1- In what way can artificial intelligence help dental industry to better serve oral health?

Artificial intelligence or A.I. is just one of several terms applied to computer-technologies used to assist humans. The word **intelligence** *provoke different sentiments, but we have to remember that computers have no sensations, emotions or knowledge, but is simply binary logic based on electric circuits that can sift through digital information. The magic lies in identifying smart solutions for everyday challenges and to develop smart algorithms for the computer, that is, the set of instructions on how the binary logic inside shall most effectively process the digital information.*

Since digital hardware continuously improves due to faster and cost-effective electronic components, manufacturers possessing with the right expertise, creativity and capacity can create sophisticated algorithms for innovative devices that can be customized to the needs and demands by society, individuals as well as the dental professionals.

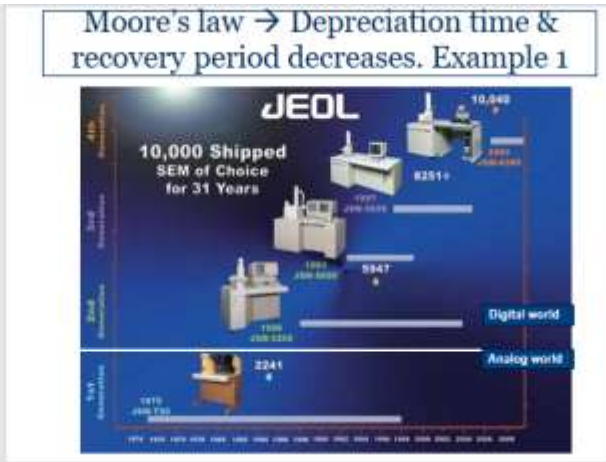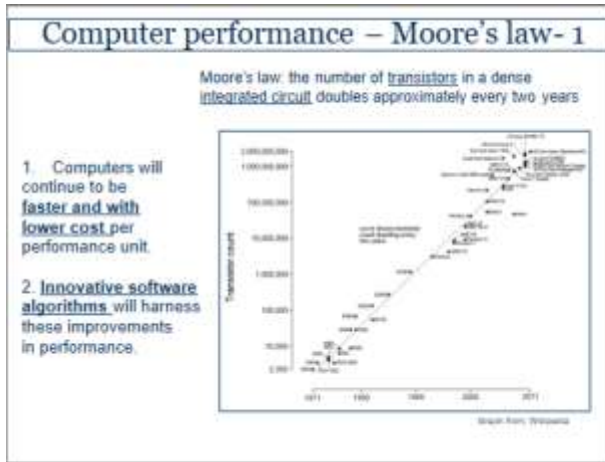The range of potential applications is exhaustive, but keywords are

- analyses of dental health system performance,
- treatment decision support,
- individualized care
- minimal invasive dental and oral surgery

2- How much time is required to develop a new product, and how to proceed to obtain approval without undue delay by regulators for sale in USA and Europe?

3- Does computer-aided navigation pose any risk to the patient? How does it compare with other implant position orientation methods?

A prerequisite for risk minimization with any computer-assisted (C.A.) tool and device is that the user possesses professional skills and expertise, and judiciously undertakes clinical judgment during actual surgery. Given this requirement, C.A. dynamic navigation surgery does not pose any higher risk to the patient compared to alternative approaches. Advanced dynamic navigation surgery has been in use already for several decades in hospital settings, and C.A. dynamic navigation surgery is frequently linked to "robotics".

For the competent surgeon, dynamic navigation surgery allows the placement of dental implants to the same level of accuracy as with alternative dental implant position orientation methods. A perceived advantage of dynamic navigation concepts are situations when the patient wish to walk out of a dental clinic not only with new implants, but also with his or her new teeth, the so-called supra-construction. A temporary supra-construction based on the planned implant locations is made in a laboratory in advance of the surgery and is precision-fitted immediately after the implants have been placed. Occasionally, circumstances develop during the surgery that negates an implant placement according to the plan. In such situations, dynamic navigation carries an advantage over alternative approaches because a new three-dimensional virtual plan can be made swiftly, with a redesign of the supra-construction that can be rapidly manufactured by an in-office additive or subtractive machining device.

4. What are the potential benefits of investing in computer-assisted technologies and are there potential risks?

Computer performance – Moore's law- 1

Moore's law: the number of transistors in a dense integrated circuit doubles approximately every two years

1. Computers will continue to be **faster and with lower cost** per performance unit.

2. **Innovative software algorithms** will harness these improvements in performance.

Moore's law → Depreciation time & recovery period decreases. Example 1

JEOL

10,000 Shipped SEM of Choice for 31 Years

Digital world

Analog world

Moore's law → Depreciation time & recovery period decreases. Example 2

1990   1995   2000   2005   2010   2015

5. Has dynamic navigation surgery for dental implants reached its full potential, or is the technology still at its infancy?

6- What other areas of artificial intelligence could the dental industry support the dental professionals in the treatment of patients?

Oral health care workers need hardware and software innovations that provide true and precise diagnoses of oral ill-health, as well as devices that enable minimal interventions to restore form, function and oral health of their patients. Oral health challenges are not particularly different in Brazil compared to elsewhere and the dental industry should determine the primary needs and demands of the dental community and in partnership develop innovative solutions and devices.. The dental industry in Brazil should be well positioned for a global market because the country is blessed with a multitude of very capable colleagues in academia, and likely also many in the clinical world.