

Direct-Reading Noise Exposure Assessment Methods:

Noise Exposure Instrumentation

From the Present – to the Future

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Assessment Methods (DREAM) Workshop

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NIOSH

A Manufacturer's Perspective

- Current Dosimeters - in transition
 - Form factor vs. functionality
- Effects of Technology development
 - Advances and limitations – ‘along for the ride’
- Role of Dosimeters - today and tomorrow
 - Compliance vs. best practice
- Drivers of Dosimeter Development
- What will dosimeters be like in 2020?



Current / Future Noise Dosimeter Development Trends

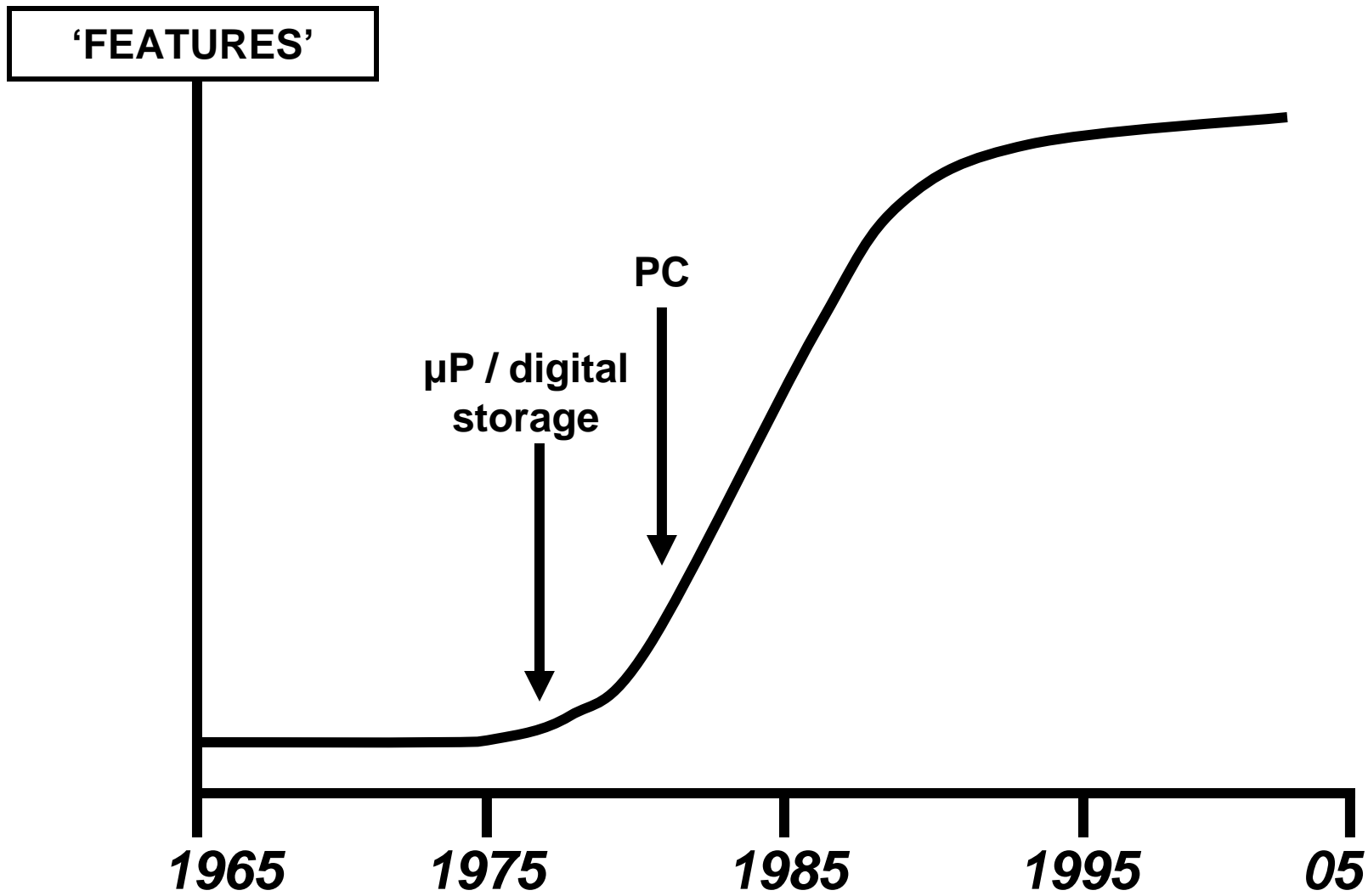
- Smaller size, lighter weight
- Integrated Form Factor – shoulder mountable
- Infra-red, RF, other remote readout technologies
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- Continual interrogation of data and continuous monitoring of exposures – remotely
 - Central ‘command’?
- Frequency Analysis (Octave Band)
- Stereo measurement (left side / right side)
- Monitoring inside the ear-canal
 - What does the data mean?

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- How much data is *too much* data?

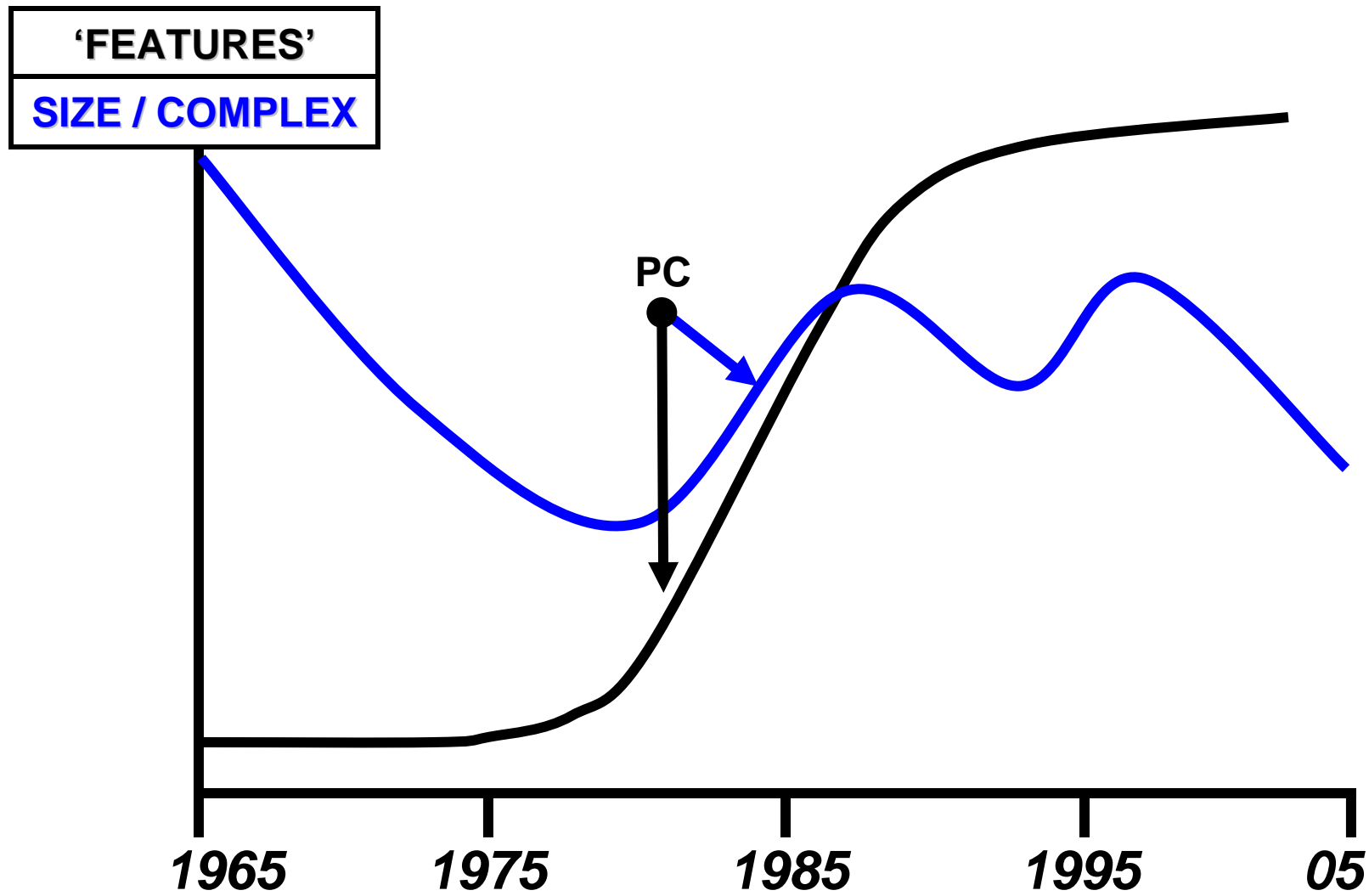
From the Present to the Future

- ‘Traditional’ Dosimeters have a long evolutionary history – 2 main events:
 - Microprocessors and Digital Storage (1970’s)
 - Time History and detailed statistical histograms
 - Major step forward in documenting exposure
 - Advent of the PC (1981)
 - Ability to store, manage, view and print
- Led to large increases of data acquisition with additional complexity and non-essential metrics (L_{DN} , etc.)

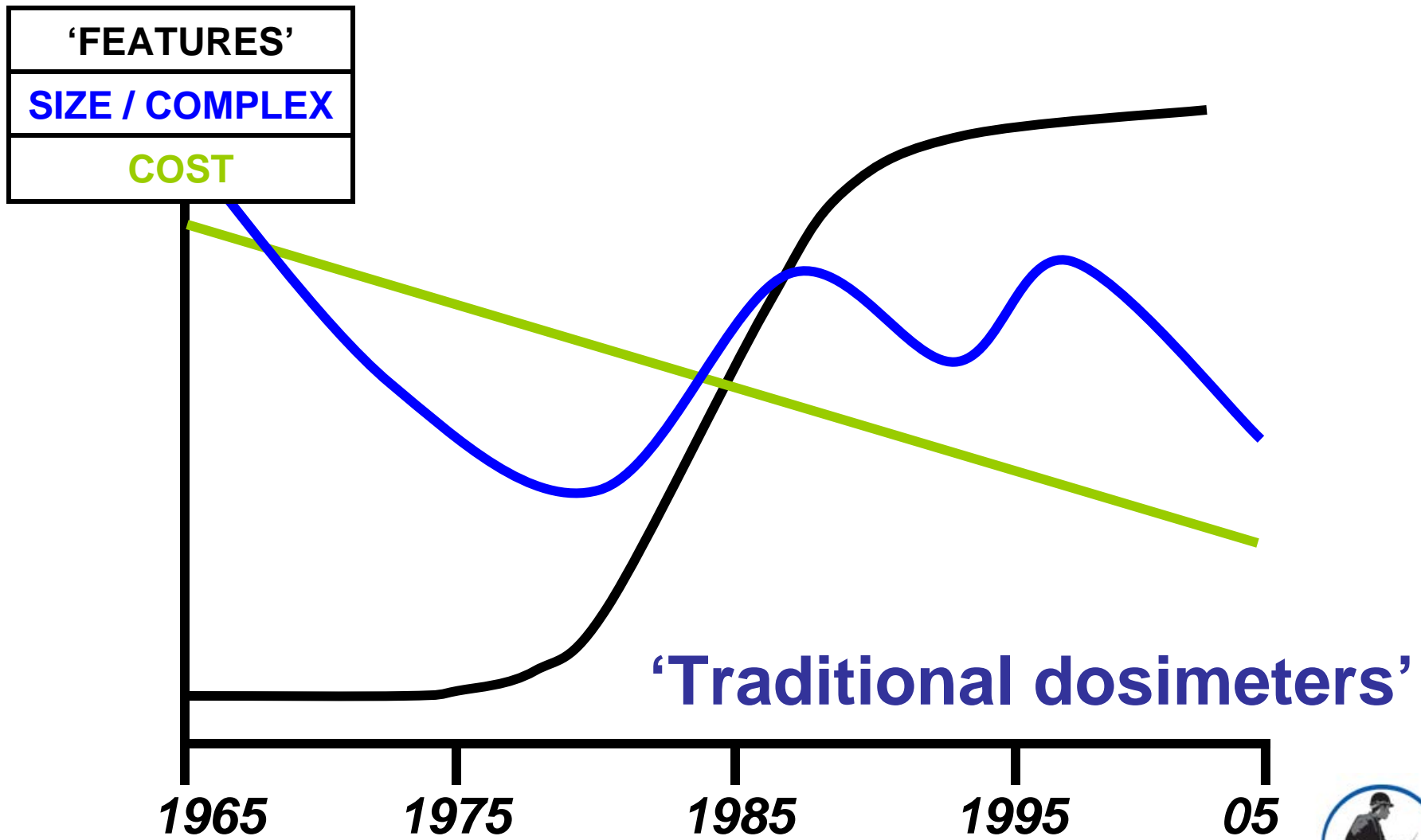
Historical Trends



Historical Trends

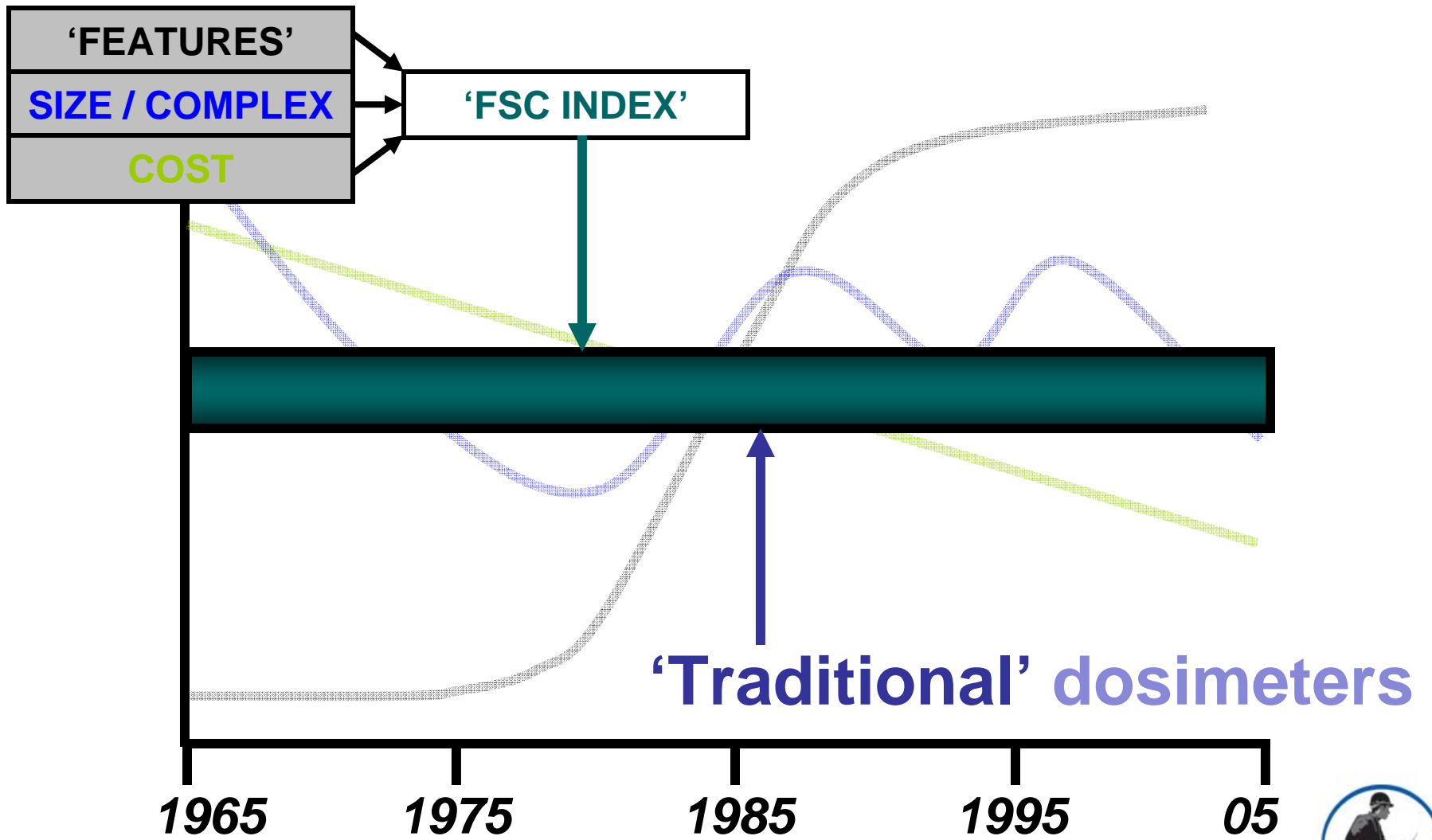


Historical Trends

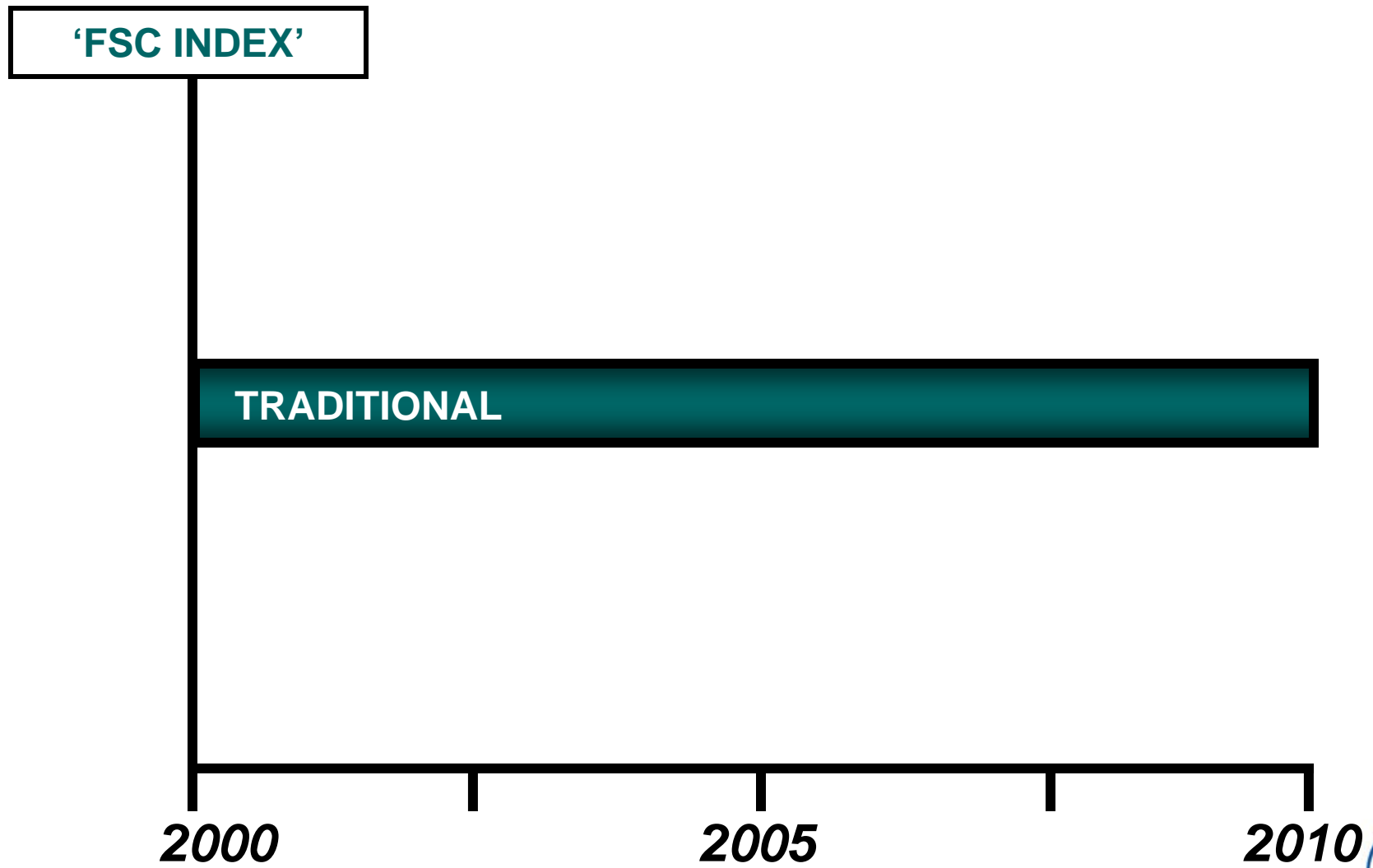


'Traditional dosimeters'

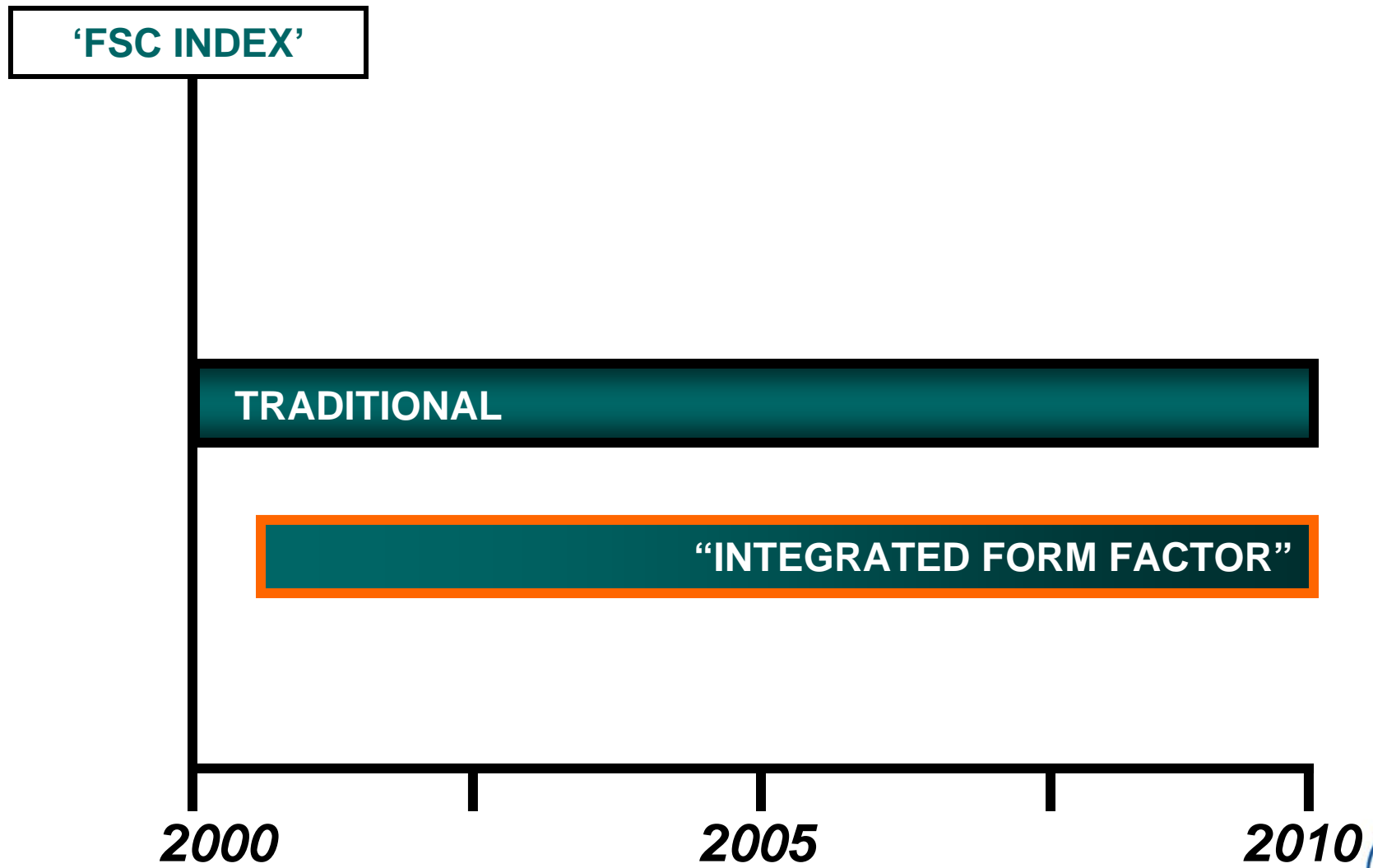
Historical Trends



Emerging Trends



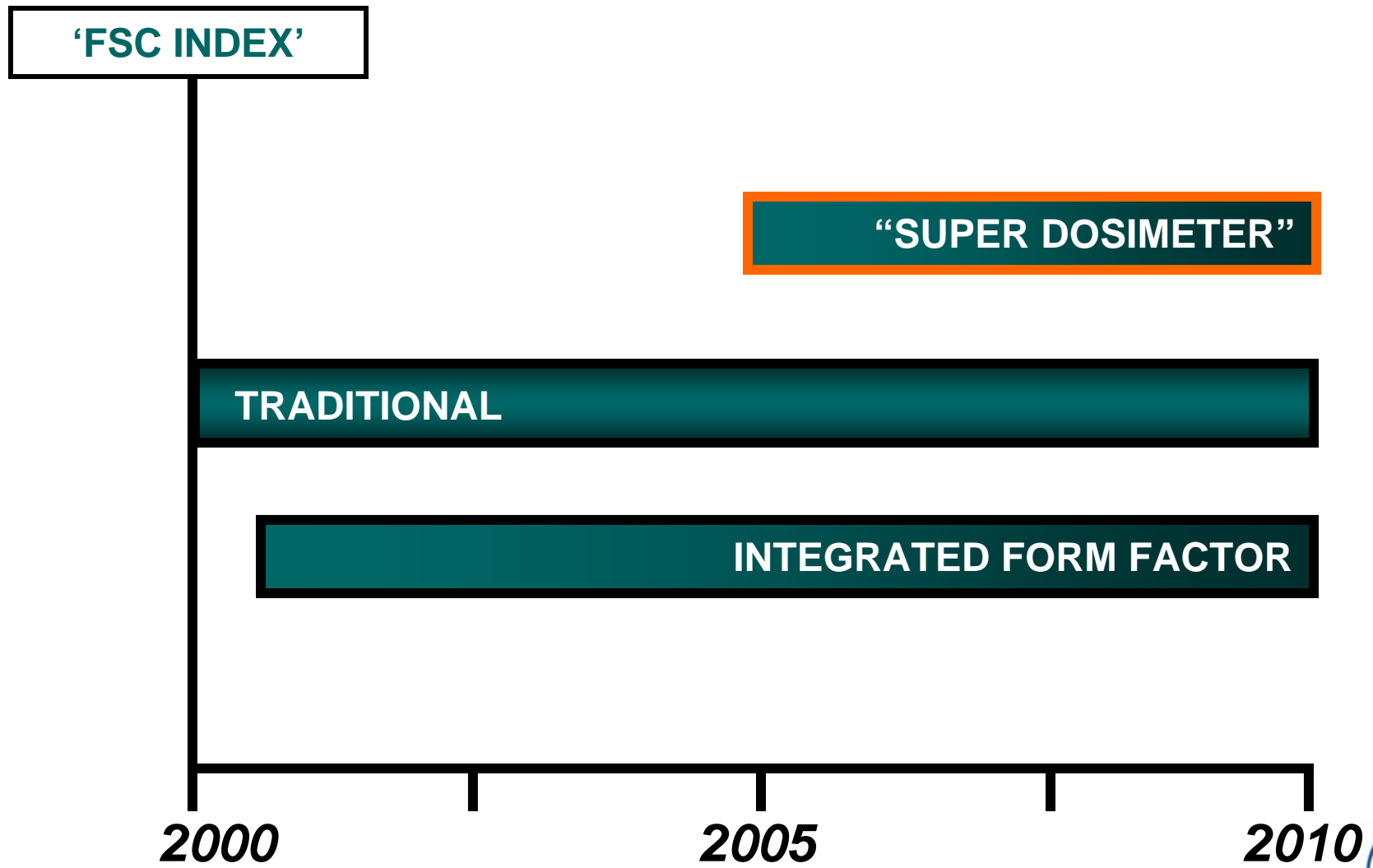
Emerging Trends



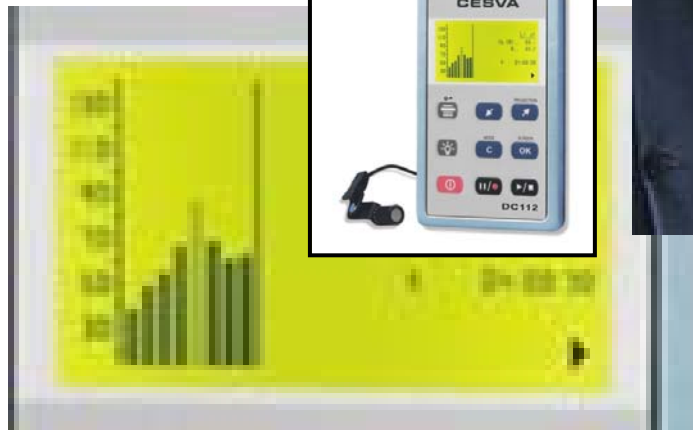
Integrated Form Factor



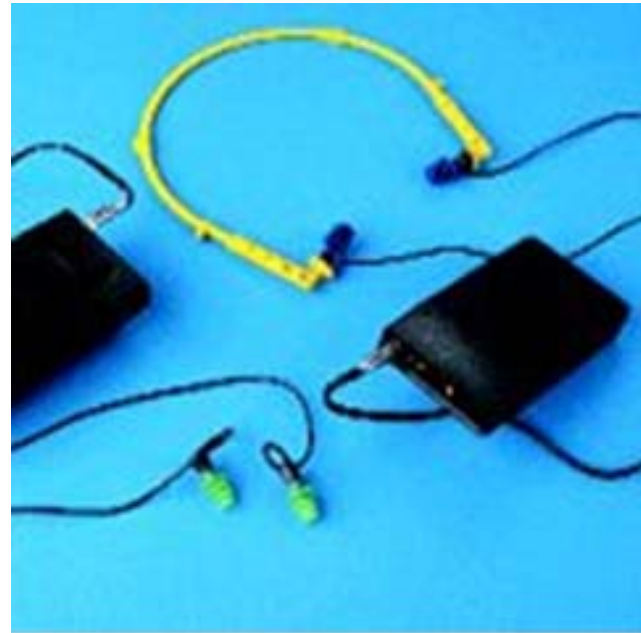
Emerging Trends



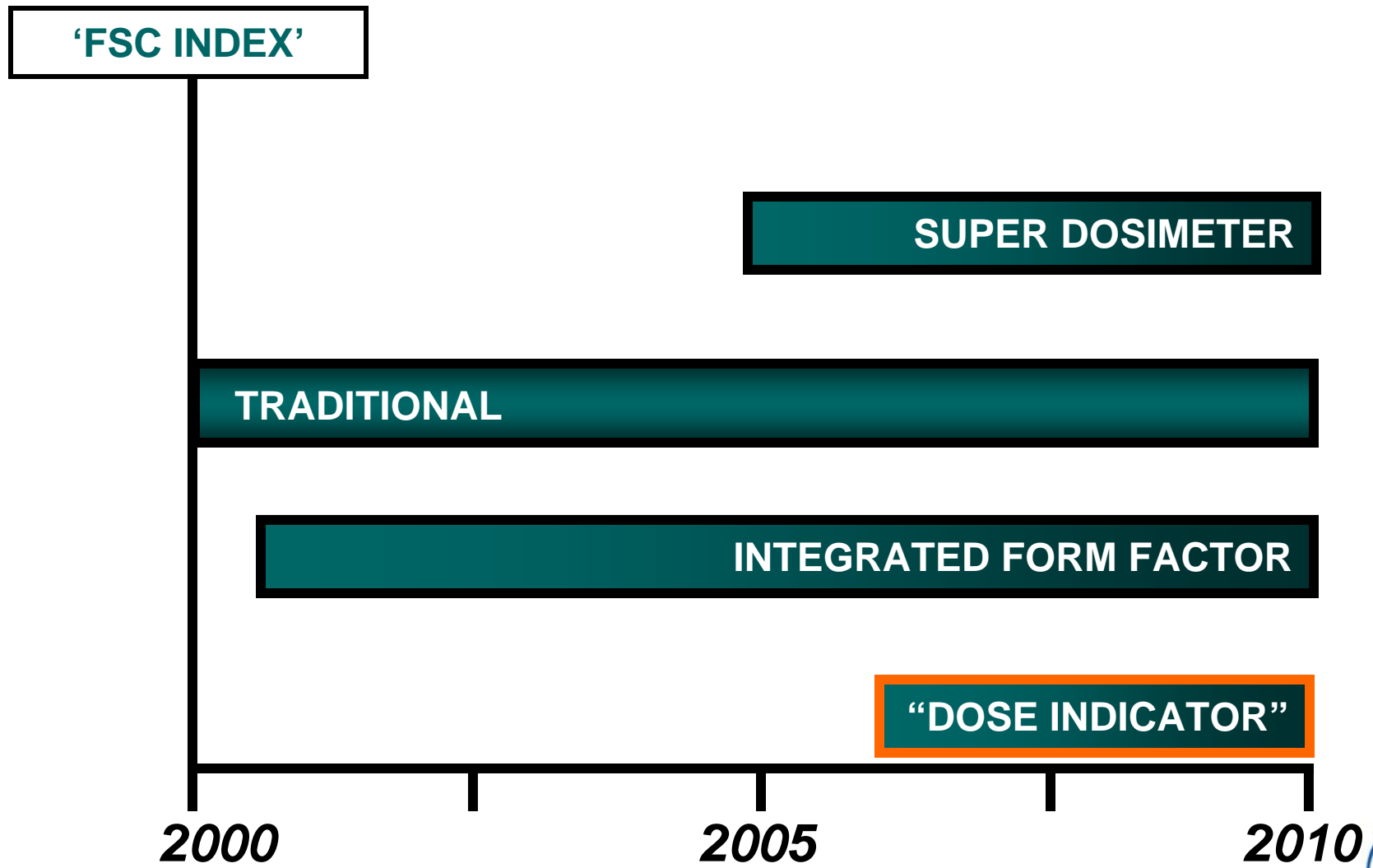
New Dosimeter Types



New Dosimeter Types



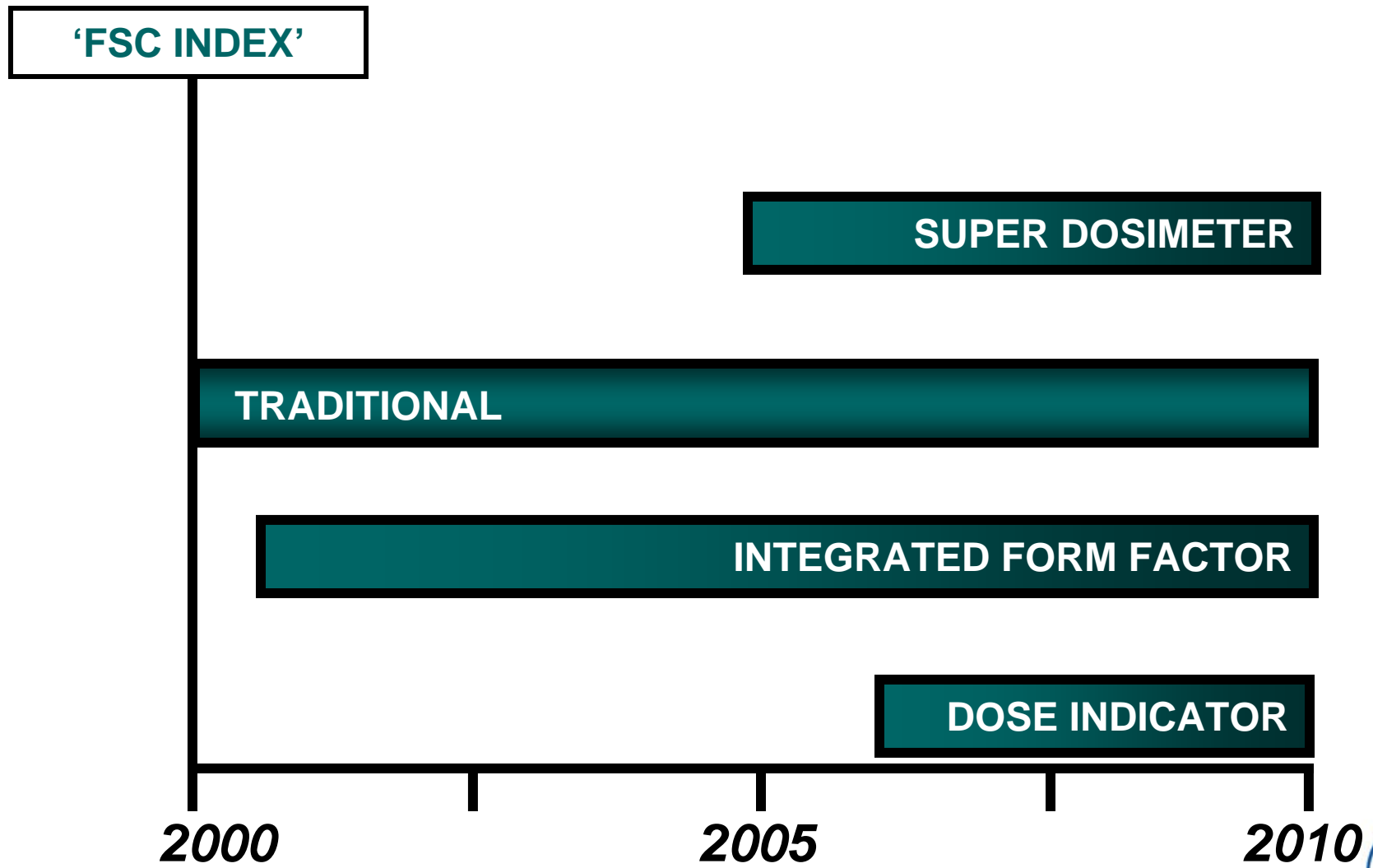
Emerging Trends



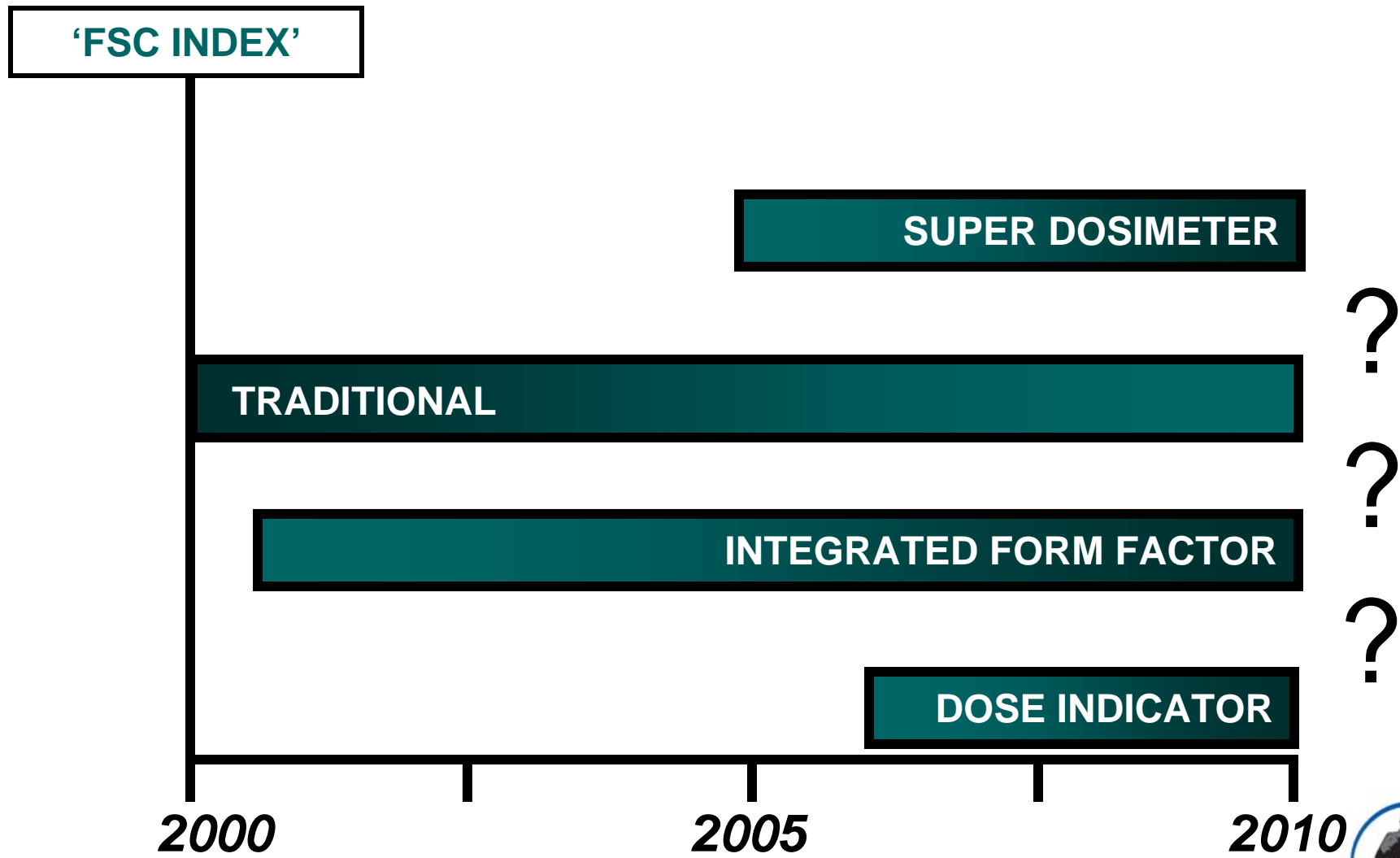
SPL and Noise Dose Indicators



Emerging Trends



Emerging Trends



Dosimeters *could* be...

- More simple and ubiquitous
 - Inexpensive screening tools (non-conforming)
 - Basic compliance tools
- More powerful and accurate
 - Taking advantage of high-speed Digital sampling
 - Incorporating new measurement criteria
- Multifunctional
 - e.g., Incorporating environmental and behavioral input

Development Drivers: + and -

- Technology availability
 - Driven by consumer goods: Phones, PC, etc.
 - Example: Digital Storage vs. Digital Sampling
- New Research – new metrics
- Customer Input
- Regulatory Pressure or lack thereof
- Economic Incentive / lack thereof
- Market Size

- **Investment Viability**

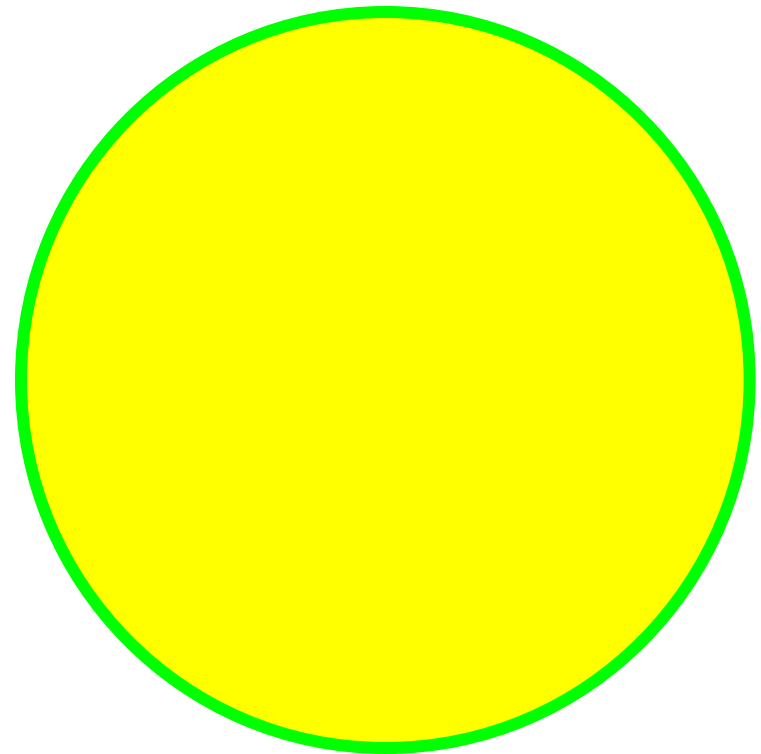
Market conditions

- Dosimeter market today is largely a 'replacement market' in the US
- Overall demand has fallen or remained static
 - Decreased industrialization, success of 'buy quiet' programs
 - Downsizing increases pressure on Health & Safety professionals to 'do more with less'
- Other markets outside US require different features / results / performance criteria



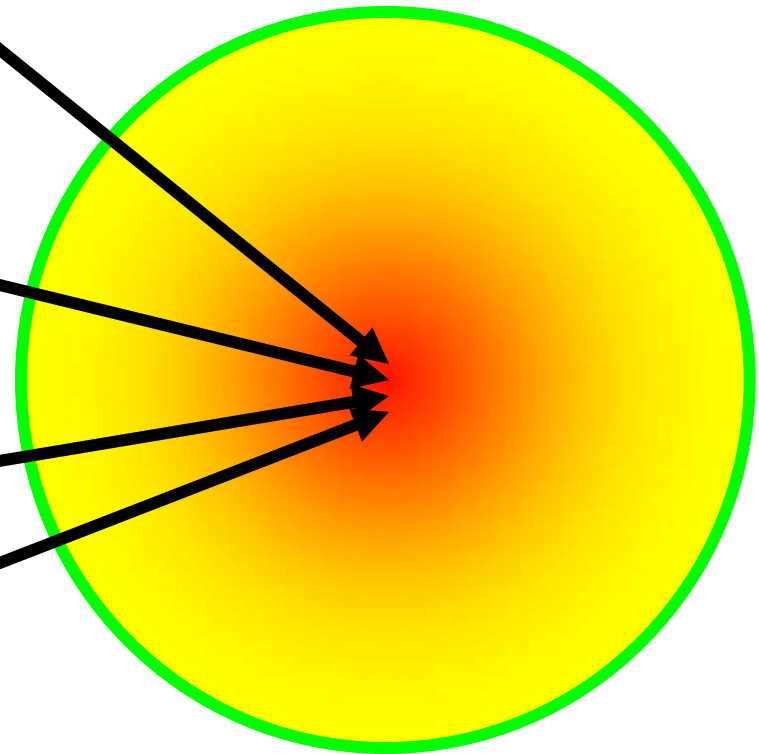
New Device Catalysts

- Technology availability
- ‘Practicability’
- Regulatory pressure
- New Metrics



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Dosimeter Technology Issues

- Detectors (A to D or just D)
 - Microprocessor speed (power consumption)
 - Memory
 - File size/download times, Data retention
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- Digital sampling – how fast is fast enough?
 - Microphone
 - Performance, Cost, Survivability
 - Battery
 - Operating costs, Lifespan, Availability

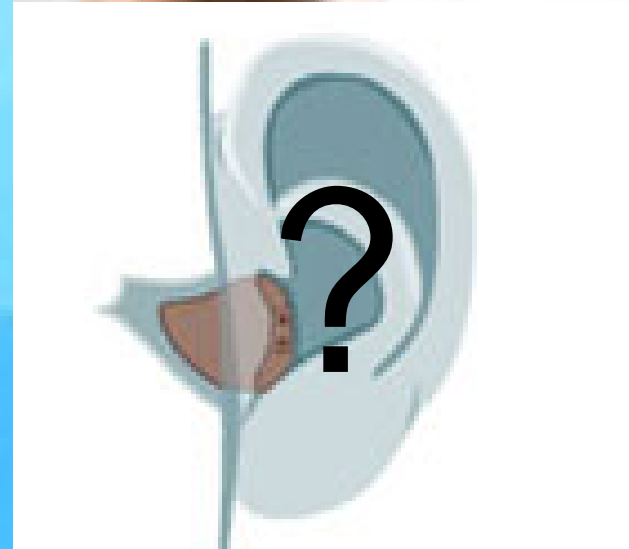
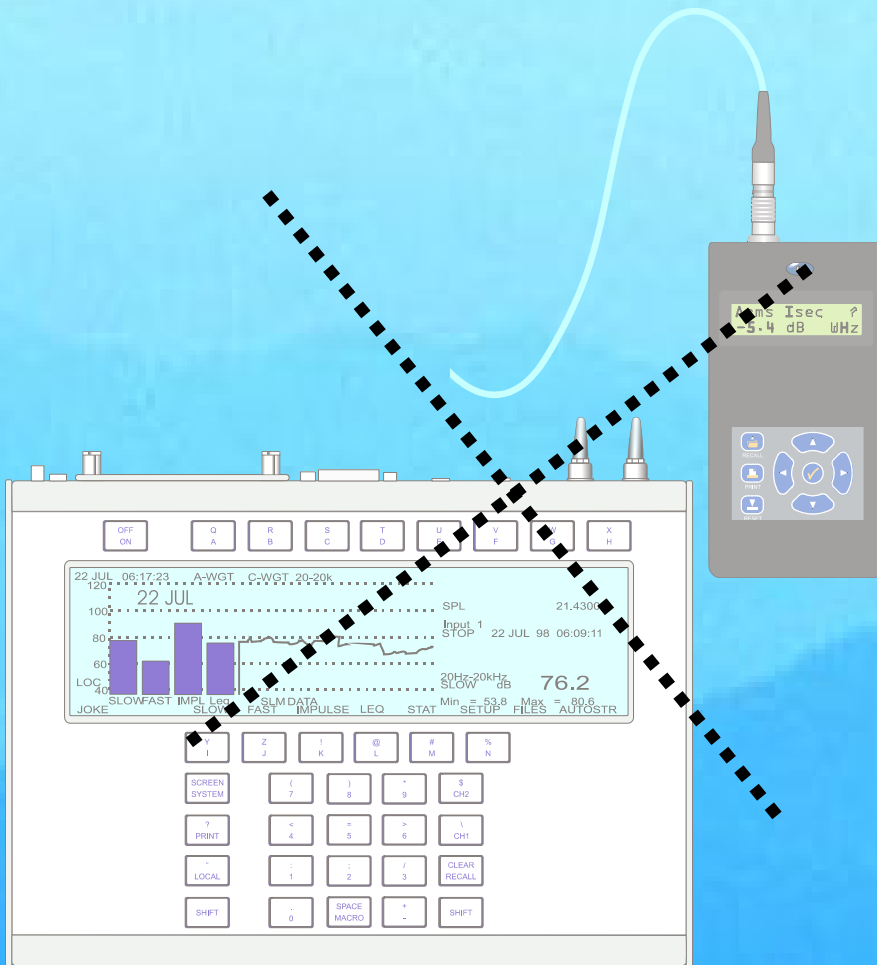
- **Intrinsic Safety Requirements**



Blue sky...?

- New measuring and analysis capabilities
 - Increased accuracy / response
 - Advanced analysis algorithms
 - New Damage/Risk Criterion model?
- Integration of noise dosimeter into other devices
- In ear measurement with integrated form factor, i.e. wireless

In the (y)ear 2020?



We want to hear from you

Manufacturers want to provide
new and better solutions
in response to market needs!



Conclusions

- Fundamental technologies allowing for various new classes of dosimeters are available today
- Demand is driven by US market conditions and international requirements
- Market demand ultimately drives investment in product development – standard business model
- Manufacturers provide only the ‘D’ in R&D
- Dosimeters can and should play a more integrated, powerful and decisive role in Hearing Conservation practices

