

People First, Then Pixels

Why human-centred design, not display technology, determines whether a control room works, and how Red Rocket's Command Centre proves it

EXECUTIVE SUMMARY

Control rooms rarely fail because the technology was not good enough. They fail because the room was designed around equipment instead of the people who must run it, and the cost of that failure is paid in missed deviations, alarm fatigue and slow decisions, shift after shift, for the life of the facility. Human-centred design inverts the sequence: understand the operators, their tasks and their decisions first, then shape the space, the consoles, the visual layer and the software around that understanding. This paper sets out what the discipline actually involves, anchored in a recent proof point: Red Rocket's renewable energy Command Centre at Cape Town's V&A Waterfront, where a world-first display installation delivers its value through the ergonomic study, operator workflows and tailored software designed around it. The same principle carries from a boutique energy operations floor to a 21-station mining iROC, because in every control room, the human is the one component that cannot be upgraded by purchase order.

THE PROBLEM: ROOMS DESIGNED AROUND EQUIPMENT

Most control rooms are procured as a collection of line items (a video wall, consoles, licences, chairs), each specified in isolation and often by different departments. The result is familiar: screens positioned where the wall had space rather than where sightlines fall; alarm systems that announce everything and therefore prioritise nothing; furniture that fights the operator by hour six of a twelve-hour shift; and software configured to mirror the plant hierarchy instead of the operator's decisions. None of these appear on a snag list, because each item individually meets its specification. The deficiency lives in the interfaces between them, and it surfaces as human cost: fatigue, workarounds, slower responses and higher turnover. An operation can spend millions on visualisation technology and still leave its operators materially worse equipped to act than a well-designed room with modest hardware.

THE DISCIPLINE: WHAT HUMAN-CENTRED DESIGN ACTUALLY MEANS

Human-centred design is not a softer aesthetic; it is an engineering discipline, codified in ISO 11064, that starts with a structured analysis of who will occupy the room and what decisions they must make. From that analysis flow the hard parameters: sightline geometry between every seat and every display; workstation ergonomics and reach envelopes; a tiered information hierarchy that separates what belongs on the shared wall from what belongs at the desk; an alarm philosophy that reserves colour and motion for the moments that demand attention; and lighting and acoustics that keep people alert without wearing them down. Critically, the discipline demands early involvement of the end users themselves: operators know things about the work that no specification captures. Applied properly, every element of the room answers one test: does it make the operator clearer, calmer and safer, and the operation more resilient?

THE PROOF: RED ROCKET'S COMMAND CENTRE

Red Rocket, the Cape Town-based independent power producer, monitors and manages its portfolio of wind, solar and hydro assets from a purpose-built Command Centre at its V&A Waterfront headquarters. The facility's centrepiece is remarkable by any standard: a 10,2 m × 1,69 m micro-LED wall of roughly 29 million pixels, the first fully redundant 0,7 mm pixel-pitch display deployed in Africa or the Southern Hemisphere. The project was led by MoveMaster, with PlanetWorld supplying the micro-LED technology. Oculus's contribution was the human layer: an in-depth ergonomic study and design of the operations environment, and a flexible software solution tailored to how Red Rocket's Operations & Maintenance and Asset Management teams actually monitor, analyse and control renewable assets in real time. That is the essential point of this paper in miniature. A world-first display becomes a world-class control room only when the geometry of the room, the workflow of the operators and the behaviour of the software are engineered around the people in the seats. Red Rocket's Head of Operations and Maintenance has described the result publicly as "a significant leap ahead" of what other independent power producers currently have in place.

THE PATTERN: THE SAME PRINCIPLE AT EVERY SCALE

The Red Rocket Command Centre sits at one end of a spectrum; the discipline behind it does not change with size or sector. At Assmang's Black Rock Mine Operations, Oculus designed and delivered a 21-station integrated remote operations centre where 84 sightline-aligned wall panels operate under a strict situational-awareness philosophy: calm, low-contrast graphics in normal operation, tiered alarming that lets critical value-chain events command the wall while plant-level alarms stay at the console, and a four-level information hierarchy that takes an operator from "something is drifting" to "this motor, this conveyor" in seconds. For a global brewing group's command hub programme, the same human-centred principles were codified into a blueprint standard, proven at two live breweries and reused across the continent. Renewable energy, mining, brewing: three industries, one constant: the room is designed outward from the operator.

THE PAYOFF: WHAT THE OPERATION ACTUALLY GAINS

The return on human-centred design compounds daily. Operators who can see what matters, when it matters, intervene earlier, shifting the operation from reactive response to proactive management. Decisions that once travelled between rooms and phone calls are made in seconds, in context. Fatigue and error rates fall because the environment works with human physiology instead of against it, and well-designed rooms retain the experienced people who make them valuable. These outcomes cannot be bought as line items, and they cannot be retrofitted cheaply once a room is built wrong, which is why the ergonomic study belongs at the start of a control room project, before the decisions become expensive to change. The technology will be replaced several times over the life of the facility. The design around the human is what endures.

ABOUT OCULUS OPERATIONAL INNOVATIONS

Oculus designs, fabricates and delivers complete control room and visualisation solutions for mission-critical environments, carrying single-point accountability from user requirements and ergonomic design through fabrication, fit-out and AV integration to handover and support, delivered within scope and within cost.

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