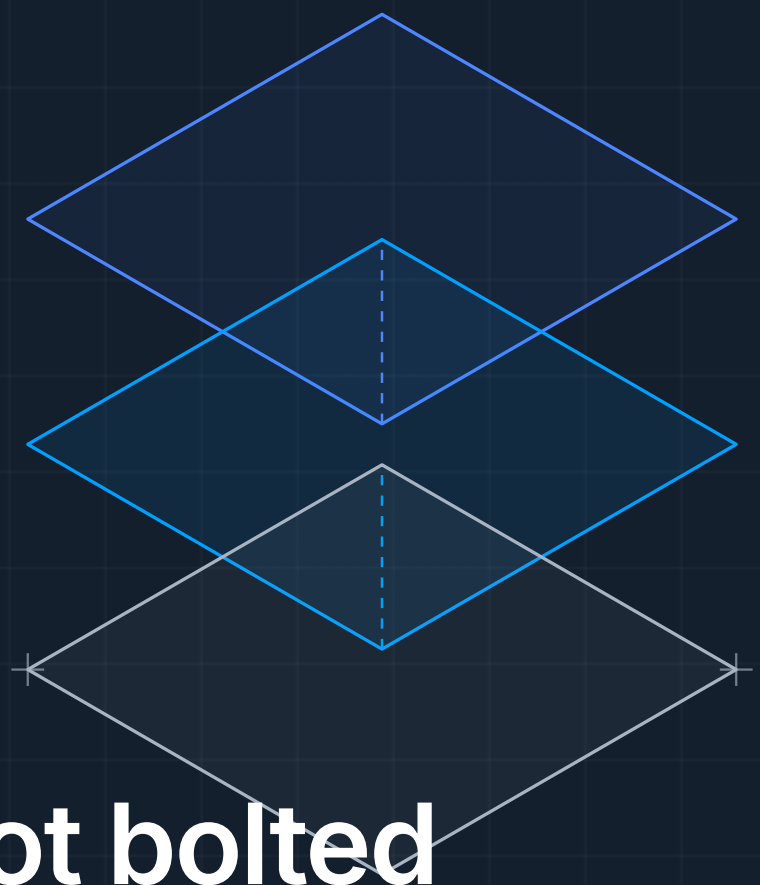
TRUSTXP



SYSTEM ARCHITECTURE BRIEF

Intelligence is engineered in, not bolted on.

The three layers every TrustXP system is built on, the gate sequence it is built through, and the certification regimes that decide the design.

A specification, not a capability list.

This brief states how a TrustXP system is put together and what decides each part of it. Every node, gate and mark in it is read from the same records the website renders from, so the two cannot disagree. Where the record holds no number, the engineering is described instead.

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The architecture referenced throughout is **ENGINE-01** — the three-layer arrangement every TrustXP system is built on, whatever the domain. It is drawn in full and probeable at trustxpengineering.com/platform.

Three layers, one closed loop.

A signal enters at the edge, is decided on in the core, and informs models in the cloud that return to the edge. The loop is the point: a system that only sends data upward is instrumented, not intelligent.

LAYER 01

Physical edge

Sensing, power conversion and actuation, in the environment the system actually lives in — heat, dust, vibration.

LAYER 02

Intelligence core

Deterministic scheduling and inference at the edge, so the decision does not depend on a network round trip.

LAYER 03

Digital cloud

Fleet management, analytics and model training, whose output is evolved models returned to the edge.

Physical edge

The layer that touches the world. Five nodes, and their constraints are physical: thermal path, enclosure and power stage cannot be renegotiated late without becoming a redesign.

NODE	WHAT DECIDES IT
Sensor array	What the system must observe, and the environment it observes it in — recorded as heat, dust, vibration.
Power stage	Conversion specified for the duty cycle it will actually see, not a nameplate rating.
Edge processor	Acquisition and control. The compute the decision needs, chosen against the duty cycle rather than a datasheet headline.
I/O	The interfaces the installed environment already speaks.
Actuator	What the system is permitted to change, and the safe state if it cannot.

Intelligence core

Where the decision is made. Placing it on the device is an architectural choice with consequences in both directions: it removes the dependency on a network, and it puts the burden of correctness on the device.

ELEMENT	WHAT DECIDES IT
RTOS	Deterministic scheduling. A worst-case guarantee is the property being bought, not average throughput.
Inference	The decision point is at the edge. What the model must conclude, and within what deadline.
Control loop	The rate the physical process demands, and what happens on a missed cycle.

Why this matters commercially. A system that must reach a network to decide inherits that network's availability. In charging infrastructure, industrial automation and medical devices, that is usually the constraint that decides the architecture.

Digital cloud

Fleet-scale learning, whose product is not a dashboard but a better model on the device. Three nodes, and the return path is what closes the loop.

NODE	WHAT DECIDES IT
Fleet management	What must be known about every unit in the field, and how often.
Analytics	The questions the operator needs answered, defined before the data model.
Model training	What the fleet has learned that a single device could not. Its output is evolved models to the edge — the return leg of the loop.

Two domains, one method.

The subject changes; the discipline does not. Both are architected, integrated and taken to volume by the same team under the same lifecycle.

DOMAIN 01

New Energy & EV Infrastructure

- Charging systems
- Energy storage
- Power electronics
- Grid integration
- Hydrogen and renewable platforms

DOMAIN 02

IoT, Embedded & Intelligent Automation

- AI-powered controllers
- Edge intelligence
- Medical devices
- Industrial automation
- Smart infrastructure

End-to-end ownership, gate by gate.

Eight gates. Development, Operation and Sourcing are not three departments handing work along — they own gates across one sequence and overlap through it.

Gate 01 · Development **Concept**	Gate 02 · Development **Schematic & ECAD**
Gate 03 · Sourcing **PCBA**	Gate 04 · Development **Firmware**
Gate 05 · Development **Verification & validation**	Gate 06 · Development **Regulatory certification**
Gate 07 · Operation **NPI**	Gate 08 · Operation **Mass production**

The decision that costs most when it is late. The applicable certification regime changes the architecture — creepage, shielding, materials. Deciding it at Gate 01 is a design choice; discovering it at Gate 06 is a redesign, with PCBA already behind you.

Certification is an input, not an outcome.

The same product needs different marks in different markets. The set is a programme input, decided at concept, because the target markets change what gets designed.

CCC | CE | UL | FCC | UKCA | Energy Star

MARK	SCOPE
CCC	China Compulsory Certification — mandatory for the Chinese market
CE	European conformity — EU health, safety and environmental protection
UL	Underwriters Laboratories — North American product safety
FCC	US Federal Communications Commission — electromagnetic compatibility
UKCA	UK Conformity Assessed — Great Britain market access
Energy Star	US EPA energy-efficiency programme

Engineering, manufacturing and quality sit where the work happens.

10	5	25+
LOCATIONS	COUNTRIES	YEARS FOUNDER EXPERIENCE

A programme moving from prototype to volume does not change companies to do it.

Bring us the system, not the specification. The most useful first conversation is about what the system has to do and the conditions it has to survive. The specification follows from that.

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