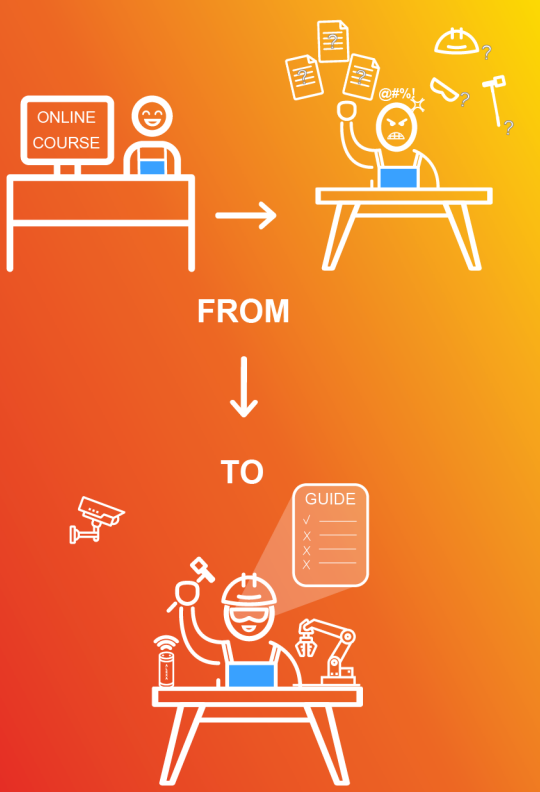


Any question? Any **additional information** needed?  
Email us on [info.hackdays@gsk.com](mailto:info.hackdays@gsk.com)

For the sake of IP, no project is visible to other participants on the platform

Challenge our training process to **Standard Operating Procedure**, keeping operations compliant when manufacturing vaccines in a regulated environment.



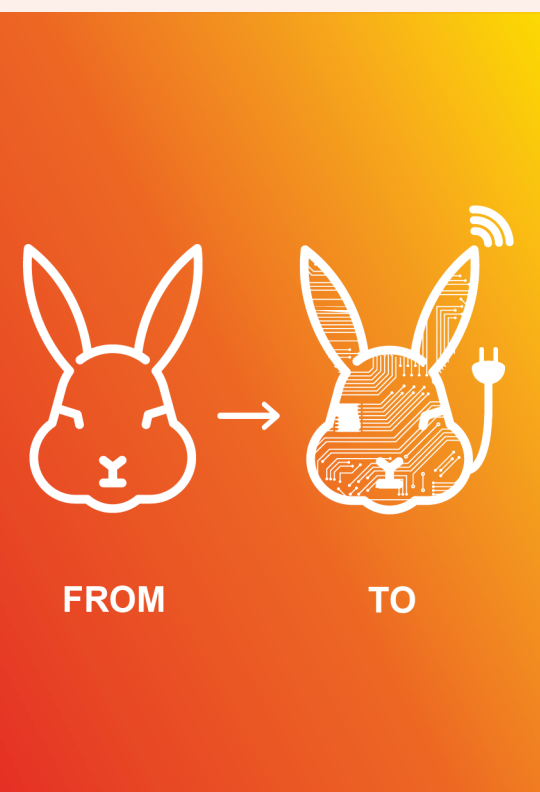
How to leverage the latest technology trends to train employees to **Standard Operating Processes (SOPs)**?

- o How could you help us be trained **more efficiently** while being compliant and right the first time?
- o How to train Employees **on-the-go** while ensuring the compliance of operations?
- o How would you help us train Employees in a more practical and **user-friendly** approaches?
- o Which solution to improve our learning experience?

**Potential Solutions**

- o Virtual learning (augmented and virtual realities)
- o Digital twin of the process
- o Learning on the go (personal assistant through visual and/or vocal instructions)
- o Cobotics

How emerging technologies could help **limit the use of living models** in vaccines development?



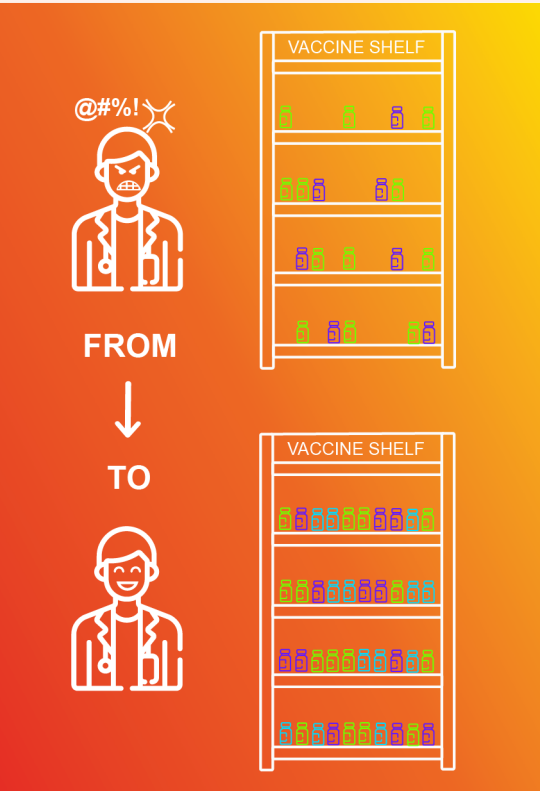
When animals are used in research, **GSK is committed to acting ethically and practicing good animal welfare. Therefore:**

- o How could you help us **replace animal testing**?
- o How could you help us **avoid or reduce the number of animals** used in a study?
- o How could **artificial intelligence, machine learning, digital technologies** contribute to our objective? Help us **predict biological effect of new candidate antigens**?
- o How could you help us **anticipate clinical outcomes** of new vaccines based on previous (pre)-clinical studies?
- o How **organ-on-a-chip** could help us predict biological effect of new antigens?

**Potential Solutions**

- o How to leverage past clinical data to better design future vaccines
- o *In silico* model
- o Organ-on-a-chip
- o 3D-bioprinting organs

How to secure vaccination on demand **even in the most remote region** of the world?



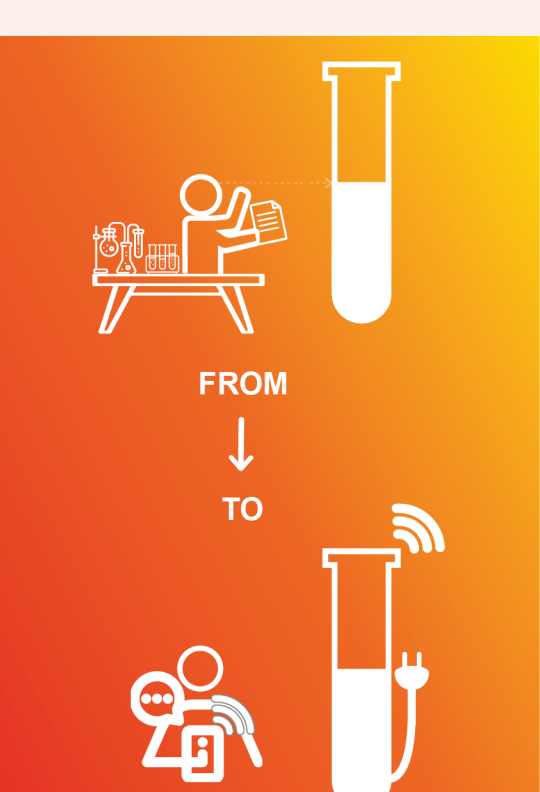
How to vaccinate anyone, anytime, anywhere, even in the most remote region of the world?

- o How could you help us **ensure any physician in the world** would ever miss any vaccine, even in the most remote region?
- o How could you help us to ensure vaccines are delivered **anywhere without being denatured**?
- o How could you help us secure **vaccine production at anytime, anywhere**?

**Potential Solutions**

- o Manufacture on-demand and on site
- o Leverage learnings to anticipate logistic (shortage and distribution)
- o Thermostable vaccines

How to quantify antigens online from the **End-to-End process**?



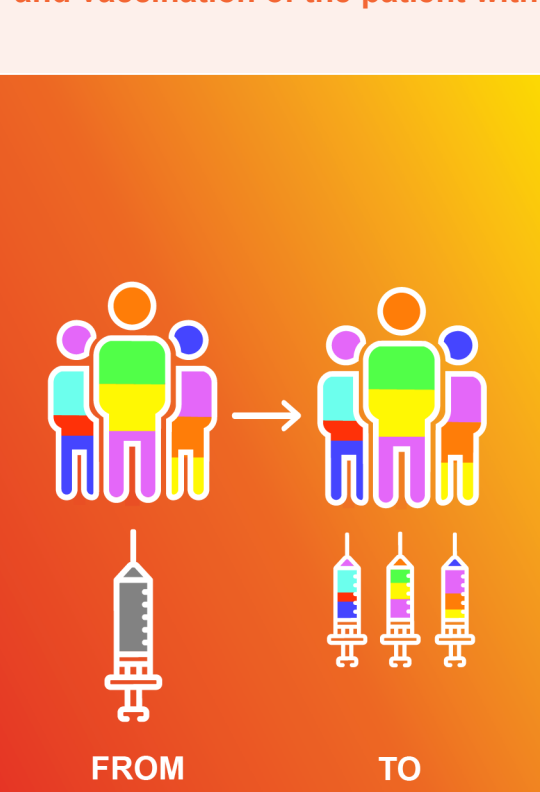
How antigens could be quantified in **real-time** during their production?

- o How could you help us follow concentration of **specific antigens produced in real-time**?
- o How could you help us follow concentration of antigens **without discontinuing their production flow**?
- o Could you help us **remotely follow concentration of antigens produced** in real-time, without discontinuing the flow?

**Potential Solutions**

- o Use physics' laws like Raman
- o Use chemistry on-the-go
- o Use sensors (IoT)
- o Use robots
- o Use modeling

How would you design the process that would allow **production of a vaccine** and vaccination of the patient within only **2 hours**?



How to produce & administer a vaccine to patients within only **2 hours**?

- o What could be the **process flow**? The **principle**?
- o **Which technology(ies)** would you leverage to reach this goal?
- o What kind of devices would allow the production of personalized vaccines to vaccinate patients in only 2 hours?

How could we reach **100% transfer of a variety of different biological components** such as nucleic acids, peptides, polypeptides, proteins, from low to high molecular weight, into the cytoplasm or nucleus of living cells?



Which methods could be used to reach **100% transfer of a variety of different biological components** such as nucleic acids, peptides, polypeptides, proteins, from low to high molecular weight, into the cytoplasm or nucleus of living cells?

- o **Which technology(ies)** would you leverage to reach this goal? **Physics? Chemistry? Nanotechnology?**
- o Could any **bio-vector** such as viruses or bacteriophages or **chemical-vector** be used?
- o Could different types of cellular compartment be targeted with your solution?
- o What kind of biological components would you favor to transfer into living cells?
- o Could your solution be used *in vivo*? *In vitro*?

**Potential Solutions**

- o Nano-injection
- o Electroporation
- o Nanorobotics
- o Physics and chemistry
- o Virus and bacteriophage