Running a data center: How to ensure high reliability in everyday operations

Data-Center as a Basis of a Digital World:
Theory and Practice
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Definition of Operational Sustainability

The behaviors and risks beyond Design Topology that impact the ability of a data center to meet its Business Objectives over the long term

Types of negative events

Incident – any event deviating from the normal workflow

Failure – failure or malfunction of any infrastructural component

Outage – load shedding or shutdown as a result of a failure

All three types of events are negative though differ in severity

Make a note: both incident and failure are common for the equipment's lifecycle.
IT IS NORMAL WHEN SOMETHING BREAKS DOWN.

AIRs – Abnormal Incidents Reports Database

One of the Uptime Institute analytics cornerstone

Data collection through 28 years: from 1994 up till now

Total amount of entries: about 10.000 (approx. 1 per day)

Depicts all types of incidents in data centers

All the incidents analyzed to the root cause (RCA)

6% of outages among all incidents

Number of outages per year: 18

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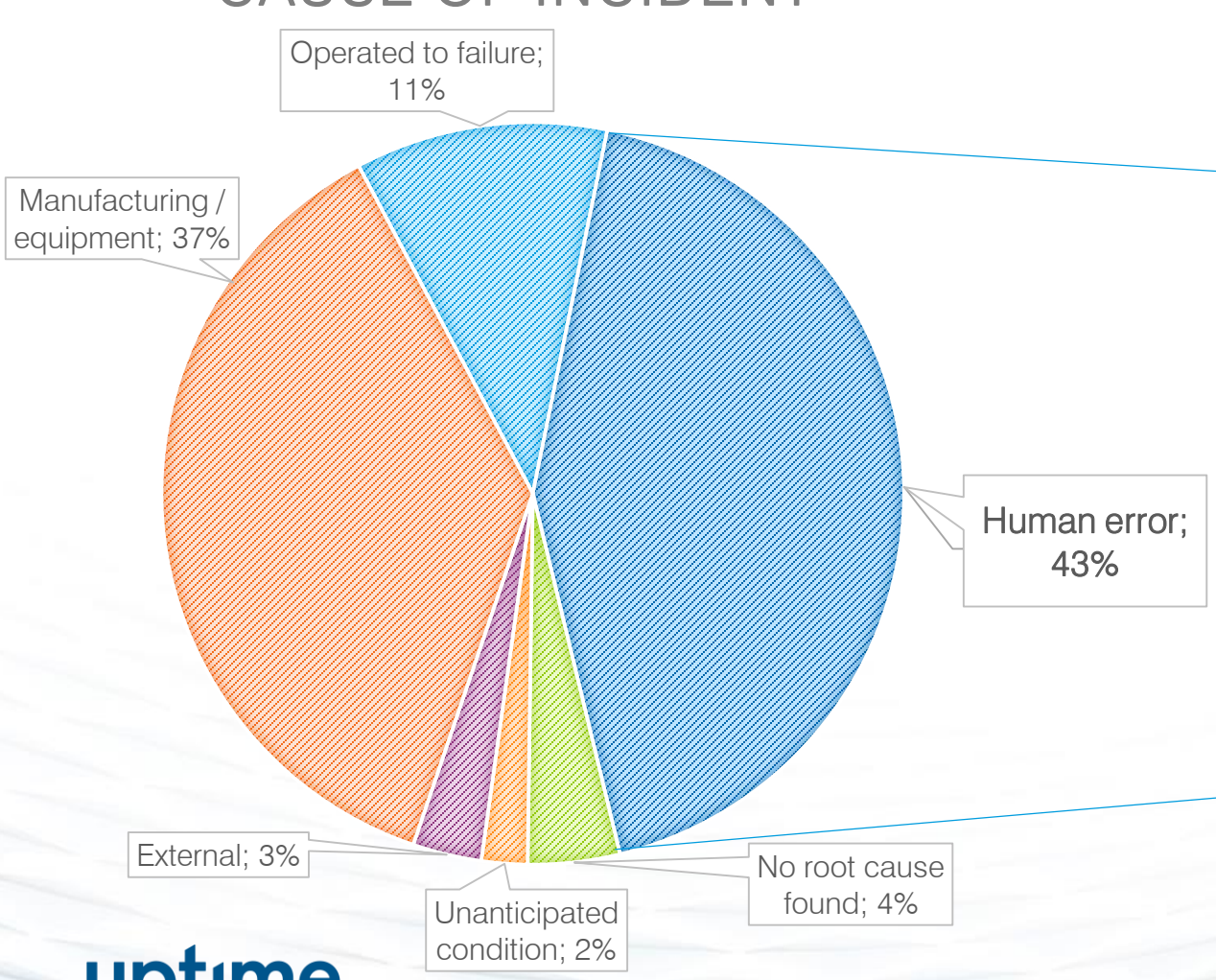
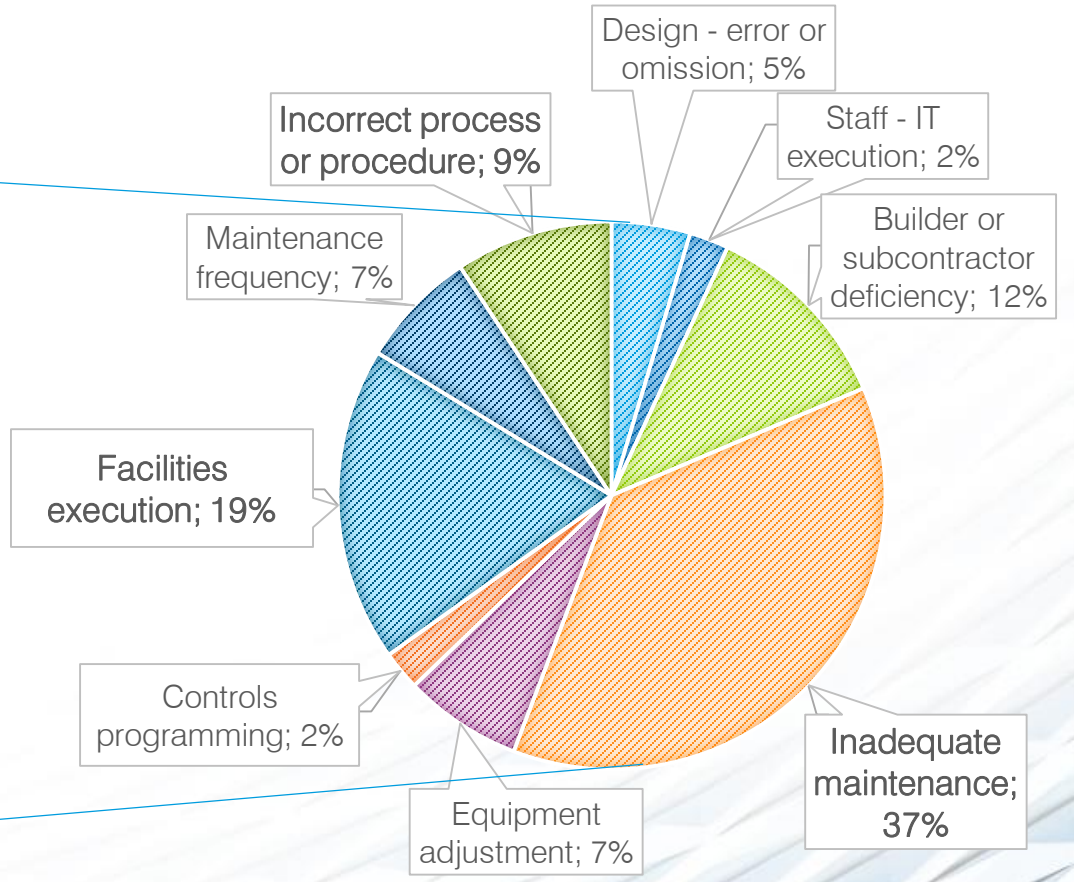
Statistics of incidents

CAUSE OF INCIDENT



TYPES OF HUMAN ERROR



74% of incidents caused by human errors tend to happen during routine operations

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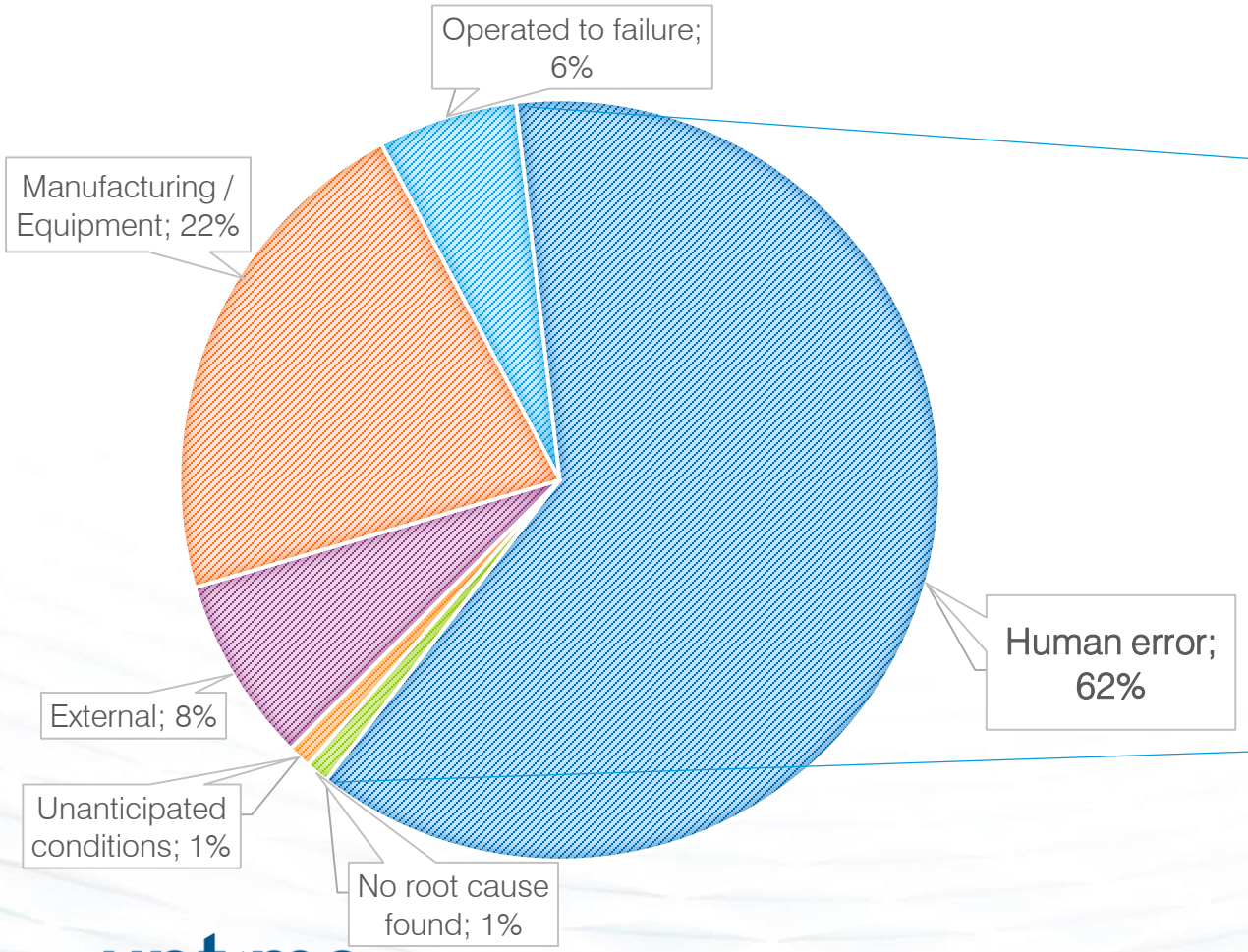
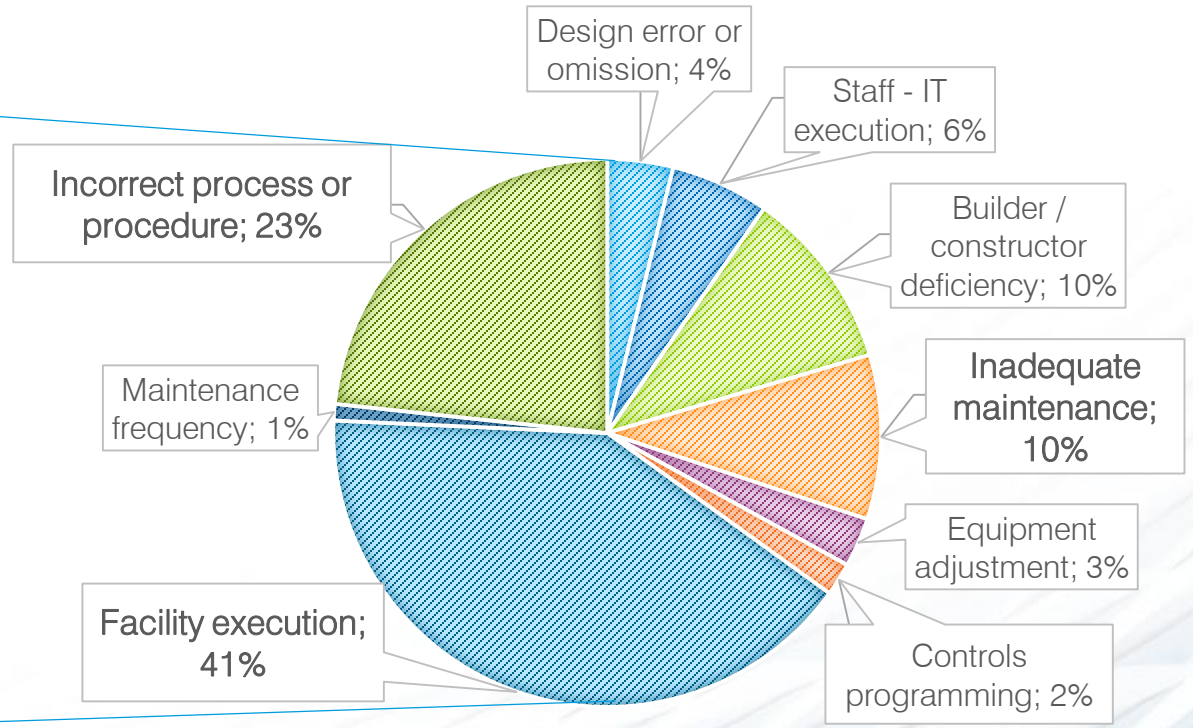
Statistics of outages

CAUSE OF OUTAGE



TYPES OF HUMAN ERROR



83% of outages caused by human errors tend to happen during routine operations

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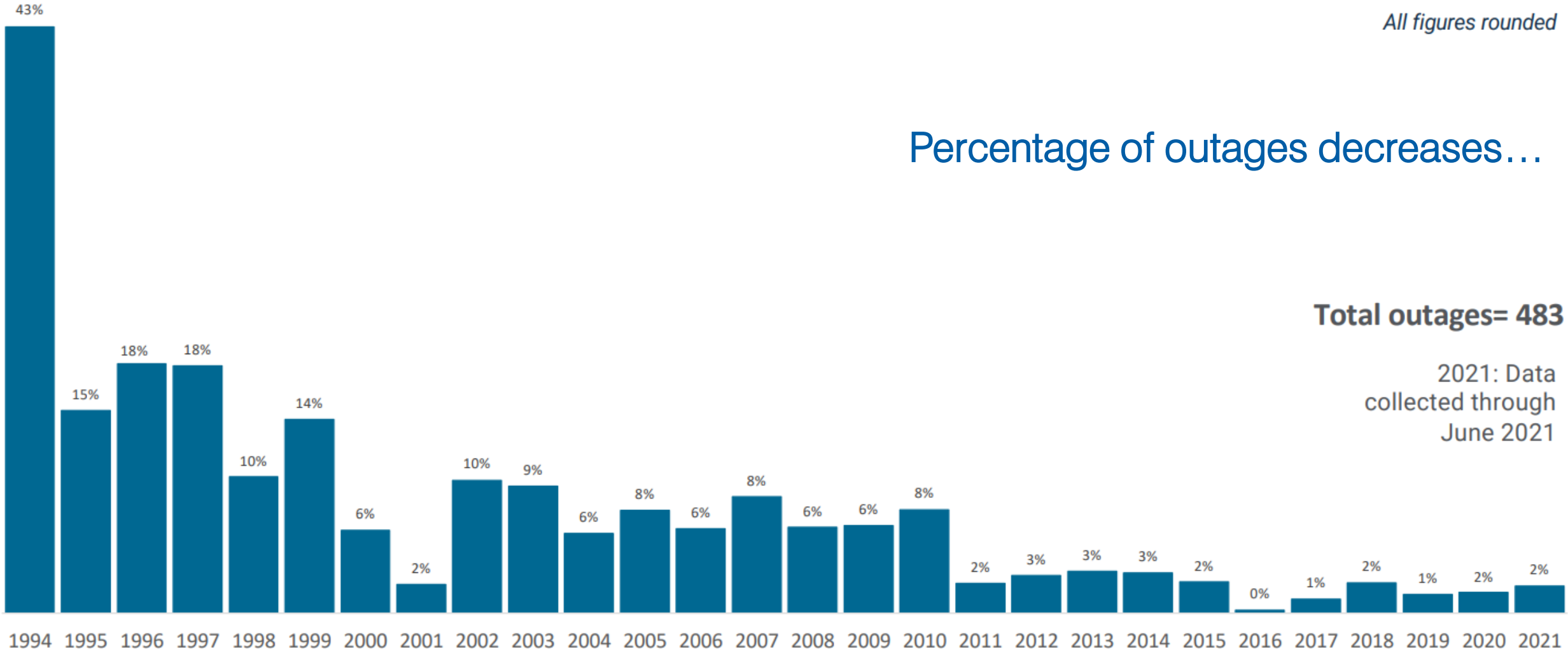
Yearly statistics of outages

All figures rounded

Percentage of outages decreases…

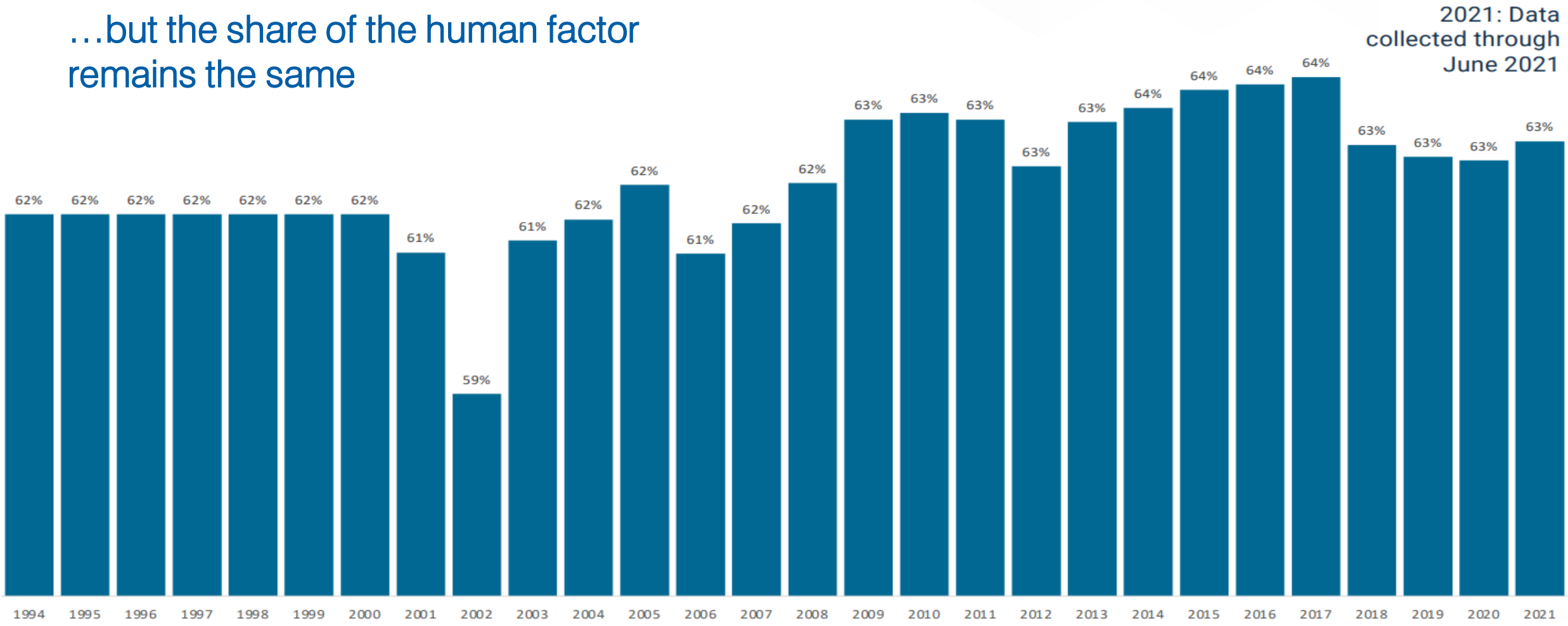


Total outages= 483

2021: Data collected through June 2021

Yearly statistics of outages

…but the share of the human factor remains the same



Man is the weakiest link

2 major causes of incidents are:

– Somebody hasn't done something what was necessary

– Somebody has done something what was unnecessary

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Incorrect processes or procedures

Any move in a DC cannot be spontaneous. It must be due to established order of work and discipline.

- Formalize and control any type of activity and every certain process
- Work out Standard and Emergency Operating Procedures (SOP, EOP) and execute them according to step-by-step Methods of Procedure (MOP)
- Document it all and keep the docs actual
- Make all documents accessible to the staff
- Make the staff aware of where to find all SOPs / MOPs / EOPs
- Keep every involved person informed
- Define the escalation scheme and describe roles and responsibilities
- Analyze and optimize your policies, processes and procedures
- Conduct trainings and drills

Inadequate maintenance

Your task is to maintain the equipment in like-new condition so that it retained its functionality as long as possible

Many incidents in the reports are classified by the respondents as “operated to failure”, however, the RCA shows that the maintenance was not carried out on time

Follow the manufacturer's maintenance recommendations

With intensive use of the equipment, it is advisable to carry out maintenance even more frequently than recommended by the manufacturer

Avoid deferred maintenance

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Inadequate maintenance

Support your maintenance activities properly

Build up your maintenance program

Remember that every manipulation of equipment involves risks

Follow the procedures and strictly control their execution

Analyze the incidents to the root cause

Use MMS (Maintenance Management System)

Train both your staff and vendor’s specialists

Monitor your warehouse and spare parts

Don’t forget the safety and LOTO

Failure to execute a procedure

Man is the weakiest link. To be successful in DC operations needs to have the right staff

Pay attention to:

- Organizational structure
- Headcount and labor trades
- Shift presence
- Overtime
- Trainings and drills
- Roles and responsibilities

Remember of human nature!

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Example: Where procedures, maintenance and staff execution meet

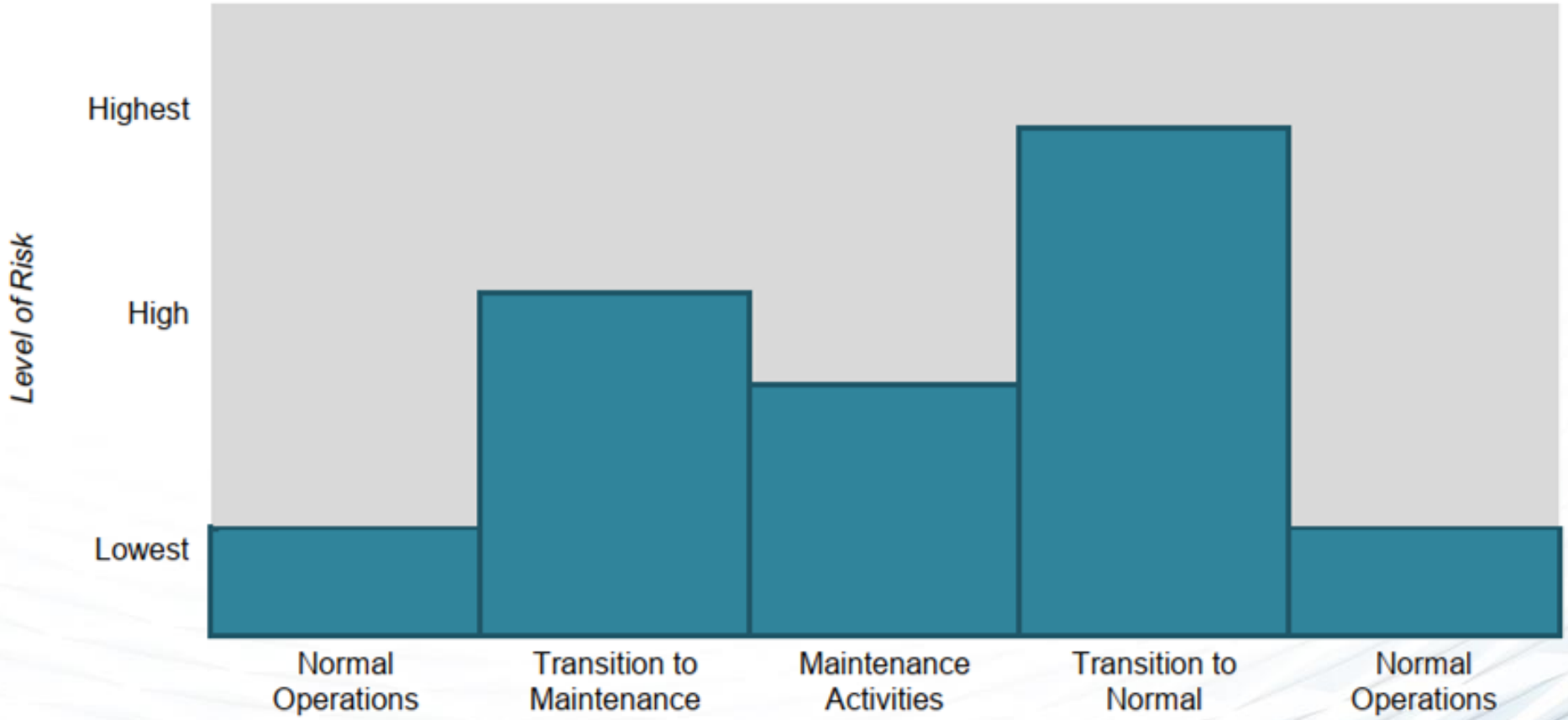

Figure 8-1
Risk During Normal vs Maintenance Modes

Source :BICSI 009-2019 "Data Center Operations and Maintenance Best Practices"

Indicators of Operational Sustainability Shortfalls

Accident or poor planning?

Computer room or storage space?

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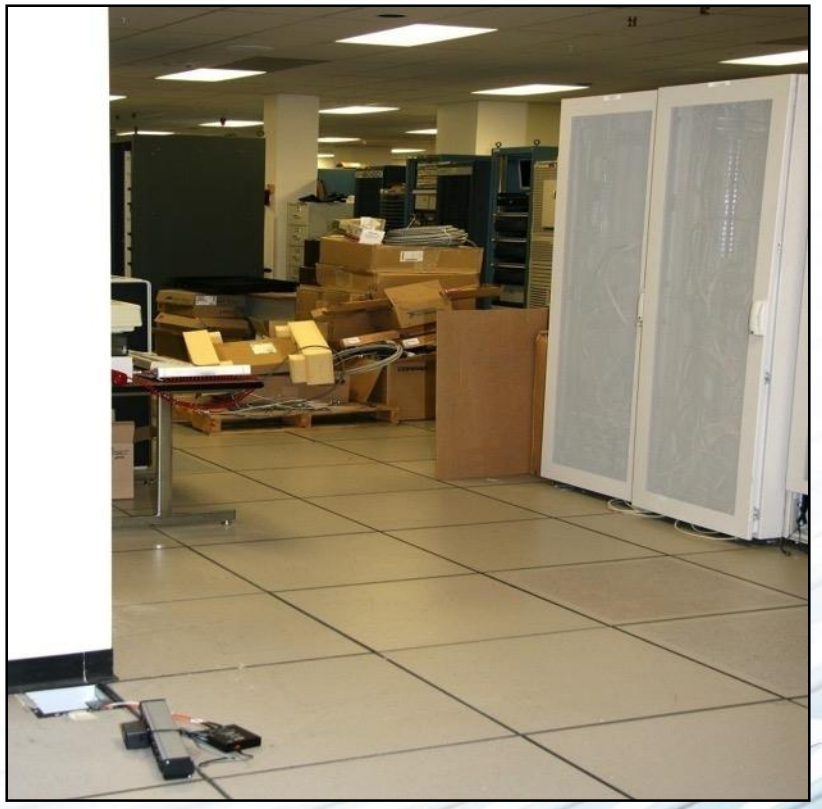
Indicators of Operational Sustainability Shortfalls

Mercedes in a data center support space… *Fierce commitment to a common objective?*

A junk pile in the computer room…



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Human Factor. A few conclusions

1. Human errors more often lead to more serious and severe incidents

2. Over 80% of all incidents happen during the routine operations

3. About 65% of all incidents are caused by three factors: erroneous processes and procedures, inadequate maintenance and failure to execute a procedure. All three are of human nature

4. Many equipment faults are considered to be caused by operation to failure. In fact, many of them happen because of improper maintenance

5. Errare humanum est. Be ready to any human mistake at any moment.

6. Remember Murphy's Law: Anything that can go wrong will go wrong.

How To: Principles of Operational Sustainability

Proactive

- Anticipate an issue or risk rather than react to it
- Continuous improvement

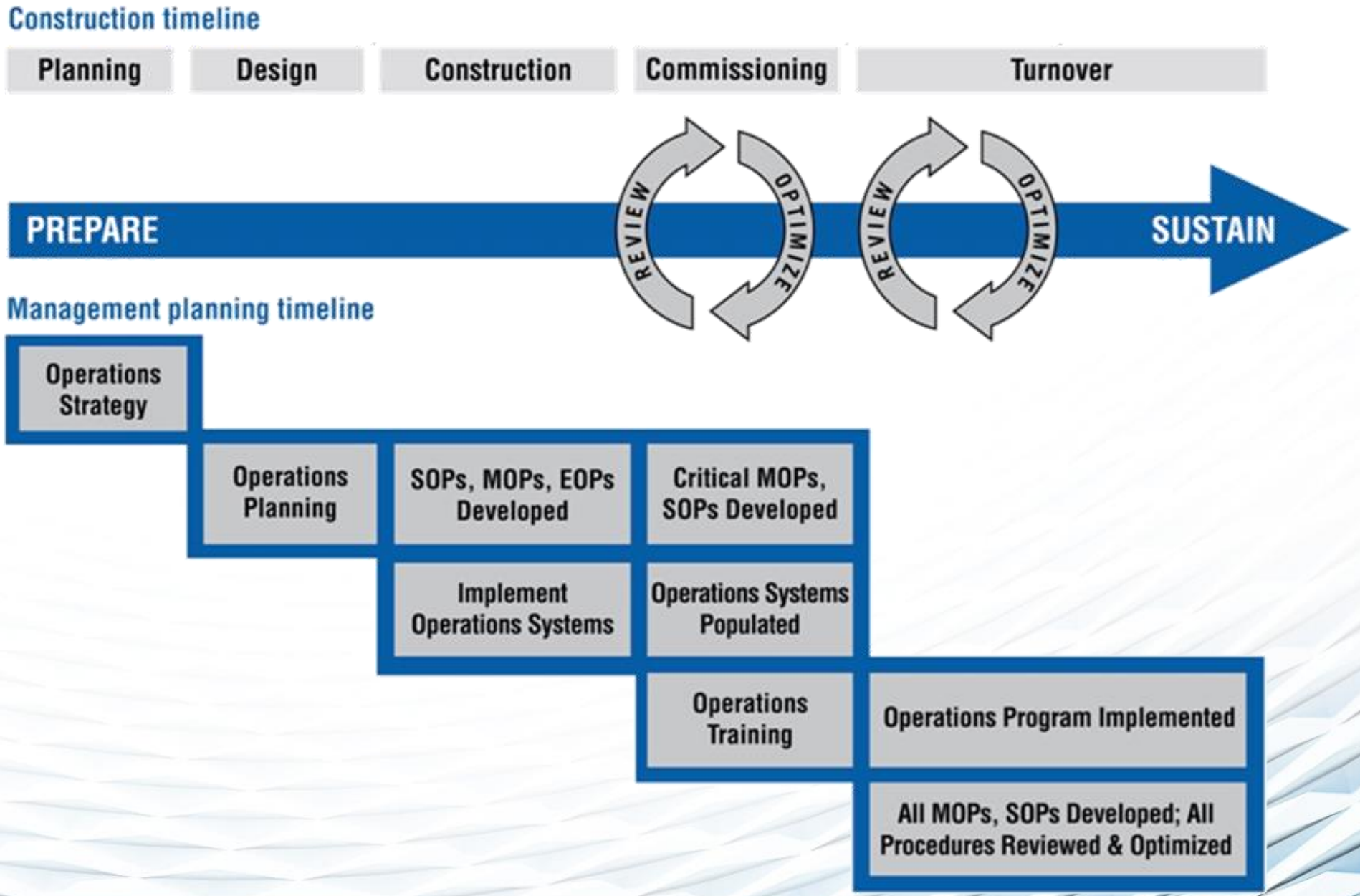
Practiced

- Disciplined approach to achieve desired result
- Processes and procedures in place and followed

Informed

- Site operations resources are known and available
- Knowledge is maintained by the organization, not the individual

How To: Start with the End in Mind



Further recommendations

Approach the plan of operations TIMELY

- Operations executives must be involved already at the DC design stage
- You must be fully prepared to run the DC on the zero day
- It is necessary that your operations team participate in the DC commissioning

Don’t ever lose focus on routine operations

- Remember that in the end it all depends on internal processes and staff
- Articulate the staff training program and follow it strictly
- Plan your maintenance program thoroughly and implement it without deviations
- Formalize all processes and procedures and revise them on a regular basis
- Conduct drills on SOP / MOP / EOP execution. Control the execution. Don’t forget to check and update Site Configuration Procedures (SCPs) in due time
- Investigate every incident to its root cause
- Be proactive, practiced and informed. Follow the principle of continuous improvement

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