



TATA ELXSI

Smart Home and Appliances

PRODUCTS & SERVICES

Intelligent | Interoperable | Personalized

EXPERIENCE THE CONNECTED FUTURE



Technology convergence and digital technologies are creating new opportunities to impact customer experience and fuel the growth of brands and businesses across the world.

It is an era characterized by unprecedented volume, variety and velocity of innovation. And these possibilities will be multiplied by emerging technology breakthroughs in fields such as Artificial Intelligence, Robotics, the Internet of Things, Autonomous Vehicles, Smart Home, Broadcast and Communication and more.

Tata Elxsi is recognized as a specialized service provider for product design and engineering services. Our integrated technology and design teams help enterprises re-imagine their products and services - from strategy, consumer research and insights, to service and experience design, technology implementation, integration, launch and beyond.

I am happy to share with you, our products and services across Automotive, Broadcast and Communications, Smart Home, AI and IoT. Learn more about how Tata Elxsi helps you discover new revenue streams, improve efficiencies, and drive business transformations by converging technologies, industries and methodologies to deliver exceptional outcomes.

Nitin Pai

Senior VP & Head – Marketing



inside



SMART HOME AND APPLIANCES 04

- **Future** - Trends, Opportunities & Challenges
- **Services** - Opportunities & Challenges Addressed
- Smart Kitchen
- Smart Laundry
- Smart Vacuum
- Smart Healthcare
- Smart Security
- Smart Entertainment

SERVICE FRAMEWORK12

- For OEM
- For Operators



FUTURE - TRENDS, OPPORTUNITIES & CHALLENGES

TRENDING

People are bringing their 'I-want-to-do' attitudes and personalization into the kitchen. They are turning to mobile apps at every phase of the cooking journey—to decide what to make, learning how to prepare it, and actually cook or bake.

There is demand for user centric appliances that can guide by suggesting procedures either through video or voice, enhancing the cooking experience . In the new world, microwave should be configured automatically for various recipes. Dishwashers will decide the wash cycle after identifying the dishes. In the laundry department, refresh and robotic wash systems will sort out different types of fabric, configure the suitable wash cycle and fold the garments automatically.



In the living room, a robotic vacuum that glides itself along the carpet everyday as you leave for work, will soon have the enhanced ability to send notifications on objects it finds in its path. Your home surveillance system will soon tag surveillance footage for easy retrieval and efficient search of stored videos.

OPPORTUNITIES & CHALLENGES

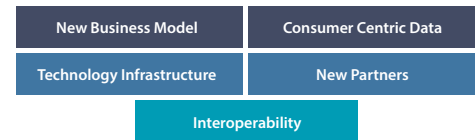
Manufacturers will soon have an opportunity to become service providers, given the amount of data they can collect with connected devices which enable the trending use cases. Scheduled services will open up new subscription based business model. Consumer experience will be

defined through insights, creation of marketplaces.

The ability to deliver great consumer experience, ensuring interoperable, secure & cost-effective solutions are the top challenges, which demand developing secured, open and scalable platforms.

No longer is the sale by any means the end of the relationship. OEMs have an opportunity to become more personalized, data-driven, and Continuous Service Providers.

Device management, remote diagnostics will reduce the cost of delivering the services. This will require building new partnerships for data management, telecommunications, applications and payments.



SERVICES - OPPORTUNITIES & CHALLENGES ADDRESSED

Launch exciting use cases for the future

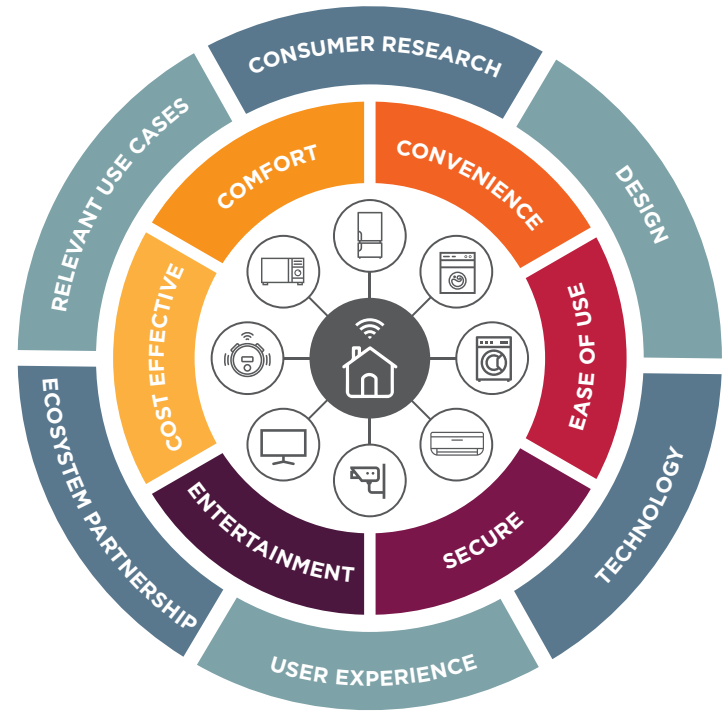
- As an expert partner, we help you with consumer research, technology and design
- Bring innovation using advanced technologies such as cognitive AI, analytics and connectivity frameworks keeping design thinking at the forefront

Win the experience battle

- User experience design methodology that delivers personalized and unique experiences for each consumer
- Best-in-class platforms and applications integrated and customized to your needs

Device interoperability and security

- Conformance and certification services for UL Cybersecurity Assurance program
- Readily available security solutions for secure boot, secure upload, OTA
- Access ecosystem partners for entertainment, e-commerce, recipe apps, health & fitness, VPA



Addressing the 'Market of One'

SMART KITCHEN

APPLICATION SCENARIO

Food management

- Detects fruit, vegetable and packed food
- Create shopping list, online grocery shopping

Recipes

- Virtual personal nutritionist
- Integrate popular cooking platforms like Sidechef and Innit

Entertainment

- Cooking platform for professionals and hobbyist for collaborative work

User interface

- Voice assistant (Alexa, Google home), dynamic UI touch and gesture control

SCOPE

AI models development for digital kitchen platform

- Custom designed network to meet high accuracy & performance requirement
- Device appropriate data gathering and augmentation strategy to address poor lighting
- Synthetically generated data to augment the datasets

Connectivity module development

Mobile and cloud application development

CASE STUDY



CONSUMER BENEFITS

- Easy to use - every one is an expert cook now
- Cooking is entertaining
- Makes grocery shopping fun
- Reduce wastage, eat right

SMART LAUNDRY

APPLICATION SCENARIO

Garment detection, identification and sorting

- Including cloth type, owner, tag and fabric identification

Robotic arm to pick and place the garments

Clothing care system to refresh cloths

Control panel with intuitive interface and options for personalization

Laundry as a service: Reserve, schedule, monitor and pay for the laundry services

SCOPE

AI models development for intelligent laundry system

- Based on state-of-the-art neural network architectures implementation
- Implement “few-shot learning” techniques to develop solution with limited data set
- Test environment setup inline with end product environment

Robovision implementation to pick and place the garments

Rapid prototype development of clothing care system

Concept design: Pre-detergent mix and water re-use

CASE STUDY



CONSUMER BENEFITS

- Spend less time on sorting clothes
- No worries on damaging those beaded garments
- You don't have to be a tech savvy to operate the machine
- Save water in every wash

SMART VACUUM

APPLICATION SCENARIO

Dry and wet mopping robotic cleaners

Decision making based on the object detected to cover maximum area

Identify misplaced objects and alert

Mapping and navigation, efficient path planning for floor cleaning

Voice enabled interface

Identify and categorize personal living space in house – understand “clean my room”

SCOPE

SLAM (Simultaneous Localization And Mapping) algorithm implementation

AI on edge device

- AI model development and optimization
- Reinforcement learning

Prototype & aesthetic mock-up development

Product design for local market needs

Form factor reduction without compromising on functionality and aesthetics

Obstacle detection: Pre-trained for detecting 15 classes

CASE STUDY



HIGHLIGHTS

- Ability to recognize object and avoiding collision
- Highly optimized AI model to fit into low footprint embedded platform
- Country-specific variant of product design
- **Execution speed:** 2.2 FPS, 90% detection accuracy

SMART HEALTHCARE

APPLICATION SCENARIO

Monitor various vital parameters like step count, heart/ breath sound, sweat level, respiratory rate, skin temperature

Determine stress level based on above parameters

Communicate with home appliances for automatic temperature control, playing calm music on smart speaker based on emotional status

Alert user or family members if anomalous readings detected

Remotely monitor/ diagnose patient

SPECIFICATIONS

Solution is based on Renesas Rx231platform

Mobile applications (Android 5+ iOS6)

Bluetooth connectivity

Compliance or Regulatory support

- IEC 62304 - Medical device SW - SW development life cycle
- IEC 60601– Medical Electrical Equipment
- FDA Class – II
- UL 2900 – Cyber security



HIGHLIGHTS

- Medical measurements with calibration and medical safety support
- Document artifacts as per IEC 62304, UL 2900
- Product design and prototyping of the device

SMART SECURITY

APPLICATION SCENARIO

Live video analytics

- Classification of person, unattended and suspicious objects

Automatic video tagging

- Easy retrieval, for efficient content search such as objects, actions, scene, emotion, face recognition

Integration with thermal infrared camera

Camera with audio analytics capabilities to detect abnormal sounds

Smart access control

SCOPE

Video analytics platform development with hierarchical object tagging

Optimized AI engine to run on embedded platform

Implementation of audio analytics

Developing AI solution on low memory edge device

Running analytics on low resolution thermal images



HIGHLIGHTS

- Platform that supports various home security use cases
- Event specific anomaly detection
- Mines stored video data and answer query
- Combination of CNN, RNN/ LSTM, NLP/ NLU

SMART ENTERTAINMENT

OTT

- Consumer experience design
- Front end – user apps
- Backend – Content management system and SDP
- System integration
- Automation and monitoring
- AI and analytics

Android TV

- End to end system integration
- Application development
- Content discovery and Monetization
- Voice Assistants

AR/VR

- Custom content development
- 3D modelling and animation
- Custom App development
- Integration with AR/VR hardware

Solutions

- Operator tier launcher
- Content management system
- OTA
- Test automation suit – falconeYE
- Cognitive video service platform

CASE STUDY



TECH PERIPHERAL OF THE YEAR

"An innovative gadget truly making a difference to television viewing by bringing the best of online content and linear TV on a single platform."

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SERVICE FRAMEWORK



**DIGITAL
DISRUPTION**

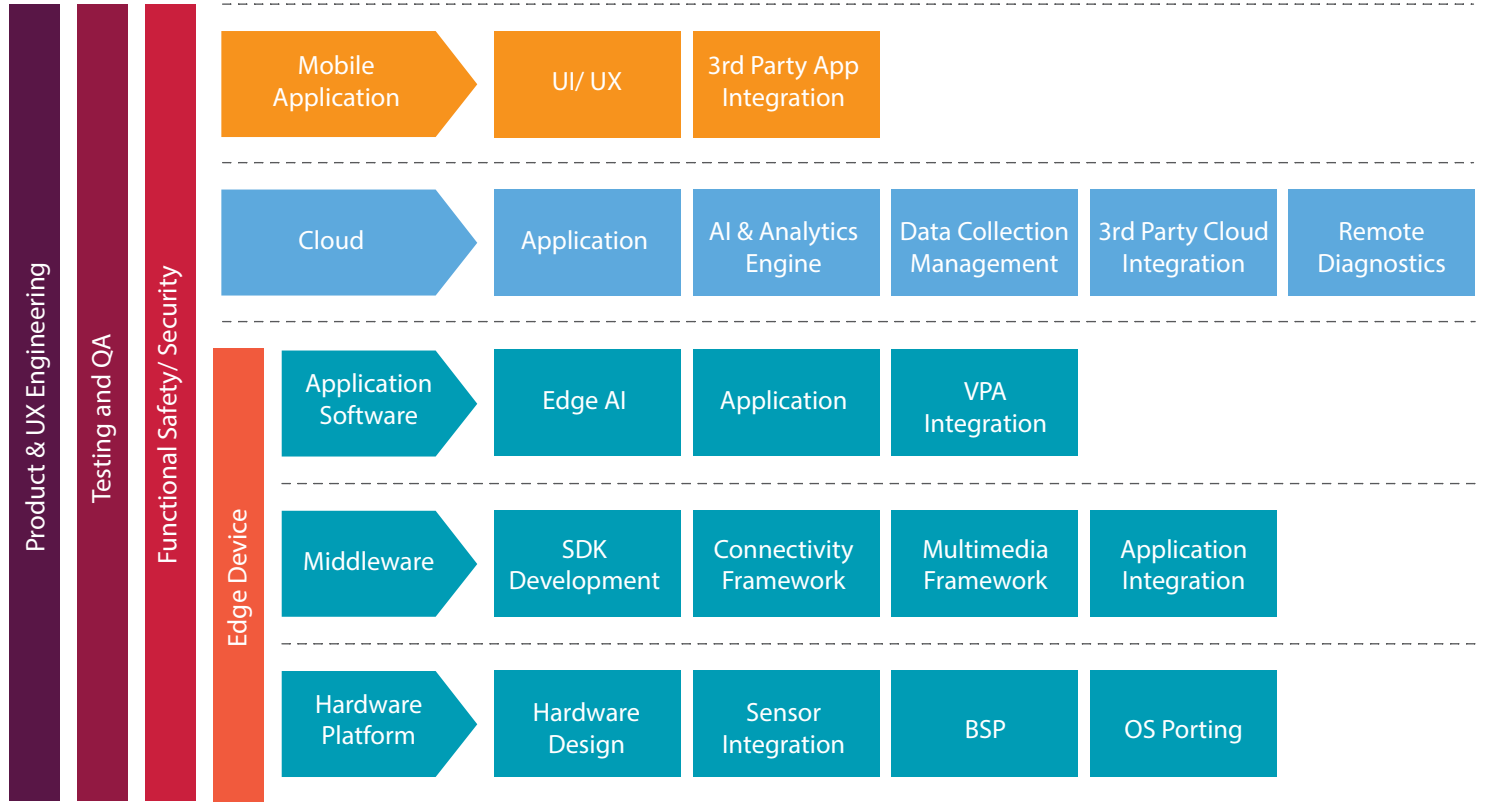
IOT

**BIG
DATA**

AI



SERVICE FRAMEWORK FOR OEM



SERVICE HIGHLIGHTS

- **Multi-Modal Interface:** Integrate virtual personal assistants, touch and gesture
- **AI Solution:** Application development on cloud or edge for optimum performance, accuracy and cost AI implementation on wide range of edge platforms – CPU/ GPU/ FPGA/ DSP
- **SDK/ Middleware Platform:** Development, productization and maintenance
- **Functional Safety Compliance:** Testing, documentation and artifacts as per IEC/ UL standards
- **Interoperability and Security:** Delivering performance, conformance and certification
- **Product & UX Engineering:** UX design, rapid prototyping, new product design, product localization

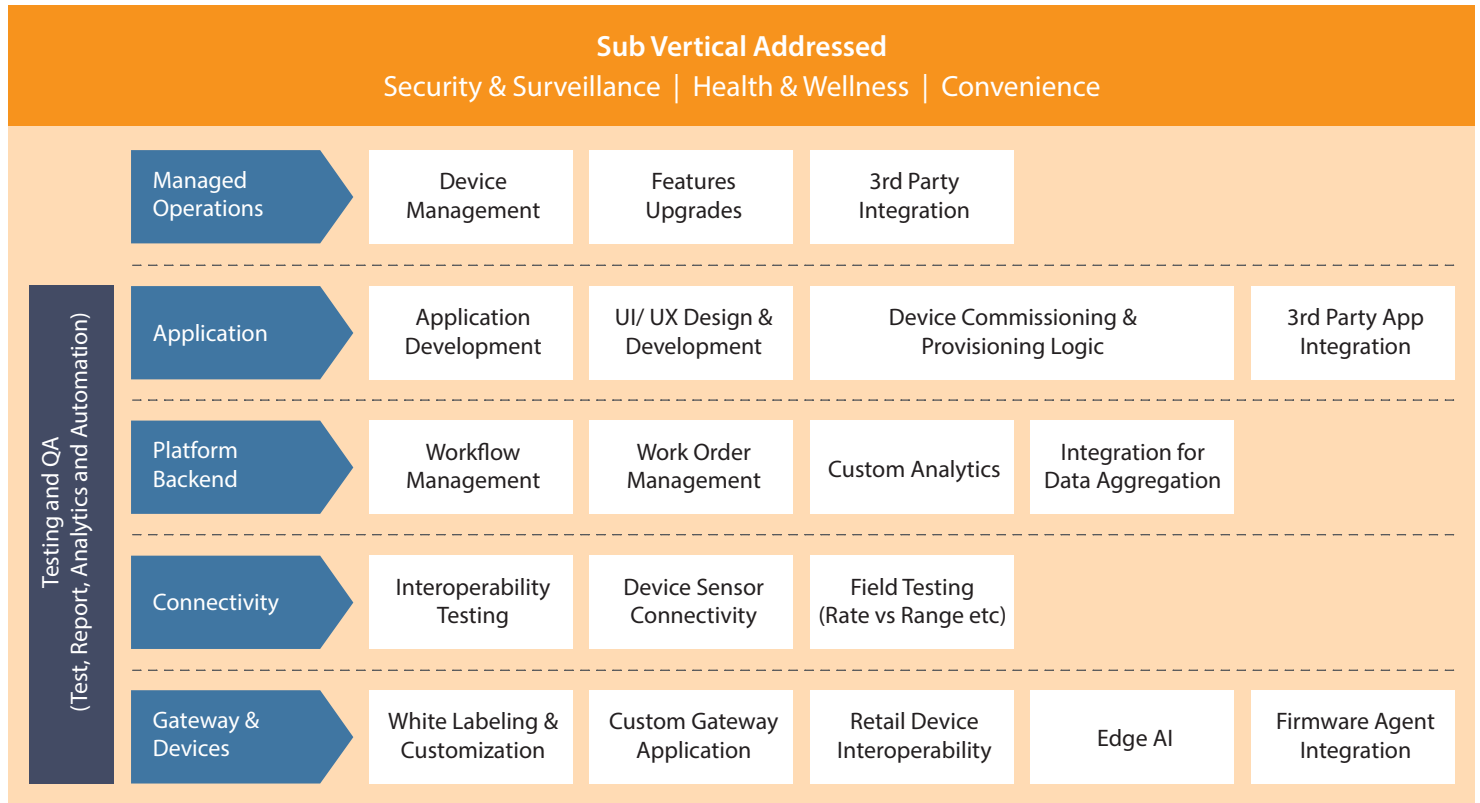
DIFFERENTIATORS

- Consumer research led product development
- Centers of excellence for Smart Home and AI
 - Developed advanced technologies for global market
 - Deep understanding of camera, sensor technologies and silicon platforms
 - Readily available cognitive intelligence solutions
- Certified functional safety professionals
- Worldwide ecosystem partnership
- Early access to partner's roadmap, reference solutions and extensive knowledge sharing, skill and capability development

CASE

- R&D center to develop globally applicable advanced technologies and product development for wide range of smart home appliances
- Develop and maintain Integrated home security solution which involves gateway development and integration testing of 3rd party devices
- SDK/ Middleware platform development on low footprint device. Developed, productized and maintained for 20 microcontroller variants

SERVICE FRAMEWORK FOR OPERATORS



SERVICE HIGHLIGHTS

- Managing sensory data before it is passed on to the network
- Measuring, reading and collection environmental data (Temperature, pressure, GPS, camera)
- Suite of development tools and APIs for developing apps
- Event data collection, data logging, data search and processing
- Remote device configuration, control and upgrades
- Collection and analysis of large data sets

DIFFERENTIATORS

Flexible

- Wide choice of readily interoperable OEM devices for operators
- Simple on-boarding and customer lifecycle management

Reliable

- Made for operators' IoT platform with millions of transactions
- Enable operators to deliver services with 99.9% uptime guarantee

CASE

Security & Surveillance – Large Tier 1 Cable Operator

Integrated Home security solution which allows their customers to control security cameras, sensors and other functions

Elderly Care as a Service – Service Providers

Enable elderly people to live independently at home

Convenience – America's Leading Consumer Electronics

Designed and developed smart switch to enable a user to remotely control home appliances with the help of a mobile application

About Tata Elxsi

Tata Elxsi is amongst the world's leading providers of design and technology services for product engineering and solutions across industries including Consumer Electronics, Communications and Automotive.

It provides technology consulting, new product design, development, and testing services. Tata Elxsi also provides solutions and services for emerging technologies such as IoT (Internet of Things), Big Data Analytics, Cloud, Mobility, Virtual Reality and Artificial Intelligence (AI).

Tata Elxsi has a global presence, and is supported by a talent pool of over 5,000 employees, a network of design studios and development centres.



LET'S BUILD THE
FUTURE
TOGETHER

TATA ELXSI

engineering creativity

Bulgaria | Canada | China | France | Germany | India | Ireland | Japan | Malaysia
Netherlands | South Africa | Spain | UAE | UK | USA

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