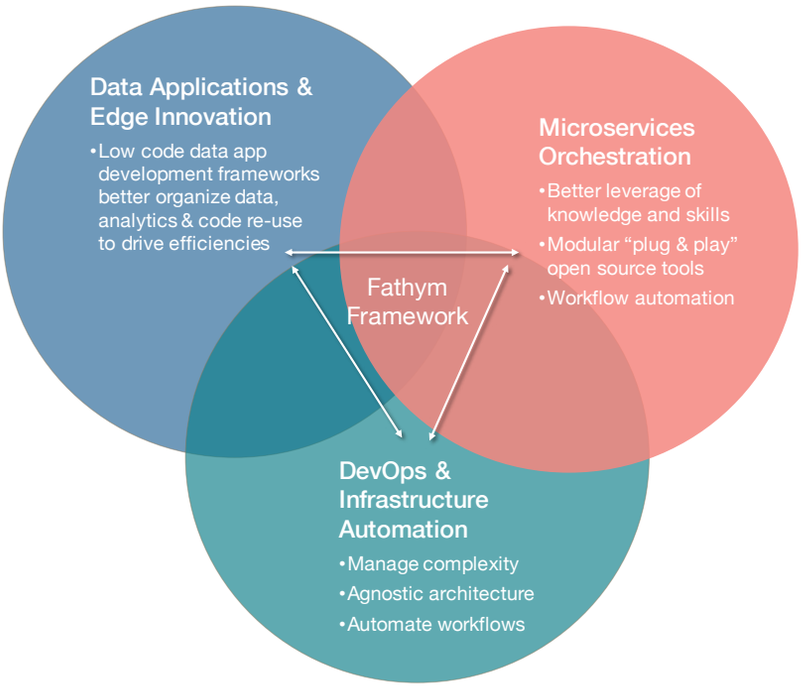
different solutions are locked away in a more tightly coupled data structure that their simplified UI hides from the user. This leaves their customers "vendor-locked" into that particular platform to exclusion of anything else.

Knowing this to be the case, Fathym turned the telescope around. They started by fully engaging the complexity of back-end software innovations, then they painstakingly abstracted that until they arrived at a simple way to build the front-end—but one that also allows trained developers to go deeper and re-engage the underlying complexity if they ever have the need to do so. By decoupling frontend and backend development, Fathym enables new workflow automation, expanded deployment management capabilities and data innovation at the edge.

FATHYM'S CREATIVE COMBINATION OF TOOLS and TECHNOLOGIES



Fathym's platform is built to support open data standards and open source tools which prevent customers from being locked into a proprietary system. Apps built on the Fathym platform can be easily integrated with third party open source frameworks and with commercial off–the-shelf computer and networking equipment, simplifying deployment, upgrade and migration strategies and helping to future proof data applications.

CONCLUSION

Fathym's distinction lies in its combination and integration of cloud infrastructure management, workflow automation and application development and deployment tools, as well as the company's aggressive commitment to an open and flexible architecture. Fathym's core innovations are well aligned with diverse developer preferences:

» Decoupling frontend and backend development to drive new distributed computing and software innovations closer to endpoints to enable the necessary real-time processing and low latency at the edge.

» Simplifying edge and cloud application development via low code tools.

» Making application development and software developer workflows much easier by integrating Git and Github with source code management and version-control tools that create and automate collaboration networks for developers.

» Microservices capabilities that enable applications to continuously evolve with business needs, replacing expensive, monolithic "hardwired" applications that are difficult to augment or upgrade.

users and

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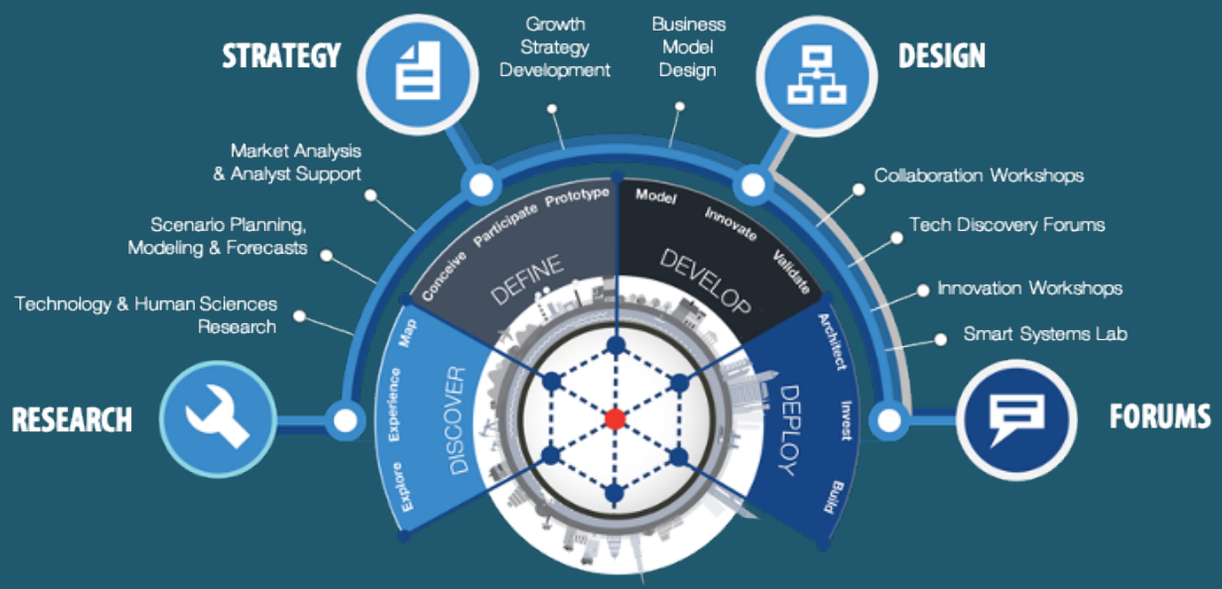

Harbor Research has over thirty years of experience working with clients on growth strategy and new business creation. At the core of Harbor's approach is a deep understanding of the core technologies, markets and business characteristics as well as the management and organizational challenges companies face adopting and developing digital and smart systems technologies. We strive to generate deep insight into how emergent technologies drive value creation and competitive advantage in our clients' businesses and the economy as a whole.

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