

# A Principled Approach to the Development of Flexible Learning Materials for the Explosives Industry

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ELMS:

# Overview of Presentation

- Introduction
- The problem of quality
- Learning theory
- Principles and processes of course design
- The *Online Learning Knowledge Garden*
- Case studies

# Introduction

- The requirement: flexible learning materials for the explosives industry
- Need to be of high quality and pedagogically sound
- Approach from first principles
  - Learning theory
  - Principles and processes of course design

# The Problem of Quality

Coopers and Lybrand (1996):

Up to two thirds of TLTP materials can be deemed amateurish due to the lack of sound pedagogy and instructional design

UK Teaching and Learning Technology Programme (1990 – cont), c. £40m

# Learning Theory: First Principles

- “The environment contains no information. It is as it is.”
- “Everything that is said is said by or to an observer.”

(Heinz von Foerster)

- Learning is constructive and conversational

# Conversation Theory

- “Man is a system that needs to learn”
- “Teaching is the control of learning”
- Adaptive, conversational systems that provide support (scaffolding) for the learner

(Pask and Scott, Thomas and Harri-Augstein, Laurillard)

# The Skeleton of a Conversation

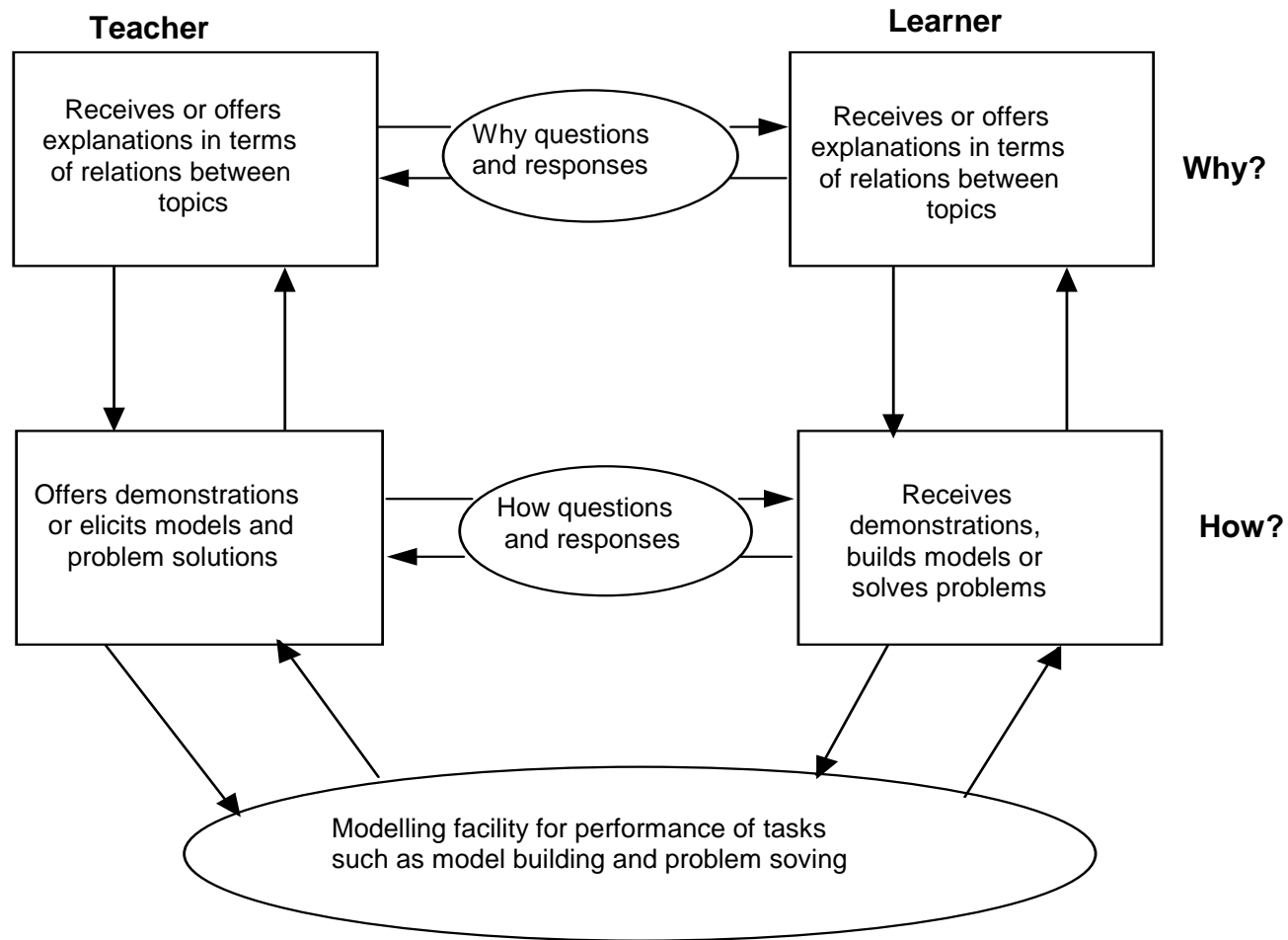
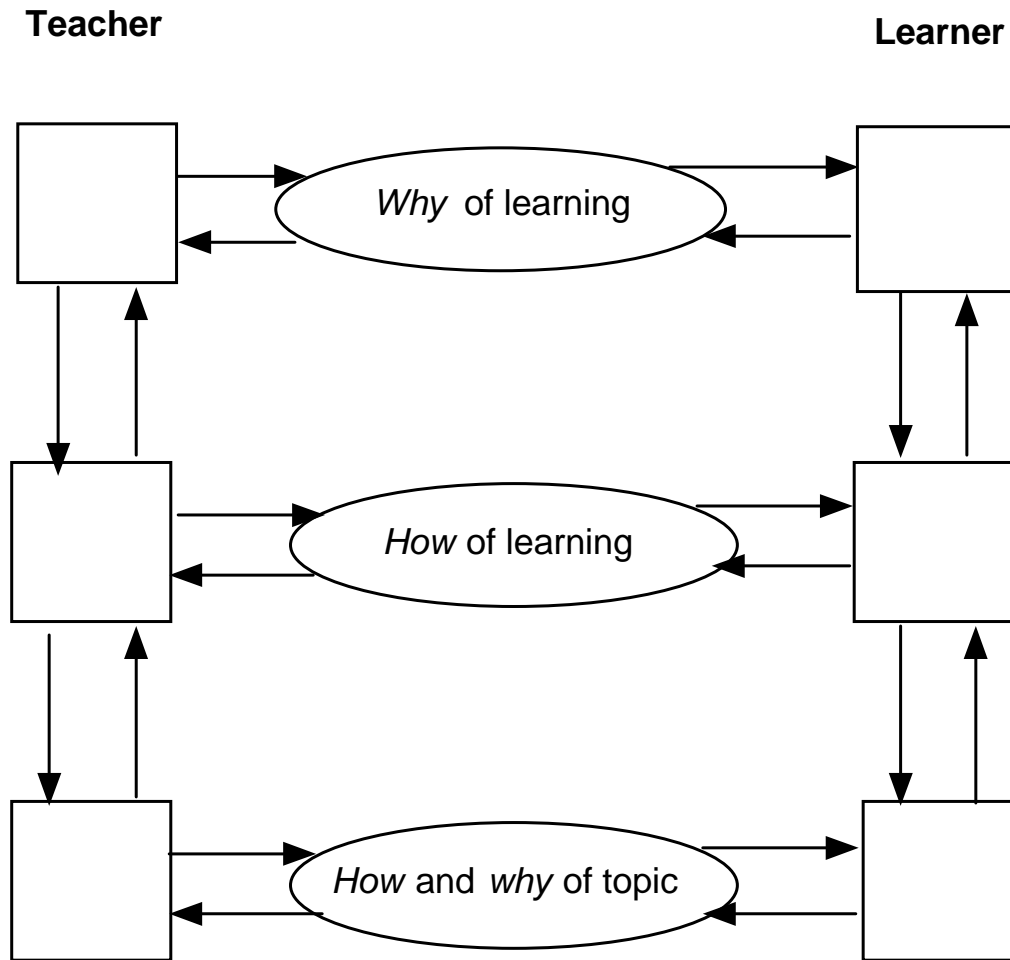


Figure 1. The "skeleton" of a conversation (after Pask)

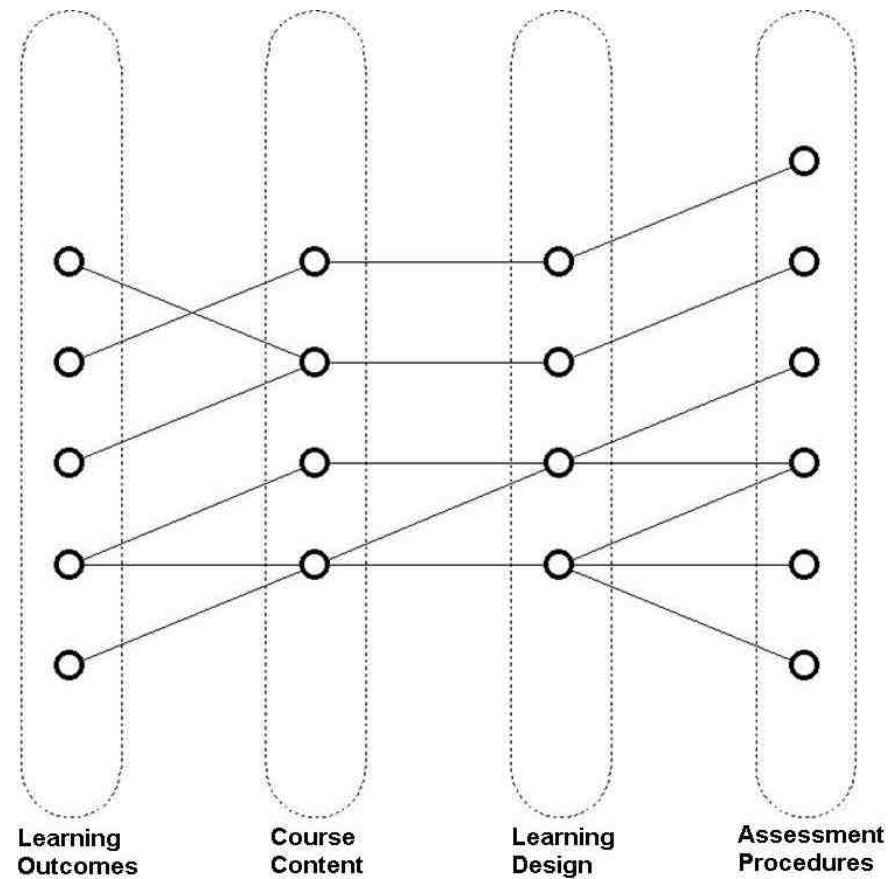
# A 'Full' Learning Conversation



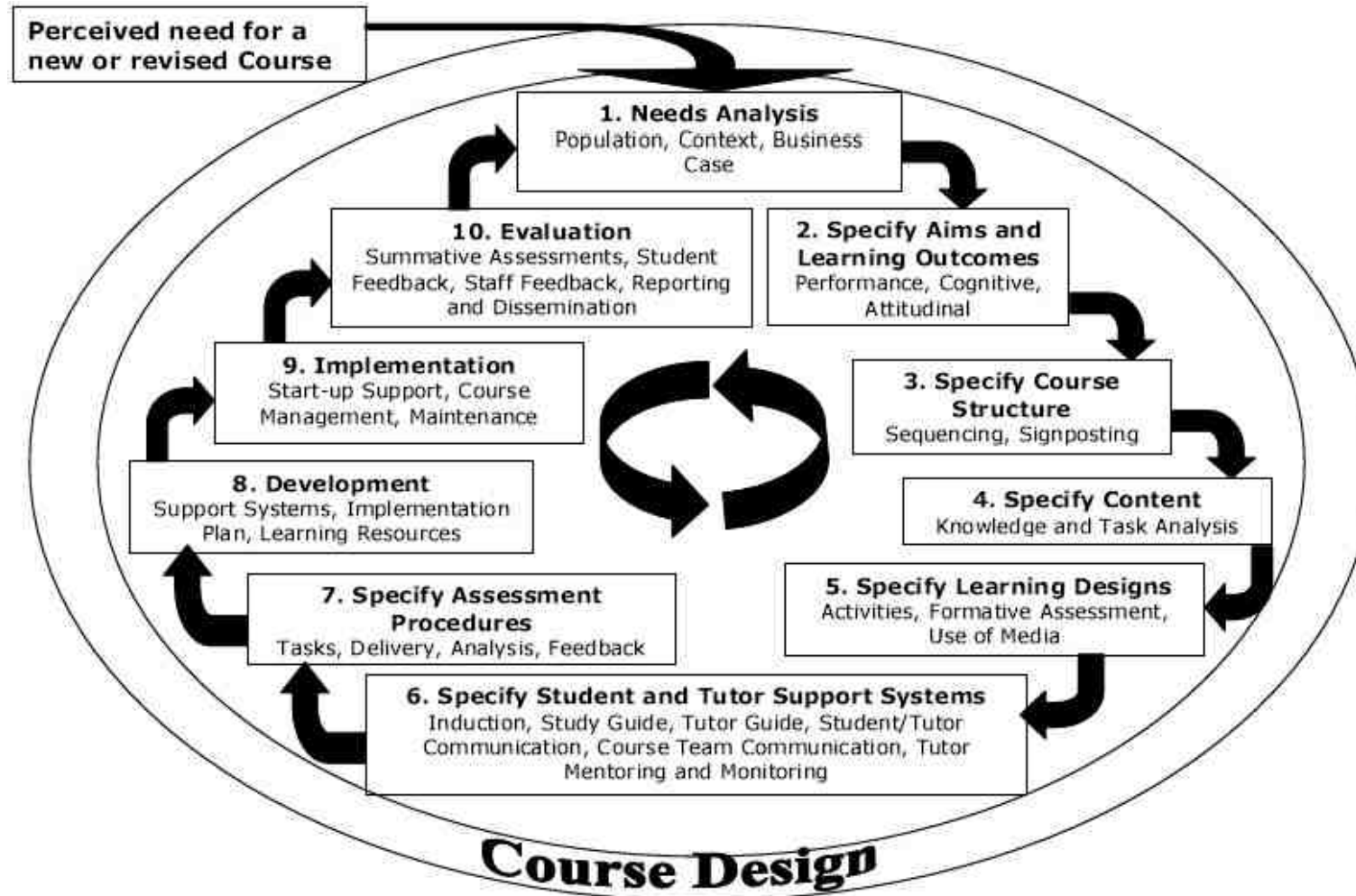
(After Thomas and Harri-Augstein)

# Course Design: Principles

A clear mapping between course components



# Course Design: Quality Control



# Course Design: Using activities to assist learning

Introductory Activity + Feedback > Lesson Content > Follow-on Activity + Feedback

Raise  
Awareness

Prepare,  
Motivate

Explain  
Concept

Demonstrate  
skill

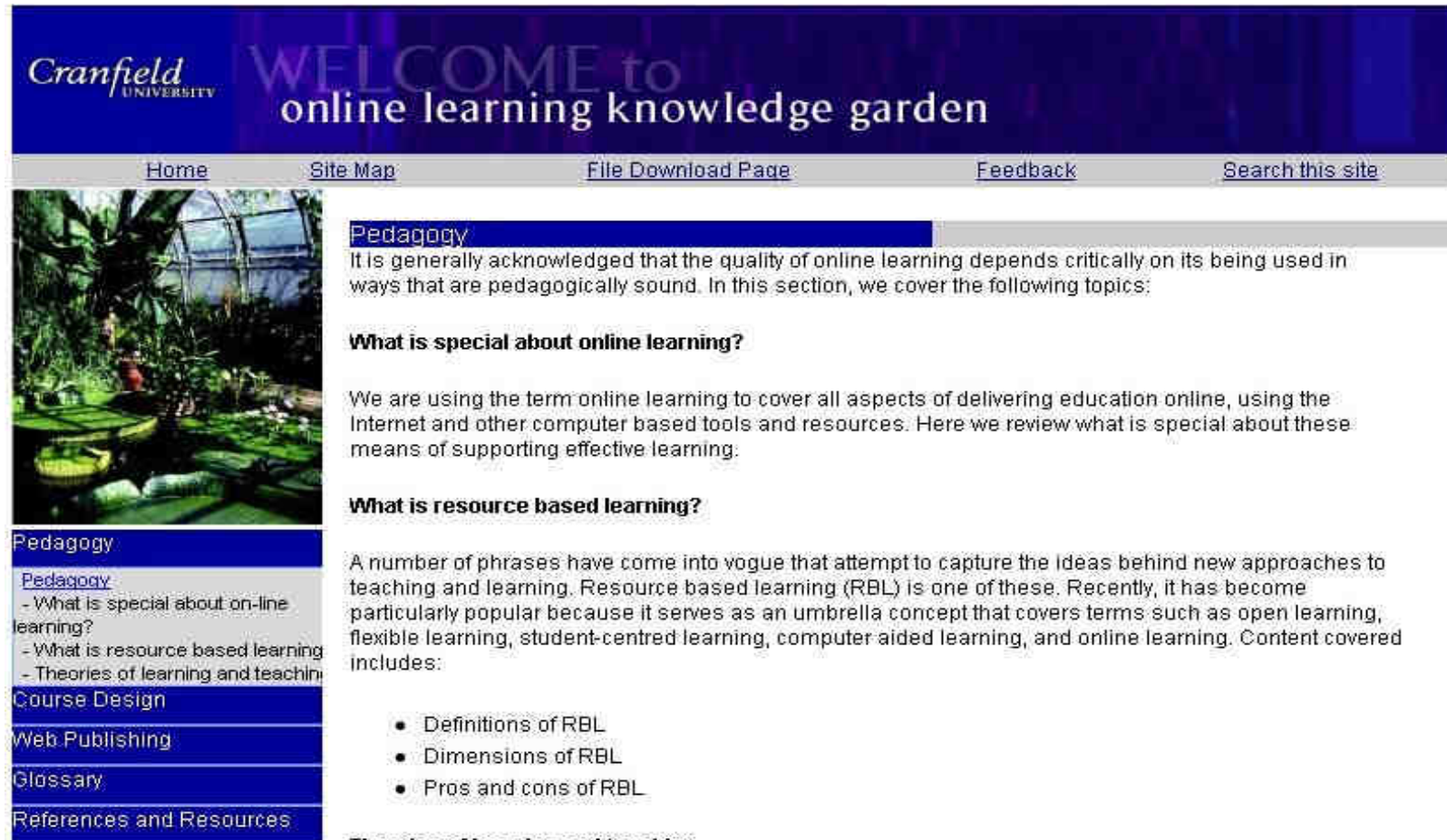
Consolidate,  
Elaborate

Practice,  
Reinforce

The “tutorial in print” (after Rowntree)

# Online Learning Knowledge Garden

<http://olkg.cranfield.ac.uk/>



**Pedagogy**

It is generally acknowledged that the quality of online learning depends critically on its being used in ways that are pedagogically sound. In this section, we cover the following topics:

**What is special about online learning?**

We are using the term online learning to cover all aspects of delivering education online, using the Internet and other computer based tools and resources. Here we review what is special about these means of supporting effective learning:

**What is resource based learning?**

A number of phrases have come into vogue that attempt to capture the ideas behind new approaches to teaching and learning. Resource based learning (RBL) is one of these. Recently, it has become particularly popular because it serves as an umbrella concept that covers terms such as open learning, flexible learning, student-centred learning, computer-aided learning, and online learning. Content covered includes:

- Definitions of RBL
- Dimensions of RBL
- Pros and cons of RBL

**Theories of learning and teaching**

**Pedagogy**

- What is special about on-line learning?
- What is resource based learning?
- Theories of learning and teaching

**Course Design**

**Web Publishing**

**Glossary**

**References and Resources**

# Case Studies

**Explosives Ordnance Engineering**  
INTRODUCTION TO EXPLOSIVES

Progress [ ] Exit

Section  
Introduction to Explosives

Topics:  
+ Introduction  
+1: Types of Explosion  
+2: Types of Explosive  
+3: Energy and Power  
+4: Explosive Compositions  
+5: Molecular Explosives  
+6: Reaction Products  
+7: Summary  
+8: Assessment

Types of Explosion

Types of Explosion

We all know what an explosion looks like but how would you define an explosion?

Click on one of the answers to complete the sentence. You have one attempt.

An explosion:

- is a rapid expansion of gas that is capable of performing work.
- is always caused by a chemical reaction releasing heat and gas.
- releases both ionising and thermal radiations.

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Explosives Ordnance Engineering  
Introduction to Explosives

OME Safety Review Panel (OSRP) Training

**OSRP Training** TES Technical Enabling Services

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Classary  
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Section 2: Requirements of an OSRP

Topics:  
Introduction  
Requirements for OME Risk Assessment and Safety Cases  
OME Safety Related JSPs and Hierarchy  
JSP 520 Requirements  
The OSRP Process  
Mature OME and Urgent Operational Requirements (UOR)  
Summary

**The OSRP Process**

Who is Involved in the OSRP Process?

The OSRP process involves two separate groups – those involved in the assurance and those involved in the implementation activities. Click on each silhouette for further information about their roles.

OSRP AND DUE PROCESS IMPLEMENTATION

ASSURANCE

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DPA DLO

# Case Studies: Acknowledgements



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*Cranfield*  
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# References and Resources

- Harri-Augstein, S and Thomas, L F (1991). *Learning Conversations*, London, Routledge.
- Laurillard, D (2002). *Rethinking University Teaching: A Conversational Framework for the Effective Use of Learning Technologies* (2nd Ed), Routledge, London
- Pask, G (1975). *Conversation, Cognition and Learning*, Elsevier, Amsterdam.
- Pask, G and Scott, B (1973). "CASTE: a system for exhibiting learning strategies and regulating uncertainty", *Int. J. Man-Machine Studies*, 5, pp. 17-52.
- Rowntree, D (1990). *Teaching Through Self-Instruction: How to Develop Open Learning Materials*, Kogan Page, London.
- Ryan, S, Scott, B, Freeman, H and Patel, D (2000). *The Virtual University: The Internet and Resource Based Learning*, Kogan Page, London.
- Scott, B et al (2004). *The Online Learning Knowledge Garden*, <http://olk.cranfield.ac.uk/>

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