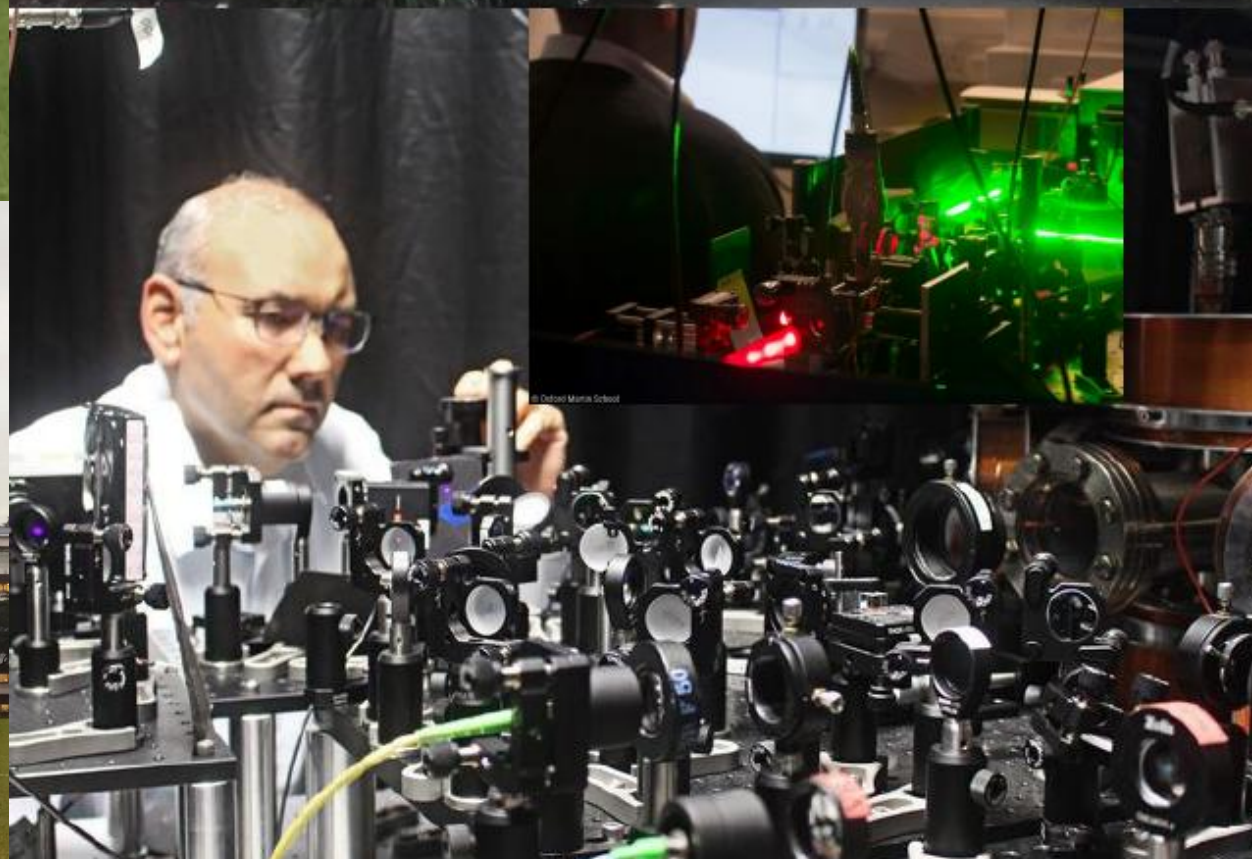
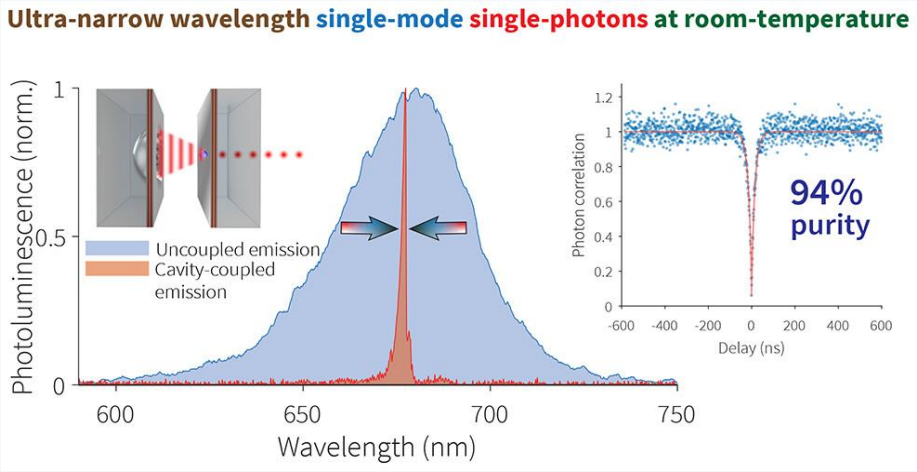


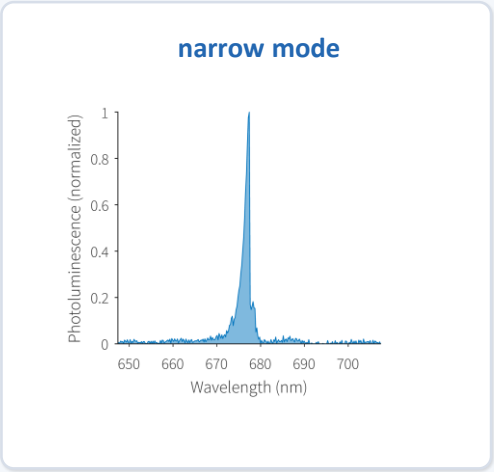
Prof. Tristan Farrow
University of Oxford

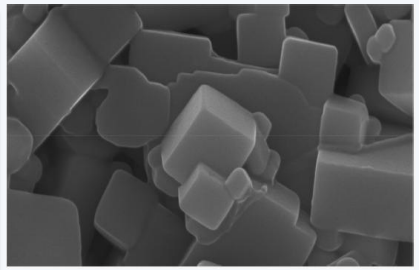
SINGLE-PHOTON DEVICES: two contrasting R&I models

UNIVERSITY – Start from the science



Perovskite nanocrystals integrated in optical cavities as a route to spectral control and efficient collection: open-access microcavity > select emitter > tune resonance > shape output mode

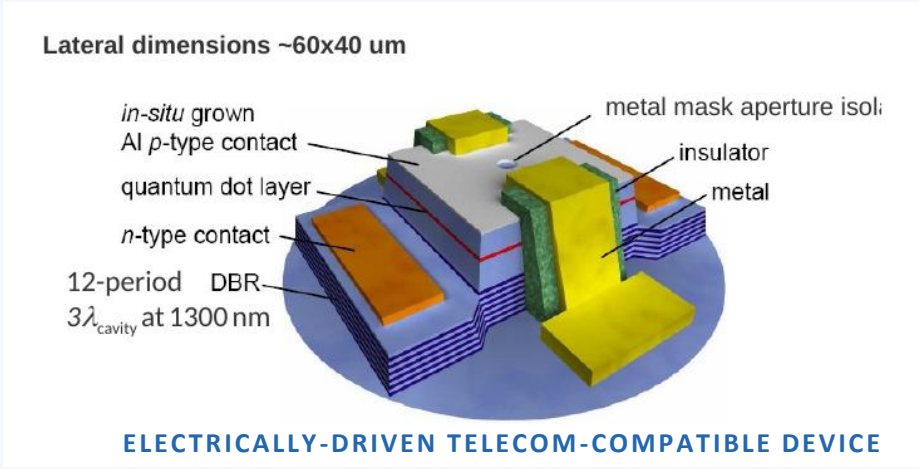


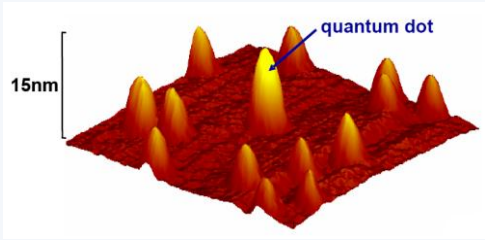


Perovskite nanocrystals promise efficient sources of single-photons

Nano Letters 23.23 , 10667-10673, 2023

INDUSTRY – Start from the application





InAs/GaAs III-V Semiconductor quantum dot layer integrated in device

Applied Physics Letters, 90(6), 063512, 2007

The starting point shapes how the technology is developed –

Science-led discovery and application-led development produce different routes to innovation

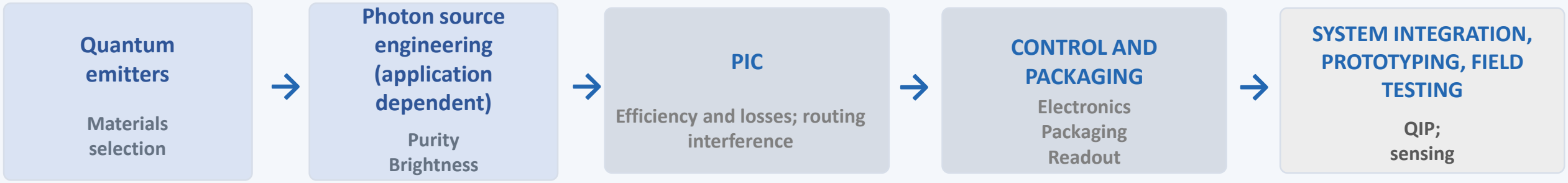
Useful quantum photonics is co-design of the components, device and optical system.

A familiar way of organising research and innovation in universities – linear and siloed

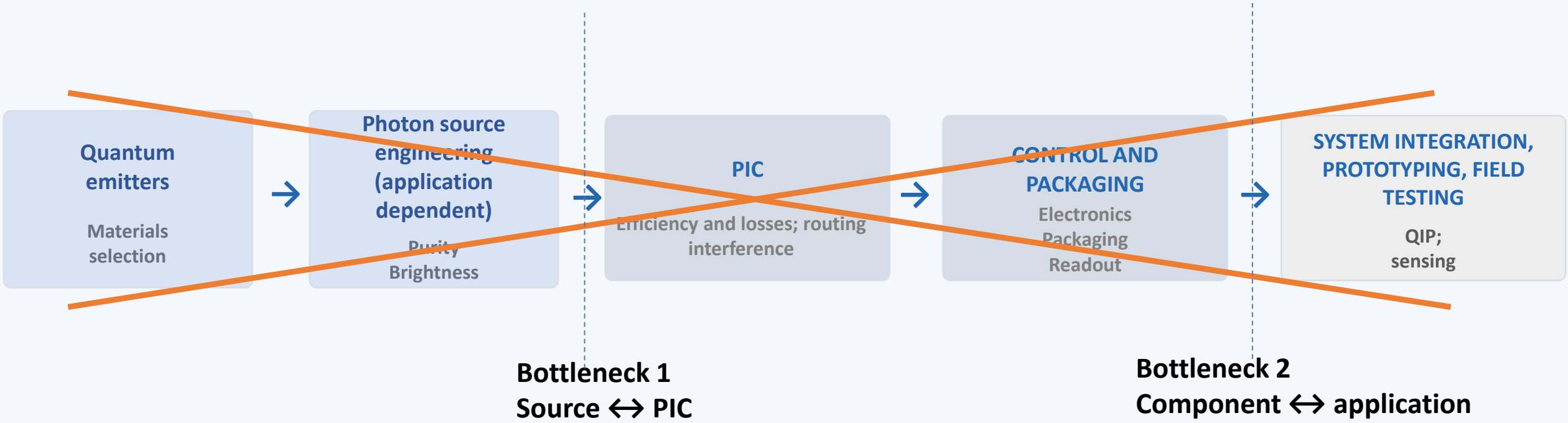
Discovery-led starting point:

basic research → component development → integration → application

Illustrative sequence in quantum photonics

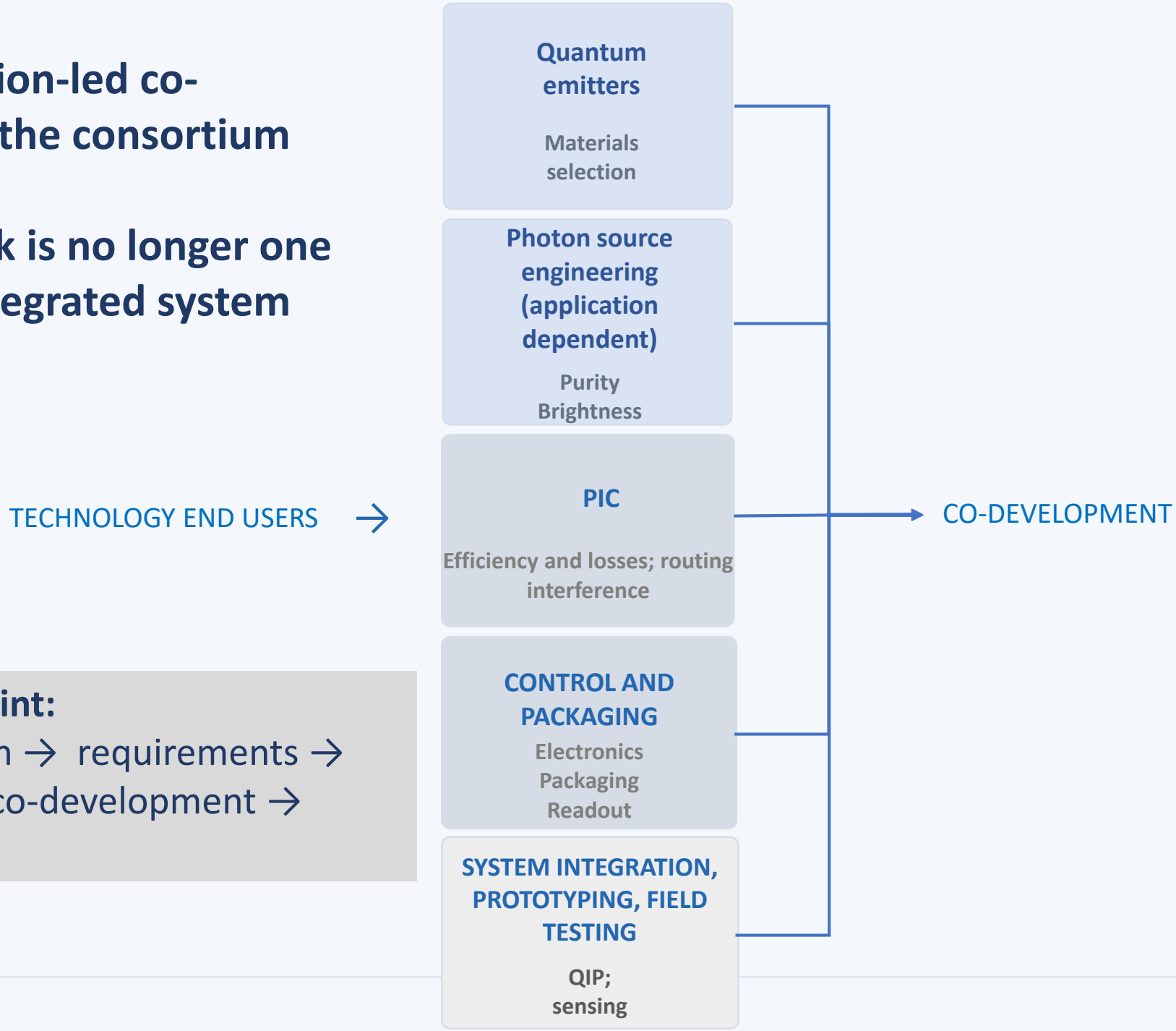


Bottlenecks break down the linear R&I model



Recreating the application-led co-development model in the consortium

– the bottleneck is no longer one component; it is the integrated system



Application-led starting point:

application → requirements → specifications → co-development → system → validation

The consortium question

Can we co-design the emitter, PIC and package around a real application – creating field-deployable quantum-photonic systems for information processing and sensing?